Investigating Domestic Burglary:

Offences, offenders and co-offending

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Copyright Statement

Abstract

A new Model of Burglary Differentiation is proposed based on the central question: how do the psychological interpretations of the domestic burglary offending styles, patterns and offender characteristics relate to a social hypothesis of this crime? Reiss and Farrington (1991) suggest burglary is most commonly committed in groups. As such, the behavioural variations are investigated in relation to an individual's position within their social network structure. A unique police database, collected from 2011 to 2015, is examined. The data was obtained from a population of offences within a major metropolitan city in the United Kingdom. It consists of 8,491 domestic burglaries (686 solved and 7,805 unsolved). A further 1,017 convicted burglaries from the Police National Computer database are also included. Initial investigation of the differences between solved and unsolved domestic burglaries provided crucial insight to the validity of modelling crime and the utility of the data. Behavioural analysis identified a good relationship between solved and unsolved domestic burglaries, validating the use of this data in modelling burglary and highlighting the evidence required in burglary detection. To provide further clarification of the sample, the behavioural co-occurrences were examined with the aim of identify distinct variations in domestic burglary. Co-offending burglary was apparent in 60% of cases, thus supporting the social hypothesis of burglary. Smallest-Space Analysis (SSA) systematically revealed thematic behavioural differences between offenders in solved and unsolved offences. It was hypothesised that through examination of the offence characteristics, offender traits, and criminal history, behavioural differentiation of burglary could be determined. Four behavioural patterns are identified: Skilled Domestic, Interpersonal, Forceful, and Non-Domestic. The succeeding study predicted offender characteristics from the previously identified behavioural styles, hypothesising differing criminal experience across offending actions. A new Model of Burglary Differentiation was found, across distinct stages of development based on the offender's age and experience, labelled: Skilled Domestic, Versatile, Opportunistic and Non-Domestic. The prominence of co-offending within the sample allowed for a social-psychological framework of domestic burglary to be investigated. The analysis identified three distinct types of domestic burglary networks: Starter, Core, and Structured. The criminal histories of the co-offending networks were then examined, finding a robust framework of identifying criminal differentiation, with evidence of specialisation to Material, Power, and Vehicle related crime. The final study demonstrates a social-psychological framework of domestic burglary by drawing on the findings of the previous studies. The findings identify small-scale domestic burglary organisations formed through role differentiation. This has significant implications in the use of quantitative information in drawing psychological interpretations of co-offending information. The research demonstrates the utility of a social network framework for understanding the behavioural, social and psychological characteristics of burglary offenders. This suggests further exploration of the social interdependence between offenders and how individuals provide support in offending behaviours. The implications of uncovering a social-psychological framework of domestic burglary and how it contributes to theoretical, methodological and practical settings are discussed.

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Chapter 1. Domestic Burglary

1.1.   Introduction

Throughout the long history of its study, domestic burglary has been consistently highlighted as a volume crime with a low solvability rate that produces significant psychological effects upon its victims. Extensive empirical efforts have been made in modelling domestic burglary offending actions, but these efforts have thus far failed to establish why certain actions might lead to an offence being solved or not. Previous studies have also failed to effectively account for the prominence of co-offending among domestic burglars, or improve the understanding of group processes contributing to these crimes.

An early attempt at providing a theoretical understanding of domestic burglary and highlighting its importance within the criminological literature came from Maguire and Bennett (1982). Their detailed study on domestic burglary, using police recorded data and interviews with 322 victims, focused on the offences, offenders and victims of these crimes. A factor noted as significant was the public perceptions of domestic burglary and how it has been accounted in much of the literature as one of fear and defencelessness. With domestic burglary remaining one of the highest volume, least detected crimes within the United Kingdom, it is valid to say that the public perception will remain similar over 30 years later. A subsection of the legal definition of Burglary within the United Kingdom under the Theft Act 1969, s 9, relates specifically to domestic or dwelling burglaries. It is important early on in this thesis to establish the distinction of the domestic aspect of burglary. As addressed by Maguire and Bennett (1982), studies focusing on an individual's dwelling being broken in to adds a significant personal aspect to the crime. The nature of the offence causes for heavier penalties than those committed against a commercial premise, such as a shop or pub. The reason for this is argued that victims can be put at fear and that the offence is a violation of a person's privacy and peace within their home. The personal violation as well as financial losses that have been emphasised across studies of domestic burglary highlight the seriousness of these offences.

Previous studies of burglary include developing profiles from offence and offender traits (Fox and Farrington, 2012), work on how burglars are convicted (Farrington and Lambert, 1997), studies of repeat victimisation (Kleemans, 2001; Farrell and Pease, 2017) and extensive prospective mapping of burglary (Bowers, Johnson and Pease, 2004; Johnson and

Bowers, 2016). Although not a focus within this thesis, it is important to note the high amount of repeat victimisation that occurs with domestic burglaries. Kleemans (2001) states that repeat victimisation in burglary may be because the offender is aware of what items are available to steal and what mode of transport they made need to remove goods. These goods that were originally stolen are also likely, with some time, to have been replaced through insurance. Repeat victimisation is also common in burglary because not only does the offender now know the goods available, but they will also be aware of the risk factors involved, for example the ease of access. The study of repeat victimisation has evolved into further work on predictive policing through crime hotspots (Bowers, Johnson and Pease, 2004; Farrell and Pease, 2017). In their study of prospective hot-spotting, Johnson and Bowers (2016) state that prior victimisation of burglary is a very good indicator of future risk. There is an exhaustive amount of literature covering burglary, however the current thesis draws a focus on the behavioural aspect of the offences, offenders and co-offending. The thesis sits within the burglary literature of is solvability, the differences in behaviours that occur and the decision to co-offend.

As well as the establishing a psychological understanding of the offences, many practical implications can be drawn from a closer examination of domestic burglary. Although the police are fully aware of not just the high amount of offences occurring but the low detection of domestic burglary, the resources supplied in policing the problem are beyond stretched. Meaning that now, more than ever, a deeper investigation into domestic burglary is needed.

1.2.   Problems with Solvability

Over the last 10 years the Office for National Statistics Crime Survey for England and Wales (2015) estimated a 26% decline in burglary. Although this appears a positive statistic, researchers have long debated over whether crime figures accurately describe 'real crime patterns' (Biderman and Reiss, 1976; Sutherland et al., 1992; MacDonald, 2002).

Domestic burglary is one of the most common offences across the world and yet also one of the most difficult to solve, with an average detection rate across England and Wales between 2011-2013 of 16% (Home Office Statistical Bulletin, 2013). It is important to address these limitations that when a crime model is constructed, particularly in the case of burglary. Many studies of domestic burglary are based on solved crimes because these

provide information about the offender. Farrington and Lambert (2007) previously addressed this limitation in their study of offender profiling, stating that within their sample it is not clear how similar convicted are to undetected offenders. More recent studies of domestic burglary are still addressing this limitation. For example, Fox and Farrington's (2016) study of the development of burglars relating to crime scene behaviours are unable to generalise their findings to unsolved burglaries. Without being able to test the differences between detected and undetected offenders in the sample, they, along with many other researchers, are unable to generalise their conclusions to undetected offenders. If solved crimes are different from unsolved, then it will have significant implications for the way in which we understand criminality.

1.2.1. *Contributions to the 'dark figure' of crime: Unsolved and unreported burglary*

MacDonald (2002) defines the 'dark figure' of crime as the "discrepancy between the amount of crime that is officially recorded by the police and that which is actually experienced by victims" (p. 86). Early research of crime reporting identified the inconsistencies of crime models being constructed, shedding light on how much crime was going unreported (Biderman and Reiss, 1967; Skogan, 1977). As improvements in recording crimes were made, an increase in reporting crime was identified. Criticism mounted against reports of crime rising as the development of recording crimes improved. This was because the crime being reported was not crime rising but surfacing that had previously gone amiss. Skogan (1977) pointed out that not only did errors in reporting crime conceal social problems but it is also complicated the validity of statistical inferences made from crime data.

The validity of published crime statistics is previously discussed in terms of whether they reflect actual criminal behaviours or police recording techniques. Farrington and Dowds (1985) examined the crimes recorded in three similar non-metropolitan areas: Nottinghamshire, Leicestershire and Staffordshire. Although demographically similar, the 1981 crime statistics (Home Office, 1982) showed that Nottinghamshire's figures topped major metropolitan cities, such as London and Liverpool, with Leicestershire and Staffordshire being half that. In order to investigate this, Farrington and Dowds interviewed a random sample of 1000 adults across each area to establish the nature of crimes and victimisation in their area. Police recording techniques were also studied for each area to establish whether there were any major differences. The findings showed that the main reason

for the differences in crime rates were because of variation between forces in recording practices. Farrington and Dowds stated that if crime recording techniques were uniform across forces then the figures shown would have been more on the same level rather than some cities displaying higher amounts than others. However, they described how the police recording techniques for Nottinghamshire revealed the iceberg of hidden crimes and that other forces should follow suit to reveal more hidden offences.

Although Farrington and Dowds (1985) could address hidden figures of crime, their findings still do not account for the lack of understanding researchers and policy makers have in unsolved figures of crime. Farrington and Lambert (1997) later addressed how the consideration of how offenders are caught can assist in improving our understanding of burglary detection. In their study of burglary and violent offenders, Farrington and Lambert investigated the reasons for arrest from 401 burglaries and 293 violent offences. The findings identified that the most common ways in which burglars are arrested were being caught in the act (15%), an informant (13%), caught near the scene (12%) and traced through property left or disposed of. The least likely reasons for arrest were recorded on video (0%), found at co-offender's home (1%), offender followed to home/work (1%) and gave themselves up (1%). However, the highest frequency reasons for arrest in violent offences related much more to descriptions from victims (15%) and witnesses (13%), with the most common reason being arrested on scene (16%). Farrington and Lambert state that it is more common for violent offenders to be apprehended in this manner because often victims and witnesses saw them. On the contrary, burglars are less likely to be seen and an arrest is more likely to be made if they are caught in the act.

A further flaw in gathering understanding of unsolved burglary is the lack of data available. Biderman and Reiss (1967) stated that studies of criminal activity cannot relate to 'real crime' that takes place if their data is incomplete. Not all researchers are able to gain access to a full database of solved and unsolved offences to carry out analyses. However, it is the solved offences that contain more offence and offender information to construct models of criminal behaviour. It is important to highlight this limitation when working with any crime data since as there is likely to be an abundance of missing information. As addressed in the current study, where able to, researchers constructing crime models should draw a comparison of the solved and unsolved offences. If a comparison displays no differences between the two, then the findings based on solved offences are valid in being generalised

across undetected. With studies of domestic burglary being conducted on mostly solved offences, it is still relatively unknown if these studies can relate to the 'real crime' occurring.

Domestic burglary has one of the lowest detection rates of crime types within the United Kingdom. There is also a surprising amount of burglaries that go un-reported. In a study investigating the use and interpretation of crime statistics, MacDonald (2002) highlighted the reporting tendencies for property crime. Upon analysing household surveys, MacDonald identified significant features that relate to a victim likely to report a burglary. These were: victim female, married, household income above £30k, worried about crime in the area, occurred at night, victim injured and insured against loss/damage. The victim was less likely to report a burglary when they were unemployed, considered there to be a drugs problem in the area or were disappointed with the police. The findings indicate that the socioeconomic characteristics of an individual will contribute to whether they report a property offence or not. Meaning that the dark figure of crime is not only based on the behaviours of the offender but likely on the victim's socioeconomic status and perceptions to crime. The underreporting from victims within an area could highlight major social problems, not just from the victim but from a community perspective of their outlook towards the police force. Evidence from an eyewitness report will rest heavily on the relationship between the community and the police. Although there are conflicting reports of the effectiveness of police resources in solvability, Baskin and Sommers (2010) demonstrated that community trust with the police can improve this. When studying the 'dark figure' of crime it should not be a matter of how much crime is revealed but rather about what features relate to crimes being solved and others unsolved or un-reported.

1.2.2. *Benefits of comparing solved and unsolved domestic burglaries*

Examining solved and unsolved domestic burglaries is ideal for researchers and police alike in developing a deeper understanding of offenders that go undetected and the way crime is solved. It is also crucial for police to understand what can makes a case more solvable over others. In doing so, investigators would be likely to place their limited resources on more solvable cases, whilst continuing to improve the process of investigation among the undetected cases. Identifying what makes a case solvable can enable the police to direct resources most effectively. Robb, Coupe and Ariel (2015) stated that understanding solvability of cases can lead to a reduction in resources by directing attention to cases more

likely to be solved. Within many police forces the distribution of resources is likely subjective to the experience of the investigator. Whereas what is proposed is enabling police investigators to understand what makes a case solvable to improve their decision making. As stated by Eck (1983), it takes tremendous resources to investigate all burglaries, particularly when so few are solved. It would therefore be beneficial to draw attention to crimes that have a higher probability of being solved.

Many police forces within the United Kingdom adopt a preliminary stage of investigation for domestic burglaries. From discussions with police investigators from the data source, it was highlighted that some sort of screening process for investigating more solvable cases ought to take place. However, this is not always the case. Domestic burglary is a high priority for police forces due to the prolific nature of property offenders. What became apparent from discussions with the police investigators is that without the presence of forensic evidence or an eyewitness, roughly 75% of cases will be closed. Unfortunately, the reality for most police forces in the United Kingdom is that with limited resources to apply to every case of domestic burglary most investigations will be affected and ultimately detection rates decreased.

Conversely, researchers have long argued that it is not down to resources but chance as to whether a crime is solved or not. Greenwood and Petersilia's (1975) controversial RAND study on the criminal investigation processes identified that detection of burglary, robberies and assault is not due to the resources of the police but was coincidental. Greenwood (1980) addressed the impact of the RAND study, stating that from surveys conducted within 153 jurisdictions across American cities, property offences received only cursory investigative attention. Their findings showed that most attention provided by investigators is spent on administrative duties. Although some elements identified from the RAND study relate to recent work on solvability of offences, the overall view of the study is very cynical to detective work. Since Greenwood and Petersilia's early work there have been many more studies that highlight much of the likelihood of detection being due to the activities of the first responder (Coupe and Griffiths, 1996; Coupe, 2014). It is likely that there will be certain aspects of an offence that, from experience, an investigator will show interest in. Coupe (2014) more recently discussed how this interest could be because an experienced investigator will know what makes an element of one case more solvable than another.

Drawing a comparison of solved and unsolved domestic burglaries will aid in identifying whether detection is due to chance or the way a crime is committed, questioning whether some behaviours are more solvable than others. Behavioural differences identified would also broaden the conceptual understanding of the psychological behavioural styles of burglary.

1.2.3. *Features of domestic burglary solvability*

A considerable amount of research has been conducted on features that contribute to the solvability of crime. These include studies on homicide (Keppel and Weis, 1994; Mouzos and Muller, 2001), robbery (Greenwood and Petersilia, 1975), burglary (Greenwood, 1980; Paine, 2012, Coupe, 2014) and other high-volume crimes (Robb, Coupe and Ariel, 2015). The results from these studies show that solvability features are relatively similar across crime types. Table 1 displays a list of solvability studies across difference crime types with similar findings. Features of solvability found within these studies include forensic evidence, police resources and the presence of an eyewitness. Although similar features are identified, there are different strengths in solvability based on the crime type. For example, where the victim can identify the offender, the crime is more likely to be solved. Eck (1983) stated that during a violent crime there is greater potential for the victim to identify the offender. Meaning that violent crimes are more likely to be solved than property crimes.

Table 1. Studies of solvability features

Study	Analysis	Crime Type	Solvability Features
Baskin & Sommers, 2010	Prospective Analysis	Burglary	Cooperation between police and community
	Logistic Regression		Witness present
Greenwood & Petersilia, 1974	Descriptive Analysis	Burglary	Police resources
	Observational Analysis	Robbery	Information from victim
		Assault	
Mouzos & Muller, 2001	Comparative Analysis	Homicide	Police resources
			Experiences officer at crime scene
			Witness present
Paine, 2012	Descriptive Analysis	Burglary	Physical Evidence
	Predictive Analysis		Witness present
			Catching offender at or near scene
			Time to attendance of first responder
Coupe, 2014	Binary Logistic	Burglary	Catching offender at or near scene
	Ordinal Regression Analysis		Witness present
			Forensic evidence
			Police resources
Robb, Coupe & Ariel, 2015	Descriptive Analysis	Metal Theft on Railway Property	Patrol interceptions
	Multivariate Analysis		Witness present
			Suspect disturbed
			Vehicle registration
			Catching offender at or near scene
			Forensic evidence
			CCTV

Keppel and Weis (1994) studied the effects of time and distance on solvability from 1,309 victims of homicide cases. They found that one of the main limitations in solving cases is the way investigators gather and use information, coinciding with other studies of solvability and the delegation of police resources. Although a crucial issue highlighted in many studies of solvability, there are few direct studies that focus on solvability and the investigative process. Mouzos and Muller (2001) state that the intuition and experience of an investigating officer will always be important in investigative decision making. However, they also addressed that research can play a significant role in informing practice. This reflects not just a bridge between academics and police forces but a mutual understanding in the importance of understanding solvability for all crime types.

Coupe (2014) stated that the study of solvability features is about cost-effective detection through effective resourcing. In support of the RAND study's findings, Coupe states that police resources are the key to explaining solvability of burglary. He states that the resourcing-solvability interaction is the underpinning to investigative success. In examining burglary solvability, Coupe (2014) emphasised that the same characteristics of solved cases are evident time again across the literature. The different actions and characteristics that occur could imply various levels of solvability. For example, if there is information on the identity of the suspect or the offender is caught at the scene, then an arrest is highly likely and therefore that burglary is more solvable. The argument then is that some burglary characteristics are going to be more solvable than others and so detection will differ depending on those. Coupe's (2014) findings highlighted that given the sufficient resource, all cases are possible of being solved. However, cases with high solvability features are more likely to be solved with additional resources than those with low solvability features and additional resources.

Although the RAND corporation study was highly critical of police investigations, they did find that some cases were solvable because of police presence at the right time. The study also highlighted that some offences are near-impossible to solve, with lacking evidence to follow up some will not be solved no matter how much resource is invested into them. With regards to resource allocation to crimes, the investigator's perception of solvability features will determine where priorities will be allocated. It is therefore important to be able to identify behavioural characteristics of solved burglary versus unsolved to assist with officer assessment of prioritising resources.

Behavioural characteristics of an offence become the priority of examination where forensic evidence may be lacking. Cases of burglary where forensic material is gathered do not often have enough additional evidence to warrant the costs associated with processing it. Coupe and Griffiths (1996) found that only 6% of reported burglaries are being cleared because forensic evidence. The main solvability features they identified were the offender being caught at or near the scene (43%) and eyewitness evidence (34%). Although the low percentage of cases cleared by forensics may seem surprising, it is not often that material recovered from the scene is processed. It is likely that if a behaviour that is found to significantly occur in solved offences is present in offence evidence, then there would be a stronger case to process the forensics recovered. If this is the case, then the percentage of

cases cleared by forensic material would likely increase, however putting this into practise would not be a simple task.

Although solvability features have been previously examined, studies that have identified the solvability features of an offence have rarely been put into practise. A study by Greenberg et al. (1973) at the Stanford Research Institute (SRI) identified characteristics of burglary that can predict the case outcome. Greenberg and colleagues developed a weighted burglary decision model in which each feature was scored to reflect its predictive value. Where a case had a sum less than or equal to 10 the investigator would be advised to suspend that case and where it was above 10 to assign the case for a follow up investigation. 2,000 burglaries were analysed across six police departments in California, identifying 170 investigative features of burglary. The features found to significantly predict the value for solving burglary were: 'time of occurrence', 'witness report', 'on-view report' (police discovered), 'usable fingerprints', 'suspect description' and 'vehicle description'. The most heavily weighted variables within the model were 'suspect described', 'usable fingerprints' and 'witness report'. In 1978, Johnson and Healy set out to validate the SRI study by testing the decision models developed in four police agencies in Minnesota. The sample contained 39 solved and 1,647 unsolved burglary cases. Much of their solved sample was initially removed due to the lack of investigative work conducted to clear them, including cases where an offender confessed to a previous offence. The decision model for burglary proved successful with a 91% accuracy for prediction. However, with such a small sample of solved offences it is unlikely that the results could reflect a real pattern of solvability and whether it could be used across similar crime types.

Throughout the literature similarities in solvability features are identified across crime types, however it is important to note that previous studies may incorporate forensic evidence. The wider conceptual issue proposed in this thesis is what it is about behaviours during an offence that make it more solvable. In this case, where forensic material is not always available, or when forensics present is unable to be processed. This thesis will investigate the behavioural characteristics of an offender, hypothesising that there will be behaviours carried out during a domestic burglary that are found to be significant to solved and unsolved offences. However, in addressing the utility of the data and validity in past crime models based on solely solved offences, the current study hypothesis that, broadly speaking, there will not be a difference between solved and unsolved domestic burglary offending actions.

1.3.   Differences in Domestic Burglary Criminality

There have been many attempts at identifying the differences between burglary by developing typologies from the actions displayed in the offence. Maguire and Bennett's (1982) exploration of domestic burglaries highlighted that offenders can be identified based on their broad level of professionalism. Offenders were said to be categorised as low-level amateurs, mid-level professionals and high-level professional burglars. Whereas in comparison, upon examining the characteristics of 457 offenders, Vaughn et al. (2008) suggested four more specific classes of burglars based on their traits and previous offending. These were identified as young versatile, vagrants, drug-oriented and sexual predators. Although the classifications identified have previously shown to differ in some respects, there are underlying traits that are shown to be similar throughout the examination of different domestic burglary cases. For example, it is likely that Vaughn et al.'s (2008) 'young versatile' offender could fall into Maguire and Bennett's (1982) 'low-level amateurs' classification, as both represent offenders that lack skill and focus on specialisations. As such, studies investigating domestic burglary are able to use many previous classifications as a base for comparison.

In explaining psychological and theoretical constructs of offending, recent studies have addressed examination of offender actions that co-occur across a sample rather than fitting behaviours into distinct categories. Examining the previous convictions of 122 homicide offenders, Trojan and Salfati (2016) identified groups of co-occurring offences across their sample. Their findings showed two thematic distinctions of previous offending for violent and instrumental offences. They stated that this approach enables researchers to account for the degree of variation offenders possess, as well as identifying central themes of criminal differentiation. This scientific method of drawing inferences of offender characteristics from offending actions is summarised by Canter (1995) as the A (actions) to C (characteristics) equation, also known as the 'profiling equation'. This approach to profiling is based on the premise that there will be co-occurring behavioural features of a crime that can be statistically derived to identify psychological themes of offending styles. The challenged faced in understanding the actions and characteristics is that they will rarely take one form. Canter and Youngs (2009) state that the relationship between actions and characteristics are canonical, whereby the relationship is not one to one but a combination of

the two mapping onto each other. Thus, a multivariate approach is needed to analyse these sorts of relationships. This approach provides an empirical basis for constructing psychological interpretations of offending behaviours and how those can relate to the offender's characteristics.

Coinciding with the work of Canter (1995), recent studies have identified that offenders often commit specific actions that can relate to their characteristics. Fox and Farrington (2012) used Latent Class Analysis on a sample of 405 solved burglary cases, identifying several categories of offence actions, offender traits and criminal history. The subtypes of these were shown to display four profiles of burglary, labelled: opportunistic, organised, disorganised and interpersonal. The 'opportunistic' offenders had low skill, with likely forced entry to commercial properties more often than residential. In comparison, the 'organised' offenders displayed high skill and were likely to have brought a tool or weapon to the scene. Similar to the 'opportunistic' category, the 'disorganised' offenders also displayed low skill and forced entry, however their motives were related to excitement and with drugs influence. Lastly the 'interpersonal' offenders were also shown to have low skill, but their offences were mostly committed at night with a high personal involvement, targeting residential properties and motivated by anger. The co-occurring behaviours present illustrate the necessity to analyse a collection of behavioural features as themes, followed by types.

Fox and Farrington addressed the concept of examining the co-occurring features of the crimes, thus producing profiles that considered the behavioural variations between offenders. This was more clearly addressed in their recent study analysing the behavioural consistency of serial burglars, in which they tested the consistency of the identified behavioural profiles (Fox and Farrington, 2016). Using the serial burglars from their original database (accounting for just under forty percent of their sample), their findings suggest that burglars will show a degree of consistency in their behavioural style across a series. The findings from this study allow for assumptions to be made regarding other classifications of burglars and how it is likely that those will remain consistent over their offending span. This is discussed further in chapters 7 and 8 where themes of burglary offending styles are derived and examined based on offender characteristics and criminal history.

The burglary profiles developed by Fox and Farrington (2015) were later applied to active police investigations to evaluate the effects on burglary arrest rates. Four police departments in Florida were selected as treatment and control groups for the experiment.

Arrest rates from each were studies for four years before and one year after the profile implementation. The experimental treatment of the burglary profiles developed was labelled the Statistical Patterns of Offending Typology (SPOT) for burglary (Fox and Farrington, 2012). The results from this experiment showed a significant rise in arrest rates, with the police department using the profiles solving more than 260% more burglaries in the post-test period than those not using them. This study was the first of its kind in evaluating the use of burglary profiles in active police investigations, highlighting the need for further development using different data.

As mentioned, studies of burglary have formed many different classifications of offenders and offences committing these crimes. What is clear from examining the literature is that there are central themes of offending styles that occur in domestic burglaries. For example, if there are a certain amount of ways one can break into an individual's dwelling, then there are likely to be offenders who tend to commit one style over another. A style of offending that has proved more effective for an offender will then likely be used in future offences. Upon examining domestic burglary recorded by Thames Valley police in 1975, Maguire and Bennett (1980) identified six different methods of entry. The most frequent method of entry occurred when no force or weapon was needed, finding that offenders would most often take advantage of an insecure property. Other methods of entry included glass being smashed or removed, bodily pressure and instrument used. The least frequent but noted method of entry was the structure of house was attacked. These different offending actions highlight likely differences in offenders that could develop across time and experience.

Findings of differences between offending behaviours are also addressed cross-culturally. From their sample of Floridian burglaries, Fox and Farrington (2012) identified a clear distinction between those who forced entry into a property (accounting for 72 per cent of their sample) and those who targeted insecure entry points, such as an unlocked window or door. Fox and Farrington also found that in the majority of their sample no tools were used and roughly half of the offenders left evidence at the scene, such as a finger or footprint. In examining a large sample of 633 burglaries in the Finnish Metropolitan Area, Santtila et al. (2004) found that different methods of entry were observable in different classifications of burglary. For example, their findings showed that spontaneous burglaries displayed a window being broken using a brick, whilst balcony burglaries were shown to have offenders that climbed to gain entry. They also identified burglaries classified as suburban displaying offenders that used crowbars to gain entry. Similarly, those classified as tool-to-scene

burglaries used a tool to gain entry as well as offenders using crowbars. Their findings identified fourteen different styles of burglary, with many of those displaying a crossover of offences actions.

The variance in offence actions across the different offending styles provides further evidence of the necessity to examine the co-occurrence of offence actions across samples. The similarities across previous studies of burglary suggest evidence of consistent broad themes of offending styles. These themes relate to levels of experience and socio-demographics of the offenders examined. As mentioned, previous studies of modelling burglary act as a base for comparison in this thesis. However, the studies of modelling domestic burglary discussed have used only solved offences to do so. Fox and Farrington (2012) addressed the limitation of generalising findings from solved to unsolved offences, as it is not entirely clear whether they can be compared. However, they do suggest that previous self-reports from prolific offenders show that they may be similar, yet this was not directly tested within their study. In their later study examining the behavioural consistency of offending styles, Fox and Farrington (2016) state that is it not possible to reflect their findings to those that are undetected from a sample of detected serial burglars. Their studies display important contribution to the theoretical and practical understanding of burglary however, these findings cannot be generalised to the high frequency of undetected offences. With such a low solvability rate being a global problem, studies of this nature would benefit from determining how offending styles vary across detected and undetected burglaries.

Chapter 2. Domestic Burglary: A Social Crime?

Domestic burglary has previously been identified as a highly social crime, only becoming possible through connections to others. It has been long debated about how an offender's surroundings influence their criminal activity, arguing that domestic burglary is a socially active crime even if it is not being committed as part of a group. In his study of the social organisation of burglars, Shover (1973) describes how working thieves, even in a built-up city, will know one another. Interviews with convicted burglars identified that a strict organisation does not need to exist for groups of burglars to know each other. Convicted burglars described how they would know the whereabouts of other offender's targets. Over the years, 'working' the same area would become common knowledge between offenders which would eventually lead to an association between them. Even if an individual was attempting to be a lone burglar, it is likely that if a 'good burglar' was working within the area that they would know. Shover stated that to be a 'skilled burglar' a social enterprise is necessary. A 'skilled' or 'good' burglar, as described by Goffman (1963), are a category of individuals likely to meet and form groups developing associations among other 'good' burglars to work with. Such networking is common practise within the non-offending population and thus likely to be similar among offenders. According to Goffman, the 'good' burglar is a general term, suggesting that burglary should be studied as a category of individuals which best describes their social world.

The social environment of a prolific domestic burglar will be based on their association to individuals through other offences. The associations may not be from a co-offence, in which Reiss (1980) describes as the crime being committed with the simultaneous presence of more than one offender, but apply to the theoretical position of burglary as a social offence. For example, according to Shover a 'good burglar' will need to know where to burgle and if it is worth it (tipster). If they cannot immediately sell the goods, then they will need somewhere to store them (handler) and lastly, they will need to know how to avoid a possible sentencing if caught (lawyers). The suggestion made within this thesis imply that is it crucial when studying burglary, to consider the social matrices in which these individuals will regularly resort to.

2.1. Terminology within Studies of Co-offending

Although the term co-offending is relatively clear, there is much debate within studies of what can be classed as a co-offence. For example, according to Felson (2009) a co-offender is someone who collaborates with another individual in a criminal act, but this could lead to questions of whether the offenders should be together to class it as a co-offence. It is therefore important for researchers to distinguish their terminology within each study of co-offending.

For this thesis, the author follows the terminology put forward by Albert Reiss (1980), who first coined the term 'co-offending'. Reiss describes the act as an offence that is committed with the simultaneous presence of more than one offender. When using police data there is direct evidence that two or more people have committed a crime at the same time, thus justifying the terminology used. The other arguable form is sequential co-offending, where the offender doesn't necessarily have to be present during the crime but has had some form of criminal cooperation for the crime to take place. A sequential crime is said to involve more planning and can also include a division of labour (Felson, 2009). Cowan (2013) discusses the question among researchers of inclusion and exclusion, where some may class sequential co-offenders as actually solo offenders that work alongside each other. Warr (1996) made a distinction between sequential and simultaneous by naming them 'offending groups' (simultaneous co-offending) and 'accomplice networks' (sequential co-offending'). However, this does clearly define the interaction between individuals in the commission of a crime. Reiss and Farrington (1991) stated that an offending group implies that members act together as a unit.

With many varying definitions and explanations of co-offending, one can see how there can be increased questioning without conclusion. Within any study of co-offending these distinctions must be clearly addressed from the onset. Offending with the simultaneous presence of other offenders will be characterised as either 'group offending' or 'co-offending', used interchangeably throughout this thesis.

Another key feature when focusing on co-offending groups is to distinguish between the study of 'gangs' and 'groups'. One of the most influential and in-depth studies of co-offending was Reiss and Farrington (1991) with their longitudinal survey of co-offending males in London. In this study, they defined gangs as peer groups which within them are a

defined leadership, territorial organisation and engagement in a wide range of antisocial behaviours. Ball and Curry (1995) analysed much of the literature surrounding the many definitions of 'gangs' highlighting the problems of definition in terms of the audience. They state that different audiences will seek different definitions. Theorists will seek a logical framework, researchers a standardised definition to draw comparisons, administrators a definition for recordkeeping and the police a definition to hold the collection of individuals for criminal acts. Interestingly, Ball and Curry's study highlighted that a definition will be formed depending on the individual definer and not the defined. For example, an individual may identify a gathering of youth outside a shop as a 'youth gang', which could either imply some form of underlining delinquency or a young friendship group. Much of the definition is likely to be based on the definer as well as the age, sex, gender and socioeconomic status of the area. A thesis surrounding the topic of 'gangs', based on definitions, falls into an entirely different context of analysis. The study of gangs is highly qualitative in nature, as much of the information, such as defined leadership and shared interests, would come from actual conversations with 'gang members'. Due to the quantitative nature of the data used within this study the author is unable to draw on a solid definition to identify gangs. Therefore, the collective of co-offenders will be described as co-offending domestic burglary networks.

When groups of co-offenders are associated with each other a social network of offenders is developed. A network can be built up from as little as three individuals, with one individual committing crimes with two separate individuals who are not directly linked to each other in a crime. The term "extended co-offending" is used to include a variety of crime networks and criminal clusters (Pourheidari and Croisdale, 2010). Felson (2009) uses the term 'extended co-offending' to describe a variety of crime organisations, crime networks, gangs and criminal clusters. He states that as a form of organised crime co-offenders are likely, within the development of their acts, to change in their cooperation. This includes the likelihood of a co-offender moving on in their offending development to commit solo offences.

Research on criminal networks and organised crime has demonstrated that we cannot assume the presence of an organisation, or connections between individuals and boundaries. Bouchard and Morselli (2014) describe many small groups of offenders as opportunistic operates for being less organised criminal operations. Small networks can be referred to as 'action-oriented network organisations', that come together for either a one-off crime or act in an opportunistic manner. This means that in studies of co-offending networks, the nature of

the organisation may be misinterpreted for something on a much higher level of operation than it actually is. Instead, Bouchard and Morselli (2014) state that researchers must focus on structural features of criminal groups that correlate to the direct actions taken. Studies further on in this thesis will explore the structure of co-offending domestic burglary networks in this manner.

2.2. The Decision to Co-offend and its Effect on Future Offending

In their review of the co-offending literature, Pourheidari and Croisdale (2010) stated that within criminal networks, co-offending can be unlimited in time, space, number of persons included and types of crimes committed. They highlighted that the act of committing an offence with more than one accomplice has become a key area of research. Until recently this research area had received very little attention with a similar view that co-offending is most common among early adolescents. Research has also linked prolific offending and criminal co-offending to prominent level of violence, increased risks for recidivism and more prolonged criminal careers (Felson, 2009; Stolzenberg and D'Alessio, 2008). It is therefore crucial to examine the factors that contribute to the decision to co-offend and identify behavioural characteristics of those that do.

A central focus when studying co-offenders is how they come together and what characteristics differentiate them from individuals who commit crimes alone. There is much evidence to show that offenders will at some point offend with the simultaneous presence of another individual (Reiss, 1980; Reiss and Farrington, 1991; Malm, Kinney and Pollard, 2008; Stolzenburg and D'Alessio, 2008; Felson, 2009; Andresen and Felson, 2010; McGloin and Nguyen, 2013). The criminal career hypothesis supports this notion, whereby stating that most offending careers begin with a predominance of co-offending but that solo offenders are more likely to survive or persist in offending (Reiss and Farrington, 1991). The benefits for an offender to commit acts of crime alone are usually far greater, being that for financial gain or even less likely to be caught. Felson (2003) questioned the decision to co-offend as it does get more people caught up in trouble but also paves the way for further criminal acts and delinquency. The question continually asked within the study of co-offending is why offenders would commit crimes together and if they were recruited into crime based on certain skills they have acquired.

In his study explaining the characteristics of co-offending as social exchange, Weerman (2003) highlighted that although many characteristics of co-offending have been identified, little have been explained. Table 2 shows the characteristics that Weerman (2003) highlighted within his research and a brief description of each, displaying a variety of decision making reasonings.

Table 2. Characteristics of Co-offenders Addressed by Weerman (2003)

Characteristic of Co-offending	Description
Varying preferences between co-offending and solo-offending	Offenders switching from solo to co-offending or vice versa. Hindelang (1971) found that offenders often switched, whereas Reiss and Farrington (1991) found that there was less chance of a switch and more repeat offender as either a co-offender or solo-offender.
Co-offending varies between offence types	Higher rates of co-offending are committed during drug-use, vandalism, burglary and robbery, whereas the lower rates are for violent, minor thefts and shoplifting (Weerman, 2003)
The relationship between co-offending and age	Co-offending has been found to occur more frequently among young offenders.
Co-offending is instigated by another offender	Warr (1996) states that in around 80% of co-offending cases, the offender has reported that one member of the group took the leading role.
Co-offending can be a simple or complex operation	Shoplifting and vandalism are not likely to involve a division of labour, however in complex operations offenders may plan roles, for example the look-out, driver, first in etc.
Co-offending usually occurs in small groups	Most co-offending groups are formed of dyads or triads (Weerman, 2003). Small criminal groups make up many criminal organisations, coming together for one-off crimes (Bouchard and Morselli, 2014).
Homophily among co-offending groups.	Co-offending groups tend to commit offences with those of a similar age, ethnicity and sex.
Co-offending groups are dynamic in nature.	Warr (1996) points out that most of offending groups will change after one event.

The decision to co-offend has many connotations relating to age, motivation and relations to other individuals. As previously mentioned, when analysing burglary, it is important to focus on it as a social crime. An early study by Bennett and Wright (1984) examined burglars' perceptions and decision-making. Their findings showed that 46% of a burglar's decision to offend was based on instrumental needs, whereby the more lucrative the

offence, the longer the period before the offender needed to commit another burglary. Another 46% of their sample also stated that their decision to commit the burglary was based on the influence of others. Many of these stated that they played an active part in the decision making with a minority being passive. Lastly a much smaller percentage (22%) said that their decision to offend was usually precipitated by 'presented' opportunities, with the majority seeking out opportunities to commit crimes. Recent research supports the notion that the decision to offend in general is driven by material motives (Bernasco, 2006). Tremblay (1993) addresses co-offending as a market phenomenon, with offenders searching for partners in a manner which maximizes the benefits of partnership and minimizes its costs. However, the search for a partner to co-offend with will vary depending on the type of crime.

Although research focused on group offenders covers a range of crimes, the focus within this thesis is placed on burglary groups. It has been highlighted that research on co-offending burglary is of most importance as it is the most commonly committed group crime (Piquero, Farrington and Blumstein, 2007; Reiss and Farrington, 1991). The decision among burglars could be based around their likelihood to specialise in long-term offending. There may be more benefit to domestic burglars to stay within a social network of other offenders to further their criminal career, rather than rely on the short-term benefits of solo offending.

In their study of solo and co-offending robbery outcomes, Tillyer and Tillyer (2015) found that at an incident-level comparison, co-offending is not as financially beneficial as solo offending. However, what they did suggest was that co-offending may facilitate opportunities for more frequent offending and thus lead to a higher overall profit for the offenders, even if it does require more 'work'. In this sense, it would be more beneficially for an offender with a long-term outlook of criminal activity to work with others to keep a consistent flow of 'jobs' coming in. This then begins to lean more towards the idea of criminal specialisation to co-offending paths. An offender's decision to commit a burglary with another offender is therefore likely to relate to the people they surround themselves with and their monetary need.

It is also widely acknowledged that co-offending will usually occur during the initial stages of an offender's criminal lifestyle (Conway and McCord, 2002; Andreson and Felson, 2011). Group crime can easily embed an individual into a criminal lifestyle, as well as expand and deepen offending repertoire leading to an increase in the likelihood of persistent criminality. As it is a bit more difficult in a criminal lifestyle to live off a trial and error basis,

it is more important for offenders to learn from their peers. For younger offenders that are new to offending, group crime gives them an opportunity to learn from one another and use skills of each for a job. As Morselli et al. (2006) states "there are no schools for crime", therefore learning can occur in the context of a criminal mentor opening doors to criminal opportunities and keeping a strong tie that offers security (McGloin and Nguyen, 2013).

2.3. Is Co-Offending Predominantly a Youth Crime?

Delinquency among youths has been highlighted within research for decades. Breckenridge and Abbott (1917) stated that many delinquent behaviours are committed in groups, or if the youth is committing a solo offence then others have usually influenced them. Andreson and Felson (2012) focused on co-offending as a key area of crime research especially during adolescence and stated that it might help to understand how crime emerges in the context of daily life. With much of the focus on an individual criminal lifestyle emerging during adolescence it was important to draw on the understanding surrounding this early in the thesis.

Not only will youth offenders form larger numbers within their groups, 'strength in numbers' aiding with the confidence of the group, but Reiss and Farrington (1991) found they will commit crimes within a similar age bracket. In their longitudinal survey of 411 boys in London, Reiss and Farrington stated that those under 21 years old tended to commit crimes together and were of a similar age. McPherson et al. (2001) states that many adolescent delinquent groups have been interpreted as having peer influencing effects. A common explanation for youth co-offending is the social situations they are placed in under circumstances (Stolzenburg and D'Alessio, 2008; Schaefer, 2012). During adolescence individuals will form personalities and characteristics based on their surrounding environment, including others they surround themselves with. If a group's surrounding is linked with crime, then the group influence of such will only make for stronger deviant characteristics.

Tillyer and Tillyer (2014) addressed that youth co-offenders can be formed from simple convenience or awareness, rather than a calculated effort to commit crimes or improve in committing crimes. For example, a group of adolescents may be involved in anti-social behaviour leading to criminal damage. It may not have been intentional to some but due to

the others they have surrounded themselves with they are then caught up in the crime without any calculated effort to have done so. As this behaviour may progress it can be that these individuals become more actively involved in a criminal lifestyle. Delinquent peers are described as a strong influence on offending putting other youth at risk of committing many opportunistic offences (Ouellet et al., 2013). These peers may be friends or relatives who hold more knowledge and opportunities to commit crimes and therefore, with little awareness, those that mix with them are at risk.

With much of the research on co-offending focusing on the youth that are drawn to offend there is little on the individuals that have a more extensive criminal background providing those opportunities for them to offend. It is interesting to note the likelihood of many young and older adults influencing youth into co-offending, yet Carrington (2002) pointed out that there is very little research examining co-offending in adulthood. In his study of group crime in Canada, Carrington (2002) analysed approximately 2.9 million incidents and 3.4 million alleged offenders from police records between 1992 and 1999. The sample highlighted that group crime within Canada is not primarily a youth crime, however in the adult sample it was shown to occur much less than youth. The study showed that group crime will occur across young and older offenders, with it more commonly occurring at an early age. However, Carrington found that groups involving exclusively youth were very rare occurrences.

The developmental perspective of co-offending demonstrates a peak in childhood and early adolescence until late adolescence and early adulthood where the rates of co-offending taper off (Cowan, 2013). This is also demonstrated in many studies of all crime types, where age is plotted against crime rates. As discussed by Quetelet (1931), the slope of the relationship between age and crime rates ascends rapidly during adolescence then peaking in adulthood, to then descend thereafter. Moffitt (1993) empirically examined the differences in the stability of antisocial behaviour, stating that for some it is temporary and for others stable and persistent. According to Moffitt (1993), there are two theories of developmental stages in antisocial behaviour, 'adolescence-limited' and 'life-course persistent'. The most common course of antisocial behaviour is 'adolescence-limited', which occurs as temporary and situational involvement at an early age. The changes in delinquent involvement is often abrupt for these offenders, making up the majority of the age-crime curve in desistance from offending. The 'life-course persistent' make up the minority of offenders and can be defined through their continuity of antisocial behaviour. Moffitt describes these individuals as

exhibiting changing manifestations of antisocial behaviour, such as shoplifting aged 10 years, drugs offences ages 16 years and rape aged 22 years. These offenders will change based on new social opportunities arising, however this will not stop the criminal behaviour. Moffitt states that to maintain their life-course antisocial behaviour, these individuals will be selective in affiliating themselves with antisocial others, including their partner. Robins (1978) points out that most adult antisocial behaviour entails a development from childhood antisocial behaviour. However, most antisocial youths will not continue this behaviour into adulthood. In terms of co-offending behaviour, it is then important to examine if the development of age and experience is a feature in these behaviours.

Reiss and Farrington (1991) addressed the theories of changes in solo and co-offending individuals over time. Where an individual's criminal career has begun with a predominance of co-offending, the group(s) they've been involved with will likely have individuals continue beyond into solo offending of a more serious nature. Reiss and Farrington stated that crimes of a more serious nature become more common when offenders change to solo offending later in life. For example, in the case of a robbery or assault, a weapon can substitute an individual's power and threat that they may have had. Andresen and Felson (2012) found that more serious violent offences such as homicide, aggravated assault and sexual offences do not appear in the standard age/co-offending curve. In the case of a burglary, offenders will usually work in groups but even if they work alone they have often learnt skills and expertise through their network of peers. This therefore comes back to the notion that burglary should be analysed as a social crime, even when studying solo offenders.

2.4. Evidence of Specialisation within Domestic Burglary

In her study of the link between shoplifting and burglary, Schneider (2005) identified burglars as sticking within their comfort zone of theft. The findings also showed that specialisation can relate to less serious crimes, aiding in the detection of the more serious undetected offences. Schneider interviewed 50 convicted burglars, with 44 of those admitting to also committing shop theft, showing that shoplifting plays an instrumental role in the offending patterns of prolific burglars. This study not only challenged the notion that shoplifting should be treated more seriously but implies that if police were to investigate shoplifters more thoroughly, then they may yield more detected burglaries. This relates back

to previous discussions of the problems in detecting burglary. Schneider (2005) states that police should take a holistic approach to investigations by examining relationships between crime types. Further stating that "shoplifters should be policed as though they are burglars on their day off".

Offender age and stages of development previously discussed are examined in detail throughout research conducted on offender specialisation. Nieuwbeerta et al. (2011) state that specialisation is defined and measured as the repetition of the same offence across a specific period, for a specific number of offences in comparison to the rate of the offences within the population. This means that individuals who specialise in a specific crime type will be distinct from the crime population in their pattern of offending. Youngs et al. (2014) states that the notion of specialisation can be divided into three categories. Firstly, the differentiation component is based on examining the criminal history of offenders to identify if they can be differentiated based on their motivations and goals to achieve. Secondly, as mentioned, the repetition of a distinct crime type will distinguish one offender from another. Lastly, the notion of exclusivity in an individual's offending patterns will mark a feature of specialisation. On the contrary, Cornish and Clarke (1989) state that offenders commit crimes to fulfil their needs and do not intentionally specialise into those crimes. However, much of the previous research around criminal specialisation presents both specialisation and versatility as an occurrence in offending behaviours.

In examining offender specialisation across a sample of 4,615 offender's life-course, Nieuwbeerta et al. (2011) found that there is much diversity in individual offending patterns with evidence of an age-diversity curve. They identified that a high diversity of offending was most common during adulthood followed by a pattern of specialisation. However, in relation to where domestic burglars are positioned within offending specialisation patterns, Nieuwbeerta et al. found that when present in adulthood, specialisation is mostly towards property crimes. Although much of the co-offending literature leads us to focus on youth patterns of domestic burglary, Nieuwbeerta et al.'s (2011) findings point to the idea of specialisation among groups of adult offenders. It could be that individuals within a co-offending group are found to specialise in different offences. This would lead to understanding whether individuals in a group come together based on the different skills they provide to the offence at hand. For example, if you had a domestic burglary being committed by three individuals working together, one of those members may have experience in handling stolen goods and knowing where to dispose of the items after the offence. The

second offender could have a high previous history of violent offences, acting as the "muscle" of the group. Lastly, the third offender may have a high amount of previous vehicle related offences, such as dangerous driving or stealing vehicles, making them the driver of the group. It is argued that an offender displaying evidence of specialisation in previous crimes can likely provide a useful skill to a co-offending domestic burglary.

This has been previously identified in studies relating to the similar crime type of ram raiding, whereby commercial properties are targeted through meticulous plans and strategies among a group of individuals. Donald and Wilson (2000), identified a relationship between the roles of offenders involved in a ram raid and their previous convictions. The study examined details of 70 individuals from 12 groups or teams of ram raiders across the United Kingdom. Police statements were examined for each offender to identify the specific role they played in the offence, such as being the driver or handler involved. This is one of the only studies that has examined the roles of co-offenders to their previous criminal history, showing that each member will have diverse backgrounds allowing for their skills of previous experience to be put to use. For example, the 'leaders' within their sample were displayed as having a number of previous violence and robbery offences, with many also displaying similarity in their dishonesty offences (e.g. theft, handling and criminal damage). The few 'heavies' identified in the sample as individuals who help smash an entry as well as stand guard, were shown to be the most specialised towards violent offences. Another example from their study found that all those with the role of a 'driver' were shown to have previous convictions for stealing a motor vehicle. This study provides a basis in assuming roles within co-offending domestic burglary networks from the examination of their previous offending history. Donald and Wilson (2000) describe ram raiding as behaviourally distinct from burglary, due to its high-level of professionalism and planning for execution. However, if similarities are found between ram raiders and domestic burglars, then this provides evidence of professionalism among burglars, rather than viewing it as an opportunistic crime. This is later explored in this thesis, identifying whether there is evidence of specialisation among co-offending domestic burglary networks and how it contributes to their group activity. Findings from this are also likely to provide an explanation for differences among youth and adult offenders in specialism.

One explanation for the age-diversity curve in relation to domestic burglary specialisation comes from the learning hypothesis. Spelman (1994) previously argued that as offenders accumulate experience, they will build up their knowledge-base of reward and risk

from the outcomes of their offences. Offenders are then likely to refrain from offences with a higher risk of detection. As previously noted, domestic burglary has one of the lowest detection rates across offences within the United Kingdom. Maguire and Bennett (1982) identified that many of the domestic burglars they interviewed were aware that if a successful escape was made, then there was little detection of being caught. Meaning that if offenders are learning that there is a minimal risk of detection and, depending on the properties they target potential rewards in burglary, then they will continue to become persistent in that offence. Maguire and Bennett (1982) also identified that offenders will tend to only recall the offences that were successful, allowing themselves to continuously be in the mindset of reward.

The high rate of specialisation evident in studies of property offences is reflected in research based on the efficiency of cognitive skills programs within a rehabilitation setting for offenders. Cognitive behavioural programs are designed to help offenders with personal decision making, teaching them how, rather than what to think (Travers et al., 2014). Previous studies have found that cognitive behavioural skills training may not address property offenders, highlighting that they may not be motivated to change their mindset (Robinson, 1995; Nee and Meenagham, 2006). In their study examining the differential impact of cognitive skills programs on offence types, Travers et al. (2014) found that reconviction rates were lower for all crimes except robbery and acquisitive crimes. Robinson (1995) suggested that property offenders may hold stronger pro-criminal attitudes, have serious substance abuse problems or may just not want to change their lifestyle. Within a group setting, it may be that property offenders return from prison to the same social circle and continue their offending lifestyle as before. However, similar studies have shown time again that property offenders are less receptive than other offenders to rehabilitation. With reconviction rates still high and detection remaining low, understanding whether specialisation plays a part in these aspects of domestic burglary could assist in revisiting the treatments of these offenders. There is reasonable support in the literature for evidence of specialisation among property offenders and should be taken into consideration within a rehabilitation setting.

Previous studies have shown that specialisation is more common among adult offenders that have built up experience in different offences, and thus become accustomed to a distinct style (Nieuwbeerta et al., 2011). For example, McGloin et al. (2011) argues that the process of desistance from crime will narrow the field, meaning that offenders will commit a

lower frequency of specialised crime types. Therefore, as offenders become older, they will become more specialised in the offences they commit. However, there is also evidence to show that youth and adult offenders alike are versatile in their offending behaviour (Eker and Mus, 2016). Youngs et al. (2014) stated that versatility suggests offenders with low self-control will have more opportunities for crime and will therefore be versatile in their offending pattern rather than specialist. Low self-control in offending is also discussed in research by Stolzenburg and D'Alessio (2008), stating it as an anti-social trait that is linked with youth crime. These studies have shown that low self-control leads to younger offenders displaying versatility in their offending patterns, partaking in risky behaviours with little regard for future consequences. More recently, Tillyer and Tillyer (2014) identified similar patterns in that low self-control may lead to less organised and poorly planned offences with less favourable outcomes. Although more prominent in youth offending, if versatility is identified in adult co-offenders it could be explained by other facets of group behaviour. Wardle (2000) argues that individuals within a group may not want to commit the crime but are influenced by the effects of group norms. It could also be argued that in understanding specialisation and versatility within co-offending behaviour that the effects of decision making within a group could be further understood.

Previous studies highlight that when studying co-offending domestic burglary, it is likely that differences will be identified based on age and experience in offending. Co-offending domestic burglaries are likely to display members of the group that are specialised and versatile in offending patterns. Those who are less successful in offending will likely be younger, taking risks on opportunistic offences. Whereas those who are older are more likely to be specialist in offending patterns and as such provide skills necessary in successfully committing the domestic burglary.

2.4.1. Youngs' Model of Criminal Specialisation

As previously discussed, many studies draw on the differences in offending patterns in identifying specialisation in criminal behaviours. However, only one has drawn on a conceptual psychological framework of distinguishing between offending behaviours in determining the existence of specialisation. Youngs (2006) applied Bandura's (1986) Social Cognitive theory of behaviour to the differentiation of crime in determining offence

specialisations. In doing so, Youngs identified a means of distinguishing offending patterns from one another, allowing for an explanation into the causation of crime.

Bandura's (1986) framework is based on Social Cognitive principles that performance is dependent on and shaped by a combination of human incentives. The full range of these fundamental human incentives are: Primary, Sensory, Social, Monetary, Activity, Power/Status and Self-Evaluative. Bandura (2000) discusses how individuals are not onlookers of their actions, but are agents of every experience. People will be driven to accomplish tasks and goals, that are described as providing meaning, direction and satisfaction to their lives. Youngs (2006) states that criminal and deviant behaviours only form a subset of human incentives and are therefore sufficient in accounting for criminal actions in these analyses.

Youngs' (2006) Model of Criminal Specialisation differentiates between Bandura's Sensory, Monetary and Power/Status human incentives. Bandura describes the Monetary incentive as a behaviour that is understood by an individual's need for obtaining what they desire. Criminal behaviour examples may be stealing cash or even forging a cheque. However, Youngs uses the label 'Material' to best describe the Monetary incentive, stating that it is the desire to possess goods rather than just the simple monetary gain. Put simply, in terms of the psychology behind the Material incentive, Youngs states that the desire to obtain goods may not just be for financial gain. The desire for Material possession can be fulfilling in other ways that relate to an emotional or symbolic response. Further, in a criminal context, a Material gain may not just relate to obtaining money, this therefore broadens the crime types that can be labelled with this incentive.

The second incentive Youngs (2006) addresses within the Model of Criminal Specialisation is the Power and Status gain. This can be best described within a criminal context as a means of ascertaining some sort of Power. For example, the use of violence and aggression within offences, and crimes such as robbery, criminal damage and assault. The Power incentive comes from the goal of obtaining control and status above others. Bandura states that by asserting their control over others in society, the Power incentive individuals will increase their rank among the hierarchies.

The Sensory incentive stems from Bandura's notion for the human desire for pleasure and stimulating experiences, whilst avoiding aversive experiences. Sensory gains are an internal experience that can be manifested in criminal behaviour through committing offences

that may produce a stimulating experience. Offences such as, dangerous driving or absconding from the police, may provide the individual with the stimulating or pleasurable experience they desire.

To differentiate between individuals of a co-offending group, this thesis will draw on Youngs' (2006) Model of Criminal Specialisation. Evidence of roles within groups and networks can be drawn where individuals differentiate. This will have further implications in understanding the processes between individuals within a co-offending group, as well as the dynamic nature in offending.

2.5. Group Processes and Structures

One of the earlier theorists of group dynamics, Hubert Bonner (1959) stated that "Modern sociology, since its beginnings, has concerned itself with the processes by which individuals are compelled or induced to conform to the customs of the group" (p. 4). The study of group dynamics has been embedded in sociological theory for decades and whilst psychology was newer to the area, Bonner (1959) described it as having made important contributions along the way, in particularly true of social psychology. The existence of a group is described by Lewin (1948) as two or more individuals being interrelated with an interaction. These individuals can be distinguished from an aggregate of individuals, such as a population or collection, because of the process of interaction between them.

All groups built on social interactions are subject to continuous change and are dynamic in nature for a few varied reasons. Bonner (1959) states that the first reason is due to the state of tension within the group, whereby individuals are attracted or repelled by one another. Secondly, changes in group membership can cause a shift in the development of structure in the group, for example, the desistance from offending. The presence or absence of members, changes in leadership or key individuals will likely change the structure of a group. However, Bonner points out that a change in membership does not always equate to a change in group structure. Features that lead to group change also come from group rigidity and flexibility, with the pressures of change affecting these two features both internally and externally.

Further changes depend on the degree of organisation within a group, relating to the overall structure and individual motivation for all-round cooperation and morale. Within organisational psychology previous studies have discussed the size of the organisation as a major contributing feature in individual motivation and morale. A well-known study within behavioural theory conducted by Barker and Gump (1964) called 'Big School Small School', investigated the effects of varied school sizes and staffing upon the activities of school students. The study discussed how in a school there are a set amount of entities needed, such as a football team, band etc. In a small school, the students will do all those things, so the person on the football team may also play in the band because they don't have a lot of choice. Whereas in a large school the students will tend to be specialists, so they will have the good people in the band and different people on the football team as there is more choice to do so. The understaffed, smalls schools were shown to produce higher engagement with more varied activities and more responsibility for their actions than the large schools. These findings suggest that as an organisation grows, so too does the differentiation between individuals.

However, in re-testing the assumptions made by Barker and Gump (1964), Weiss et al. (2010) stated that there is no real conclusion over what size is better. In their study, Weiss et al. (2010) identify that moderately sized schools (200 – 299 students), in comparison to small (under 200 students) or larger schools (over 300 students), appear to provide the greatest advantages in levels of engagement for all students. There are all sorts of consequences to the size of an organisation such as these. For example, it is often that the bigger the organisation the less job satisfaction and thus lower turnover, which is why a large organisation might be split into smaller sub-sections. Within organisational psychology, many behaviours are said to be a consequence of size rather than an artefact of it.

In large organised groups, there is likely to be a structurally sound dynamic and with that comes leadership, co-operation within subgroups and a systematic hierarchy. Leaders are less effective or even less present in an unorganised group than in an organised. It is up to the members of the group to adjust the formation and changes within it through the efforts made by them. Bonner described the formation and changes within a group as the consequence of the efforts made by members in solving the problems and fulfilling their needs. For example, a group of offenders that have a high material need may satisfy this with individuals who are willing to commit a burglary. Bonner states that "A dynamic group is in a continuous process of restructuring, adjusting, and readjusting members to one another for reducing the tensions,

eliminating the conflicts, and solving the problems which its members have in common" (p. 5).

Bonner (1959), described the work of early sociologist Georg Simmel (1908), who stated that society is interaction. Participation among individuals will lead to gaining acceptance and approval of others to become a part of a group. This acceptance follows through to the relationships within the groups and how leadership is formed and maintained. Simmel describes how leadership takes on a reciprocal relationship, whereby the leader and the led influence each other and therefore without one the other cannot function. Stating then that the leader is formed around the entire group structure. Individual performance within the group will also be achieved through the social influences the others in the group have on them.

Many studies have been conducted on the social influences on individual performance, with one of the earliest of these demonstrating that a cyclist's speed was significantly increased when paced by another than when un-paced (Triplett, 1897). It is likely that there will be levels of differences between individuals and the amount of effect the influence of their social environment places upon them. The questions that can then be raised, in terms of domestic burglary networks, are at what level or structure of a network are individuals the leaders or influencers and, which are the led? Who has more influence and can this lead certain individuals within the group to specialisation within crime? However, researchers must remain conscious of the fact that when analysing groups these are not physically real but are structures of individuals formed from the interactions between them (Lewin, 1950).

The research body focuses towards formulating principles which underlie the group behaviour as well as devising techniques for effecting group decisions and group actions in a practical setting. Co-offending, as previously mentioned, develops over time and in many circumstances at a younger age through diverse groups of individuals. By examining those individuals closely at a structural level, we can understand the role everyone plays in either the commission of crimes or the formation of network growth among their peers.

2.6. Destructive Organisational Psychology

In organisational psychology, the focus is mostly towards non-criminal networks, usually within a business setting, in examining how to strengthen and increase productivity. Canter (2000) coined the term 'Destructive Organisational Psychology', whereby the notion of organisational psychology is reversed. Destructive organisational psychology is the examination of criminal networks with the goal of removing the central individuals and breaking down the network to cease productivity of crime. The aim in examining criminal networks is not just for understanding the social processes of crime, but it also has immense potential for law enforcement to use in terminating criminal organisations.

Canter and Alison (2000) highlighted that many studies of criminal activity are based on the individual, yet they have shown in detail that nearly all crime is part of a social process. For example, people may not necessarily commit a crime together but their connections to either pass on belongings (a burglar to a hander) or retrieve information (an online paedophile network) involve social processes. Canter (2004) states that a large amount of crimes only become possible from connections with others. It is therefore important to examine an offender's surroundings to identify any influences on criminal activity.

A focal point when studying structural analysis is assessing the social psychology of the activity. McAndrew (2000) stated that it is fundamental when assessing a social human experience that the understanding comes from underlying components that structure the social aspect. When examining team effectiveness in organisations, Guzzo and Dickson (1996) defined a "work group" as a social entity as seen from outside of the organisation and within it. Within this group, members are interdependent because of the role they play, be that in the work place or within a criminal organisation. Organisations of burglary, for example, are ones built of many structures whereby individuals within the network are dependent on others. An individual burglar would use a handler to gain from their goods, or even use them as an information point for tip offs on new opportunities.

The early work of Sutherland (1937) applied the idea of dependency among others to theft. Sutherland could use this concept to trace the structure of a 'professional thief". Upon analysis, Sutherland identified that without an organised structure surrounding them and therefore a dependency on others, a career as a professional thief could be difficult. Shover (1978) took the direction of Sutherland's work and applied it to the social organisation of

burglary. Shover's study focused on the social relationships within and around working burglars and what characteristics of social relationships make what his participants defined as a 'good burglar'. By using autobiographies of thieves, novels, journalistic accounts of crime, questionnaires within inmates and interviews with incarcerated and un-incarcerated burglars, Shover found that the social organisation, in which the individuals carry out their work, is something they depend on. This was something that had proved unchanged since the work of Sutherland but something that he questioned would continue. After conducting further interviews with law enforcement officials and convicted burglars, Shover discovered that the view of a 'good burglar' was on the decline and that the material gain made from burglary is no longer present. However, it is documented in more recent research that criminal organisations built up on the foundation of social networks are still active today.

More recent research examining criminal networks has tended to focus on how the networks vary in organisation rather than focusing solely on one individual. For example, Canter (2004) highlights the popular view that each criminal organisation is headed by some sort of 'Mr Big' in charge, which relates back to the early work of Sutherland's 'Professional Thief' and Shover's 'Good Burglar'. Canter's study on different criminal organisations provided evidence in the variation between networks to their size and the nature of the crimes. He found, out of three types of crimes examined, that the least organised was the small hooligan groups and small property criminal groups. These were labelled the 'ad hoc' group, whereby there appears to be little or no structure. The 'oligarchies' group were slightly larger and had more control over their communication within the group, and contained property criminals and the larger hooligan groups. Lastly, Canter found that the largest and most structured illegal organisations, labelled the 'criminal organisations' were the largest property networks and the drug dealers. These findings highlighted the variation among networks but also indicated that the larger the group the more tightly structured an organisation needs to be to survive. The variations in networks are shown by the differing structures. The varying levels of network features will affect the communication differently as well as the different number of individuals.

2.7. Features of a Network

There have been many studies that focus on network structure, as well as individual positions within a group. Models of social organisation examined within the field of Cultural Theory focus on connections between individuals, values and the behaviours central to the organisation (Mars, 2008). In a study applying cultural theory to organisation of crime, Mars (2000) used two cultural classification dimensions. These were labelled 'Grid' and 'Group' dimensions, to construct fourfold categories of criminal organisations. The first 'Grid' dimension classifies cultures based on the extent to rules and regulations being imposed. The limitations applied to members of these cultures will be based on their ability to move about freely within an organisation. For example, a strong grid organisation will have strict rules and regulations for its members, whereas a weak grid organisation will allow members to come and go as they please. The second 'Group' dimension classifies cultures based on their collectiveness of individuals associating with each other face to face. Mars describes our society as a prime example of a weak group culture because individuals are likely to be involved in diverse groups with no dominant influence from one. Another example of group classification are individuals being members of the army and living collectively together within a quarter. This is an example of strong group culture, offering members full life support.

Upon applying the two dimensions together, Mars (2000) could obtain a four-fold typology of categories of criminal organisations. These were labelled:

A. Criminal Individualists (Weak Grid/Weak Group)
B. Criminal Isolates (Strong Grid/Weak Group)
C. Organised Criminal Hierarchies (Strong Grid/Strong Group)
D. Criminal Ideologues (Weak Grid/Strong Group)

Each of the categories can be discussed in terms of network structure as well as criminal specialisation among offenders. The criminal individualists can be described as using people as a means to an end. With no solid connection to an organisation it is likely these individuals come together for a one-off crime. These types of offenders coincide with Canter's (2004) 'ad hoc' offenders, such as the hooligan groups coming together in an arbitrary fashion. The criminal isolates are likely to be the offenders on the edge of a network. These offenders

could be involved with petty, low skill crimes whilst spending their resources as they acquire them. These individuals will lack the support of an effective group relationship.

The organised criminal hierarchies are the most structured organisations through their connections and strong network features. Mars uses the Mafia as an illustration of this organisation, whereby there is a clear distinction between individuals who are in the group and those who are out. Those within an organised criminal hierarchy will have differing support of group members by following their roles and the rules set out by the organisation. Lastly, Mars illustrates the criminal ideologues to terrorist organisations. These groups will have strong boundaries to live by with few rules imposed on them. For example, a terrorist organisation will have members that will live by the same values and strong culture, whereas they are likely to carry out their offences on their own. These organisations are described as small but controlled.

Although the classifications outlined may appear to be strict types of criminal organisations, they are not insulated packages. Questions can be raised regarding the graduation between the categories as there are often found to be blurred boundaries between them all.

When studying the difference between networks, McAndrew (2000) stated that understanding the network features are key to the structure of organisations. Network features are crucial in understanding the strengths and weaknesses within a social organisation, as well as directing an understanding of operations in accordance to activities. Based on the original work of McAndrew (2000), Canter examined seven distinctive features of a network derived from social network analysis measures. These are as follows:

Table 3. Canter's (2004) network features

Network Feature	Description
Size	A large network is analysed at 15 or more members.
Key Central Figures	Most central individual(s) of the network
Core Group	Group of individuals that co-ordinate operations in a network.
Subgroups	Cliques of individuals working together.
Mid-Level Members	Individuals that communicate with the key central and lower-level individuals. Are not most central but not on peripheral of network either.
Isolated Individuals	Individuals on the outskirts of the network providing information.
Subgroups as Chains	Rather than clusters or cliques these are highly connected members acting as a more structured hierarchical organisation.

As mentioned previously, Canter (2004) found in his study that for the size of burglary groups the larger they are the more likely they will form features of an illegal organisation. However, he does also state that size is not the only influencing feature of a network.

Shover (1973) focused on the social problems of burglary, finding many aspects that highlight burglary as a highly social crime that relies heavily on steady connections. These related to the features of networks as drawn from the extensive work of McAndrew (2000). Although a social crime, functioning on partnerships, Shover found that burglary organisations are not likely to have clear leaders. However, there will be identifiable key central figures such as the 'good burglar', as mentioned previously, that will be differentiated by either their age, criminal experience and/or skill.

Following on from this the core groups are usually those within an organisation that can be mostly recognised for its structure and built up from the key central figures. Again, Shover (1973) found that membership within a burglary network is in a constant state of flux but that a core of two or three individuals remains intact. As a network of burglars builds up and becomes larger, it is likely that the groups of twos and threes form their own subgroups that are connected through their trust and experience. A highly differentiating quality found by Canter is the subgroups as chains, whereby the subgroups exist and are connected to the main network by having a few connections within other members of the group. These are connected by a chain like link, implying a much more complex structure to the network than just containing sub-groups.

A network containing mid-level members is likely to display a more structured hierarchy (Canter, 2004). These individuals can act as 'fences' between the leaders and other members within the organisation but also lay fairly central powerful individuals. For example, Shover discusses a good burglar coming from a core group needing to have a handler where they can gain information on about potential jobs but also must have a safe source to sell to without risk of detection. This rests a central role on the handler as they hold a lot of power within the organisation as well being a trustworthy individual to go to. Handlers within a burglary network can also be the isolated individual on the outskirts. This is where there is an easy source to 'dump' the goods stolen with little connection to the structure of the network. Although these individuals will not add much to the structure of the network they do add an element of organisation as they could act as information gatherers that then transfer opportunity tips up through the network.

2.8. Social Network Analysis: Uses within Investigative Psychology

Social network analysis (SNA) is a major methodological approach to studying human behaviours and social interactions. It incorporates a set of specific analytical and statistical methods to examine structures of social relationships. SNA techniques are designed to discover patterns of interaction between social actors, making them especially appropriate for studying criminal networks. These methods have been developed across the years using mathematical applications, with further applications across many different fields, including biology, human disease networks, business and online social networking platforms. Social network analysis has becoming increasingly used in the fields of psychology, sociology and anthropology. With varying data sets and methods, researchers have been exploring the techniques of SNA with friendship ties between children in schools (Moreno, 1934), improving flows of communication within organisations (Cross and Parker, 2004) and exploring the uses of SNA as an investigative tool (Mullins, 2012). In relation to studying criminal activity there is significant importance in studying the social patterns between offenders. The structural significance of studying criminal networks aids in the examination of network formations and how central individuals can be placed over time with relation to other offenders around them. This also contributes to our understanding of the role an individual will play within a network. Although structural patterns are important when using

SNA, it is also important to examine the underlying psychological relationships between individuals.

The study of social networks is not a new phenomenon, in fact some of the earliest discussions of human social behaviour began looking at social networks as systems of relationships. Georg Simmel and Jacob Moreno were two of the earliest researchers in social network analysis. Simmel (1922) used points, lines and connections to describe social relations. Simmel's early work of social networks stemmed from the area of sociology, with his research focusing on the relations made between individuals and forming a method of sociology from that. He stated that "man in all aspects of his life and action is determined by the fact that he is a social being". As a pioneer in SNA, Moreno (1953) stated that once we are studying a social structure then sociometry has begun. Sociometry is the quantitative study of social relationships, which is a fruitful method of studying criminal activities. This enables researchers to analyse the dynamics of a group with little information on the individuals themselves.

A general hypothesis for network analysis is that where an actor is situated in relation to others within their group will determine the information they receive. Within relation to domestic burglary this could also determine their opportunities for material gain (Borgatti et al., 2013). SNA has been used in many studies to empirically test various features of criminal networks (Young, 2011; Canter, 2004: McAndrew, 2000).

UCINET software, developed by Borgatti et al. (1992), can be used to directly test the structure of a network. It is a comprehensive programme and one of the most frequently used within the social sciences for the analysis of social network data (Huisman and van Duijn, 2003). Using this software package, researchers within the social sciences can incorporate their methods into social theories. These measures allow for the quantification of network features, such as how many connections an individual has, the strength of their ties between others and ultimately how central an individual's position is. Centrality measures within UCINET, can be used to identify these prominent features of a network. For example, it has been identified that individuals connected to more members are likely to be key figures and therefore have more power within that network (McAndrew, 2000). In his study of criminal networks, McAndrew (2000) highlighted the importance of individual positions within the group. McAndrew examined features of criminal groups using social network analysis to

understand their structure and efficiency. In doing so found that network positions can be used to identify potential sources of individuals.

2.8.1. Measures of centrality in identifying individual roles

In their introduction to social network methods, Hanneman and Riddle (2005) best illustrated measures of centrality using three diagrams, a star, circle and line. The argument put forward in previous research and the current study is that it is important, when assessing the centrality of individuals within a network, to use more than one measure of centrality. The figure below displays three diagrams that allow for ease of interpretation when using centrality measures.
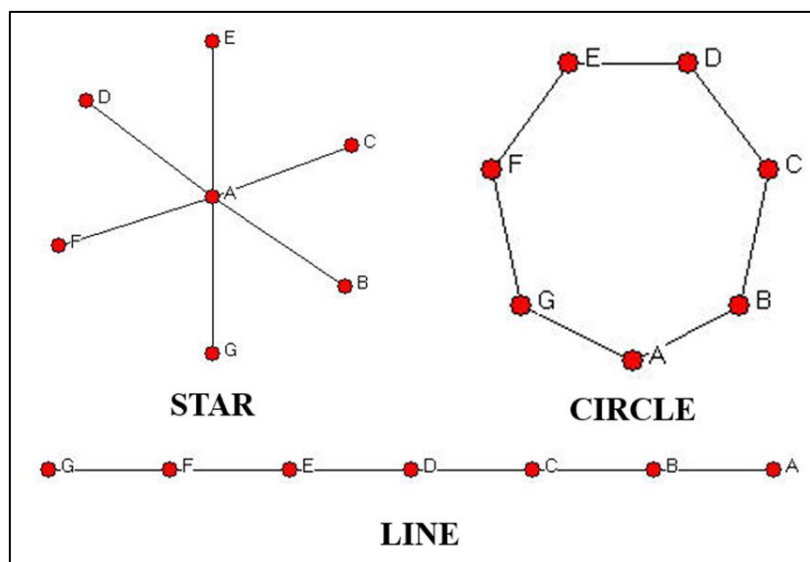
Figure 1. Star, Circle and Line Network (Hanneman and Riddle, 2005)

2.8.1.1. Degree

A high Degree measure shows more connections to an individual. This is the most commonly used centrality measure. Individuals who have more connections will have more choices and therefore greater opportunities within a network. This autonomy makes them less dependent on any specific other individual, and hence more powerful. Hanneman and Riddle (2005) describe this as a simple but effective measure of an individual's centrality and power

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within the network. The following bullet points outline Hanneman and Riddle's (2005) explanation for the degree measure using the star, circle and line networks.

- The star network displays person A having more opportunities and alternatives than other actors. If person D elects to not provide A with a resource, A has several other places to go to get it; however, if D elects to not exchange with A, then D will not be able to exchange at all.

- The circle network displays each person as having the same number of alternative trading partners and therefore all have equal degree to the rest of the individuals in the network. All within this network are equally advantaged or disadvantaged.

- The line network displays individuals at the end of the line (A and G) at a structural disadvantage and in a sense, all the other individuals can be seen as equal. Those who have more connections will have a higher degree, mean that with A and G having only one connection each and the remaining individuals having two, they are in favourable positions with more power.

2.8.1.2. Betweenness

Betweenness is the extent to which a person lies between others on their geodesic paths. For example, an offender may want to make a deal to exchange some resources but to talk to the dealer they must go through a middle man. The more people depending on the middle individual to make connections with other people, the more power they have. If, however, two individuals are connected by more than one path, and the middle man is not connected on all of them, they then lose some power. Again, this centrality measure is described referring to figure 1 above.

- Like Degree centrality, the star network displays that person A will have the highest betweenness in this network as they act as the main facilitator for the network. For example, if person E wanted to connect to person G, they first must go through person A.

- The circle network shows that everyone within that network has the same potential to connect with another within the network, therefore they will all have equal betweenness centrality scores.

- The line network shows that person D has ties to E and C. E has ties to F and G; C has ties to B and A. Person D will have high betweenness, because it connected two branches of ties, and lies on many geodesic paths. Persons C and E also have a higher betweenness, because they lie between D and their "subordinates". But persons F, G, B and A have zero betweenness.

2.8.1.3. Eigenvector

Eigenvector denotes the extent to which an individual is well connected with another individual who is also well connected in the network. Individuals with high eigenvector scores have many connections, and their connections have many connections, and their connections have many connections and so on, out to the end of the network. These individuals are the leaders of the network but also may not be able to influence as well as other measures of centrality as they may be isolated from peripheral individuals. This is again illustrated using the star, circle and line diagrams above.

- The star network displays all the individuals having an equal eigenvector measure. As everyone is connected to someone else who is well connected within the network.

- The circle network also shows that each person within the network has an equal eigenvector score as they are all equally connected to someone who is well connected to another.

- The line network displays that persons E, D and C will all have equal high eigenvector scores as they are all well connected to others that are also well connected. F and B will have an eigenvector score that is slightly lower than the central persons as they are connected to G and A on the ends who are not well connected. G and A will have low eigenvector scores as they are connected to only 1 other person who is well connected.

2.8.1.4. Closeness

Closeness is based on the ideas of efficiency and independence. As a result of being situated close to others in the network, an individual high on closeness measures can efficiently transmit information from other more outlying individuals. Closeness centrality emphasises the distance (in relation to their place within network, be that outlying or inner) of an individual to all others in the network. Therefore, the further out from the group you lie the longer it will take for information to get to you. The following examples are given to illustrate the closeness centrality measure using figure 1.

- The star network displays person A as having the highest closeness score as they sit directly in the centre of the network. Being on the outskirts of the network will mean a low closeness score as the spread of information will take longest to get to each of them.

- The circle network once again will display equal closeness scores as there is no outer connections of this network. They are all equally connected and therefore an equal spread of information.

- The line network shows that D will have the highest closeness score sitting in the centre of the network. G and A both rest on the outskirts of this network and therefore will have the lowest closeness score, meaning that when it comes to the spread of information from the centre of the group they will be the last to receive it and thus at a disadvantage to the rest of the network.

Chapter 3. Theoretical Position and Rationale for Research

This thesis aims at contributing to the study of domestic burglary offences and offenders through investigating their underlying behavioural components. Upon doing so, it will be examined whether distinct styles of domestic burglary can be related to the characteristics of offenders and if these differ in solved and unsolved cases. Few empirical studies of domestic burglary have examined the differences between solved and unsolved cases. In developing models of domestic burglary, many studies will use solely solved crimes without first examining whether there is a difference within their sample of the two. The studies explore a unique database of solved and unsolved police incidents, enabling the validation of previous crime models as well as being able to generalise findings across other major cities. Mawby (2001) stated that little is still known about the many number of individuals that go undetected, leaving fewer studies of domestic burglary to focus on the offender. The insufficient amount of detected offences will often mean that studies of offenders will include small sample sizes that lack reliability to measure against other models.

Studies have also suggested that at some point offenders will co-offend, with much of the literature neglecting to investigate adult as well as youth co-offending. The focus within the thesis looks at the concept of domestic burglary as a social crime, built from a sub-culture of connections between individuals. Past studies of domestic burglary have been driven by distinguishing between solo and co-offenders, whilst also taking the same approach in looking at adult and youth offenders. The study youth co-offending dominates the literature in understanding the peer's associations and influences in relationships and how those contribute to crime (Reiss and Farrington, 1991; Stolzenburg & D'Alessio, 2008; Schaefer, 2012). However, the current arguments within this thesis stem from the psychology of the individual and not just their peer relationships. McAndrew (2000) previously stated that offenders are like all humans, in that we will form some part of a group that shapes our behaviours. This should not detract from the study of criminals as an individual, but we must not ignore the social aspects of criminality. In sum, it is argued that domestic burglary is a social crime and thus should be treated as one.

3.1. Questioning the Nature of Domestic Burglary

The central question of this thesis is: what are the underlying behavioural components of domestic burglary and how do the psychological interpretations of these relate to a social hypothesis of this type of crime? This is examined through the variations of domestic burglary reflected across a sample of solved and unsolved offences. One of the most central aspects of domestic burglary is its lack of solvability, which therefore acts as a basis of establishing a meaningful distinction between offenders who commit these crimes. This thesis also questions how behavioural variations in domestic burglary are applied to an individual's position among other connecting offenders. The studies in this thesis allow for a full exploration of a unique sample of solved and unsolved domestic burglaries, expanding on the existing research surrounding behavioural styles and co-offending. In addition to this the study aims to uncover whether domestic burglary can be classed as a social crime in relation to an underlying framework of interdependence among offenders within a city.

The central aim is to uncover the nature of domestic burglary from a population of offences and offenders within a major city and how those results can be generalised in expanding the understanding of this crime. The central research question will be explored through the following aims within each study of the thesis:

Study 1 (Comparison of Solved and Unsolved Domestic Burglaries)

- The first study begins with the crucial analysis of solved and unsolved domestic burglaries. The offence behaviours in solved and unsolved domestic burglaries are compared with an aim to assess any difference between the two. The validity of modelling domestic burglary using only solved cases will be examined. If the actions in solved are shown to be similar those in unsolved cases, then this further validates previous crime models developed from solely solved offences. Behavioural differences will also be examined to allow for further understanding in how these crimes are solved.

Study 2 (Differences in Criminality)

- To understand this further, the second study examines the co-occurrence of domestic burglar behaviours. Following from the initial evaluation of solved and unsolved behaviours, this study acts as the next step in evaluating the utility of the data for

further analysis. It is hypothesised that distinct themes of differing criminality will be evident among the sample of domestic burglaries.

Study 3 (Inferences of Characteristics from Behavioural Differentiation)

- In study 3 a statistical analysis of the actions carried out during a domestic burglary is carried out. This study aims to identify themes of behavioural differentiation in deriving inferences of characteristics. It is hypothesised that the inferences can be derived based on offender criminal history, demographic traits and offence behavioural style.

Study 4 (Predicting Offender Characteristics from Offending Actions)

- Following from study 3, the aim of study 4 is to establish a decision tool in predicting offender characteristics from offending actions. In doing so it is hypothesised that an offender's stage of development, based on their age and criminal experience, can be identified relating to the characteristics of their offence.

Study 5 (The Developmental Structure of Domestic Burglary Co-Offending Networks)

- The question of whether there is a viable proportion of co-offending that supports a social hypothesis of burglary is examined within study 5. The aim of this study is to empirically test the development of organisational structure among co-offending groups. The argument being that as co-offending criminal networks increase in network features and thus size, so changes important aspects in their structure, relating to the positions and roles placed on individuals.

Study 6 (Differing Criminal Activity of Network Associated Domestic Burglars)

- Study 6 places focus on the previous offending history of co-offending domestic burglary criminal networks. Drawing on Youngs' (2006) Model of Criminal Specialisation, the study aims to identify distinct themes of previous offending behaviour between offenders that provides evidence towards criminal specialisation.

Study 7 (A Social-Psychological Framework of Domestic Burglary)

- Lastly, study 7 looks at encapsulating the previous findings by aiming to identify evidence of roles within co-offending groups. These roles will be examined based on offender behavioural inferences, network structures and criminal differentiation

identified in previous chapters. The study will also aim in identifying whether there is commonality in criminal actions across the domestic burglary co-offending groups. If roles are identified within the groups, then the findings will provide evidence of ties based on skills and individual contribution towards a crime.

Chapter 4. Methodology and Nature of the Data

The central argument of this thesis is that domestic burglary should be treated as a social crime, functioning more frequently and likely more effectively through ties between offenders. This argument is drawn from the previous literature and in doing so seeks to explore the behavioural variations within domestic burglary and their psychological bases. Although studies of burglary have been accumulating for decades, it is still one of the least detected, high-volume crimes in the United Kingdom. Past research is also lacking in the study of co-offending domestic burglaries in relation to the interdependent ties between individuals. It is therefore of crucial importance to study domestic burglary in this manner to gain further understanding into the psychological attributes of these offenders.

4.1. Data

The data used for this thesis came from a major metropolitan city, however, one or two specific details have been changed to hide its identity, but these do not have any implications for the results. The police representatives expressed concerns of publicising the research carried out on domestic burglary within the area. Therefore, the name of the area from which the results are derived will be referenced throughout this thesis as "Midlands City".

4.1.1. Data collection

Early in the data collection process it became clear that the approach of how the data was received, merged and cleaned would be crucial. Working to limited timescales to resolve issues with the database and, ensure its usability became a major factor. Data received from Midlands City police came in four secure files containing crime location, stolen property, offender and victim information. Data was downloaded from the Crime Recording System (CRS) to the analysis software to then be extracted, then merged and cleaned to be fit for purpose.

Whilst developing the database, issues arose regarding missing information, disentangling police codes and validating merged information. The four files first had to be

merged for the data to be in a format suitable for analysis. This was conducted using lookup formulas in excel to match the offender unique reference number to the other data sets. Where there was no offender reference number, the crime number information would be used. The formulas were edited by hand for each variable, thus each was merged separately. Due to the large sizes of these files from the number of cases and variables within the datasets, the merging procedure was a lengthy process. The offender data file was used as the master file, whilst the crime details, victim details and property variables were all merged onto the crime location file.

Once the merge was completed several steps were taken to ensure that variables within the dataset were in a format that would withstand statistical analyses. The content analysis process included:

- Recoding the crime actions e.g. time of crime, entry and exit point, MO means, MO instrument, crime location, sex of victim, relationship to victim, type of crime, property stolen into dichotomous (present/present) and categorical formats.
- Recoding the offender characteristics e.g. age, stature, build, hair colour, eye colour, ethnicity in to dichotomous and categorical formats.
- MO text was screened for information that added to the crime action variables such as use of violence, weapons, tools used, force and other behavioural variables.

Many administrative weaknesses were flagged with the police force, that displayed how their data is recorded and where the information is being kept. Many fields were missing information altogether, however police data is not recorded for research purposes, so it was expected that the data cleaning process would take some time.

In order to derive inferences of offender characteristics from offence actions and examine criminal specialisations, each burglar's full offending history was required. The database from the police representatives did not contain the appropriate level of offending history information. Thus, data from the Police National Computer (PNC) was obtained. Again, this data had to be understood in terms of police codes, cleaning and merging to the original case files for each offender.

4.1.2. Working with police data

A significant amount of time was spent discussing the variables, codes and meanings with the police analysts. It proved essential to be able to discuss the data with the police force as they are likely to format their data in slightly different ways to others. For example, the police data contained two offender reference numbers. The first is the unique serial reference number (SRN) for that force which was given to an offender upon arrest and was used in any subsequent arrest after. The lower the SRN in the database, the earlier the offender began committing crimes. The second offence reference is the police national computer identification number (PNCID) for the national database of offender information. An offender can have both a SRN and a PNCID or a SRN and no trace (NT) if they are not in the national database.

The PNC data is formatted differently to the offence databases provided by Midlands police. The police force base much of their investigations on the offender serial reference number (SRN), these were then used in the analysis as a valid way of representing each offender. The PNCID numbers did not appear to accurately represent each offender's criminal history in the police database as many where missing. This lead to unforeseen difficulties when merging the PNC and police force data sets. However, as a substantial amount could be merged (N = 1,017), that allowed for the analysis of domestic burglary criminal histories.

4.1.3. Student population

Midlands City is known for being heavily populated with university students. According to the 2011 census data, 14% of the population (roughly 70,750 individuals from two large Universities) in Midlands City were made up of full-time students. At a very early stage of the study is was made apparent that domestic burglary crime prevention was a big problem among the student population. Discussions with officers of various ranks at the data source described how students living in the area are easy targets for domestic burglary. For many first-year students it would be their first time living away from home and their low sense of security leaves them open to crime. It is likely that students could also be targeted due to their low security housing and likelihood of possessing high-valued items. Student accommodations will usually have several individuals in one house or flat, and if access is

gained, then there is a high chance of coming away with multiple high-value goods. For example, a domestic burglar aware of these homes and that gains successful access could potentially take multiple phones, laptop computers and televisions.

Each year the police force works closely with the Universities to help thousands of new students by way of educating them in the importance of home security, with a great deal of police resource dedicated to raising awareness of the potential dangers. Discussions with Midlands City police also suggested that students will be targeted by a range of offenders including prolific burglars, opportunists and surprisingly, other students. Although student burglary is not the major focus for this study, it is still a prominent issue to be aware of due to the high-rate of this crime type in the area.

4.1.4. Ethics

The data source for the current project was a police force within a major city of the United Kingdom, labelled as Midlands City. Consent was granted by Professor Canter (head of IRCIP archives) to use the data for the purposes of the project. The use of the data was additionally approved by the University of Huddersfield School Research Ethics Panel (SREP).

The issue of confidentiality was addressed before the data was collected, data sanitised from the police source, allowing for offenders and victims to remain anonymous. Furthermore, a risk assessment was completed by the current researcher which was submitted as part of the ethics application and approved by the SREP.

4.2. Sample

A noticeable gap when addressing studies that use police recorded data is the analysis of both solved and unsolved offences. One limitation in crime research is conducting valid analysis that can represent the "real crime picture" (Biderman and Reiss, 1967). This topic is addressed in Chapter 5 on the comparison of solved and unsolved domestic burglaries. Data was collected from a four-year period (2011-2015) within Midlands City, meaning that a realistic focus on domestic burglaries in a major UK city could be addressed. The full sample of solved and unsolved domestic and commercial burglaries was made up of 15,468 offender-

offence combinations. However, much of this data contained missing information and/or errors and as such had to be removed for the data to be fit for analysis. The final sample of solved and unsolved domestic burglaries contains 8,491 (686 solved and 7,805 unsolved) offender-offence combinations of domestic burglary. When analysing the offenders themselves, only the solved (convicted) offences were appropriate to study. This is because accurate information on an offender can only be gathered after they are convicted of the crime.

The PNC database was made up of 1,017 offence-offender combinations of convicted burglaries (including domestic and commercial burglaries) committed by 605 unique offenders that matched the solved cases from the original files. As previously mentioned, merging the databases by offender PNCID number meant that some of the cases did not match the original files. However, 485 unique solved domestic burglaries matched the original full database and were therefore applicable for analysis. This data is used in deriving inferences of offender characteristics from the offence actions in Chapter 7, predicting offending characteristics from offence actions in Chapter 8, as well as the exploration of criminal differentiation in co-offending domestic burglary networks in Chapter 10.

4.2.1. Offenders

When addressing the offender characteristics, it is only appropriate to analyse the solved domestic burglaries. This is because the offender information will be as accurate as is recorded upon arrest. The unsolved offences did display some offender information, but this is likely to be from possible witness accounts that did not lead to a conviction and therefore cannot taken as valid information. 686 offender-offence combinations of solved domestic burglaries were committed within the Midlands City area by 461 unique offenders across the four-year period. These figures already highlight a large amount of offences that will be repeat and/or co-offences.

Many of the solved domestic burglaries committed in this area were done so by White males respectively, with 93% of the sample being male (7% female) and 67% of the sample being White. Other ethnicities included in the sample that committed domestic burglaries are Black (19%) and Asian (4%) respectively. Offender occupation was mainly unemployed or unknown (58%) and the offender was reported as being known to the victim in 7% of cases.

The age of offenders at the time of the offence is a major area addressed in the study of criminal activity. This is due to the focus that the offender age will relate to the criminal activity occurring in a group. Reiss and Farrington (1991) state that it is uncommon for young offenders to commit crimes alone with an offender beginning with a predominance of co-offending and later resorting to solo offending. In supporting this notion, Reiss and Farrington argue that it is only the most persistent criminals that will continue to offend later in life. Although this argument extends to different criminal activity, theorists have addressed that it is the more serious crimes that occur later in adulthood. These include robbery and assault, where a weapon can substitute the threat and power of a co-offender (Reiss and Farrington, 1991).

Most of the domestic burglary sample can be described as a young adult, aged between 18 and 24 years (47%). 41% of the sample are adult offenders, aged between 25 and 63 years, whilst the smallest percentage was adolescent offenders, aged 12 to 17 years (12%). This follows the typical age-crime curve, with the slope of the relationship between age and crime rates ascending rapidly during adolescence, peaks in early adulthood and then falls thereafter (Quetelet, 1831). Figure 2 displays the comparison of solo and co-offending domestic burglars age at the time of the offence. This demonstrates a similar crime curve to the norm, identifying a small significant difference between solo and co-offending ages ($p < 0.01$, $r = -.11$). Coinciding with Reiss and Farrington's study, the solo domestic burglars in the sample are shown to be older than the co-offenders, with the solo offenders continuing to offend later in life. It is interesting to note that there is a minor difference in the youth offenders displayed in figure 2. Meaning that the sample of domestic burglars does not follow other theoretical arguments that co-offending is particularly high at a young age, but that solo and co-offenders will follow a similar age-crime curve.
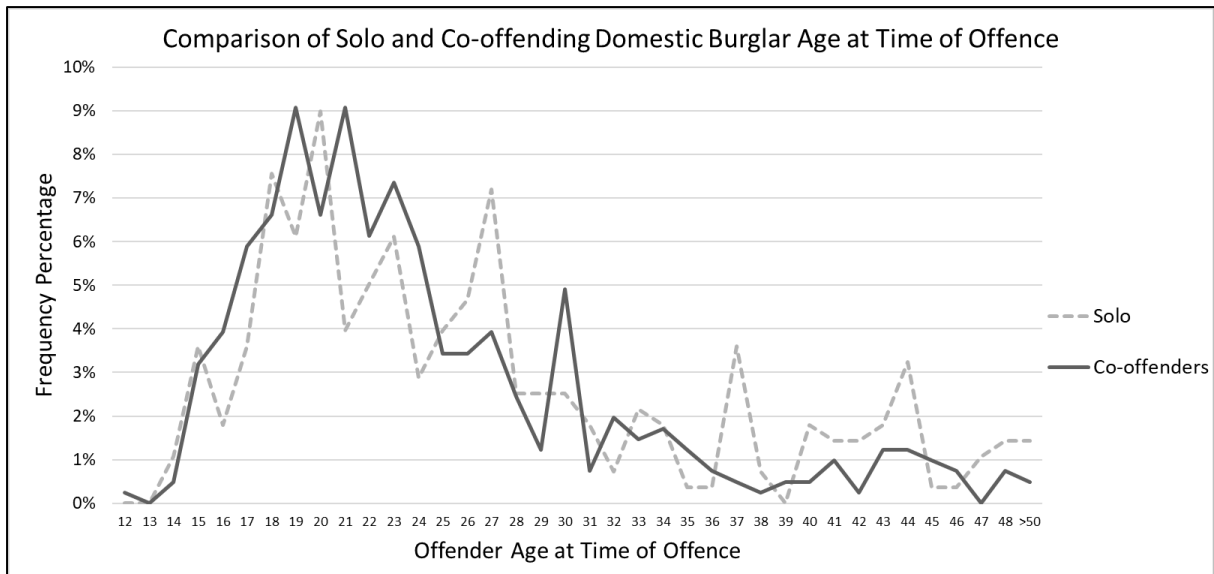
Figure 2. Comparison of solved solo and co-offending domestic burglar age at the time of offence.

4.2.2. Criminal history

The frequency of previous offending behaviours provides an indication of what crimes the offenders are most actively engaged with. The following descriptive statistics were derived from the sample of offenders that could be matched to the PNC database (605 unique offenders). The PNC database displays 95% of the sample to have a previous burglary in their offending history, followed by 91% with a previous offence for theft. The domestic burglary offenders also have a high frequency of violence, drugs and criminal damage within their previous offending history. The lowest occurring offences within the domestic burglary sample's previous offending is arson (9%), sexual (8%), rape (7%), murder (3%) and indecent assault (1%).

Table 4. Number of each offence type committed by whole sample.

Crime Type	Frequency
Burglary	572
Theft	550
Violence	430
Drugs	381
Criminal Damage	380
Shoplifting	307
Driving Offence	261
Firearms	81
Fraud	69
Arson	56
Sexual	46
Rape	41
Murder	17
Indecent Assault	7

Table 5 gives an indication of the experience of the sample showing that the sampled offenders are likely to have an extensive criminal history. Nearly all the sample has committed three or more prior offences (88%), 8% had committed one or two prior offences and only 4% had no prior criminal convictions.

Table 5. Frequency of total previous offences committed by whole sample.

Total Previous Offences	Frequency
No Prior Offences	22
1-2 Prior Offences	50
3+ Prior Offences	533

The frequency of previous offending in years in table 6 also shows that the sample are well adapt to a criminal lifestyle. Most of the offenders (66%) are shown to have offended across a six to thirty-year period and subsequently a large frequency of the same have offended between one and five years (25%). Only 6% have offended over a 30-year period and 3% have had less than a year of offending.

Table 6. Frequency of length of criminal activity by whole sample

Length of Offending	Frequency
0 Years Offending	17
1-5 Years Offending	153
6-30 Years Offending	401
30+ Years Offending	34

Similar to Fox and Farrington's (2012) approach to analysing offender previous history, the offender's age of criminal onset was calculated by subtracting the offender's date of birth by the date of their earliest recorded offence. The offender's ages for calculating criminal onset were the following: 7 to 14 years (early onset), 15 to 21 years (adolescent onset) and 21 to 65 years (late onset). The frequencies displayed in Table 7 coincide with the idea that domestic burglars not only have many years of offending but that their onset into the criminal lifestyle began at an early age.

Table 7. Frequency of criminal onset.

Criminal Onset	Frequency
Early Onset	408
Adolescent Onset	167
Late Onset	30

4.2.3. Offences

The full database of solved and unsolved domestic burglaries across the four-year period was sampled (N = 8,491). Table 8 displays descriptive statistics of when and where the domestic burglaries were occurring. Table 9 displays the frequency of offence behaviours occurring in the sample, including weapons, method of operation, premise type and property stolen.

The highest percentage of domestic burglaries occurred on a Friday (17%), followed by Saturday (16%), with the lowest occurrences on a Sunday (11%). What is very clear from the seasonal trends of domestic burglary is that the majority occur in the Autumn, between September and November. This relates back to a high percentage of victims being students, indicating a trend in a high increase of domestic burglaries that occur at the start of the new

academic year. The time of day the crimes occurred was an equal split between daytime and night-time. The daytime hours were recorded from 6am until 6pm, with the night-time offences recorded after 6pm and before 6am.

Table 8. Frequency of day of the week, season and location deprivation the sampled domestic burglaries (N = 8,491) occurred in.

Offence Attribute	Frequency	Percent
Offence Day of Week		
MON	1,083	13%
TUE	1,082	13%
WED	1,126	14%
THU	1,234	15%
FRI	1,455	18%
SAT	1,331	16%
SUN	917	11%
Offence Season		
Spring	2,037	25%
Summer	1,674	20%
Autumn	2,373	29%
Winter	2,144	26%
Offence Location Deprivation %		
1%	110	1%
5%	925	11%
10%	689	8%
20%	1,322	16%
30%	1,077	13%
40%	632	7%
50%	782	9%
60%	493	6%
70%	158	2%
71%-100%	95	1%
Offence Time of Day		
Daytime	3,845	47%
Night-time	4,383	53%

Due to the vast amount of information within the police records the decision was made to analyse offence behaviours that occurred in 5% or more of cases. Most of the cases showed that a weapon was used (65%) but that it was unknown what instrument it was. In over half the cases the offender would enter the property from the rear (59%) and/or window (51%). It also appeared that an even split of offenders (48%) displayed evidence of leaving the crime scene the same way they entered. The highest frequency of methods used were via an insecure property (34%), the use of force (30%) and/or by smashing (29%). This appears

to show that there may be two distinct types of offenders. The first may watch a property or check for unlocked doors/windows to enter quietly. While the other would want to enter as quickly as possibly using force and/or some sort of weapon.

The property stolen shows that many domestic burglaries in the sampled area will take building/DIY materials (62%). This would include stealing from garden sheds where many occupants are likely to leave household tools. There is also a high amount that steal computers/computer accessories (51%). Midlands City police described an issue of laptop theft, particularly among the student population. As mentioned previously, an offender is likely to know they are targeting a student home to gather multiple laptop items.

Most of the domestic burglaries are against houses (36%) with a high percentage of those being semi-detached housing (13%). The extra offence information shows that 18% of homes burgled had alarms fitted and, as already mentioned, 16% of cases were against student homes. 15% of domestic burglaries in the sample were shown to be attempt burglaries. 11% of cases stated that the offender was disturbed and in 10% a witness could describe the suspect.

Table 9. Frequency of offence behaviours occurring in sample of domestic burglary

Offence Behaviour	Frequency	Percent
Weapon Used		
Weapon Unknown Instrument	5,387	66%
Weapon Key	1,005	12%
Weapon Foot	460	6%
Method of Entry		
Entry rear	4,870	59%
Entry window	4,198	51%
Entry door	3,484	42%
Entry front	1,879	23%
Entry side	631	8%
Exit Same as Entry	3,962	48%
Method of Operation (MO)		
MO Insecure	2,775	34%
MO Force	2,463	30%
MO Smash	2,348	29%
MO Climb	1,134	14%
MO Unlock	1,098	13%
MO Kick	498	6%
MO Reach	416	5%
Property Stolen		
Building/DIY	5,104	62%
Computers/Accessories	4,187	51%
Audio/Visual	2,384	29%
Documents/Cash/Stamps	1,932	24%
Handbags/Purses/Luggage	1,330	16%
Jewellery	1,192	15%
Keys/Locks/Safes	869	11%
Photographic/Optical	869	11%
Watches/Clocks	701	9%
Credit Card	578	7%
Furniture/Household Effects	379	5%
Clothing/Linen	332	4%
Pedal Cycles	255	3%
Vehicle/Accessories	24	1%
Premise Type		
House	2,969	36%
Semi-Detached	1,052	13%
Flat	758	9%
Terraced	672	8%
Extra Offence Information		
Alarm Fitted	1,515	18%
Victim Student	1,368	17%
Attempt	1,269	15%
Offender Disturbed	897	11%
Suspect Described	841	10%

4.3. Nature of the Data

Throughout the thesis, the data is explored based on the offence actions and offender characteristics. The findings addressed in exploring this information rest on the utility of the database. A limitation for any researchers using police data is its utility in deriving psychological theory. Police data is not recorded for academic research and therefore it must be approached in a systematic manner. Fortunately, many police forces within the United Kingdom are working towards methods of evidence-based policing and are therefore more conscious of the crime information recorded. The police however are aware that the data storage systems were designed with no provision for reuse, with data that has been recorded without an end in mind. Although there are limitations, the value in the results come from the fact that we are working with official data and can provide the real crime picture of domestic burglary.

The findings initially cast light on the problems of solving domestic burglary, with Midlands City police highlighting it was one of their most problematic crimes to solve. Domestic burglary is also a high-volume crime within most areas of the city, with some parts being recorded as the worst burglary hotspots in the United Kingdom. Table 10 displays the conviction rates of domestic burglary from the sample between 2011 and 2015. The full yearly average (2012 – 2014) conviction rate is 8% with domestic burglary offences displaying a steady consistency in volume and detection across the four-year period. The low detection rates of domestic burglary are a common theme throughout the literature as well as within this thesis. Dealing with a crime with such low detection rates means it is unavoidable in discussing when analysing data of this nature.

Table 10. Domestic burglary conviction rate between 2011-2015

Detection	2011 (Aug – Dec)		2012		2013		2014		2015 (Jan - Aug)	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Solved	141	11%	245	8%	220	8%	232	9%	74	7%
Unsolved	1,132	89%	2,891	92%	2,677	92%	2,486	91%	1,053	93%
Total	1,273	100%	3,136	100%	2,897	100%	2,718	100%	1,127	100%

Analysis Section Introduction: Distinctions of Behaviours, Offenders and the Relationship Between the Two

Study 1 addresses the validity of modelling domestic burglary using only solved cases. In doing so, the study also addresses the solvability of domestic burglary in attempting to depict offence behaviours that occur in more solved than unsolved cases. Past crime models of domestic burglary can be criticised as only representing solvable offences. This means that what we think could be a viable crime pattern and generalising it across the population, could not be displaying the 'real crime' picture (Biderman and Reiss, 1967). The aim of this study is to compare the offence behaviours of solved and unsolved domestic burglaries. It is hypothesised that there will be no difference in behaviours that occur across solved and unsolved offences, validating the use of solved data in modelling domestic burglary patterns. However, it is also hypothesised that there will be certain behaviours that will be identified as more significant to solved or unsolved offences. If there are behaviours identified as significantly different, then these can be used in predicting the solvability of domestic burglaries.

Study 2 examines the differences in domestic burglary criminality from the offence actions displayed, hypothesising distinct variations of the crimes. Smallest-Space Analysis is used in investigating the thematic structure of the offence behaviours. The main reasons for this are 1) to understand the criminality of domestic burglars and 2) to open further material for later use with an aim in investigating an accurate representation of domestic burglary.

Study 3 draws on Canter's (1995) profiling equation, where the actions in a crime can relate to the characteristics of an offender, hypothesising that different themes of burglary will be identified. Moffitt's (1993) Life Course Theory of criminal development and Fox and Farrington's (2012) study developing burglary profiles are used as frameworks for testing. Following this, study 4 aims to predict offender characteristics from behavioural offending patterns to produce a model of burglary offending styles across criminal development.

Chapter 5. Comparison of Solved and Unsolved Domestic Burglaries

5.1. Introduction

The current study highlights the use of solved crimes in modelling criminal activity and how these portray the so called "real crime picture". The study of criminal activity often implies that the crimes which are solved can be treated in the same way as the ones that are not. This raises a central question of whether the proportion of offences that are solved are any different from the offences that are unsolved. Differences present between the two samples may be due to the fact that there are a greater number of cases that go undetected than those that are cleared, thus a greater number of unknown offenders. The way an offender behaves during the offence could make the crime more, or less solvable. Comparing the behaviours that occur in solved and unsolved domestic burglary will uncover a greater conceptual issue of criminal activity.

Unlike previous studies focusing on specific technical details that facilitate operational issues, the broader question of what it is about the way a crime is carried out that allows its detection remains unclear. This issue of what people do behaviourally rather than focus on specific offences opens a whole domain of criminal activity. For example, in analysing the detection of metal crime on the national rail network, Robb et al. (2015) identified twelve features of solvability from metal theft detection including, identifying forensic material, witness evidence and covert police activities. On the other hand, previous studies discussed have suggested that there may be something about an offence that makes the police more interested in it (Greenwood and Petersilia, 1975; Greenwood, 1980; Coupe, 2014). This leads to the assumption that if an offence appears more interesting and solvable to an investigator, then they may apply more resources to that case. The solvability features of domestic burglary identified within the literature provide another layer of uncertainty to the nature of cases that go undetected.

The reality of studying criminal activity is that many researchers are unable to access a full database of solved and unsolved crimes. Additionally, the researchers that do have access to this information will work towards policy issues and more effective policing. Although a prominent issue to study, by analysing solved and unsolved offences at a conceptual level, the broad domain of the psychological behavioural context can be

uncovered. The very low detection rates of domestic burglary offences mean that they are an ideal crime type to analyse in this way. By examining the relationship between solved and unsolved domestic burglary, the findings will highlight any features of crimes that can make them more solvable. In identifying these the aim is to provide support to questions of whether detection is due to chance or the way the crime is committed. If features of the crimes can be found to predict solvability the possibility of prioritising offences will contribute to operational policies. Furthermore, identifying the features of crimes that can be most readily solved will improve the process of investigation with unsolved offences.

5.1.1. Solvability features of the sample

Many U.K. police forces adopt a preliminary stage of investigation for domestic burglaries which is not based on any statistical model, but subjective officer experience. From discussions with investigators from Midlands City Police, it was highlighted that some sort of screening process for investigating more solvable cases ought to take place but is not in practise. Lack of evidence means that many cases are closed with little investigation, for example, infrequently occurring solvability features such as forensic evidence and eyewitnesses. Police investigators stated that without these solvability features, roughly 75% of cases are closed without being solved.

Midlands City Police state that their system's solvability features are currently listed as: 'suspect named', 'associated vehicle', 'attempted burglary', 'stolen vehicle information', 'suspect linked', 'suspect described' and 'outstanding enquiries of investigation'. As already mentioned, where the suspect is named, described or linked are shown within the literature to be highly solvable features of domestic burglary (Farrington and Lambert, 1997). Although these elements of an investigation are known to be high solvability features, according to police representatives, these occur very infrequently. An associated vehicle or vehicle information (usually regarding a stolen vehicle), is flagged here as a solvability feature, yet not much past research has highlighted this as a solvable element. Again, this could be due to the police investigators' experience, which relies on more of a subjective decision, rather than an empirically investigated feature. Lastly, where an outstanding enquiry is highlighted, an officer has requested that information regarding the case will come back to them. Meaning that domestic burglary case is open to receive more resource attention.

Previous studies have identified features of burglary that can be used to predict the case solvability. Many of the same characteristics are repeatedly found within the research that feature more prominently within solved burglary cases. The aim of the current study is compare solved and unsolved domestic burglars to identify characteristics associated to solvability within a major city in the United Kingdom. In doing so, this study will assess the validation of basing models of crime solely on solved offences and adding to the uncertainty of the unsolved 'dark figure' of crime. The study also addresses the following research questions: Is there a difference between solved and unsolved domestic burglaries? Are there offence behaviours that occur more in solved than unsolved domestic burglaries? If yes, then can those offence behaviours be used to predict solvability of domestic burglaries? It is hypothesised that there will be behaviours carried out that are found to be significant to solved or unsolved offences. It is also argued that any significant behavioural characteristics of offences that are more solvable will reflect a model of the different behavioural styles of burglary.

5.2. Method

5.2.1. Sample

The sample of 8,491 (686 solved and 7,805 unsolved) offender-offence combination domestic burglaries across the four-year period, 2011 to 2015 is used. The data contains details relating to the offence characteristics, offender traits, victim traits, geographical location and the property stolen. For the comparison of solved and unsolved characteristics only details obtained from the scene or before an arrest are analysed. This includes information on the method of offending (M.O.), possible weapon used, type of property burgled and what property was stolen. Although the victim occupation was not a consideration in comparing solved and unsolved domestic burglaries, in cases where the occupation is recorded, 16% were shown to be a student. As previously mentioned, the considerable amounts of student burglaries in the area highlight this as a variable to consider and thus is also included in the analysis.

The sample of solved domestic burglaries displayed that 93% of the cases were committed by male offenders. 7% of the offenders were known to the victim, including a low

percentage of possible neighbour or family relations. The offenders displayed an average age at the time of offence of 25 years (Std. deviation = 8.472), ranging from 12 to 63.

Domestic burglary was highlighted by representatives at the data source as one of their most problematic crimes to solve. It is also a high-volume crime to most areas of the city, with some parts being recorded as the worst burglary hotspots in the United Kingdom. As mentioned previously, the full yearly average (2012 – 2014) conviction rate is 8% with domestic burglary offences falling each year. Although the sample is taken from a major metropolitan city, it includes a variety of inner city and outer suburban areas. The areas include varying residential property types, suggesting that the findings can be applicable to other areas of the United Kingdom.

5.2.2. Limitation of sample

Although obtaining a rich police database is hard to come by, further limitations have been addressed in the comparison of solved and unsolved cases. Paine and Ariel (2013) stated that where the victim knows who may have committed the burglary plays a powerful feature to the solvability of the case. In cases where the victim is involved in a domestic family related or a distraction burglary may provide more evidence to a case due to the interaction with the offender. Interaction between the victim and offender during an offence leads the suspect to be more easily described, making violent offences more likely to be solved than property offences.

Another limitation within the sample in comparing solved and unsolved domestic burglaries related to the way intelligence is gathered and recorded. The actual definitions used in the type of solved crimes that are analysed is an important consideration to make in such research. Some offences can be categorised as solved from what is referred to as 'taken into consideration' (TIC). A TIC is when an offender is already on trial for an offence or has been convicted of an offence and is given the opportunity to admit to other offences. Paine and Ariel (2013) describe these offences as ones that are convictions based on the absence of evidence and not because of it. With these limitations addressed, it was then important to construct a solid database that attempts to eliminate possible victim/offender relationships as well as only looking at offences that resulted in conviction due to the evidence available.

Taking the limitations into account, the data is made up of solved crimes where the detection is displayed as charged, warnings or cautions, removing TICs and restorative justice detection. Distraction burglaries were also removed as the victim would have had a more personal interaction with the offender than a 'normal' domestic burglary. Data was also removed where there was missing information for actions that did not occur within the sample. If the M.O., weapon used, property stolen and property type field contained less than 5% of information then it was excluded.

It is known that when working with police data the information gathered was not done so for research purposes. Therefore, a great deal of cleaning and sorting the data must be carried out for it to withstand the analysis. The presence or absence of forensic material that have been explored in studies of solvability were not available in the current study. Although previous studies have highlighted the presence of forensic material as one of the key features in solving burglary (Coupe, 2014; Robb, Coupe and Ariel, 2015), the current study places emphasis on the behavioural features of the offence. The use of DNA evidence, such as fingerprints and footwear impressions, are powerful solvability features but either do not occur or are not processed often. By studying the behavioural features, we can assess cases of domestic burglary irrespective of whether there was forensic evidence or not.

5.2.3. Analysis

The following analysis is split into two stages to fully comprehend whether the characteristics of solved and unsolved domestic burglaries differ and whether any case screening for solvability could be possible. The first part of the analysis will compare the frequency of offence characteristics for all the solved cases (n = 686) within this sample, with the unsolved cases (n = 7,805). The objective is to determine whether solved domestic burglaries differ from unsolved and to highlight any prominent characteristics to the solvability of cases. The data will be displayed using a scatterplot to ascertain the level of association between them. Chi-square tests will then be conducted to test the association between the variables to discover the significance of any relationship (p < .001).

The second stage of analysis assesses the possible police application of using the offence characteristics to screen cases for solvability. This is conducted by using a validation scheme. A random sample of 20% of the solved and 20% of the unsolved cases are set aside

as a validation database with the testing database made up of 80% of the original data. The final data training set is made up of 6,793 (549 solved and 6,244 unsolved) crimes for the model construction and 1,698 (137 solved and 1,561 unsolved) crimes for model validation.

Binary logistic regressions are used to investigate whether solvability could be predicted based on the offence characteristics examined. The validation database is then used to assess the fitted model to see if the offence characteristics are consistent in predicting solvability. Receiver operating curve (ROC) analysis is used by analysing the area under the curve (AUC) for the training and validation model to assess its performance. ROC analysis is a measure of goodness-of-fit often used to evaluate the fit of a logistic regression model based on the simultaneous measure of sensitivity (true positive) and specificity (true negative) for all possible cut-off points.

5.3. Results

5.3.1. Comparison of offence behaviours

The central question examines if there is any relationship between solved and unsolved domestic burglaries. This is conducted by statistically comparing the frequency of 40 offence characteristics available in solved and unsolved domestic burglaries. Figure 3 displays the scatterplot of the frequencies of 40 behavioural characteristics. The raw frequencies of the behaviours present in solved and unsolved offences with the significant differences are displayed in table 11. For ease of interpretation, the numbers displayed in the scatterplot relates to the list of 40 offence behaviours to the right of the plot. These behaviours are numbered from lowest frequency of solved offence behaviours to highest.

A major finding when statistically comparing the behaviours of solved and unsolved domestic burglary cases is that there is good relationship between the two samples ($r = 0.95$). This is important to note as it means that there is no difference between the behaviours that occur in solved domestic burglaries to those in unsolved. This is a major finding as it contributes to the validity of using solved offenses for developing models of domestic burglary.

The scatterplot below displays that only a small amount of offence behaviours occurred more in one sample than the other. 16 offence behaviours display a significant (p <

.001) difference between the samples, as indicated by the chi-square analyses. A higher percentage of those behaviours are shown to occur more in solved offences. These differences are displayed in figure 3 where there are offence behaviours that are positioned away from the central line of equal prevalence.

1 MO Reach	21 Suspect Described
2 Vehicle/Accessories Stolen	22 MO Unlock
3 MO Kick	23 Jewellery Stolen
4 Weapon Foot	24 Weapon Key
5 Attempt Burglary	25 Handbags/Purses/Luggage Stolen
6 Pedal Cycles Stolen	26 MO Force
7 Clothing/Linen Stolen	27 Keys/Locks/Safes Stolen
8 Terraced Property Type	28 Entry Front
9 Flat Property Type	29 Documents/Cash/Stamps Stolen
10 Furniture/Household Effects Stolen	30 House Property Type
11 Entry Side	31 MO Insecure
12 Credit Card Stolen	32 MO Smash
13 Suspect Linked	33 Entry Door
14 Victim Student	34 Audio/Visual Material Stolen
15 MO Climb	35 Exit Same as Entry
16 Watches/Clocks Stolen	36 Weapon Unknown Instrument
17 Semi-Detached Property Type	37 Computers/Accessories Stolen
18 Alarm Fitted	38 Entry Rear
19 Photographic/Optical Material Stolen	39 Entry Window
20 Offender Disturbed	40 Building/DIY Material Stolen

Figure 3. Scatterplot displaying frequencies of solved and unsolved offence behaviours. r = 0.95

The 16 significantly different offence behaviours are displayed in table 11 below. The 12 significant behaviours displayed in more solved offences, from highest to lowest frequency are: 39 (entry window), 37 (computers/accessories stolen), 34 (audio/visual material stolen), 32 (MO smash), 27 (keys/locks/safes stolen), 25 (handbags/purses/luggage stolen), 24 (weapon key), 21 (suspect described), 13 (suspect linked), 10 (furniture/household effects stolen), 6 (pedal cycles stolen) and 2 (vehicle/accessories stolen).

Upon investigating the data, domestic burglaries committed by two or more individuals were shown to occur in over half of solved offences (69%). This offence behaviour displayed a striking significant difference between solved and unsolved domestic burglaries. These findings coincide with Santtila et al.'s (2004) study identifying 69% of solved burglaries to be co-offences. However, the current cases only occur in the full sample of domestic burglaries (N = 8,491) in 5% of cases. It is previously discussed that this offence characteristics is likely to be only determined upon arrest. On the contrary, police representatives have stated that in many cases of domestic burglary it is known from the crime scene whether it was conducted solo or in a group. The evidence for this relies on

information from attempted burglaries that have been disturbed and witnessed, or cases where sizable items were taken that needed more than one individual. The high solvability of co-offences is an indicator that this is done so upon arrest of certain members of the group. If an offender lower down the command chain of a group is arrested for a domestic burglary, they may be more inclined to give away information. Due to the uncertainty around the unknown co-offences within the sample, the current analysis does not include this offence behaviour. However, as co-offending occurs in a large amount of solved domestic burglaries, it is important to consider for further analysis.

A surprising finding is the identification of specific property being stolen that relates more to solved domestic burglary. The higher frequency significant behaviours that relate to the items stolen are: computers/accessories stolen (56% of solved offense) and audio/visual material stolen (43% of solved offences). These variables provide evidence that police will be able to trace and recover items of higher value, leading to the offence inevitably being solved. Although there is a significant difference between these behaviour frequencies in the two samples, they do still occur in a high frequency of unsolved offences. Meaning, that it is difficult to identify whether these behaviours can act as predicting features of solvability.

The four significant behaviours displayed in more unsolved offences, from highest to lowest frequency are: 36 (Weapon unknown instrument), 26 (MO force), 14 (victim student) and 5 (attempt burglary). Although occurring in the lowest frequency of the full sample (15%), there is a highly statistical significant difference in solved and unsolved attempted burglaries. As with Robb et al.'s (2015) findings, if an offender is disturbed in the commission of their crime, the odds of solvability is halved. It is likely that the high frequency of unsolved attempted burglaries compared to the solved is because the offender could flee the scene without a successful entry. Meaning that the chance of an on-scene or near-scene arrest is reduced.

The comparison of offence behaviours also highlights the significant amount of domestic burglaries against student dwelling properties that go unsolved. Police representatives know these property types to be more planned targeted domestic burglaries in comparison to others. Unlike a domestic burglary against a non-student, if an offender knows their target is a student property, then they are aware that they may come away with a multitude of high valued items. It is well known that students will have mobile phones, computers, televisions and other high valued goods with less knowledge of home security.

For most students, it will be there first time living away from their family home and they are then likely to be less aware of security, making them easier targets.

Table 11. Offence behaviour frequencies from sample of 686 solved and 7,805 unsolved domestic burglaries (N=8,491) with indication of significant values

Label Number	Offence Behaviour	Solved	Unsolved
40	Building/DIY Material Stolen	403 (59%)	4860 (62%)
39	**Entry Window ***	**403 (59%)**	**3948 (51%)**
38	Entry Rear	390 (57%)	4638 (59%)
37	**Computers/Accessories Stolen***	**384 (56%)**	**3953 (51%)**
36	**Weapon Unknown Instrument ***	**382 (56%)**	**5124 (66%)**
35	Exit Same as Entry	315 (46%)	3766 (48%)
34	**Audio/Visual Material Stolen ***	**297 (43%)**	**2210 (28%)**
33	Entry Door	251 (37%)	3318 (43%)
32	**MO Smash ***	**243 (35%)**	**2199 (28%)**
31	MO Insecure	237 (35%)	2631 (34%)
30	House Property Type	223 (33%)	2833 (36%)
29	Documents/Cash/Stamps Stolen	191 (28%)	1824 (23%)
28	Entry Front	178 (26%)	1768 (23%)
27	**Keys/Locks/Safes Stolen ***	**163 (24%)**	**789 (10%)**
26	**MO Force ***	**159 (23%)**	**2359 (30%)**
25	**Handbags/Purses/Luggage Stolen ***	**147 (21%)**	**1246 (16%)**
24	**Weapon Key***	**145 (21%)**	**936 (12%)**
23	Jewellery Stolen	127 (19%)	1111 (14%)
22	MO Unlock	121 (18%)	1022 (13%)
21	Suspect Described *	105 (15%)	774 (10%)
20	Offender Disturbed	102 (15%)	837 (11%)
19	Photographic/Optical Material Stolen	96 (14%)	809 (10%)
18	Alarm Fitted	93 (14%)	1455 (19%)
17	Semi Detached	86 (13%)	1001 (13%)
16	Watches/Clocks Stolen	79 (12%)	656 (8%)
15	MO Climb	78 (11%)	1082 (14%)
14	Victim Student *	70 (10%)	1315 (17%)
13	Suspect Linked *	59 (9%)	69 (1%)
12	Credit Card Stolen	57 (8%)	545 (7%)
11	Entry Side	56 (8%)	595 (8%)
10	Furniture/Household Effects Stolen *	55 (8%)	344 (4%)
9	Flat Property Type	52 (8%)	716 (9%)
8	Terraced Property Type	42 (6%)	643 (8%)
7	Clothing/Linen Stolen	41 (6%)	303 (4%)
6	Pedal Cycles Stolen *	40 (6%)	233 (3%)
5	Attempt Burglary *	38 (6%)	1252 (16%)
4	Weapon Foot	35 (5%)	442 (6%)
3	MO Kick	34 (5%)	480 (6%)
2	Vehicle/Accessories Stolen *	26 (4%)	125 (2%)
1	MO Reach	24 (3%)	396 (5%)

Note: *Difference between Solved and Unsolved offences significant at $p < 0.001$. Row displays in **bold** are used in the logistic regression model.

5.3.3. Binary logistic regression

The next stage of analysis uses binary logistic regression to assess whether the offence characteristics observed could be used as predictors of solvability for a domestic burglary. The model contains nine statistically significant domestic burglary characteristics identified when comparing the solved and unsolved samples. These are 'Entry window', 'Computers/Accessories Stolen', 'Weapon unknown instrument', 'Audio/visual material stolen', 'MO smash', 'Keys/locks/safes stolen', 'MO force', 'Handbags/purses/luggage stolen' and 'Weapon Key'. The statically significant behaviours selected for the logistic regression model are present in a high frequency of offences. Other offence behaviours (displayed in table 11) are significant but only occur in a small percentage of cases and therefore were not selected for the logistic regression model.

The model was constructed using training data (n = 6,793). This resulted in the model containing the 9 statistically significant predictors (X^2 (9, n = 6,793) = 166.593, $p < .001$), indicating that the model could distinguish between offence characteristics observed in solved and unsolved cases. The significant features observed for solving offences were whether the offender entered through the window, audio/visual equipment were stolen, keys/locks/safes were stolen, weapon unknown instrument and forced used.

Table 12. Results of Logistic Regression on Training Data (N = 7,793)

Variables in the Equation	B value of prediction	Wald value	P value	Exp(B) odds ratio for predictors
Entry window	0.35	13.59	0.00	1.42
Computer Accessories Stolen	0.15	2.26	0.13	1.16
Audio/Visual Equipment Stolen	0.48	23.96	0.00	1.62
Keys/Locks/Safe Stolen	0.97	60.96	0.00	2.63
Weapon Key	0.07	0.26	0.61	1.07
Weapon Unknown Inst	-0.25	5.97	0.01	0.78
MO Smash	0.16	2.51	0.11	1.18
MO Force	-0.27	5.80	0.02	0.76
Handbags/Purse/Luggage Stolen	-0.02	0.03	0.86	0.98
Constant	-2.86	549.91	0.00	0.06

The results from the ROC analysis displayed the AUC as .650 with 95% confidence interval (.625, .674). The AUC was also significant ($p < .001$), meaning that although the AUC displays a fair score, the logistic regression can classify whether an offence is likely to be solvable significantly better than by chance. The ROC curve is presented in figure 4.
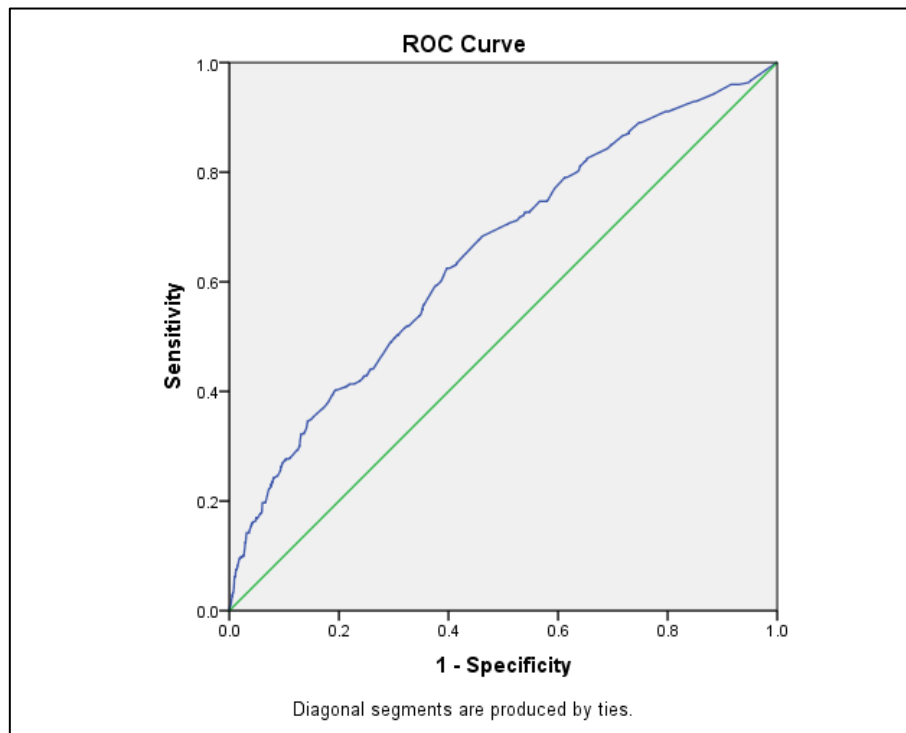
Figure 4. ROC graph representing the degree of accuracy in predicting whether a domestic burglary is likely to be solved or unsolved

Figure 5 shows the density distribution of the model's predicted probability within solved and unsolved for the training data. Without the significant behaviours used displaying vast differences in solved and unsolved offences, the model is only partly able to differentiate between solved and unsolved crimes. Thus, highlighting the difficulties faced by police forces in detecting domestic burglary.
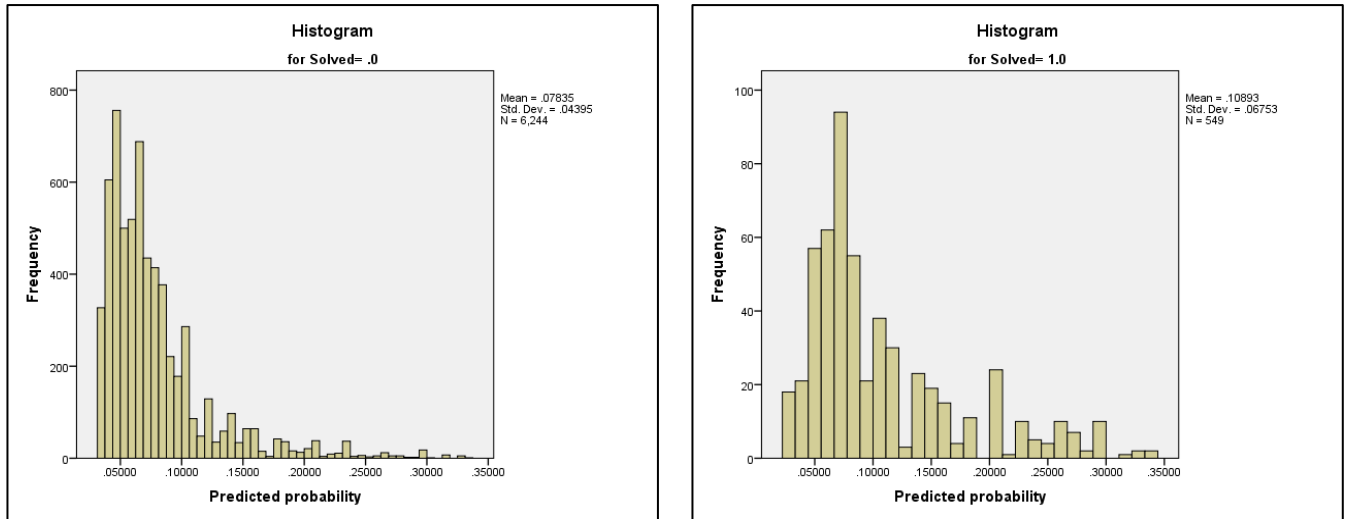
Figure 5. Predicted probability density distribution by solved class

5.3.3. Model validation and performance

The nine domestic burglary characteristics were again used to conduct a binary logistic regression using the validation data. The model was shown to be statistically significant (X^2 (9, n = 1,698) = 49.749, $p < .001$), indicating that using a different sample, the model can distinguish between solved and unsolved characteristics.

Table 13. Results of Logistic Regression on Validation Data (N = 1,698)

Variables in the Equation	B value of prediction	Wald value	P value	Exp(B) odds ratio for predictors
Entry window	0.00	0.00	0.99	1.00
Computer Accessories Stolen	-0.21	1.22	0.27	0.81
Audio/Visual Equipment Stolen	0.82	18.47	0.00	2.27
Keys/Locks/Safe Stolen	0.51	3.85	0.05	1.66
Weapon Key	0.01	0.00	0.98	1.01
Weapon Unknown Inst	-0.42	3.72	0.05	0.66
MO Smash	0.75	13.60	0.00	2.12
MO Force	0.15	0.48	0.49	1.16
Handbags/Purse/Luggage Stolen	0.20	0.79	0.37	1.22
Constant	-2.71	94.33	0.00	0.07

The validation data-set was then put through the same analysis as the training data-set to validate the model. The results for the validation data-set displayed almost identical results

as the training data with an AUC of .667 with 95% confidence interval (.617, .716). The AUC is also significant ($p < .001$), showing again that the logistic regression classifies the group significantly better than by chance. The ROC curve for the validation data-set is displayed in figure 6.
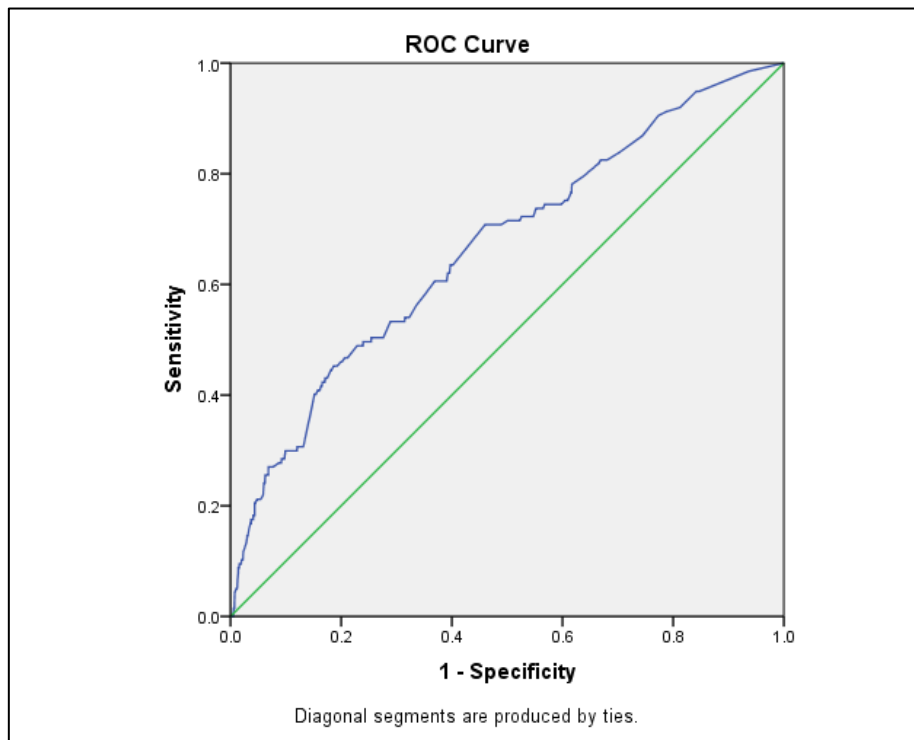
Figure 6. ROC graph representing the degree of accuracy from the validation data-set

Figure 7 shows the density histogram of predicted probabilities of the validation data distinguished by whether they are solved or not. The density distribution shows to follow the observed distribution found from the training data-set in figure 5.
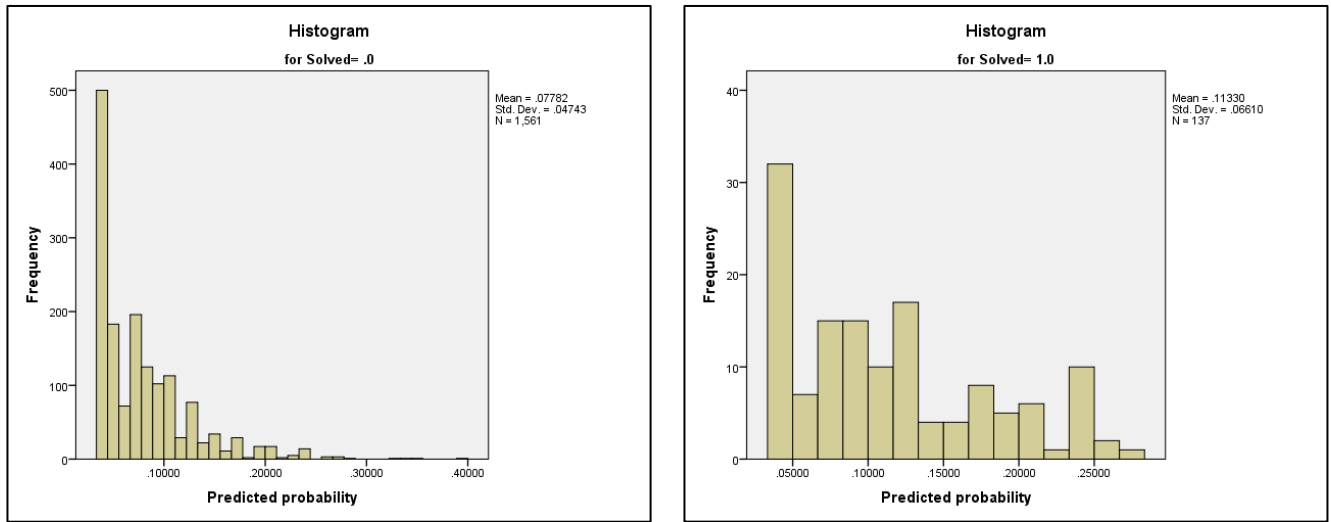
Figure 7. Predicted probability density histogram of validation data by solved class

The results indicate an overall good fit of the model when predicting solved domestic burglaries. However, the weak AUC test score indicates that the offence behaviours are not distinct enough in solved or unsolved offences to differentiate effectively between the two. This highlights further issues for the police in effectively detecting domestic burglary. Although this study does not contain forensic material, the solvable characteristics of an offender entering through a window or using a weapon could imply that forensic material was recovered. The audio/visual equipment and key/locks/safes stolen could potentially have been recovered or traced. However, this is an intriguing finding as items stolen have not been addressed in previous studies of solvability. The findings highlight that from a police perspective, to solve a crime, they need evidence and these characteristics all relate to situations where there is more evidence to clear the crime.

5.4. Chapter Summary and Conclusions

The central question within this study was whether solved domestic burglaries are different from unsolved. In order to answer this the frequency of behaviours occurring in both samples were compared. The findings showed a good relationship between solved and unsolved domestic burglaries, indicating many similarities in the behaviours that occur in both. The similarities in offence behaviours, displaying no significant difference between

solved and unsolved domestic burglaries, are shown to include method of entry and operation. This included offences where the offender entered from the rear, front, side and door, and where burglars targeted insecure properties, unlocked entry, climbed, kicked or reached to gain entry. Behaviours in solved and unsolved cases were also the same for property types, including houses, flats, terraced, semi-detached, and security, showing similarity between properties that have alarms fitted. Lastly, the type of property stolen displayed similarities across solved and unsolved cases, with stolen documents, cash, jewellery, photographic material, watches, credit cards and clothing displaying no significant difference. The similarities found across the offence behaviours in solved and unsolved domestic burglaries points to the likelihood that offenders will also be the same across the distinct styles committed. Suggesting that offenders shown to have a high amount or very little skill in their burglaries will be equally similar in solved and unsolved offences.

Although the findings displayed many similarities between solved and unsolved domestic burglaries, differences in characteristics were also identified. These characteristics related heavily to situations where there is more evidence to clear the crime. For example, much of the property stolen was shown to be the same in solved and unsolved cases, however, property of higher value was shown to be significantly different. These findings demonstrate a likelihood that these items provide more evidence for the police, possibly by being more traceable than those shown not to differ between solved and unsolved burglaries. The items include stolen computers, audio/visual material, keys, handbags, furniture, pedal cycles and vehicles. The results from the binary logistic regression also displayed behaviours that could provide more evidence for the police in domestic burglary cases and thus improving their chances of being solved. These findings highlight a significant contribution to the understanding of how domestic burglaries are solved and the behaviours carried out across unsolved crimes.

The results of the binary logistic regression demonstrated the utility of using offence characteristics as predictors of domestic burglary solvability. The frequently occurring significantly different behaviours used to construct the model resulted in an overall good fit when predicting solvability of domestic burglaries. However, the predicted probabilities displayed that the behaviours are not distinct enough in solved and unsolved offences to strongly differentiate between the two. The findings also have further implications for police investigators in effectively detecting domestic burglary, understanding differences in solved and unsolved crimes and prioritising resources to solvable cases. The results also provide a

better understanding for police in how to improve investigating unsolved burglaries, whilst also providing a theoretical understanding in the styles of domestic burglary.

Further evidence has suggested that offence behaviours that are prominent in solved offences compared to unsolved will have a significant impact in the predicted probability of crimes. However, these offence behaviours may rest heavily on police evidence and information gathered after an arrest. For example, upon examining the data the current study found that co-offending occurs in nearly 60% of solved domestic burglaries, and 0% unsolved. Unlike solo offenders, co-offenders increase their risk of being caught with the more individuals they involve themselves with. It is likely that weak members involved in the group could provide information to the police on current and past cases, putting other offenders at risk of being detected. The unknown behind this offence behaviour meant that it was not included in the current analysis, however it does prove to be a significant contribution to the predicted probability of domestic burglaries (see appendix).

What was identified in discussions with Midlands police is that where a burglary is in progress the police will attempt to reach the scene as soon as possible. On the other hand, it may take a responding officer a considerable amount of time longer to get to the scene if the offender is no longer there. This could play a part in why attempted burglaries are less likely to be solved, but also contribute to the 'dark figure' of unreported crime. As MacDonald (2002) pointed out, there are many socio-economic features that contribute to under-reporting of burglary, including a dissatisfied attitude to police. If it's public knowledge that the police will not respond as quickly to an attempt burglary, there is less chance of it being solved and they have not lost out financially, then it is likely that they may have doubts in reporting a burglary altogether. It is also important to note that the times/dates of recorded burglaries are often estimates, as the victim may have been away on holiday. The longer timing left between the incident occurring and being reported not only effects the detected outcome but also means that analysis is often imprecise.

As with the RAND Corporation study, many solved burglaries in the current study were shown to be based on the consequence of the burglary and whether anyone could witness the incident. This highlights the importance of resourcing police from the beginning of a burglary being reported to gather valuable information from the victim and those in the surrounding area. These results are consistent with those found by Coupe (2014), identifying that the evidence in characteristics of the offence can determine the solvability, but its

successful detection is contingent on resource inputs. The findings show that the solvability of domestic burglary rests heavily on where there is evidence, but also that there are very few differences between the offender behaviours. Therefore, when discussing the psychology of a burglar in later chapters there is little concern over the differences in behaviours that occur in unsolved and solved offences.

The characteristics that feature across unsolved domestic burglaries have not been previously focused on within the literature. By plotting the frequencies of solved and unsolved offences against each other, a greater theoretical understanding is made of the characteristics that feature within each.

Chapter 6. Differences in Criminality

6.1. Introduction

The previous chapter found a good relationship between solved and unsolved domestic burglaries, highlighting the utility of this data in modelling burglary. However, the findings do imply that behavioural styles carried out by burglars will differ. In order to understand this further the current analysis investigates the co-occurrence of behaviours with an aim in identifying the differences in criminality between offenders.

There is an abundance of research in developing models of crime that show burglary as prominent in the criminal histories of most offenders (Farrington and Lambert, 1994; Canter and Youngs, 2009). By exploring burglary in different contexts, researchers can get an understanding of the differences and similarities between the culpable offenders. The challenges faced when studying burglary, as previously discussed when focusing on the nature of the data, are reflected in the way models are developed. The information is usually limited and detection rates are low, particularly from the sampled city in this study. A similar challenge arises from using police data in which researchers will meticulously clean and organise the information for it to withstand analysis. Thus, models and typologies of burglary are frequently built from a small subset of offences with limited information.

Much research has cautioned against the use of typologies in any study that aims to model offending behaviours. Addressing the classification of adult offenders, Eysenck (1977) stated that early attempts of investigating offender "types" have been unsuccessful in doing so because of elevated expectations to find clear distinctions. Eysenck suggested that lowering the expectations in accord with the criminal situation, would increase the chance of differentiation between offenders, yet not take away the discovery of classifications between them. Canter and Youngs (2009) state that if using a typology, each broad type would need to be distinct from the other, meaning that each characteristic within that type would also be distinct from those in others. Coinciding with Eysenck, in many cases a distinct type of action will rarely be identified in inferring characteristics from offending behaviours. Offence characteristics that are present in one type will usually overlap and co-occur with other characteristics in another type.

Within Investigative Psychology, the challenges of studying offending behaviours are addressed using a thematic differentiation approach. This means that offence behaviours are

examined based on the theme they belong to. The identified themes can display psychological differences through distinguishing patterns of co-occurring behaviours. A basic hypothesis suggested by Youngs (2004) is that different types of the same crime will be reflected in offender characteristics relating to the styles in which they interact. This means that there will not just be one specific way a domestic burglary is carried out. Using statistical techniques within psychological research to group together types of offending behaviour is the only way to develop scientifically defensible descriptions and classifications of offenders. As with previous studies of crime modelling (Trojan and Salfati, 2016; Ioannou et al., 2015; Canter and Youngs, 2009), it is hypothesised that a thematic pattern of differing offence behaviours will be present within the sample.

The current study addresses the issue of differences in crime by producing an initial understanding of the co-occurring behaviours in domestic burglaries from a major metropolitan city. By investigating the sample of domestic burglaries, the following research questions are addressed: Are there behavioural differences in the way domestic burglaries are committed? Following from the previous study, if differing offending styles are identified, then do they relate to the offence being solved or not? It is hypothesised that differing themes of domestic burglary offending styles will be displayed that show a combination of solvability features. In this analysis, we look to identify meaning in the way offenders interact with their surroundings. In doing so the variables are distilled to those that could be relevant to the themes potentially revealing the underlying structure. The crucial point in this analysis is to establish the actions that correlate across the sample and how those reveal underlying styles and themes of offending behaviours.

6.2. Method

6.2.1. Sample

The sample used consisted of 8,491 (686 solved and 7,805 unsolved) offender-offence cases of domestic burglary committed between 2011 and 2015 in Midlands City. Many previous studies of crime will be limited by working solely with solved offences. To develop an understanding of the differences in domestic burglaries, the offence behaviours of both solved and unsolved cases are analysed. The behaviours examined include details obtained

from the scene or before an arrest, including the method of operation (M.O.), possible weapon used, property stolen, type of property and witness information.

6.2.2. Analysis

The current study uses a thematic differentiation approach in investigating 42 offence behaviours testing the differences in criminality of domestic burglary. This is conducted using Smallest-Space Analysis (SSA), a form of non-metric multi-dimensional scaling procedures that can represent correlations between the offence behaviours. Smallest space analysis (SSA-I), developed by Guttman and Lingoes (1973) allows the underlying structure of a set of variables to be appreciated by generating a spatial representation of the relationship of each variable to each other. SSA makes no assumptions about underlying structure, allowing a systemic structure to draw out themes of behavioural styles. The Jaccards coefficient is used in the analysis to assess the degree of co-occurrence between the variables. Jaccards is noted as the most appropriate correlation to use for a clearer SSA when analysing police data because of any missing information within the sample. It is known what the individuals are convicted of but not what they have done that they have not been convicted of. The dichotomous database is made up of 0's for the absence of information and 1's for the presence of information. The technical argument of the 0's in the data is that when using correlations, the 0's will push the co-occurrence very high. The Jaccards coefficient, however, ignores the co-occurrences between 0's so not to be biased towards them. The degree of co-occurrence is then expected to give a clearer picture using Jaccards.

The results that appear in the geometric representation simplify the analysis as follows: The closer any two points on the data matrix are the stronger the correlation between them. This means that there is a stronger relationship and better association between the variables in that space. The plot can be divided into regions and different themes are then generated by close examination of each variable to the next in the same regions of the plot. Shye (2015), describes variables as marking points to draw out regions, stating that it is not the clustering that has significance but the distinct regions with well-defined attributes. Variables that sit close together in the geometric space can be part of different regions, just as two cities can be close together but in different countries (Shye, 2015). Visa versa, two variables that are far apart can be in the same region, such as two cities far apart yet in the same country.

The smallest space analysis will also produce a coefficient of alienation (Borgs and Lingoes, 1987) which is used to show a measure of how good the fit between the spatial representation and the co-occurrences is. The coefficient of alienation can fall between 0 to 1, with the measurement working on the premise that a smaller value represents a closer fit between the plot and the matrix. In practice, a coefficient smaller than 0.15 would be considered a good fit while a coefficient between 0.15 and 0.20 is considered a reasonably good fit. However, there is no empirical evidence that shows the level of value of coefficient of alienation that can be accepted (Borgs and Lingoes, 1987). This will depend upon a combination of the number of variables, the amount of error in the data and the logical strength of the interpretation framework.

6.3. Results

An initial overview of the frequencies in solved and unsolved domestic burglaries displays some difference between the two, indicating that there may be variation in offending styles. Findings from the previous chapter showed that there are many similarities in behaviours that occur in solved and unsolved offences. This means that the offending styles will display a combination of behaviours occurring in more solved and unsolved domestic burglaries. This provides evidence in the importance of analysing a full sample of offence behaviours when studying the initial difference in criminality. The table below contains the total frequency of offence behaviours in the sample as well as the frequencies present in solved and unsolved offences.

Table 14. Total Frequency of Domestic Burglary Offence Behaviours. Displaying full database frequency and frequency for solved and unsolved cases.

Offence Behaviour	Total Frequency	Solved	Unsolved
Weapon Unknown Inst	5506 (65%)	382 (56%)	5124 (66%)
Building/DIY Stolen	5263 (62%)	403 (59%)	4860 (62%)
Entry Rear	5028 (59%)	390 (57%)	4638 (59%)
Entry Window	4351 (51%)	403 (59%)	3948 (51%)
Computers/Accessories Stolen	4337 (51%)	384 (56%)	3953 (51%)
Exit Same as Entry	4081 (48%)	315 (46%)	3766 (48%)
Entry Door	3569 (42%)	251 (37%)	3318 (43%)
House	3056 (36%)	223 (33%)	2833 (36%)
MO Insecure	2868 (34%)	237 (35%)	2631 (34%)
MO Force	2518 (30%)	159 (23%)	2359 (30%)
Audio/Visual Stolen	2507 (30%)	297 (43%)	2210 (28%)
MO Smash	2442 (29%)	243 (35%)	2199 (28%)
Documents/Cash/Stamps Stolen	2015 (24%)	191 (28%)	1824 (23%)
Entry Front	1946 (23%)	178 (26%)	1768 (23%)
Alarm Fitted	1548 (18%)	93 (14%)	1455 (19%)
Handbags/Purses/Luggage Stolen	1393 (16%)	147 (21%)	1246 (16%)
Victim Student	1385 (16%)	70 (10%)	1315 (17%)
Attempt	1290 (15%)	38 (6%)	1252 (16%)
Jewellery Stolen	1238 (15%)	127 (19%)	1111 (14%)
MO Climb	1160 (14%)	78 (11%)	1082 (14%)
MO Unlock	1143 (13%)	121 (18%)	1022 (13%)
Semi Detached	1087 (13%)	86 (13%)	1001 (13%)
Weapon Key	1081 (13%)	145 (21%)	936 (12%)
Keys/Locks/Safes Stolen	952 (11%)	163 (24%)	789 (10%)
Offender Disturbed	939 (11%)	102 (15%)	837 (11%)
Photographic/Optical Stolen	905 (11%)	96 (14%)	809 (10%)
Suspect Described	879 (10%)	105 (15%)	774 (10%)
Flat	768 (9%)	52 (8%)	716 (9%)
Watches/Clocks Stolen	735 (9%)	79 (12%)	656 (8%)
Terraced	685 (8%)	42 (6%)	643 (8%)
Entry Side	651 (8%)	56 (8%)	595 (8%)
Credit Card Stolen	602 (7%)	57 (8%)	545 (7%)
MO Kick	514 (6%)	34 (5%)	480 (6%)
Weapon Foot	477 (6%)	35 (5%)	442 (6%)
Co-Offences	422 (5%)	408 (59%)	14 (0%)
MO Reach	420 (5%)	24 (3%)	396 (5%)
Furniture/Household Effects Stolen	399 (5%)	55 (8%)	344 (4%)
Clothing/Linen Stolen	344 (4%)	41 (6%)	303 (4%)
Pedal Cycles Stolen	273 (3%)	40 (6%)	233 (3%)
Vehicle/Accessories Stolen	151 (2%)	26 (4%)	125 (2%)
Suspect Named	135 (2%)	122 (18%)	13 (0%)

Suspect Linked	128 (2%)	59 (9%)	69 (1%)
Total	**8,491**	**686**	**7,805**

6.3.1. Co-offenders

A substantial and notable difference, between the solved and unsolved offences is the frequency of co-offences in the sample. In the total sample, the co-offences only make up a low 5% of offence behaviours. However, when divided there is a difference, with 59% (N = 408) of those occurring in solved domestic burglaries and 0% (N = 14) in unsolved. The domestic burglary being a co-offence (committed with two or more individuals) is one of the highest occurring offence behaviours in the solved cases. These findings are evidence of group crime producing more cases for the criminal justice system. Much of the criminological research has established that co-offending accounts for a large proportion of all crime. This adds support to the notion that understanding co-offending in all crime types will lead to an understanding of the processes that contribute to crime (McGloin and Nguyen, 2013; Bastomski et al., 2017). Thus, the high frequency of co-offending occurring provides evidence in supporting a social hypothesis of domestic burglary.

6.3.2. Property stolen

The property-related offence behaviours display an unsurprisingly high frequency of building and DIY equipment stolen (62%), in a high frequency in both solved (59%) and unsolved (62%) cases. The most common type of burglary accounted by the police representatives was towards garden sheds and workshops with easy access. The police have found that the detection for a shed break in can often be detected more than for a dwelling. This is because many properties will have closed-circuit television (CCTV) covering their sheds and rear garden areas so the police can trace the footage back to an offender. However, building and/or DIY equipment being stolen still occurs slightly more in unsolved than solved offences.

Computer equipment is the second most stolen property in domestic burglaries in the area (51%). It is likely that this high frequency is due to the increasing student population in the city. Nowadays the average household will contain either a laptop or desktop computer, but a student dwelling will contain multiple computer related items. Much of the other items

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stolen relate to small and common items taken in a burglary. 30% of cases had audio and visual equipment stolen, such as televisions and sound systems. In 24% of cases documents and cash were taken, 16% had a handbag or purse stolen and in 15% of cases jewellery was stolen.

The large sample size means that the lower frequency offence behaviours are significant to assess. For example, in 3% (N = 273) of the sample a pedal cycle is stolen, with 6% (N = 40) in solved and 3% (N = 233) in unsolved cases. However, police representatives suggested a blurred line between a stolen bicycle being detected as a handling or burglary offence. Although a bike being stolen may have been part of a burglary, the recovery of that item may result in it being charged as a handling offence. The police push for more residents and students to mark their bikes through the national register 'immobilise' and stop checks are conducted periodically. Registered serial numbers will be run through the system and if the bike is flagged as stolen then action will be taken. Stolen pedal cycles can also be solved in a quick sweep of many items as the stolen bikes will often end up in storage, likely with multiple bikes and other items, in the possession of a single offender. If police can detain that individual, then they can usually clear up multiple crimes in one hit.

6.3.3. Method of operation

There is almost an even split displayed in solved and unsolved domestic burglaries between an offender entering a property by insecure means, with the use of force and by smashing. In many cases the offender entered the property via the rear (59%) and/or through a window (51%). These offence behaviours can be used to distinguish between different styles of offending, as was found in Maguire and Bennetts (1982) study that showed differences in those that use force and those who enter via insecure means. An insecure entry relates to an offender breaking in via an unlocked or left opened access point, such as a door or window. Offenders that enter via insecure means have been noted in past studies to target properties for that specific reason. In addressing methods of entry recorded in 1975 by Thames Valley police, Maguire and Bennett (1982) found that the clear majority smashed glass or used bodily pressure to enter, whilst the remainder used an insecure opportunity. The findings show that methods of entry have shown little change in the past forty years, however whether they can be used to distinguish between offending styles is later discussed.

6.3.4. Police recording

The findings lay the ground work in terms of issues with differences in what the police do and how offences are detected. A very low frequency of cases shows that the suspect is named and/or linked. However, the suspect is disturbed in 11% and described in 10% of cases, meaning that even when an individual is witnessed, they are not always detected through the identification of a name or linked to other offences. The offence behaviours display a higher frequency in solved cases when the suspect is disturbed (15%), described (15%), named (18%) and linked (9%).

Although the gathering of witness statements will be based on the competence of the police officer recording the incident, many of these behaviours are likely to be related to the caution taken by the offender. For example, an offender being disturbed or suspect named would suggest that the offender did not take as much caution as they should have in the commission of the offence.

6.3.5. Smallest-Space Analysis (SSA-I) of offence behaviours

The examination of the offence behaviour frequencies found that there will likely be a thematic distinction present in establishing differences in criminality. To investigate this further, the sample of 42 offence behaviours were analysed using SSA-I. The three-dimensional resulting configuration has a coefficient of alienation of 0.206 with 38 iterations, which indicates a reasonably good fit of the co-occurrences of listed characteristics. The two-dimensional configuration did not display as good a fit as the three-dimensional (coefficient of alienation = 0.300 with 14 iterations) and was thus not used for the analysis.

The frequencies examined play an important role in distinguishing patterns of behaviours within the SSA-I plot. Figure 8. displays the three-dimensional configuration with superimposed frequency contours indicating a modular facet of the variables. As shown, the behaviours that occur most frequently within the sample are positioned within the centre of the space, whilst those that occur least frequently are positioned towards the periphery. This circular pattern can be described as a 'radex of criminality' (Guttman, 1982). The radex of criminality illustrates quantitative and qualitative variations in crime that relates to the rarity

of behaviours occurring and the differentiation of behaviours into themes (Canter and Youngs, 2009). The commonality shared between variables will bring them closer, showing that those with shared characteristics will bring them to the centre of the plot. Previous studies, have illustrated similar variations between crime scene actions. For example, in their investigation of crime scene actions of juvenile fire setters Santilla et al. (2003) found that the high frequency of actions would be central to the SSA plot, whilst the more specific actions that define the themes would move towards the outskirts. The behaviours on the outskirts of the plot are those that produce qualitative variations in offence behaviours as they do not share similar characteristics. These act as the distinguishing variables that allow regions to be drawn around the behaviours into themes of offending styles. The frequency contours display a guide of the pattern that can be seen from the frequencies of occurrence. The centre of the plot displays high frequency behaviours such as, 'Weapon Unknown Instrument' (65%), 'Entry Rear' (59%), 'Entry Window' (51%) and 'Exit Same as Entry' (48%). A few of the lowest occurring behaviours along the periphery of the plot include 'Entry Side' (8%), 'MO Kick' (6%)', 'Co-Offence' (5%), 'Suspect Linked' (2%), 'Suspect Named' (2%) and others relating to property stolen and method of entry.
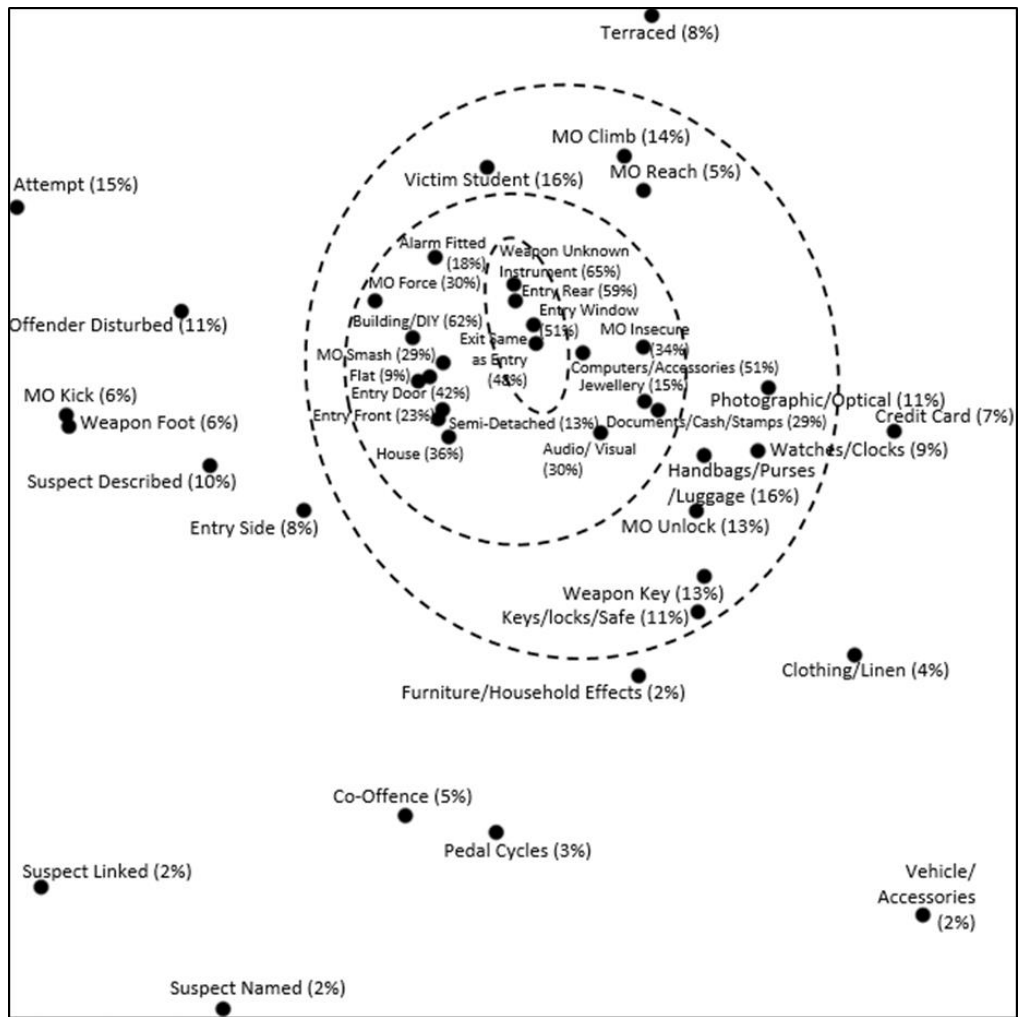
Figure 8. 1 by 2 projection of three-dimensional SSA-I with frequency contours superimposed on. Coefficient of Alienation = 0.21

The frequencies of offence behaviours occurring are an important aspect to any pattern or relationship between variables. The SSA results display an interesting radex, with the high-frequency offences gathered in the centre of the plot, whilst the low frequency offences are positioned along the periphery. The large sample means that some offence behaviours will have much lower frequencies of 2% and 3%. Gaps in the plot are then caused by these low occurring behaviours that pull-out variables from the high frequency ones remaining in a central position.

When analysing the offence behaviours, it is crucial to examine how they interrelate to emphasise clearly-defined and distinct regions. For example, 9% of cases take place in a flat, which is a low-frequency offence to be positioned in a central area surrounded by 'MO Smash' (29%) and 'Entry Door' (42%). In this instance, the property type may mean that

there would be no other way to get in the door, hence the low frequency variable 'Flat' is pulled into an area of high-frequency behaviours. This is also evident for the semi-detached property that occurs in 13% of domestic burglaries and is positioned next to 'Entry Front' (23%). If the semi-detached property is in the middle of two others, as many are in a city area, then the offender will mainly enter through the front of the property.

As discussed when observing the frequency of the offence behaviours, the variables 'MO Force' and 'MO Insecure' are positioned away from each other in the SSA. These behaviours not co-occurring adds further support to the theory that domestic burglars have distinctive styles of offending. This is also evident when examining the weapons used; the SSA plot displays the variables 'Weapon Foot', 'Weapon Unknown Instrument' and 'Weapon Key' all in different areas of the space. As discussed by Shye (2015), the observable attributes will mark out a point to draw the regions. These regions can only be distinguished from clearly defined attributes, which in this study are the offence behaviours.

The results displayed in the figure below show four identified thematic differentiations of domestic burglary. The four themes are labelled: 'Forceful', 'Skilled', 'Interpersonal' and 'Opportunistic'.
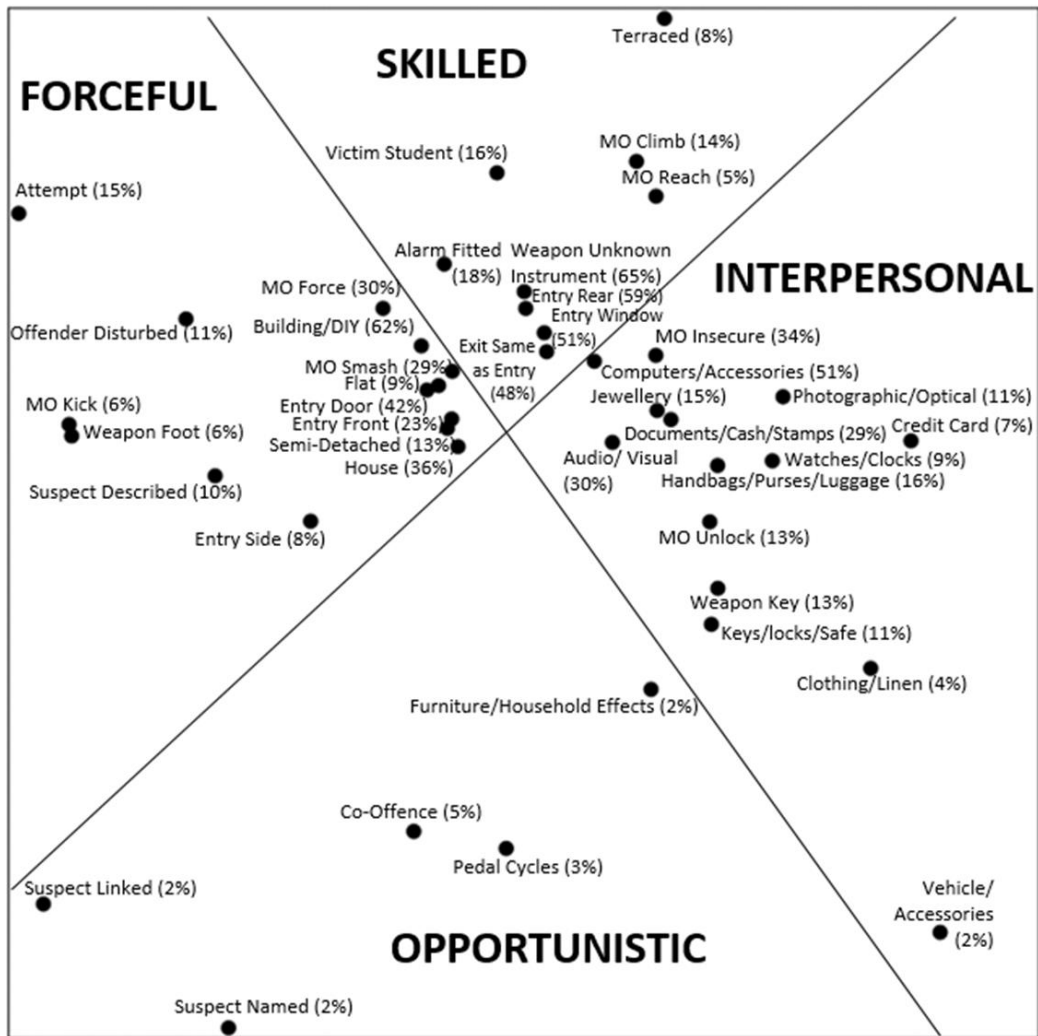
Figure 9. 1 by 2 projection of three-dimension SSA of 42 offence characteristics.

An interesting observation also came from assessing where the behaviours that appear in more solved or unsolved cases are placed in the SSA-I space. The figure below displays a divide between the solved and unsolved offence behaviours. Although there are a few anomalies, such as 'Suspect Described' and 'Offender Disturbed' appearing in more solved cases, the divide between behaviours appears evenly down the middle. This implies that some behaviours will co-occur more in solved and others in unsolved domestic burglaries.

Although figure 10 displays behaviours occurring in more solved or unsolved domestic burglaries, the significant predicting factors of solvability identified in the previous chapter are scattered throughout the themes. 'Co-offence' is shown in the Opportunistic theme, 'entry window' and 'weapon unknown instrument' are within the Skilled theme, 'MO smash' and 'MO force' are within the Forceful theme and lastly, 'computer/accessories

stolen', 'audio/visual material stolen' and 'handbags/purses/luggage stolen' are within the Interpersonal theme. This finding provides further evidence in arguing that the solvability of domestic burglary rests heavily on the evidence obtained by the police. However, when accounting for the behavioural variations of the crime, solvability is not based on what the burglars do differently.
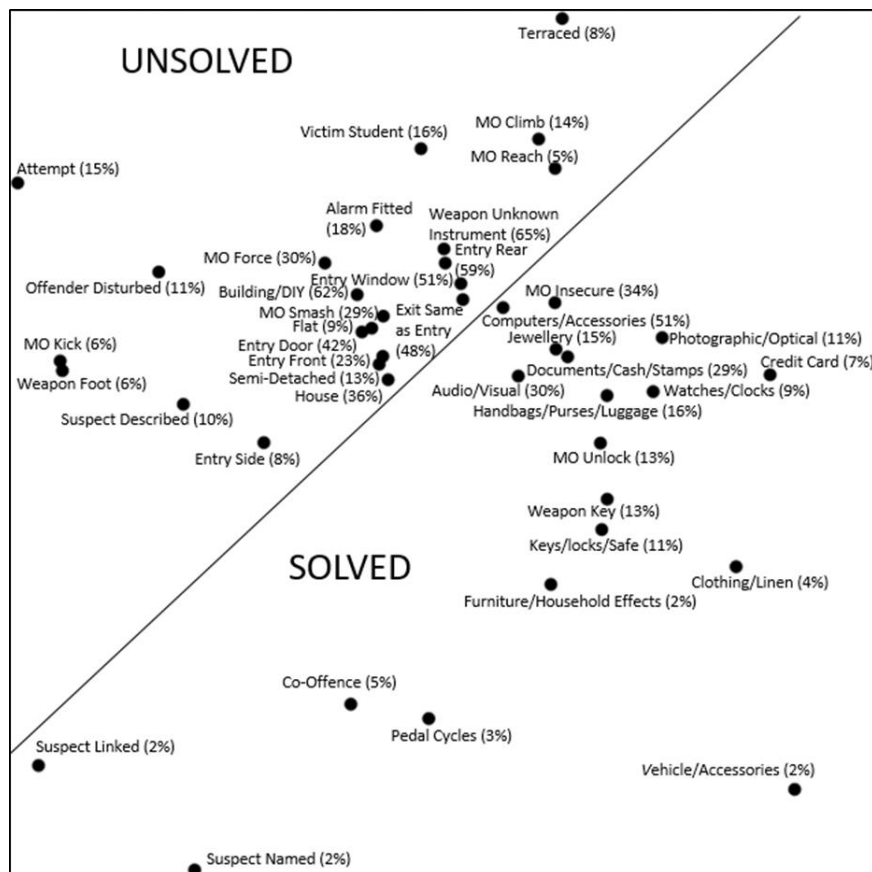
Figure 10. 1 by 2 projection of three-dimensional SSA-I with regional divide of solved and unsolved behaviours superimposed on. Coefficient of Alienation = 0.21

6.3.5.1. Forceful

On the left-hand side of the SSA space, shown in figure 9, are offence behaviours that are indicative of an offender who is not taking much caution in their approach. This region is labelled the 'Forceful' offending style as many of the behaviours relate to the offender using behaviours that imply force. These include: 'MO Force', 'MO Smash', 'MO kick' and 'Weapon Foot'. These forceful behaviours appear to co-occur in the SSA space with the offender entering through the front door. As previously mentioned, this could be due to the

property being a flat and there being no other option but to break-in through the front door. However, semi-structured houses are also positioned close to these behaviours, meaning that there is a heightened level of confidence displayed through the actions in this style of offending.

The 'Offender Disturbed' (11%) and the domestic burglary being an 'Attempt' (15%) are attributes to the 'Forceful' offending style. Attempted burglaries are well documented in recent studies to be highly undetectable (Coupe, 2014; Robb et al., 2015). If little evidence is left at the scene, then the chance of an on-scene or near-scene arrest is drastically reduced. When the offender is disturbed in the act it gives them a chance to flee the scene, therefore leaving the case likely undetected. However, if an offender is disturbed there is also the likelihood that they were witnessed, which on the other hand, could lead to their arrest. The suspect being described is positioned within the Forceful theme and occurs more in solved (15%) cases than unsolved (10%). However, the suspect being described still occurs in a very small overall percentage of cases (10%). These attributes of the Forceful style of offending highlight that this haphazard, sporadic way of committing a domestic burglary will not be as fruitful as other styles.

The only stolen property in this region is building equipment which, in many cases, will come from a garden shed. Building and DIY equipment is the most frequently stolen material in the sample (62%), occurring more frequently in unsolved (62%) than solved (59%) domestic burglaries. In many cases offenders will target garden sheds for a quick and easy burglary attempt. This offence behaviour occurring more in unsolved offences does not necessarily mean that they were successful. As already mentioned, many of the forceful burglaries will be disturbed, leading to an attempted burglary.

6.3.5.1. Skilled

The area towards the top of the SSA space displays offence behaviours that imply a level of planning, skill and forethought, and is therefore labelled the 'Skilled' style of domestic burglary. The offence behaviours that imply a level of skill include the variables 'Alarm Fitted' (18%), 'Weapon Unknown Instrument' (65%), implying the use of a weapon, 'MO Climb' (14%) and 'MO Reach' (5%).

As with the Forceful style of offending, the behaviours present in this region appear more in unsolved cases of domestic burglary. However, unlike the forceful offending style, the skilled offender will have a higher material gain from their domestic burglaries. The variable 'Victim Student' is positioned within the skilled style of offending. As mentioned already within this thesis, if a burglar targets a student property, then they are likely to come away with multiple high-value items including phones, laptops and televisions. Offenders that target student properties can benefit from knowing that the job is likely to be more fruitful than targeting a family dwelling. The victim being a student occurs in a low frequency of the sample (10%), with most of those cases being unsolved (17%). For many students, it will be their first time living away from the comfort and security of their family home, so they will have a lower sense of security for their properties. Offenders that target these dwellings take advantage of this, knowing that these properties will have easier access than a non-student accommodation.

The variable 'Alarm Fitted' is also within the Skilled offending style and is positioned close to the 'Weapon Unknown Instrument' variable. The co-occurrence of these two variables within the SSA space implies a level of forethought from the offender to bring a weapon in the case of damaging the alarm system. These offenders are also shown to enter and exit at the rear of the property and through a window. These behaviours positioned within this region add further support to the offender demonstrating a higher level of skill than other offending styles.

The findings within this themed region coincide with Canter and Youngs' (2009) study of modelling burglary based on a Narrative Actions System. Behaviours present in the current findings are also displayed in Canter and Youngs' (2009) 'Adaptive Adventurer' theme. They describe this offender as being fully aware of their intrusion into someone's home, but gains satisfaction in mastering their environment, such as bringing a weapon to the scene and preparing an exit. Canter and Youngs (2009) describe these offenders as functioning on their highly-instrumental actions in gathering all valuable items identified in a search of the property.

6.3.5.2. Interpersonal

The 'Interpersonal' style of offending highlights the offender's lack of awareness of the victim, in that the property being occupied is not a high concern. The right-hand side of the SSA-I space displays the variables 'MO Insecure', 'MO Unlock' and 'Weapon Key', alongside others. The use of a key to unlock may suggest that the offender either has a relationship towards the victim, gaining access to the property, or that the offender has stolen the victim's vehicle keys to steal it from the property. Out of the occupied properties (N=275) that could be ascertained from the police description of the offence, 45% were insecure. Many of the occupied properties that are shown to be insecure were targeted at night-time (73%) when the occupier is likely to be asleep. Although the details of the property being occupied, identified in the police reports, are only evident in a small amount of cases (3%), the findings highlight the offender's awareness of the victim. However, previous studies have identified burglary as mainly a daytime offence with offenders actively avoiding occupied homes (Reppetto, 1974; Maguire and Bennett, 1982).

All the offence behaviours within this region have a higher frequency in solved than unsolved domestic burglaries. The high volume of property stolen variables within this region suggests that the Interpersonal offenders are likely to steal a multitude of items regardless of the value. The co-occurrence here, however, indicates that the items stolen in a domestic burglary are only known or recovered upon detection. The low frequency of stolen items within the sample show that in many cases of domestic burglary items are not recovered.

Canter and Youngs (2009) state that the Interpersonal style of offending can have many connotations to the way they relate to the victim. Within Investigative Psychology the understanding of the social transaction of burglary allows us to interpret the focus of the offender. This Interpersonal style of offending can be compared to Canter and Youngs (2009) 'Expressive Quest' burglar through their task focus. The offender committing this style of burglary is likely to have an awareness of the home they are intruding but a lack of focus on the task. They demonstrate a risky style of offending, being that the property could be occupied and are not concerned with detailed technical proficiency.

6.3.5.3. Opportunistic

The offence behaviours occurring in the bottom section of figure 9 are some of the lowest occurring behaviours in the sample, labelled 'Opportunistic' domestic burglaries. The offence behaviours included in this region of the SSA-I are 'Co-Offences', 'Pedal Cycles Stolen', 'Furniture/Household Effects Stolen', 'Suspect Named' and 'Suspect Linked'. Much of these behaviours relate to whether the offender has taken much caution in their approach. For example, in many of the cases where the suspect is linked and/or named, the offender has been witnessed during the act. These offenders will have taken little planning into their actions and instead gone about the task without too much forethought. These offenders will use less caution then the other offending styles which leads to them being witnessed and detained.

As mentioned earlier, there is a substantial difference between the co-offences that occur in solved and unsolved domestic burglaries. The co-occurrences of these behaviours suggest that the information of a domestic burglary being committed by more than one offender is acquired upon arrest. The police can clear up multiple crimes of bike theft once the offender is detained, so it is also evident that the same occurs in co-offences. If the police have detained and individual who is willing to talk about if the offence was carried out with other offenders, then they can clear up multiple offences in one go. However, this finding contributes to the problem of co-offending being a major role in the volume of domestic burglaries.

All the behaviours within this region are displayed in more solved than unsolved domestic burglaries. Meaning that much of these behaviours will rest on the police investigative process as well as the offender's lapse in caution. It is likely that if the data contained forensic material that it would sit within this region, co-occurring with other solvable offence characteristics. The procedure of obtaining and processing forensic material found at a crime scene rest heavily on the judgement of the police investigator. As well as the investigative process, the offender had to have been inexpert in having left forensic material, such as blood or fingerprints, at the scene.

6.4. Chapter Summary and Conclusions

This chapter provides the basis for understanding domestic burglary within Midlands City, laying the ground work of differences in criminality. It opens all sorts of cross-references in how it relates to other models and underlying themes. The methodology, utilising both solved and unsolved cases, identifies broad patterns of domestic burglary offending styles, providing an accurate representation of offence behaviours present within the sample. The results presented here demonstrate that by using a thematic approach it is possible to differentiate domestic burglary offending styles. The differentiation of offending styles places the offence behaviours into one of four themes, labelled: 'Forceful', 'Skilled', 'Interpersonal' and 'Opportunistic'. The offence behaviours that are positioned within these thematic regions are shown to have a common underlying meaning. However, it is not their clustering that has a significance but their meaning to the distinct thematic region (Shye, 2015).

The overall framework identified here coincides with Youngs' (2004) hypothesis, in that there are four distinct domestic burglary behavioural offending styles. The results also demonstrate that, based on the position of the behaviour in relation to the distinct themes, some styles of offending occur in more solved cases than others. However, the solvable behaviours identified in the previous study are shown to be spread throughout the different offence styles. This indicates that there may be more evidence in some cases than others that link to an offender to a crime, which is why the behavioural patterns in the Interpersonal and Opportunistic themes are shown to be more solved. As there was previously shown to be a good relationship between solved and unsolved domestic burglaries, it can be argued that the differing offence styles will occur across both.

The current findings highlight the importance of analysing a full database of solved and unsolved offence behaviours in studying differences in criminality. This process is the only way to gather an accurate representation of a sample, and it is likely that this not only relates to domestic burglary but other crime types also. The succeeding chapter moves towards the examination of offending behaviours to the distinction of offender characteristics.

Chapter 7. Inferences of Characteristics from Behavioural Differentiation

7.1. Introduction

In the previous chapters, focus was drawn to the specific domestic burglary offence characteristics in identifying different styles of offending behaviours. The current study places a more detailed focus on the offender's background in deriving inferences of characteristics from the actions carried out. Drawing on Canter's (1995) A → C equation, the inferences will be derived from the offending styles (time of day, method of operation, etc.) that display patterns relating to the characteristics of the offender (criminal history, age, race, sex, etc.). It is hypothesised that by applying this scientific psychological approach, the actions of the crime will correspond to the characteristics of the offender.

Previous studies of burglary have sought to predict the traits of an offender based on the readily available characteristics displayed at the crime scene (Maguire and Bennett, 1982; Santtila et al., 2004; Farrington and Lambert, 2007; Vaughn et al., 2008; Fox and Farrington, 2012). Many of these have identified a development in burglary expertise based on the offender's age, criminal onset and the experience that coincides with those attributes. In their study developing burglary profiles, Fox and Farrington (2012) report a strong relationship between Moffitt's (1993) life course theories of criminal behaviour and the subtypes of offender traits and criminal history. Fox and Farrington (2012) reported that the rate of offending in their sample of burglar's criminal experience fit Moffitt's (1993) adolescence-limited and life-course persistent typologies. The findings suggest that there will be differing levels of burglars, with some offenders that begin their criminal career at an early stage of life. These offenders will engage in antisocial behaviour that continues into adulthood, also known as Moffitt's life-course persistent offending type. Moffitt (1993) highlighted that an early onset into criminal behaviour has a powerful correlation to serious criminal offending further into adulthood. The others form the age-crime curve with criminal careers of shorter duration and a more temporary involvement in antisocial behaviour, also known as adolescence-limited offenders (Moffitt, 1993).

These differences in criminal experience have been found to influence the way a burglar behaves when committing their offence. Mawby (2001) suggested that most burglaries are planned, rational acts and that unplanned, opportunistic styles are rarely

represented. Although this may be evident in many cases, research has consistently identified differing distinct groups of burglary levels. Maguire and Bennett (1982) highlight the disagreement among researchers for the best term to use to describe a so called 'professional burglar'. Instead they insist that domestic burglars can fall into one of three categories; low level amateurs, mid-level professionals and high-level professionals. Although this has not been developed as any uniform classification of burglars, similarities are noted to these different levels of burglary throughout the literature. Maguire (1988) later reported that burglars can be classified based on their decision-making processes and levels of sophistication. These were labelled as planners, searchers and opportunists. Like other studies of burglars, the planner was shown to pre-select targets in advanced, the searchers would seek out suitable targets, whilst the opportunists were motivated by any opportunity that arose to steal.

The finding of distinct groups points to the knowledge that burglary is a more professional offence, but there are differing levels of that professionalism. As previously mentioned, Vaughn et al. (2008) identified four classes of burglars: Young versatile, vagrant, drug-oriented and sexual predators. Coinciding with the previous findings, Vaughn et al. (2008) could derive levels of burglars based on their previous criminal experience. The young versatile offenders were noted as being younger in age and tended to commit a variety of offence types. Vaughn et al. suggested that these offenders could escalate into a specialisation of offending type but are yet to be defined by their patterns of offending. The vagrant burglars could be described as offenders that commit crime for a brief period for material gain. These offenders were described as having a lack of skill to gain legal employment and therefore survive on what they can gain from their offences. The drug-oriented and sexual predator level was defined by their high frequency of burglary in their criminal history than the other types. The drug-oriented burglar had a higher specialisation in drug related offences, portraying the picture of an offender seeking gain to fund their habits. The sexual predator burglar specialised in sexual offences, such as rape and prostitution and had the longest criminal history in comparison to the other types. Vaughn et al. (2008) also found that the sexual predator burglar was the most violent and it was likely that their gain was from the thrill of entering an occupied dwelling. The sexual predator burglar was found to display the most potential for further serious offending. The offence mixes of violent, sexual and property offences could lead to more serious homicide offending.

As highlighted in Vaughn et al.'s (2008) study, the danger of the 'professional' burglar is their criminal experience and further offending specialisation. The study provides evidence to suggest that where a burglar is older, has an earlier onset and previous serious and violent offences that they are a precursor to even more serious offences. For example, many previous studies have found crimes of violence and burglary to be prominent in the criminal histories of homicide offenders (Canter et al., 1996; Delisi and Scherer, 2006). In their study of multiple homicide offenders, Delisi and Scherer (2006) found that offenders who had committed a burglary alongside their homicide event would be more likely to kill multiple victims. They state that burglary can be a highly instrumental offence relating heavily to the predatory nature towards the victim.

Findings in the current study will be discussed further in relation to the typologies of burglars derived in previous studies. It is hypothesised that when analysing burglars that there will not be distinct 'types' of burglars or burglary but themes of some distinct and overlapping offence and offender characteristics. It is stressed within this study that although an individual can sit within a distinct themed region of behavioural style, it does not mean that they cannot move between them. We are dealing with human beings in which there will always be the nature to change in behaviour and patterns across time. As Maguire and Bennett (1982) state, it is important to understand the systems of behaviours and the reasons behind them, rather than to 'type' each offender based on their offending characteristics.

7.1.1. Aim

The study aims to statistically analyse the association between aspects of burglary and features of the offenders. In doing so, it is hypothesised that inferences of characteristics of domestic burglars can be derived based on offender criminal history, demographic traits and offence behavioural style. The aim of this study leads us to question whether there is a relationship between the actions undertaken during a domestic burglary and the characteristics of the offender?

7.2. Method

7.2.1. Sample

To analyse the offender's full criminal background, the sample used was taken from the Police National Computer (PNC) database. However, the PNC database did not contain information regarding offender characteristics and offence information. In order to make sure the study could be conducted with all the relevant information, the PNC database was matched to the Midlands City database. The resulting data consisted of 1,017 offender-offence cases of convicted burglaries (including domestic and commercial burglaries). The analysis focuses on a sample of domestic and commercial burglaries to identify any distinction between the two. It was essential to use just solved cases in this study to assess the offender's background as the unsolved sample will not have valid reference to an offender. However, the previous chapter found no difference between solved and unsolved domestic burglary, providing validity in drawing inferences from solely solved cases.

Given that each case in this study is solved and an arrest made, a great deal of information on the offender was available. The data included information on offender criminal history, including, length of offending in years, total number of offences, previous convictions, age of onset, previous co-offending and relationship to victim. The offender traits within the data included, race, sex, age, hair colour, eye colour, height, occupation and home area of deprivation. Lastly, the offence characteristics examined included, premise type, time, entry, exit, method of operation, weapon used and items stolen.

7.2.2. Content analysis of burglary cases

Content Analysis was conducted on the 1,017 burglary cases. Each of the cases includes a crime number and the unique offender information to match the crime details. Where the offence has been committed by more than one offender there will be duplicated identical crime numbers for each case but different unique offender numbers. By counting the crime numbers, we can see that a total of 704 recorded burglaries have been committed by 605 offenders, with 31% of those burglaries being committed by more than one offender.

Variables based on the offender's criminal history, traits and offence style were obtained. The table below displays a breakdown of the frequencies of occurrence for the

variables within the dataset. In order to compare to previous findings of profiling burglary, the current study used a similar coding dictionary of criminal history, offender characteristics and offence characteristics to the previous study conducted by Fox and Farrington (2012).

Table 15. Descriptive Statistics for All Burglary Offender and Offence Characteristics

Criminal History					
Item	**Frequency**	**Percent**	**Item**	**Frequency**	**Percent**
0 Years Offending	19	2	Previous Burglary	975	96
1-5 Years Offending	283	28	Previous Theft	942	93
6-30 Years Offending	660	65	Previous Violence	717	71
30+ Years Offending	55	5	Previous Drugs	679	67
No Prior Offences	28	3	Previous Criminal Damage	657	65
1-2 Prior Offences	59	6	Previous Shoplifting	534	53
3+ Prior Offences	930	91	Previous Driving Offence	486	48
Early Onset	746	73	Previous Firearms	161	16
Adolescent Onset	236	23	Previous Fraud	108	11
Late Onset	35	3	Previous Rape	78	8
Network Association	518	51	Previous Arson	77	8
Previous Co-offence	747	73	Previous Sexual	75	7
Offender Knew Victim	54	5	Previous Murder	28	3
			Previous Indecent Assault	10	1
Offender Characteristics					
Item	**Frequency**	**Percent**	**Item**	**Frequency**	**Percent**
White	748	74	Brown Eyes	456	45
Black	170	17	Green Eyes	12	1
Asian	31	3	Blue Eyes	348	34
Offender Male	948	93	Offender Short	211	21
Offender Female	67	7	Offender Average	709	70
Offender Adolescent	154	15	Offender Tall	36	4
Offender Young Adult	487	48	Offender Unemployed	533	52
Offender Adult	376	37	Offender Student	29	3
Brown Hair	489	48	Offender School Child	24	2
Black Hair	228	22	5% Deprivation	257	25
Blonde Hair	88	9	10% Deprivation	126	12
Other Hair Colour	212	21	20% Deprivation	146	14
			30% Deprivation	46	5
Offence Characteristics					
Item	**Frequency**	**Percent**	**Item**	**Frequency**	**Percent**
Commercial Burglary	298	29	Exit Same as Entry	420	41
Residential Burglary	710	70	MO Smash	255	25
Daytime Offence	481	47	MO Insecure	298	29
Night Time Offence	536	53	MO Unlock	130	13

Entry front	235	23	MO Force Lock	55	5
Entry window	450	44	MO Climb	96	9
Entry rear	451	44	MO Force	248	24
Entry door	412	41	Weapon Key	152	15
Entry side	70	7	Weapon Foot	48	5
Exit front	186	18	Weapon Unknown Inst	246	24
Exit window	187	18	Alarm Fitted	138	14
Exit rear	358	35	Credit Card	67	7
Exit door	400	39	High Value Stolen	205	20
Exit side	46	5	Low Value Stolen	812	80

Note: Percentages calculated excluding missing values.

7.2.2.1. Criminal History

The criminal history of the burglary offenders within the analysis focus on the types of previous offences committed, length of offending span and possible ties to other offenders. Burglary and theft are shown to occur in over 90% of the sample's previous history. Offences occurring in over 50% of the sample's offending history include, violence (71%), drugs (75%), criminal damage (65%) and shoplifting (53%).

The time span in years of offending and total number of prior offences gives an indication of the degree of offending experience prior to the burglary being analysed. The burglars within the sample are displayed to have an extensive criminal career, meaning that they are experienced offenders. 65% of the sample have been offending for 6 – 30 years, whilst 91% of the sample have had 3 or more prior offences. As with Fox and Farrington's (2012) study, the age of onset was calculated based on previous studies of life-course analysis (Zara and Farrington, 2009; Nieuwbeerta et al., 2011). The offender's date of birth was used and subtracted by the earliest recorded offence in the database. The dichotomised variables were based on ages between 7 to 14 years (early), 15 to 21 years (adolescent) and 21 years and over (late). Early onset offenders have previously shown to be more diverse in their offending history from starting at a younger age. 73% of the sample are early onset offenders, adding further support to the burglars within the sample being highly experienced offenders.

The PNC data used did not contain records of whether the offenders had ever committed a co-offence. As previous chapters have shown, co-offending is a high occurrence among domestic burglars, in particularly solved cases. It is therefore crucial to attempt to identify whether individuals within this study have previously committed a co-offence. The

only accurate record of co-offending was matched to those who had previously co-offended in the Midlands City Police data, with 73% of the sample are shown to have been involved in a co-offence between 2011 and 2015. Previous studies of co-offending among burglars have reported lower figures than the current sample. Fox and Farrington (2012) found that only half of their sample co-offended. However, the high frequency of co-offending occurring among burglars further corresponds to the social hypothesis of this crime. Further to assessing whether the offenders co-offended or not, the current study analysed whether the offender has association with a network of co-offenders. The network in the Midlands City Police data was discovered by identifying every connection between groups of individuals from who they co-offend with. This is addressed further in later chapters.

Fox and Farrington (2012) discuss the importance of distinguishing between offenders who know the victim and those that do not, as this will add support to an interpersonal nature of burglary. The interaction between offender and victim may mean that the offender's motive for the burglary was victim and not materially related. The sample displayed 5% of offenders knowing the victim. However, this figure does not disregard that the offenders motive was victim driven, but instead removes the factor that if it is victim driven then it is because the offender knew the victim. Canter and Youngs (2009) state that there are a variety of potential interactions that can reveal the offender's preparedness to interact with others when committing a crime. For example, the offender's criminal history containing a high frequency of violence suggests that they are willing to interact with others in a crime.

7.2.2.2. Offender Characteristics

The age of offenders within the sample ranged from 12 to 63 years, with a mean age of 26 years (SD = 9.74). The age of the offenders was dichotomised into adolescent (11 to 17 years), young adult (18 to 24 years) and adult (25 years and over). Nearly half of the offenders, 48%, were shown to be young adults, 37% adults and 15% adolescents. The age of the offender in developing inferences is important in understanding what point in their criminal development they are at. Other offender details included race, sex, height, occupation, hair and eye colour. The demographics of Midlands City is predominantly white, as reflected in the sample displaying 74% white and 93% male offenders, respectively.

The English indices of deprivation 2010 (IMD) provides a level of deprivation in each small area of land across the United Kingdom. Each small area is assessed for levels of income, employment, health and disability, barriers to housing or services, crime and living environment and a combined overall level of depression, and then placed into a nationwide rank order. Rank orders are then divided into percentages, which then provide an indication as to the relative levels of deprivation in a particular area (see table 14). For example, an area in the top 5% of rank orders demonstrates elevated levels of overall deprivation, whereas an area in the 70% rank order percentile would be amongst the least deprived in the country. Postal codes from the database were used to gather the percentage categories for each offender. Although not previously analysed in a study of this kind, the level of deprivation was looked at in an attempt to find whether offenders from more deprived areas were more material focused than others. The levels of deprivation with the sample were shown to range between 5% and 30%.

Table 16. Deprivation Percentage Score Categories

Rank order	Percentage Category
1 – 325	1% *(most deprived)*
326 – 1824	5%
1825 – 3248	10%
3249 – 6496	20%
6497 – 9744	30%
9745 – 12,002	40%
12,003 – 16,240	50%
16,241 – 19,488	60%
19,489 – 22,736	70%
22,737 – 32,472	71 – 100% *(least deprived)*

7.2.2.3. Offence Characteristics

The current sample displays a higher percentage of residential to commercial burglaries and an almost equal split in daytime and night-time offences. Similar frequencies of entry methods were identified for entry through the window (44%), rear (44%) and door (41%). The offender entering through the front (23%) and to the side (7%) did not occur as often within the database. The lower frequency method of exit actions is exit from the side (5%), front (18%) and window (18%), whilst the higher frequency is exit rear (35%) and door

(39%). What is interesting to note about the frequency of offender entry and exit methods, is that a large amount of the burglary sample will enter the property through the window, yet a small percentage exit from the window. This indicates that some offenders will find and easier escape route, such as going out through a door to make their escape than going back through the window. However, 41% of the sample are shown to exit the same way they entered the property.

The most frequently occurring methods of operation displayed are when the offender targets an insecure property (29%), they smash (25%) and use force (24%). The less frequently occurring behaviours displayed are the offender unlocking (13%), climbing (9%) or forcing a lock (5%). The cases did not include many offences where the offender used a weapon, however where a weapon was used it was noted as an unknown instrument (24%) that was not recovered. This is when there is evidence of a weapon being used during the burglary but no trace of it left behind, indicating a level of planning by the offender. In 15% of cases a key was used and in 5% the offender used their foot as a weapon.

14% of the sampled burglaries displayed that an alarm was fitted to the property. In their study on a burglar's decision to offend, Bennett and Wright (1984) found that roughly half of burglars would report an alarm deterring them. The offenders interviewed described how their decision to offend would be based on the circumstances. For example, whether the alarm could be 'by-passed' and their confidence in dealing with it. Some burglars were found to take the risk if there was something worth stealing inside and whether the increased risk would be worth the larger material reward. This implies that burglars who target homes with alarms fitted are driven by a high material gain, willing to take bigger risks. On the other hand, Bennett and Wright (1984) also found that some offenders were not deterred from entering a home with an alarm because they could always make their escape fast if the alarm did go off.

The property stolen is analysed based on whether it a high (>£300) or low value (<=£300) item was stolen. Only 20% of the sample are displayed to steal high value items, whilst 80% stole low value items. Bennett and Wright (1984) found that 90% of the offenders interviewed mentioned their main reason for the burglary being their need for money. They also found that in 16% of offenders interviewed, their main reason for the burglary was for excitement. The main reason for the money was for pleasure and entertainment purposes, such as drink and drugs, with very few needing monies to support their daily subsistence,

such as food and bills. The excitement burglars sought was described by the offenders in Bennett and Wright's (1984) sample as for fun or out of boredom. Due to the difference between the high and low value items stolen in the current sample, it is likely that offender's motivations could vary in terms of gain and thrill seeking.

7.2.3. Analysis

The first analysis section uses Two-Step Cluster Analysis in identifying subtypes of the criminal history, offender characteristics and offence styles. The aim being to identify clusters of behaviours that highlight styles of offending behaviour and distinctions between previous criminal experience and offender characteristics. The second section uses Smallest-Space Analysis (SSA-I) to derive inferences between the characteristics and the offender details. This method allows for the co-occurrence of each of the characteristics of criminal history, offence behaviours and offender traits to be measured against each other and presented by a graphical representation of the variables.

Two-Step Cluster Analysis is particularly useful in exploring a database with the aim of deriving groups, or clusters, that are not otherwise clearly obvious. The features of using two-step cluster analysis over other clustering techniques are its handling of large datasets of categorical variables. In exploring the dataset, cluster analysis can automatically select the number of clusters from the variables given. The procedure will compare the values of a model-choice criterion, in this case Bayesian Information Criterion (BIC), across different clustering solutions. Chi-square tests of association were conducted to test any statistical relationships within the clusters and determine if the relationships were significantly different from chance. Adjusted Standardised Residual (ASR) tests were also conducted to measure the strength of the different between observed and expected values. ASR is used to measure how significant an individual cell is to the chi-square value. As in Fox and Farrington's (2012) study, ASR is used in considering the overall size of the sample and gives a fairer indication of the difference between the observed and expected values. A general rule for ASR values are if the residual is less than -2, the cell's observed frequency is less than the expected frequency and if the residual is greater than 2 then the observed frequency is greater than the expected frequency.

Although recent studies have used Latent Class Analysis (LCA) for finding subtypes of related cases (Fox and Farrington, 2012), the two procedures are closely related. They both are used to discover groups or types of cases based on observed data, and, possibly to also assign cases to groups. Early studies have successfully used cluster analysis to study patterns of groups within data. For example, Green et al. (1976) in using cluster analysis to derive subtypes of burglary methods of operation and, Kalik et al. (1968) who used the procedure to identify patterns of adolescent antisocial behaviours. Using cluster-analysis Mandeville-Norden and Beech (2009) were able to identify multiple subgroups of child molesters based on low and high deviancy and a subtype distinguished using a unique treatment. More recently, Ennis et al. (2014) applied cluster analysis to a sample of 345 male sexual offenders. The findings highlighted three subtypes of male sexual offenders based on low, low to moderate and moderate to high risk groups. The developmental histories of the clusters found were also notably related to the histories of Moffitt's (1993) Life Course Persistent offenders, tying into the developmental theory of crime.

Although the two analyses work on similar principles, the SSA-I items are not confined to a linear space and fewer assumptions are made about the underlying structure of the variables. Instead this method allows the relationship of every variable to every other variable to be represented in a three-dimensional space. If variables are to co-occur across each of the cases, then they will be positioned closer together in the space. The final plot will be displayed with thematic regions in relation to each of the items that co-occur. The issue with cluster analysis is determining the criteria cut-off point of whether something will cluster or not, which can be very problematic. The arbitrariness of putting items into a group or not means that you do not get the boundary conditions that are defined with SSA-I regional interpretations. The cluster analysis, in this case, will be used to focus on the variables that are distinct from the rest to them validate using SSA-I. By cross-validating the regional themes of the SSA-I, a clearer representation of differing styles of burglary can be presented.

Previous studies have found that an offenders age and criminal experience can provide an indication to what stage of criminal development they may be at (Maguire and Bennet, 1982; Moffitt, 1993; Fox and Farrington, 2012). If regions of differing behavioural styles are identified from the SSA-I, then these will be correlated against the offender's age, total amount of convictions and total years active. The results from these correlations will aim to provide further evidence in the stages of criminal development.

7.3. Results

7.3.1. Two-step cluster analysis of offence behaviours, offender traits and criminal histories

The cluster analysis displayed fair quality clusters based on the measure of cohesion and separation for criminal history types (average silhouette = 0.3, ratio sizes = 2.10), offender traits (average silhouette = 0.3, ratio sizes = 1.88) and offence characteristics (average silhouette = 0.2, ratio sizes = 3.25). Tables displaying the cluster analysis results for each can be seen in the appendix.

Upon analysing the differences in criminal history, the key distinction between the two clusters are the number of previous offences and the total years offending. One cluster displays higher levels and length of offending than the other, showing that the majority commit a high rate offending (68%) and the remainder a low rate (32%). The cluster analysis indicated an offending time span of one to five years and six to thirty years as a highly important predictor of the two cluster types. There is a clear distinction between individuals who have not been offending for many years (low rate offenders) and those who have been offending for over six years (high rate offenders). The previous types of criminal convictions for high and low rate offenders suggest that the full sample has a varied criminal history. Nearly all high and low rate offenders have committed a previous burglary and theft related offence. However, there is a higher percentage identified for high rate offenders in violence (81%), criminal damage (76%), drugs (79%), driving offences (61%) and more criminal convictions, displaying the experience and range of the high rate offender's history. Along with violence (48%) and drugs (42%) offences, the low rates offenders also have a high percentage of shoplifting offences (46%). The higher frequency of shoplifting offences demonstrates an inexperienced nature of the low rate offenders. However, the overlap of offending behaviours explains the fair quality of these clusters, in that there is not one distinct 'type' of experienced offender compared to another.

A higher percentage of co-offending behaviour is observed for the low rate offenders, with 86% previously committing a co-offence and 67% with network association. This contributes to the argument that co-offending is related to more inexperienced offenders

starting off in their criminal career (Reiss and Farrington, 1991; Stolzenburg and D'Alessio, 2008; Tillyer and Tillyer, 2014).

The race and hair colour of the offenders are shown to be the highest predicting features for cluster distinction when examining the offender traits, resulting in three cluster labels. For example, a distinction is displayed between the offenders being White with brown hair or Black with black hair respectively. The first cluster, labelled *Adult Minority Male*, displays the highest percentage of Black (67%) and Asian (12%) offenders and a low percentage of White (20%) offenders. This cluster displays the highest percentages of offenders with black hair (83%), brown eyes (99%), tall height (8%) and from a 5% (29%) and 20% (18%) deprivation area.

The second cluster labelled the *Younger White Male* occurs in 31% of the sample. These offenders are predominantly White (79%) males (90%), with the highest percentage of adolescent offenders (31%). This sample has the highest percentage of offenders with blonde (28%) and other hair colours (64%) and high percentage of short offenders (23%). These offenders also show a high percentage, in comparison to the other clusters, of being in some sort of education (14%).

Lastly, the *Adult White Male* cluster contains the highest percentage of White (99%) male (96%) offenders. This is similar to the *Adult Minority Male* cluster, who also display to be mostly young adult or adult (92%). All the offenders in the *Adult White Male* cluster have brown hair and either brown (38%) or blue (47%) eyes, with the highest percentage of unemployed offenders (61%). The demographics of the Midlands City area, as well as the dataset, are mostly White individuals and therefore unsurprisingly the highest frequency of offenders is within the *Adult White Male* cluster (45%).

Lastly, the analysis of offence characteristics resulted in four clusters, with the burglary being commercial or residential as the highest predicting features for differentiation. The time of day was also shown to be a high predicting feature of distinction between offending styles. The *Non-Domestic* offending style contains many different offence characteristics spread out evenly. The one distinct characteristic from the other clusters is the offender forcing the lock on the property (12%). Two of the offence characteristic clusters relate solely to domestic burglary, suggesting that domestic burglars will differ more in the method of operation than non-domestic burglars.

The *Forceful* offending style is displayed in both commercial (26%) and residential (72%) burglaries. This cluster displays a high frequency of force (32%) in comparison with the other offending styles, also smashing (19%) and using their foot as a weapon (18%). These offenders are also shown in most cases to enter through the front (99%) door (96%). Previous chapters have shown that where an offender uses a lot of force that they will also be disturbed by a witness or alarm and result in being an attempted burglary (Paine, 2012; Robb, Coupe and Ariel, 2015). This accounts for a small percentage (10%) of the sample present in this cluster.

The third, labelled *Interpersonal*, occurs in 32% and the fourth, labelled *Skilled Domestic*, occurs in 33% of the sample. These offending styles are almost identical except the *Interpersonal* style occurs only at night time and against mainly insecure properties (45%). Whilst the *Skilled Domestic* style occurs during the day, stealing high value goods (28%) and display evidence of using a weapon (26%).

7.3.2. Chi-square tests of association between identified clusters

Chi-square tests of association were conducted to test any statistical relationships between the clusters and determine if the relationships were significantly different from chance. ASR tests were also conducted to measure the strength of the difference between observed and expected values (see appendix).

7.3.2.1. Offence Characteristics and Offender Traits

The results indicate statistically significant relationships between the three offender trait clusters and the four offence characteristic clusters ($X^2 = 26.30$, df = 6, $p < .001$). Each of the offender trait clusters displays a significance to differing offence characteristic types. The relationship between the *Adult Minority Male* and the *Interpersonal* cluster produced a positive statistically significant ASR value (ASR = 3.5, $p < .05$). This result indicates that there are substantially more *Adult Minority Male* offenders committing offences in an *Interpersonal* style than predicted by chance. 36% of Black offenders within the sample are shown to commit a burglary in an *Interpersonal* style. A significant, but negative, ASR value is displayed between the *Adult Minority Male* and *Non-Domestic* clusters. Meaning, that there

are fewer *Non-Domestic* burglaries committed by *Adult Minority Male* offenders than expected (ASR = -3.4, *p* < .05).

A positive significant ASR value indicated that there were more *Non-Domestic* burglaries committed by *Younger White Males* than expected by chance (ASR = 3.6, *p* < .05). The *Younger White Males* also show to commit more *Non-Domestic* style burglaries than any other offending style, with 32% of the cluster committing this style. A significant negative ASR value was displayed between the *Younger White Males* and *Interpersonal* offending style (ASR = -3.6, *p* < .05), indicating that there are fewer than expected.

The relationship between the *Adult White Male* and the offending styles did not indicate any significant strength based on the ASR values. However, 36% of *Adult White Males* are associated to the *Skilled Domestic* burglary offending style. No statistically significant relationship was identified for the *Forceful* Burglar.

7.3.2.2. Offender Traits and Criminal History

Chi-square tests also indicated highly statistically significant relationships between the three offender trait clusters and the two criminal history clusters (X^2 = 47.63, df = 2, p < .001). The *Younger White Male* displays a significant relationship to the *Low Rates* criminal history cluster, highlighting the lack of experience of younger offenders. A positive significant ASR value indicates that there are more *Younger White Males* that will have a *Low Rate* of criminal experience than expected by chance (ASR = 6.7, *p* < .05).

The *High Rates* criminal history type is shown to have a statistical association to the *Adult White Male* type. This coincides with the relationship highlighted between offender traits and offence characteristics, whereby the *Adult White Males* are shown to relate to the *Skilled Domestic* burglar. The positive significant ASR value indicates that offenders who commit the *Skilled Domestic* offending style of burglary will be more criminally experienced (ASR = 5.5, *p* < .05).

The *Adult Minority Male* type did not show a significant relationship to either the high or low rate criminal history type. However, this offender trait cluster did occur more in the high rate criminal history cluster, displaying that the *Adult Minority Male* will have a similar criminal background to the *Adult White Males.*

7.3.2.3. Offence Characteristics and Criminal History

There was no significant association identified between the offence characteristic and criminal history clusters. This finding was also observed in Fox and Farrington's (2012) study, where a general relationship between offence style and criminal history type was not significant. An observation of the criminal history highlighted that much of the sample was *High Rate* with experience in many offences as well as a lengthy criminal career.

7.3.3. Smallest-space analysis of offence and offender characteristics

Smallest-Space Analysis is used to test the assumption that there will be underlying inferences that can be derived between offending actions and offender characteristics. The classification of the items goes beyond the arbitrary proposals of the cluster analysis 'grouping' by using the principle of contiguity (Canter and Youngs, 2009). Whereby, the more highly correlated the variables are the closer they will appear in the multidimensional space. The three-dimensional resulting configuration has a coefficient of alienation of 0.23 with 14 iterations, indicating a good fit of the co-occurrences of listed characteristics (see figure 11). The frequencies of the items occurring are an important aspect in identifying patterns of relationships between variables. Table 15 displays the frequencies of the offence and offender characteristics used in the analysis.

Table 17. List of offence actions, offender characteristics and criminal histories positioned within each region of the SSA-I.

Skilled Domestic			Forceful		
Characteristics	**Frequency**	**%**	**Characteristics**	**Frequency**	**%**
Previous Violence	717	71	Co-offender	747	73
Residential Burglary	710	70	Early Onset	746	73
6-30 Years Offending	660	65	Brown Hair	489	48
Offender Unemployed	533	52	Previous Criminal Damage	657	65
Network Association	518	51	Exit Same as Entry	420	41
Offender Young Adult	487	48	Blue Eyes	348	34
Daytime Offence	481	47	1-5 Years Offending	283	28
Entry rear	451	44	MO Force	248	24
Entry window	450	44	Offender Short	211	21
5% Deprivation	257	25	Offender Adolescent	154	15
MO Smash	255	25	Alarm Fitted	138	14
Weapon Unknown Inst	246	24	1-2 Prior Offences	59	6
Previous Firearms	161	16			
MO Climb	96	9			
Interpersonal			Non-Domestic		
Characteristics	**Frequency**	**%**	**Characteristics**	**Frequency**	**%**
Offender Average	709	70	White	748	74
Previous Drugs	679	67	Night Time Offence	536	53
Brown Eyes	456	45	Previous Shoplifting	534	53
Offender Adult	376	37	Previous Driving Offence	486	48
MO Insecure	298	29	Entry door	412	41
Adolescent Onset	236	23	Commercial Burglary	298	29
Entry front	235	23	Other Hair Colour	212	21
Black Hair	228	22	High Value Stolen	205	20
Black	170	17	10% Deprivation	126	12
Weapon Key	152	15	Blonde Hair	88	9
20% Deprivation	146	14	Previous Arson	77	8
MO Unlock	130	13	Previous Sexual	75	7
Previous Fraud	108	11	Entry side	70	7
Previous Rape	78	8	Offender Female	67	7
Credit Card	67	7	MO Force Lock	55	5
30+ Years Offending	55	5	Weapon Foot	48	5
Offender Knew Victim	54	5	30% Deprivation	46	5

In relation to the SSA plot there is an apparent circular pattern that can be distinguished, which indicates that the association between variables will also have a relation to their frequencies. Figure 11 displays the SSA-I plot with circular patterned contours

showing the relationship of each variable to another based on the frequency. This illustrates how the criminal differentiation of themes can emerge out from the core of criminality to produce variations in offending styles. The behaviours on the outside of the SSA-I plot are more specific behaviours that provide a qualitative variation, whereas the behaviours in the centre of the plot will share common features and thus group in the centre. For example, many of the behaviours in the centre of the plot relate to frequently occurring previous offences across much of the burglary sample, including previous violence (71%), drugs (67%) and criminal damage (65%). Behaviours that were either very high or low frequency were removed from the SSA-I analysis as they either do not contribute to the regions or distort the findings. For example, previous burglary offence occurred in 96% of the sample, whilst previous indecent assault occurred in 1% of the sample and were therefore removed.
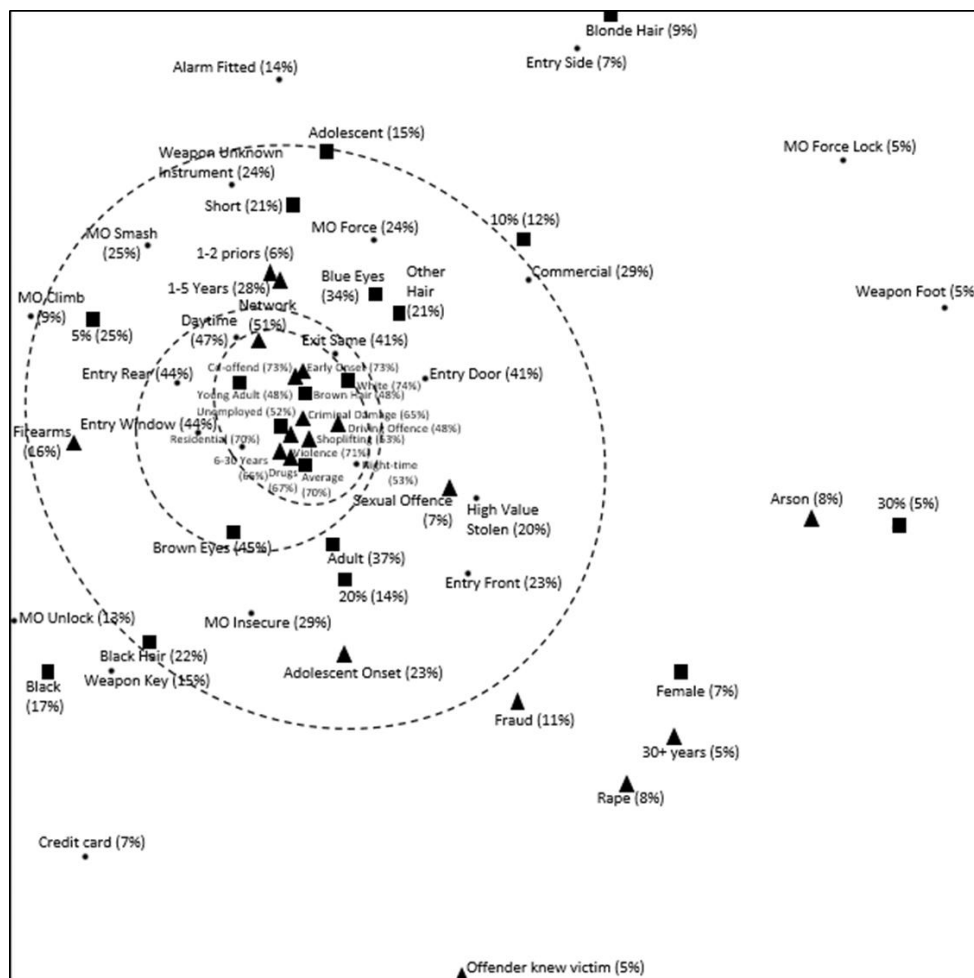
Figure 11. 1 by 2 projection of three-dimensional SSA-I with frequency contours superimposed on. Coefficient of Alienation = 0.23
Note: *circled dot = offence actions, square = offender characteristics, triangle = criminal history*

The central principle in interpreting the SSA-I plot is referred to as the 'regional hypothesis'. As previously mentioned, behaviours that co-occur will be positioned closer together in the multidimensional space, forming regions of items that share a commonality. However, not all the items will share the same meaning and based on how the resulting configuration is interpreted or any slight change in the variables could mean that they will positioned in a different region of the plot. You would never expect the variables to be perfect groups because we are dealing with human beings, further highlighting the interpretation as regions and not clusters or groups.

Initial examination of the variables within the plot displayed a mixture of offence, offender and criminal history characteristics, showing that there is a relationship between the characteristics and the offence details. The chi-square analysis of the different clusters gives an indication as to which behaviours will co-occur. For example, the *Interpersonal* offending style and the *Adult Minority Males* were shown to be statistically significant. We would therefore expect to see the 'Black' offender variable situated close to 'MO insecure'.

The final SSA solution is presented in figure 12 displaying four themed regions that develop from the core of the plot. The regions are labelled based on the offending styles identified using the cluster analysis, these are: *Skilled Domestic*, *Forceful*, *Interpersonal* and *Non-Domestic*.
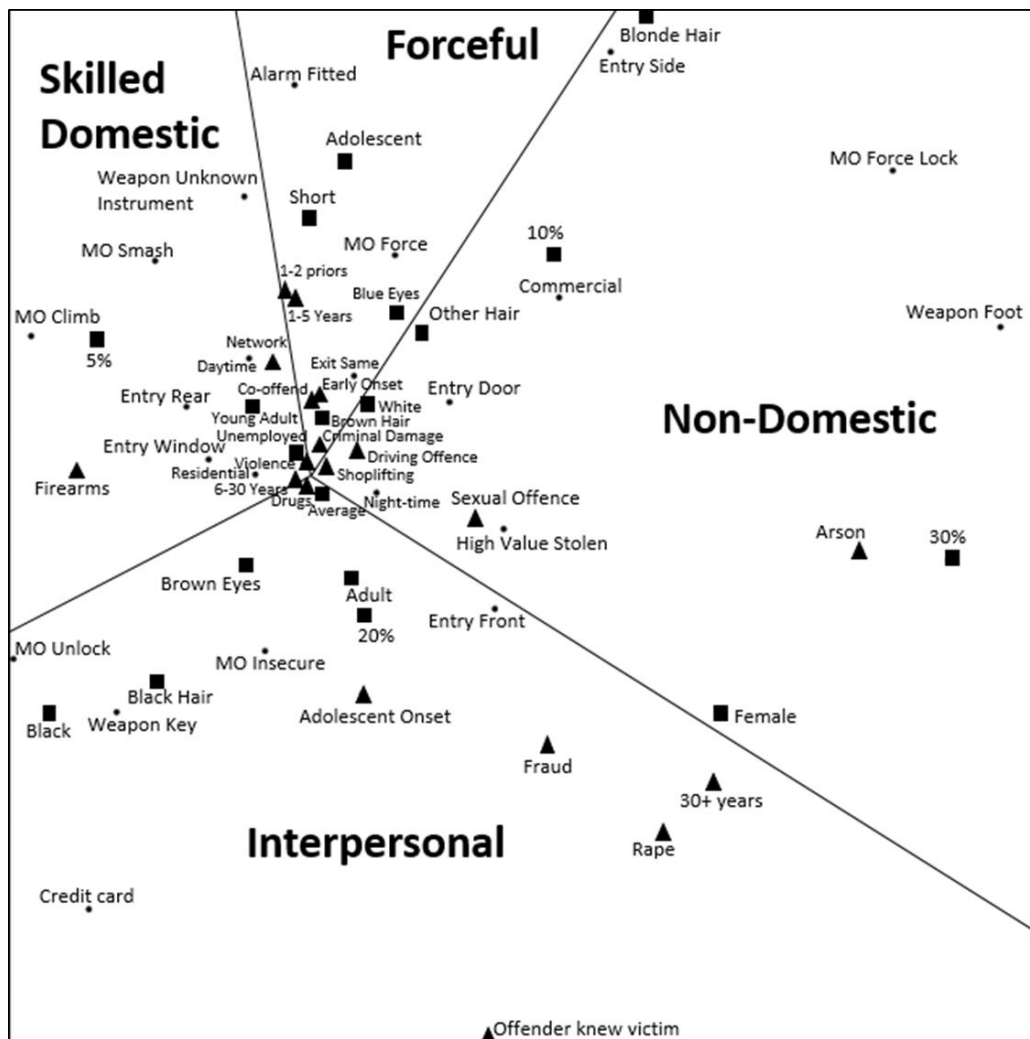
Figure 12. 1 by 2 Projection of the three-dimensional SSA-I of the 704 burglary cases.
Note: *circled dot = offence actions, square = offender characteristics, triangle = criminal history*

The results indicate that the cluster analysis can be mapped onto the SSA with a bit of overlap, indicating the difficulty in placing a group of burglaries into specific 'types' or 'clusters'. Instead, there are clearly defined regions of offending behaviours that relate to an offender's traits and previous criminal history.

7.3.4. Inferences of burglar characteristics

7.3.4.1. Skilled Domestic Burglar

The *Skilled Domestic* burglar region in figure 12 includes behaviours that portray a burglary committed by an offender with previous experience. These actions include the

burglary occurring at residential properties (70%), during the day (47%), entry through the rear (44%), entry through the window (44%), the offender smashing (25%), the use of a weapon (24%) and climbing (9%). As mentioned, this style of offending was identified in previous chapters as a style that implies a level of skill and forethought. Similarities are also evident to previous studies resembling Fox and Farrington's (2012) 'Organised' burglar, whereby the offender uses a weapon, and displays skill in entrance to properties with alarms and disabling them. Although the 'Alarm Fitted' variable is positioned within the *Forceful* region of the SSA plot, the cluster analysis displayed this offence behaviour as also occurring in the *Skilled Domestic* style. This coincides with the previous chapter where 'Alarm Fitted' was present within the 'Skilled' region but situated close to the *Forceful* region. Once again highlighting the difficultly in developing specific 'types' of burglary styles.

By drawing on Canter's (1995) A → C equation we can derive actions within this region that relate to offender characteristics. The offender traits and criminal histories present within the *Skilled Domestic* region include previous violence (71%), 6 to 30 years offending experience (65%), offender unemployed (52%), criminal network association (51%), offender young adult (48%), offender home within 5% deprivation level (25%) and previous firearms offence (16%). The *Skilled Domestic* burglaries are shown to represent the 'typical' domestic burglar, with actions relating to controlling an environment. As with the findings in previous chapters, this coincides with Canter and Youngs' (2009) Narrative Action Model of burglary, with an offender of this nature being described as gaining from the satisfaction of controlling their environment. This can be seen with offenders bringing a weapon, climbing and the offence occurring in the daytime. Their years of offending experience and previous violence and firearms offences result in the *Skilled Domestic* burglar taking control and, following Canter and Youngs (2009) description, being aware of their intrusion.

There are also some interesting co-occurrences present within this region, such as 'MO climb' and '5%'. The co-occurrence of these variables shows that individuals who live within the highest area of deprivation will climb in some way into the property they are burgling. Chi-square was used to examine the two variables, identifying a statistically significant relationship between them (X^2 (1, N = 1017) = 4.653, $p < .05$). A statistical significance was also found between 'MO climb' and 'Entry Window' (X^2 (1, N = 1017) = 4.653, $p < .001$), identifying these offenders as able to climb into property windows during their offence. Although only 25% of the sample were shown to come from a 5% level area of deprivation the findings show it as meaningful. The results illustrate that offenders from the

highest areas of deprivation will have a high level of criminal experience, be unemployed and commit burglaries that incorporate skill for their gain.

7.3.4.2. Age and criminal experience correlates of a Skilled Domestic behavioural style of burglary

Although the *Skilled Domestic* burglary style indicates an offender that knows what they are doing, this does not mean that they will be the most experienced in age, total convictions or years active compared to others. This offending style represents offenders in the prime of their offending careers, as young adults with over six years previous experience. Table 16 shows the relationship between the *Skilled Domestic* Style and the age of the offender, total convictions and years active displayed in the sample. This relationship is assessed using a Kendall's Tau correlation due to the age, total convictions and years active data being not normally distributed within the sample.

Table 18. Correlation (Kendall's Tau) of Skilled Domestic Burglary Behavioural Style with Age, Total Convictions and Years Active

	Age of Offender	Total Convictions	Years Active
Skilled Domestic Style	-.086[**] (N = 1,014)	.021 (N = 1,017)	-.033 (N = 1,017)

Significance: * p< .05 ** p< .01 *** p< .001

Table 16 shows a weak negative significant relationship between the *Skilled Domestic* style and offender age. Suggesting that, within the sample, the older the offender the lower recording of them committing a burglary in this behavioural style. The correlation between the *Skilled Domestic* style and total convictions provides evidence of offenders that are in the prime of their offending careers. Although not significant, the positive relationship shows that even though these offenders are younger than other styles, they will have many prior convictions. The negative non-significant correlation to the amount of years actively offending adds further support to the *Skilled Domestic* style. This was to be expected because an offender that is within the peak of the age-crime curve will be in their early twenties and therefore not old enough to have much more temporal experience.

These findings portray offenders that resemble Maguire and Bennett's (1982) middle-range burglars. These will be more rational and experienced as a thief than younger less experienced offenders. Meaning that this burglary offending style will be the onset of further burglaries to come. These offenders also coincide with Sutherland's (1937) description of a 'professional thief', who is not just skilled but recognised in their efforts from other offenders. This is highlighted through the presence of network association within this behavioural region, with 75% of the burglaries committed in this style being done so by a co-offending group. Previous chapters have highlighted a prominence of co-offending among domestic burglaries, with much past research indicating a developmental perspective within this behaviour. Co-offending is said to peak within early adulthood, as Carrington (2002) best describes these offenders as being involved in group crime through an expression of psycho-social development. These individuals are more likely to carry out offences in a group because they will carry out most of their leisure activities in groups. These offenders will find comfort in planning and carrying out crimes together, like their other activities, with the support the group provides (Carrington, 2002).

7.3.4.3. Forceful Burglar

The offending actions found to be positioned within this region of the SSA are the offender exiting the same way they entered (41%), using force (24%) and an alarm fitted at the property (14%). As mentioned, properties where an alarm is fitted occurs across the offending styles but is shown to be positioned within the *Forceful* theme. However, 36% of burglaries where the property is fitted with an alarm were carried out by the *Skilled Domestic* burglar, whilst 28% were committed by the *Forceful* burglar. The difference between the two will be in the offender's criminal experience. The *Skilled Domestic* burglar will have the experience in dismantling alarms, whilst with evidence of these offenders being younger in age, the *Forceful* burglar may be scared off by them. The nature of this offending style indicates an offender that takes little care in their detection and leads to them getting noticed during the act. Previous studies found that when an offender is noticed and disturbed that they will flee the scene, leading to unsuccessful attempts (Paine, 2012; Robb, Coupe and Ariel, 2015). The low occurrence of this offending style indicates that a *Forceful* burglary will be conducted by someone less experienced, committing burglaries on a trial and error basis.

The offender characteristics positioned within this region imply that the burglaries committed by these offenders may also be carried out for fun and excitement by younger offenders. This is shown through the offender traits and criminal histories positioned in this region of the plot. These are previous co-offending (73%), early onset (73%), brown hair (48%), previous criminal damage (65%), blue eyes (34%), 1 to 5 years offending experience (28%), short in height (21%), offender adolescent (15%) and the offender have 1 to 2 prior offences (6%). The criminal history within this region provides evidence of the lack of experience the offenders have. These offenders have not been active for many years and have only been convicted for 1 or 2 offences prior to the burglary.

Although the current data sample shows that co-offending is not just a youth crime, there is a decay curve present, with older offenders moving into solo offences later in their offending careers. The co-offending variable situated within this region provides support to developmental studies of youth offending, including Carrington's (2002) psycho-social maturity perspective and Warr's (2002) companion in crime hypothesis. According to Warr (2002) the relationship between age and crime is rooted in the social nature of juvenile delinquency. As with the *Skilled Domestic* burglary style, the *Forceful* offenders will be driven by the support and influence of their peers. Such individuals are best described as being more susceptible to techniques of neutralisation (Sykes and Matza, 1957) and forms of peer pressure (Warr, 2009). The highest amount of co-offending burglaries, in comparison to the other offending styles, occur within this region, with 86% of *Forceful* offences being done so by a group. A statistical significant relationship was also found between the co-offending and early onset variables (X^2 (1, N = 1017) = 4.653, $p < .05$), providing further support to this notion.

The *Forceful* burglar shows some similarities to Fox and Farrington's (2012) 'disorganised burglar', relating to the force and failed attempts in offending. However, Fox and Farrington highlighted their 'disorganised burglar' as having a long criminal career, whereas the current findings display very little criminal experience. This does point to the notion that the *Forceful* offenders resemble Moffitt's (1993) life-course persistent offenders. These offenders begin early in their offender careers and, displaying a similarity to Fox and Farrington's (2012) 'disorganised burglar', will continue offending into adulthood.

7.3.4.4. Age and criminal experience correlates of a Forceful behavioural style of burglary

As discussed, the *Forceful* behavioural style of burglary is shown to account for the younger burglars within the sample, with much less criminal experience. Table 17 below displays the correlation between the *Forceful* offending style and the offender's age, total convictions and years active.

Table 19. Correlation (Kendall's Tau) of Forceful Burglary Behavioural Style with Age, Total Convictions and Years Active

	Age of Offender	Total Convictions	Years Active
Forceful Style	-.370** (N = 1,014)	-.105** (N = 1,017)	-.263** (N = 1,017)

Significance: * p< .05 ** p< .01 *** p< .001

The age, total convictions and years active display a negative significant relationship to the *Forceful* offending styles. The correlations displayed suggest that the offenders within this region will be younger in age, have a low amount of total convictions and years active in comparison to other burglars. Although a negative correlation was also displayed for the *Skilled Domestic* burglars, they are shown to be slightly older. With the *Skilled Domestic* showing an average age of 26 years, compared to 23 years for the *Forceful* theme, adding further support to the peak age-crime curve offenders.

The *Forceful* behavioural style is therefore found to be associated with younger offenders within the sample, with a low amount of convictions and less temporal criminal experience than other burglars. These offenders coincide with Maguire and Bennett's (1982) low-level pattern of development. Although these offenders commit the lowest amount of crimes in comparison to the other regional styles, the difference is not significant. This implies that these offenders have an association to Moffitt's (193) life-course persistent offenders, beginning early in their criminal careers.

7.3.4.5. Interpersonal Burglar

The *Interpersonal* offending style relates to the offender's awareness of the victim and with burglary, focuses on the potential interactions (Canter and Youngs, 2009). The offence actions displayed within this region are burglaries against insecure properties (29%), enter through the front (23%), weapon key (15%) and credit card stolen (7%). Although the offending action occurring at night-time are situated within the *Non-Domestic* region, the cluster analysis displayed all the *Interpersonal* burglaries as occurring at night. This behaviour sits closely to the *Interpersonal* theme on the boarder of *Non-Domestic*, demonstrating a degree of overlap in offence actions across styles.

A key behaviour within this theme is the property being insecure and in many cases, with these occurring at night-time (65%), the likelihood of the property being occupied is increased. In the previous chapter the findings showed that 45% of the properties that could be ascertained as occupied from the police descriptions were insecure. Youngs (2004) previously noted different styles of property crime reflected in the offender characteristics that relate to the interpersonal style of interacting with others. In relation to their Narrative Action System of Burglary, Canter and Youngs (2009) described how an offender that is victim aware may be functioning with a central concern on impacting their external world. The *Interpersonal* offending style in the present findings coincide with Canter and Youngs' (2009) 'Expressive Quest' burglar concerned not with their technical detail, but their manly prowess and risky style. This offending style is also found in Fox and Farrington's (2012) 'interpersonal' burglar that directs their offences towards occupied insecure residences.

Inferences can be made of the offender character based on the traits and criminal history identified within this region. These are the offender being average in height (70%), previous drugs offences (67%), brown eyes (45%), offender adult (37%), adolescent onset (23%), black hair (17%), offender Black (17%), comes from a 20% level of deprivation area (14%), previous fraud (11%), previous rape (8%), 30 or more years of offending (5%) and offender knew the victim (5%). A statistical significant relationship was identified between the property targeted being insecure and the offender being Black (X^2 (1, N = 1017) = 12.551, $p < .001$). Although not being statistically significant, the sample shows that almost 60% of the burglaries that occur at night-time are carried out by Black offenders, respectively. These findings coincide with Fox and Farrington's (2012) interpersonal burglar, which was found to have the strongest association with older Black males. The burglary

occurring at night-time also displayed a significant relationship to entering through the front $(X^2 (1, N = 1017) = 14.038, p < .001)$ and the offender coming from a 20% level of deprivation area $(X^2 (1, N = 1017) = 5.466, p < .05)$. The offence occurring during the night-time was not identified as significant to any other offender areas of deprivation.

It is important to note that within the SSA behaviours that are mutually exclusive will be forced apart as they cannot co-occur. This is illustrated by looking at the behaviours in the *Forceful* region compared to those in the *Interpersonal*. The *Forceful* offender has the lowest criminal experience of the sample, is younger in age and co-offends. On the opposite area, the *Interpersonal* offender has a high criminal experience and will be older in age. The offender traits and criminal history present within the *Interpersonal* region support the notion that the offenders committing crimes in this style have a lot more years of experience than the regions opposite. The *Interpersonal* offending style is also shown to differ from the *Forceful* and *Skilled Domestic* styles in the amount of solo offences committed between them. The *Interpersonal* region displayed 49% of its cases to be solo burglaries, whilst the *Forceful* displayed 14% and *Skilled Domestic* displayed 25% to be committed by solo offenders. The high frequency of solo offenders within this region means that these offenders have either moved on from co-offending into more specialised solo offending, or that they started late in their offending careers as solo offenders.

7.3.4.6. Age and criminal experience correlates of an Interpersonal behavioural style of burglary

The regional divide of the SSA leads to the assumption that the *Interpersonal* style will be committed by offenders who are older and therefore likely to have more criminal experience. A positive significant correlation is shown between the offender's age, total convictions and years active to the *Interpersonal* behavioural style, shown in table 18. The weak correlations show a general pattern within this region, that as the offenders age, amount of convictions and years of offending increases, so to do their involvement in the *Interpersonal* style.

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Table 20. Correlation (Kendall's Tau) of Interpersonal Burglary Behavioural Style with Age, Total Convictions and Years Active

	Age of Offender	Total Convictions	Years Active
Interpersonal Style	.393** (N = 1,014)	.286** (N = 1,017)	.355** (N = 1,017)

Significance: * p< .05 ** p< .01 *** p< .001

The variable displaying an adolescent onset positioned within this region, shows that these offenders would have begun offending later in life compared to the other offending styles. This shows that out of the *Skilled Domestic* and *Forceful* offending styles, relating to domestic burglary, the *Interpersonal* burglars have the most experience. The high number of solo offenders within this theme compared to the others provides evidence for a desistence in co-offending later in life. It can also be argued, with regards to co-offending behaviour, that as an offender gains experience and confidence in burglaries that they will progress onto solo offending.

7.3.4.7. Non-Domestic Burglar

Previous studies have sought to address domestic and commercial burglaries to identify whether there are distinguishing features and different offenders committing them. However, these studies have failed to distinguish between the two. Fox and Farrington (2012) found that commercial burglaries were spread across three offending type: opportunistic, organised and disorganised. However, burglaries against commercial property types were not evident in their 'interpersonal' offending style.

The main distinguishing point of this region in comparison to the others is that these offences are conducted on commercial (non-domestic) properties rather than residential. The offence actions found within this region include the offence occurring at night-time (53%), entry through the door (41%), commercial burglary (29%), high-value stolen (20%), entry side (7%), force lock (5%) and using foot as weapon (5%). A statistically significant relationship was found between the offence occurring at night-time and high-value items stolen (X^2 (1, N = 1017) = 11.910, $p < .01$). Meaning that the commercial burglaries that occur during the night-time will be more lucrative than those in the day. The offence

characteristics also display offenders that will enter through the side or a door by using force to break the lock.

Using the offender traits and criminal histories within this region we can derive inferences of *Non-Domestic* burglar characteristics. The offender traits and previous offending history positioned within this region include the offender being White (74%), previous shoplifting (53%), previous driving offences (48%), other hair colour (21%), coming from a 10% level of deprivation area (12%), blonde haired (9%), previous arson (8%), previous sexual offence (7%), female (7%) and coming from a 30% level of deprivation area (5%). 78% of the *Non-Domestic* burglars are shown to be over 18 years of age. From the information that could be gathered on offender home location deprivation levels, only 5% were shown to live within a 30% deprivation level area. 35% of these were for *Non-Domestic* burglars, indicating that these offenders are older in age coming from the least deprived area of the sample.

7.3.4.8. Age and criminal experience correlates of a Non-Domestic behavioural style of burglary

It can be hypothesised, from the variables displayed in the SSA region, that the *Non-Domestic* burglars will have comparable criminal experience to the *Interpersonal* offenders. These offenders will be more experienced than the *Skilled Domestic* or *Forceful* offenders and, as such will also be older. The correlation results in table 19 display weak positive significant relationships between the *Non-Domestic* behavioural style and the offender age, total convictions and years active.

Table 21. Correlation (Kendall's Tau) of Non-Domestic Burglary Behavioural Style with Age, Total Convictions and Years Active

	Age of Offender	Total Convictions	Years Active
Non-Domestic Style	.060** (N = 1,014)	.184** (N = 1,017)	.105** (N = 1,017)

Significance: * p< .05 ** p< .01 *** p< .001

Although not a strong correlation is shown, the findings do highlight that offenders displaying this offending style will be older, have a higher amount of convictions and more temporal experience.

7.4. Chapter Summary and Conclusion

The current study successfully identifies a new Model of Burglary Differentiation, with four themes relating to offence actions, offender traits and criminal histories. These are labelled: Skilled-Domestic, Forceful, Interpersonal and Non-Domestic. These findings provide important implications in understanding the psychological differences between burglaries. The findings also indicate stages of development in offending, whereby offending patterns show burglaries starting as a Forceful style then moving into Skilled-Domestic. Later offending stages show evidence of Interpersonal styles, as offenders are older, more criminal experience and have a high number of solo offences. In terms of age and experience, the Non-Domestic theme is shown to be a mix of both the Skilled Domestic and Interpersonal stages.

Although these stages appear clear within the analysis, it is unlikely that any offender sticks solely to a distinct type of offending. For example, it is unlikely that an offender will solely commit domestic or non-domestic offences, but instead display a mix of the two within their offending history. It could be that the offender committing a domestic or non-domestic burglary at any stage in their offending experience is down to chance and not specialisation. For example, if an offender attempts to break into a house but is unsuccessful, they may then attempt to gain access to an unlocked shed in the garden. This change between domestic and non-domestic is by chance and unlikely to be premeditated.

Using SSA, inferences could be derived from the offence behaviours in identifying the sorts of offenders committing the burglaries. An initial indication of the difference in offending styles was found using cluster analysis. The cluster analysis produced four offending style variables labelled, 'Skilled Domestic', 'Forceful', 'Non-Domestic' and 'Interpersonal'. These offending styles were shown to relate to two distinct levels of criminal history, labelled 'High' and 'Low' rate and three different types of offenders, labelled 'Adult Minority Male', 'Younger White Male' and 'Adult White Male'. Although the cluster analysis gave an indication of the sorts of styles and offender characteristics found within the

sample, the notion of grouping or clustering variables leaves little room for overlap. This is an issue when dealing with a sample of human beings that will not fit to one conceptual box, but are likely to develop in offending style based on their own traits.

SSA was used in overcoming this issue as an empirical way of addressing Canter's (1995) 'profiling equation', deriving inferences of offender characteristics from offending actions. The results displayed a mixture of offence actions, offender traits and criminal history variables within the SSA space, providing a good indication of a relationship between them. The positioning of the variables within the SSA space showed that the cluster analysis offending styles could be mapped on. Regions were then defined based upon the four styles of offending found in the cluster analysis.

The *Skilled Domestic* burglars can be described as young adults with experience in domestic burglary, likely to be successful in their offences due to their use of skill and forethought. The *Forceful* burglars are younger in age with less experience to the other offenders. These offenders will be new to burglary committing both residential and commercial burglaries learning based on trial and error, in which many of their offences will likely be unsuccessful attempts. The *Interpersonal* burglars are mostly adult Black offenders that commit burglaries during the night-time. These offenders will have many years of experience in targeting insecure, likely occupied properties. Lastly, the *Non-Domestic* burglars are likely to be a mixture of offenders, with those new to crime and starting off committing petty theft and shoplifting offences. Whilst the others will be more experienced offenders dealing with targeting commercial properties for high-value gain.

The SSA plot could be interpreted based on the regional hypothesis, which indicated that some of the items share aspects of their meaning with a variety of other items. For example, where a property had an alarm fitted is positioned within the *Forceful* burglar region yet it occurs often with *Skilled Domestic* burglars, therefore sharing the meaning of this item across regions. The same goes for the offence occurring at night-time which is positioned within the *Non-Domestic* theme but occurs frequently by the *Interpersonal* burglar. The themes can also be discussed in terms of their differences. The *Forceful* and *Interpersonal* themes and the *Skilled Domestic* and *Non-Domestic* themes are positioned opposite each other within the plot. These themes represent distinct styles to what is opposite them.

The findings identified similarities to previous studies of burglaries that attempt to predict offender traits from offence actions. In relation to Fox and Farrington's (2012) study on developing burglary profiles the *Forceful* burglar in the current study display some similarities to the offence actions of the 'disorganised' burglar. The *Interpersonal* burglars within the current findings and Fox and Farrington's study display similarities in the offending style and offender description of their 'interpersonal' burglar. Lastly, Fox and Farrington's 'organised' burglar displayed similar traits to the current studies *Skilled Domestic* burglar. However, Fox and Farrington (2012) did not identify a distinct offender that focuses solely on commercial properties. Given that the area sampled in their study covers 1,200 square miles of the east coast of Florida, whereas the current study is sampled from a roughly 30 square mile major city, there are surprising resemblances. The locational information highlights similarities between small town American burglars to those of a dense major metropolitan city in the United Kingdom.

Previous studies have attempted to predict the offender behind the burglary actions, yet these are based on assumptions from the grouping of certain behaviours to others and lack to account for the natural co-occurrence of behaviours across offending styles. To take the current findings a step further we need to identify specific profiles that can tell us about individuals within the behavioural themes. The next chapter uses Partial Order Scalogram Analysis (POSA) to develop a predictive measure of burglary offending behaviours. This can be used as a decision tool in identifying behavioural themes from the current analysis and how they develop across crimes and offender criminal development.

Chapter 8. Predicting Offender Characteristics from Offending Actions

8.1. Introduction

The previous chapter indicated that burglary offending styles are empirically distinct from each other, resulting in four themes, each with inferred offender characteristics. These were labelled, 'Skilled Domestic', 'Interpersonal', 'Forceful' and 'Non-Domestic'. The central aim of the current study is to predict offender characteristics from offending actions. In doing so it is hypothesised that we can distinguish the degree of patterns across developmental stages of burglary offending styles and identify how this relates to the offender characteristics. By identifying the behaviours in mathematical terms, we can infer offender characteristics and identify how they develop, thus creating a decision tool in predicting characteristics from actions.

This approach in predicting offender characteristics from offence actions are empirically examined based on Moffitt's (1993) Developmental Theory of Crime. According to Moffitt there are two theories of developmental stages in antisocial behaviour. As mentioned in previous chapters, the first theory, labelled 'life-course persistent', is the continuous course of antisocial behaviour, whereby in every stage of life individuals will engage in deviant behaviours. The second theory, labelled 'adolescence-limited', consists of most offenders having a temporary involvement in antisocial behaviour at a young age, with criminal careers of a shorter duration.

Fox and Farrington (2016) stated that there are different types of offenders (such as Moffitt's 'life-course persistent' and 'adolescent-limited') that have been shown to commit the same types of crimes. However, these are likely to be committed in different ways and on the basis of different circumstances. In their identification of a relationship between the developmental characteristics of offenders and crime scene behaviours, Fox and Farrington (2016) found typologies of offending styles (see Fox and Farrington, 2012) that relate to various developmental features. The results from a sample of 405 solved burglaries showed that offenders who are planned and organised, committing a high-rate of offences across a short time-frame, related to Moffitt's 'adolescent-limited'. On the other hand, chronic offenders with an early criminal onset, high offending rates and versatility across crime types, related to the 'life-course persistent'. Fox and Farrington's interpersonal burglaries were

shown to be late onset offenders that were victim-focused. They stated that this style of offending is not accounted for by Moffitt (1993), but that the findings provide support for an adult onset offending group. Fox and Farrington (2016) found that these results significantly aid in understanding the developmental stages of offenders and how those relate to their decision to offend. The current study therefore examines the relationship between developmental stages of offenders based on age, total convictions and years active in relation to the offending styles previously identified. Studies have shown success in using a thematic approach to predicting offender characteristics from offending actions and as such will be used in the following analysis.

In examining 15 sub-types of burglary using a thematic approach, Yokota and Canter (2004) identified four main themes: 'residential', 'commercial', 'public' and 'industrial/storage'. Using partial order scalogram analysis they found that burglaries are distinct based upon being residential or commercial, with very few being specialised in 'public' or 'industrial/storage' burglaries. Yokota and Canter found that the number of offenders specialising in commercial burglaries decreased with the increase in burglar experience. The study indicates that stages of criminal development can be identified based on the type of burglary carried out. With their findings identifying that the less experienced offenders commit commercial burglaries, whilst the more experienced offenders commit residential.

From a developmental theory of crime position the assumption is that offending behaviours can be characterised by the offender age, rate of active offending and amount of offences committed. The degree in development of offending behaviours will then vary according to the offender's characteristics. As stated by Fox and Farrington (2016), developmental theories of crime only aim at explaining criminal behaviours over life-course and do not predict the likely offending style an individual will commit. The current study addresses situational features of an offence in not only expanding the understanding of developmental stages of offending, but also in attempting to predict the offender developmental stage from their offending style.

8.2. Method

8.2.1. Sample

As with the previous chapter, data from the Police National Computer (PNC) were matched to available records from the Midlands City Database. The resulting data consists of 1,017 offender-offence combinations of convicted domestic and non-domestic burglaries. The sample contains offence and offender information, including the full criminal history of each offender.

8.2.2. Analysis

When interpreting the offending styles identified in the previous chapter and the patterns of those themes occurring across the sample, it is inevitable that features of each may be found. There are no cases within the sample that contain solely one theme, as each case reports a small percentage of other behaviours occurring alongside that. If we were to analyse the cases based on some involvement with a theme, then all the cases would display a broad profile of offending styles. However, as mentioned there are no cases that contain involvement in just one theme, so all offenders would be classed as not being involved in any offending styles. A way to overcome this was addressed by Youngs (2006) in modelling criminal specialisation. Youngs highlighted that a consideration of the level of involvement that picks up on a variation across activity should act as the indication of involvement in that offending style. Using a 20% level of involvement cut off, Youngs found the most useful level of discriminating between offenders. The following analysis displayed a similar finding in discriminating between offenders to identify the level of offending activity across the themes.

The 20% cut off criterion was then used to assess whether offenders had a level of involvement in one of the four themes identified in the previous chapter. This allows the offender's pattern of involvement to be displayed across the four offending themes of Skilled Domestic, Interpersonal, Forceful and Non-Domestic, indicating a four-figure profile.

The current study will use Partial Order Scalogram Analysis (POSA), a method devised for investigating multivariate distributions in which individuals in a population are assigned specific categories on a set of variables (Shye, 1985). It allows individuals to be

compared on a construct that highlights the varying quantitative (degree of offending style) and qualitative (variation in types of offending style) features. This allows us to understand behavioural patterns in relation to the construct of profiles, and how these are different or similar to each other. Previous studies have successfully employed POSA in addressing individual behaviours across a multitude of offending attributes. These include Porter and Alison's (2001) study of violent group behaviour of gang rape, and Last and Fritzon's (2005) study of expressiveness in stranger, acquaintance and infrafamilial homicides.

This method is then ideal for modelling patterns of offending actions in relation to the question of specialist offending styles and criminal development. It is valuable to determine what combination of themes, derived in the previous chapter, exist for each individual. The SSA in the previous chapter is used to identify the structures and themes of distinctions in the actions of the offences, whereas POSA is used to explore people's behaviours and patterns by looking at the profile of each individual (Yokotu and Canter, 2004).

The profiles for the offenders will be built up by 1's and 2's forming a common order, in that they will go from specialist through to broad offending styles. A '2' will be given to offenders with a level of 20% of high involvement in the theme, and a '1' for those less than the 20% cut off criterion. The variables will be arranged consistently for each profile representing the following variables: *Interpersonal* (first digit), *Forceful* (second digit), *Skilled Domestic* (third digit) and *Non-Domestic* (fourth digit). The breadth of offending patterns will then display those with a broad offending style, indicated by a '2222' and those with a specialist offending styles, indicated by only one '2' shown. For example, '2111' displays an offender that is specialist in the Interpersonal offending style, whereas a profile of '1112' displays an offender specialised in Non-Domestic offending.

Although there is a profiled order, this would be insufficient in attempting to differentiate the various themes because although '1212' and '2121' equal the same total score, they are made up of a different thematic structure. A partial order would therefore only allow for the quantitative similarities but would not take into consideration the qualitative differences. In order to determine the most efficient two-dimensional representation that represents the relationships of order and quality between the elements, Shye (1978) developed an algorithm using base co-ordinates (Canter, 2004). This is known as Partial Order Scalogram Analysis with base Co-ordinates (POSAC). POSAC is used to determine the dimensionality of the partial order, generating profiles as points in the geometric space

that reflect the order among the other profiles. They are then represented as a quantitative order running from the lowest (1111) in the lower left-hand corner, to the highest (2222) in the upper right. Taylor (2002) describes POSAC as determining the placement of profiles along a joint (quantitative sum of all elements) and lateral (qualitative pattern across elements) axis, with profiles of the same score positioned within the region close together than profiles with different scores.

The profiles are positioned based on the POSAC structure described by two axes. The joint axis (J) and the lateral (L) axis reflect the quantitative and qualitative variations on the construct. The J axis runs from the bottom left to the top right of the plot, measuring the total score of each profile, thus reflecting the quantitative variations. Whereas, the L axis runs from the top left to the bottom right, reflecting the different qualitative variations within the plot. By studying the meaning of each element within the profile the qualitative variations along the L axis can be interpreted.

Interpretation of these results can be explained by examining the regional partitions for each item of the plot. A score is provided on each variable relating to the positioning of the overall profiles. The POSAC will produce a coefficient of weak monotonicity between each observed item and the features, with the higher score implying a strong loading on that axis. The plot can then be partitioned based on the loading coefficient of each variable into different roles. The figure below illustrates the different partitions the plot can be divided into.
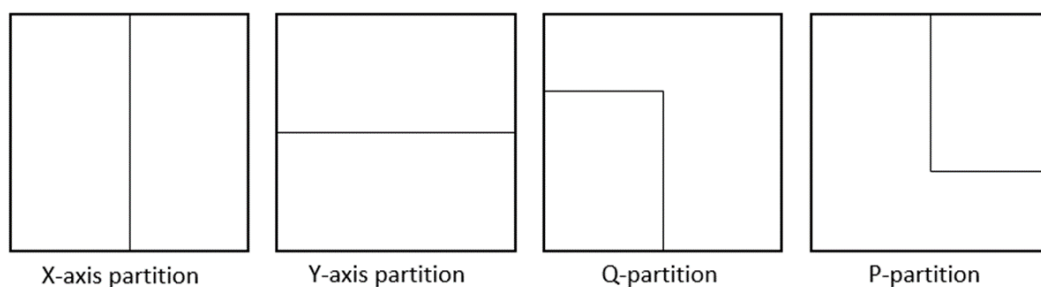
Figure 13. Different types of partitions in the item plots

A key conceptual difference within the construct is displayed by the X (vertical) and Y (horizontal) partitions. These act as the fundamental coordinates that the POSAC algorithm

operates on. The Q and P partitions are the dividing qualitive scales. The Q partition is found where the item exaggerates the qualitative scale, displaying extreme scores and magnifying the effect of the feature. Whereas, the P partition is present when an item moderates the scale, with individuals with middle scores on the qualitative scale. These partitions and the information within the plots will ease in the interpretation of the POSAC analysis.

8.3. Results

8.3.1. Partial order scalogram analysis of distinct burglary styles

The profiles, representing a combination of themes derived from offence and offender characteristics, emerge from the POSAC and are positioned within figure 14. The coefficient of correct representation for this configuration was .9006 indicating that 90% of the profiles were correctly represented on the POSAC plot.

To ease interpretation of the plot, a smaller diagram displaying the element meaning is shown in figure 15. This includes the combinations of classification features that make up each profile representing the position that profile is situated within the POSAC plot. The resulting plots include the following profile groups:

IFSN = Interpersonal – Forceful – Skilled Domestic – Non-Domestic

IFS = Interpersonal – Forceful – Skilled Domestic

ISN = Interpersonal – Skilled Domestic – Non-Domestic

FSN = Forceful – Skilled Domestic – Non-Domestic

IFN = Interpersonal – Forceful – Non-Domestic

IS = Interpersonal – Skilled Domestic

FS = Forceful – Skilled Domestic

SN = Skilled Domestic – Non-Domestic

IN = Interpersonal – Non-Domestic

FN = Forceful – Non-Domestic

S = Skilled Domestic

N = Non-Domestic
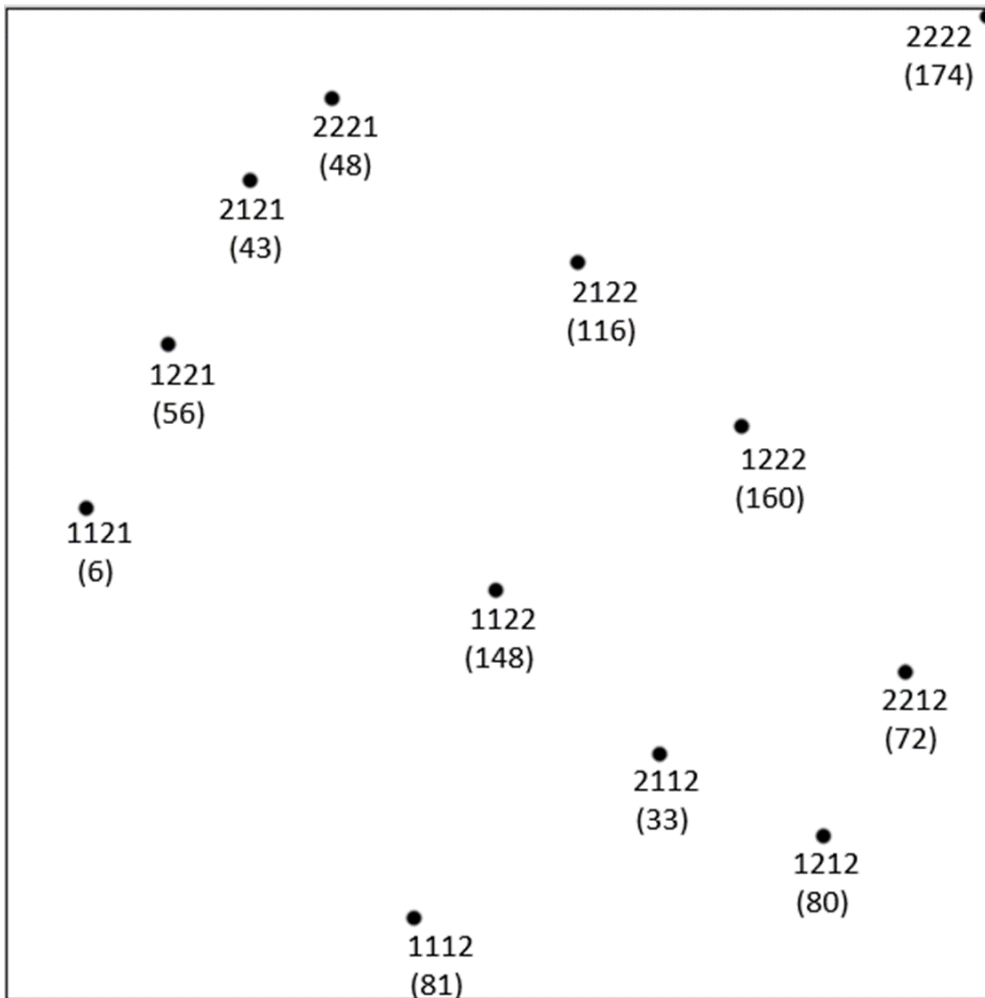
Figure 14. Partial order scalogram analysis with co-ordinates (POSAC) of 12 profiles derived from the 1,017 burglary cases with the frequency of each
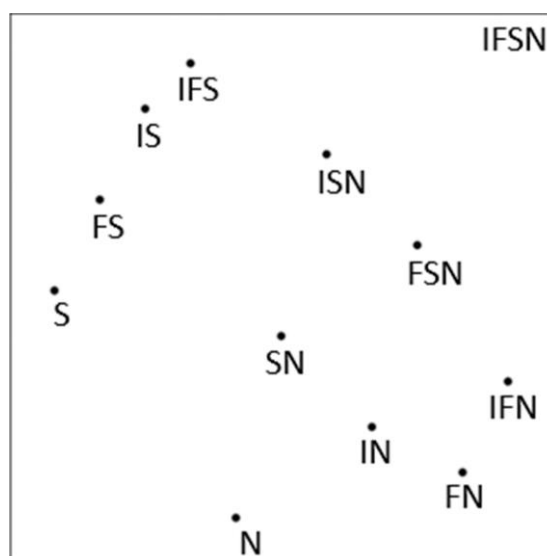
Figure 15. POSAC plot with element meaning superimposed onto it for 12 profiles

If a case contained 20% or more of the activity in the theme, then it was given a '2' in the profile. The profiles describe activity in order of Interpersonal – Forceful – Skilled Domestic – Non-Domestic, which is displayed in the profile as '2222'. A profile made up only of Skilled Domestic cases is displayed as '1121', while a '1112' describes a Non-Domestic offender.

Initial observations show that out of the sixteen profiles possible, twelve were found within the sample. Figure 15 shows that the missing profiles relate to the Interpersonal and Forceful themes, which are not shown to occur on their own. The main X and Y axes are heavily populated with either Skilled Domestic or Non-Domestic cases. The frequency of the profiles occurring within the sample are fairly evenly spread with what appears to be a slightly higher amount towards the Non-Domestic theme. 17% (N = 174) of the sample displayed a generalisation towards all four themes, shown in the POSAC plot as '2222'. Whilst the majority (74%, N = 756) displayed a mixture of two or three themes spread across the J and L axis, showing variations in quantitative and qualitative features. Only 9% (N = 87) of the sample displayed a specialist offending style, with 1% (N = 6) committing Skilled Domestic offences and 8% (N = 81) committing Non-Domestic offences. Although the figures indicate that specialism within a particular type of offending style can be identified, it does highlight these as a rarity. The Interpersonal and Forceful themes occur the least within the sample, with the Interpersonal theme occurring in 48% of cases (N = 486) and Forceful in 58% (N = 590). Whereas the Skilled Domestic theme occurs in 74% (N = 751) and the Non-Domestic theme in 85% (N = 864) of the sample. Overall, the dominant theme, occurring in more than 20% of cases, is the Non-Domestic offending style. The spread of profiles along the J axis indicates a clear quantitative variation of offending styles.

Examining the quantitative variations in offending styles is crucial for an initial understanding of the sample. However, it is also important to study the qualitative variations in the profiles to understand the diverse varieties of activity occurring. By drawing on the qualitative variations of each profile we will need to study each individual item in the plot. The figures below display each individual item plot for Interpersonal, Forceful, Skilled Domestic and Non-Domestic burglary themes, with a '2' representing the presence of that item.
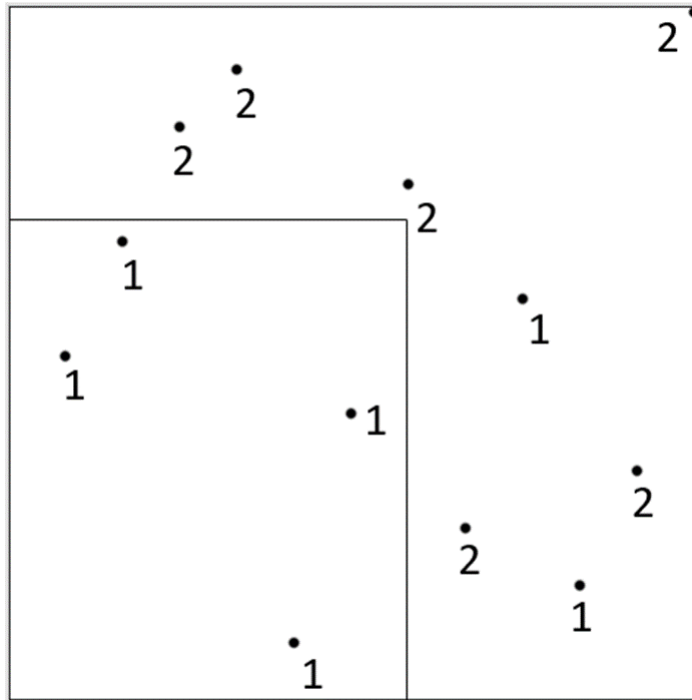
Figure 16. Interpersonal Item POSAC plot
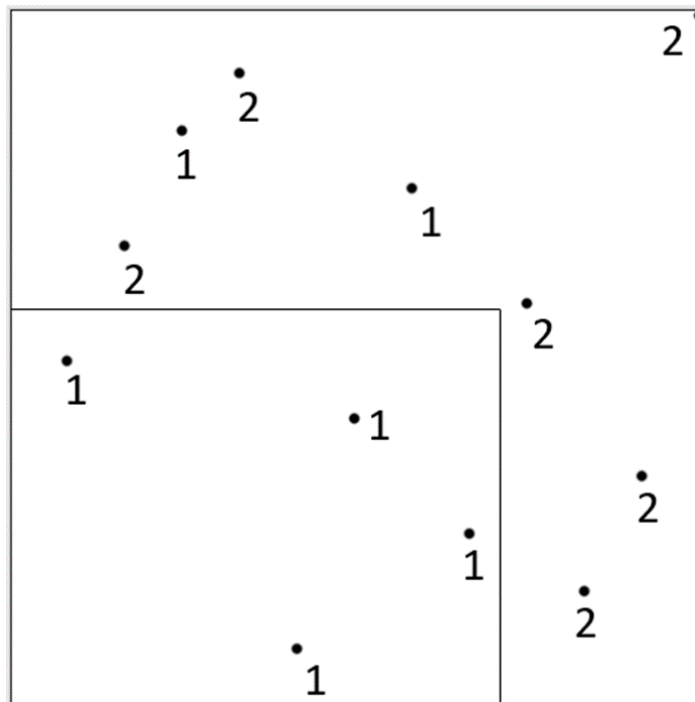
Figure 17. Forceful Item POSAC Plot
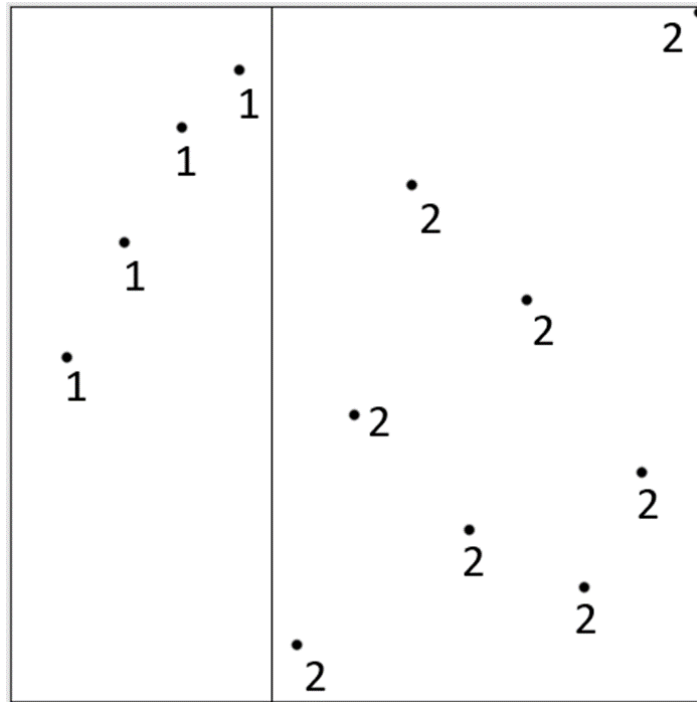
Figure 18. Non-Domestic Item POSAC Plot
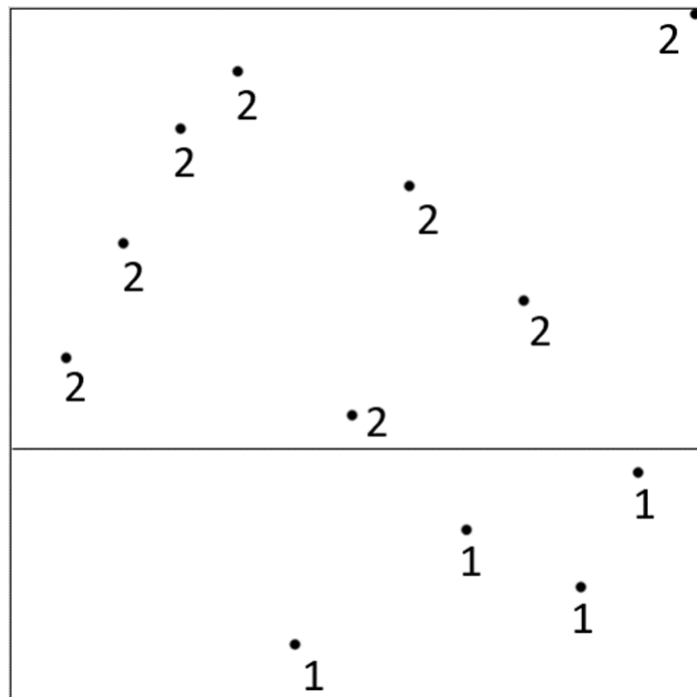
Figure 19. Skilled Domestic Item POSAC plot

The fundamental coordinates that the POSAC algorithm operates on is the X and Y axis. The items most heavily weighted on these axes will form the division of the plot. A

relationship between an item and the various axes is measured statistically using the coefficient of weak monotonicity. The Non-Domestic item displays the maximum loading on the X axis (coefficient of weak monotonicity = 1.00), representing a key distinction of qualitative variations in offending styles. The maximum loading on the Y axis is displayed by the Skilled Domestic item (coefficient of weak monotonicity = 1.00). The Skilled Domestic offending style can then be identified as a feature underlying the differences between the profiles. The results identify that burglary will be distinguished by either a Skilled Domestic or Non-Domestic offending style, classifying burglary into residential and commercial offences.

The remaining items are identified along the joint axis. The item plots for both the Interpersonal and Forceful offending styles can be divided into regions according to the Q-partition. Highlighting these items as exaggerating behaviours that contribute to an offence being either Skilled Domestic or Non-Domestic rather than those items acting on their own as distinct styles. The broader patterns of offending from either Skilled Domestic or Non-Domestic burglaries will include elements of either Interpersonal or Forceful behaviours. The co-efficient of weak monotonicity for the Interpersonal offending style is 0.90, whereas for the Forceful it is .92. This indicates that both these offending styles have a similar magnifying effect to the main styles of offending. The findings show that it is possible that there is a concept of Interpersonal behaviour and a concept of Forceful behaviour in burglary but they do not operate separately. These behaviours to do not define whole burglaries and result in being more present in the Skilled Domestic and Non-Domestic burglaries.

In focusing on the quantitative and qualitative variations of the plot we can highlight the presence of development among profiles. The sum of each profile will go from low to high along the J axis, with the lower scores toward the bottom left of the plot going up to the top right. For example, the profile '1112' is given a score of five, profile '1122' a score of six and '1222' a score of seven. This cumulative scaling allows us to examine the changes in elements as a whole in comparison to other profiles with similar developmental constructs. The cumulative scaling, also known as Guttman scaling discussed further in the next chapter, is a way of establishing whether a set of attributes measures across a single theoretical construct (Loner, 2016). However, profiles with the same cumulative score may not have the same meaning, making it inadequate to attempt to differentiate between the various themes. For example, the profile '1221' and '2112' both have a cumulative score of six but are made up of different thematic structures. Even though both profiles have the same score they are

qualitatively different and so they are not comparable within the POSAC space. As discussed previously, POSAC will determine the dimensionality of the partial order, generating profiles with the space that reflect their order. These will sit along the J (quantitative) and L (qualitative) axes displaying the variation in structure within the geometric space.

8.3.2. Modelling burglary offending styles across criminal development

To identify stages of criminal development with the sample, a variation in profile stages along paths will need to be identified. The quantitative differences between the profiles will represent a degree of specialist offending styles, whilst the qualitative variations will represent the paths they take. The offender's age, total convictions and total years actively offending will be used to measure a development in paths along the profiles identified. Any association found between the profiles of offending actions and the offender characteristics will also provide support to the process of a decision support tool in deriving inferences from crime scenes.

The profiles along the top of the plot in figure 14 display a path of development in Skilled Domestic offences. The path begins from those who just commit Skilled Domestic '1121', then Forceful – Skilled Domestic '1221', to Interpersonal – Skilled Domestic '2121', then Interpersonal – Forceful – Skilled '2221' through to all offending styles '2222'. These items highlight a route of 'Skilled Domestic Burglary' development that is low on the L axis but high on the Y axis, accounting for 32% (N = 327) of the sample.

The profiles displaying the Non-Domestic and exaggerated Non-Domestic offenders are shown to account for 43% (N = 440) of the sample. These start from the profile '1112' displaying only Non-Domestic offences, to '1212' profile of Forceful - Non-Domestic, then '2112' Interpersonal – Non-Domestic, to Interpersonal – Forceful – Non-Domestic '2212' and through to all themes. These items result in a 'Non-Domestic Burglary' development, high on the L and X axis, but low on the Y axis. Both stages in Domestic and Non-Domestic burglary are shown to account for Interpersonal and Forceful being clear contributing features in the development in offending styles.

The profiles positioned in the centre of the plot along the J axis display a cumulative sequence of attributes. Each profile is shown to form a rank order from low to high, displaying a morphology of offending styles. Beginning at the bottom of the plot with profile

'1112' Non-Domestic, to '1122' Skilled Domestic – Non-Domestic, to '1222' Forceful – Skilled Domestic – Non-Domestic and lastly '2222' Interpersonal – Forceful – Skilled Domestic – Non-Domestic. This sequence portrays an offender that moves between specialist and versatile offending, accounting for 55% of the sample (N = 563). This is a significant finding in modelling burglary offending styles as it allows us to quantify a development in offending actions.

The patterns of profiles examined within the POSAC space draw attention to a similarity of the themes found in the previous chapter. The POSAC plot can be mapped onto the SSA-I in the previous chapter, as POSA works with individual cases whereas SSA focuses on the offence characteristics. Similar to the SSA regional division, the major divide displayed in the POSAC is between the Skilled Domestic and Non-Domestic themes. This empirical relationship between the two is shown through a similarity in division across the themes. Figure 20 displays the POSAC plot divided by the X and Y axis. The results identify three themed developmental regions of domestic burglary offending style, labelled 'Skilled Domestic Burglary', 'Versatile Burglary' and 'Non-Domestic Burglary'. A fourth theme is labelled, where no profiles are evident, as 'Opportunistic Burglary'. Although not present in this sample, where offenders are shown to solely reflect the exaggerated Forceful or Interpersonal theme would sit within this region.
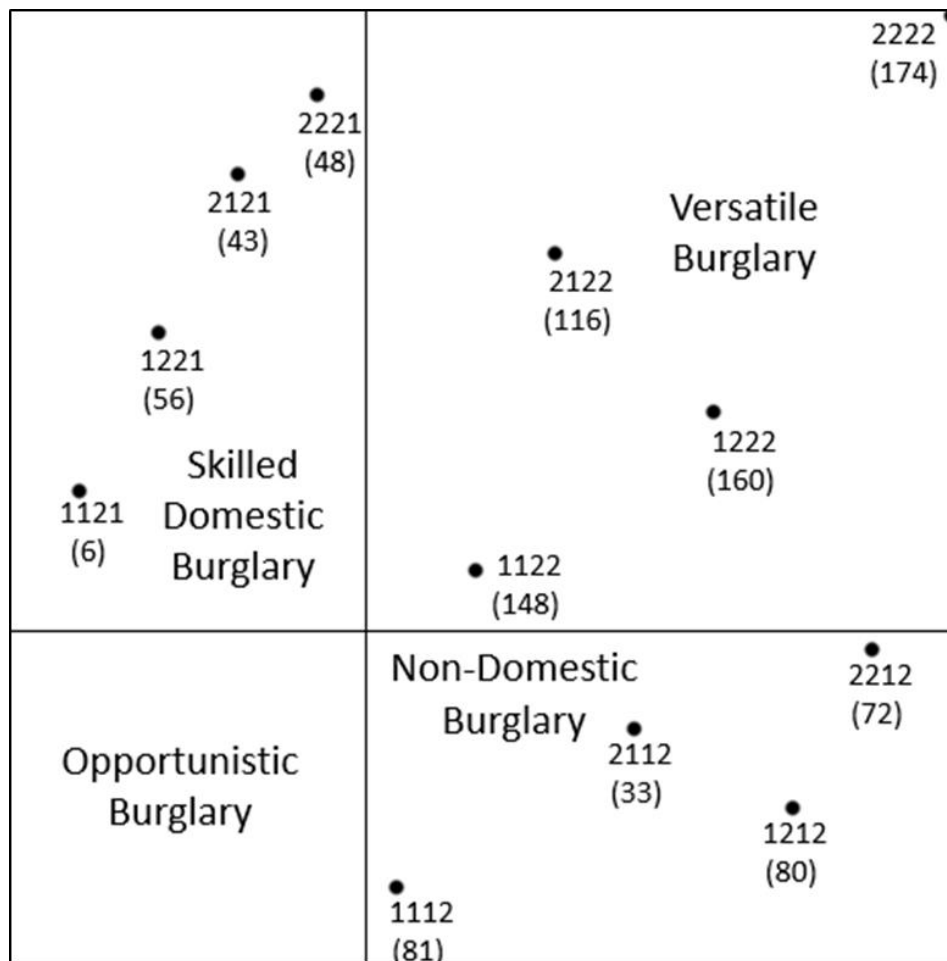
Figure 20. POSAC with X and Y axis division and area theme superimposed onto it

The results show clear developmental paths of offending styles that, if correlated to the offender characteristics, can explain a developmental model of burglars. The following section includes a breakdown of offender characteristics that represent developmental stages in offending. These are, offender age, length of years offending and total number of convictions, representing a degree of criminal development.

Previous studies have shown that burglary is a developing crime, with offending styles forming from criminal experience. Having established the range of offending styles from the profiles that describes each case within the sample, the patterns of these can be explored based on criminal experience. By modelling the offender criminal experience onto the offending styles, the profiles will act as direct inferences of action to characteristics. If offender characteristics can be inferred from the offending styles then the profiles can be used as a predictive decision tool.

Moffitt (1993) proposed two types of development in offending, these being 'life-course persistent' or 'adolescent-limited' offenders. As the life-course persistent offenders are understood through continuity, the profiles will reflect individual differences in increased offending experience. With this type, the profiles would highlight high rates of convictions for those into adulthood. It is also possible that the profiles will illustrate an underlying manifestation in offending style with the age of offenders. The adolescent-limited offenders will display younger offenders with a more limited offending career.

8.3.3. Age of burglar development

The sample age ranged from 12 to 63 years with the average being 25 years old (std. deviation = 9.210). The average offender age for each profile is examined to try to ascertain any relationship along the development in burglary style. The age of offenders was then correlated against each profile's X, Y, J and L axis score to produce a refined empirically sophisticated examination of the quantitative and qualitative variations. It is hypothesised that the age of the offenders will correlate towards the Y axis, displaying a difference between the domestic and Non-Domestic burglars. Figure 21 displays the mean offender age for each profile on the plot, including the frequency of those occurring.
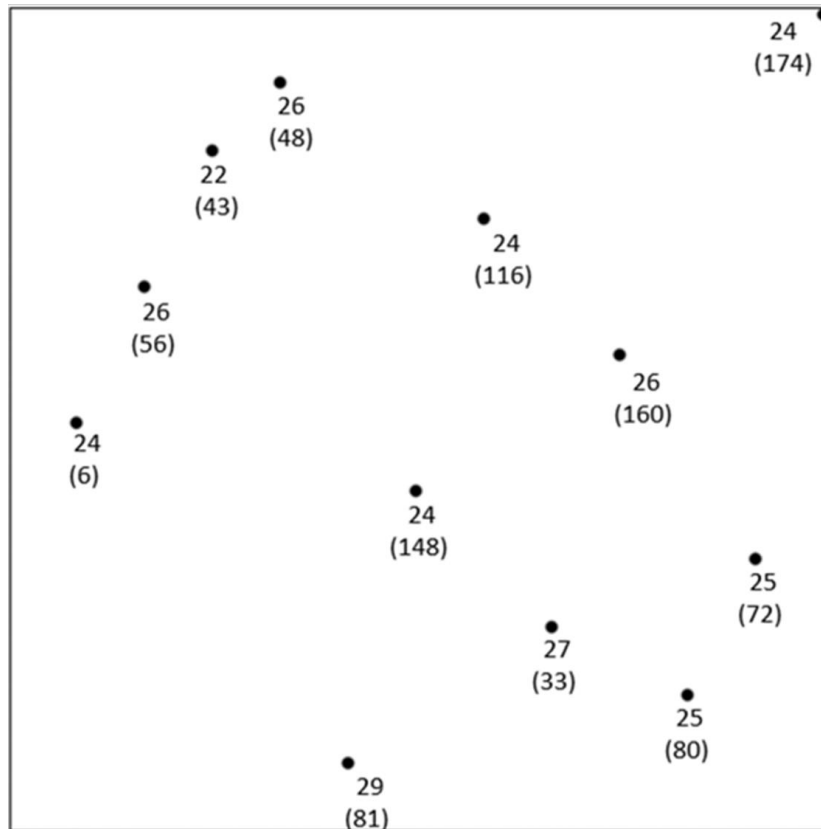
Figure 21. POSAC plot showing average offender age for profile groups

The correlations (Pearson's *r*) resulted in a negative significant relationship between offender age and the Y axis ($r = -.546$, $p < .05$), one-tailed. As shown in figure 21, the Skilled Domestic item displays the maximum loading on the Y axis, meaning that it is an underlying feature in the differences between profiles. The results demonstrate that as the offenders get older they will become more specialised in Non-Domestic burglaries, moving away from the Skilled Domestic. Figure 22 displays a scatterplot summarising the correlation results between age and the Y axis.

The oldest mean age of offenders, aged 29 years, are reported by the Non-Domestic only offending style, while the youngest offenders, ages 22 years, are by the Skilled Domestic – Interpersonal style. A divide in the difference in ages between the Skilled Domestic and Non-Domestic burglaries can be seen in figure 21. This divide is indicated by the correlation with the Y axis by the negative significant relationship.
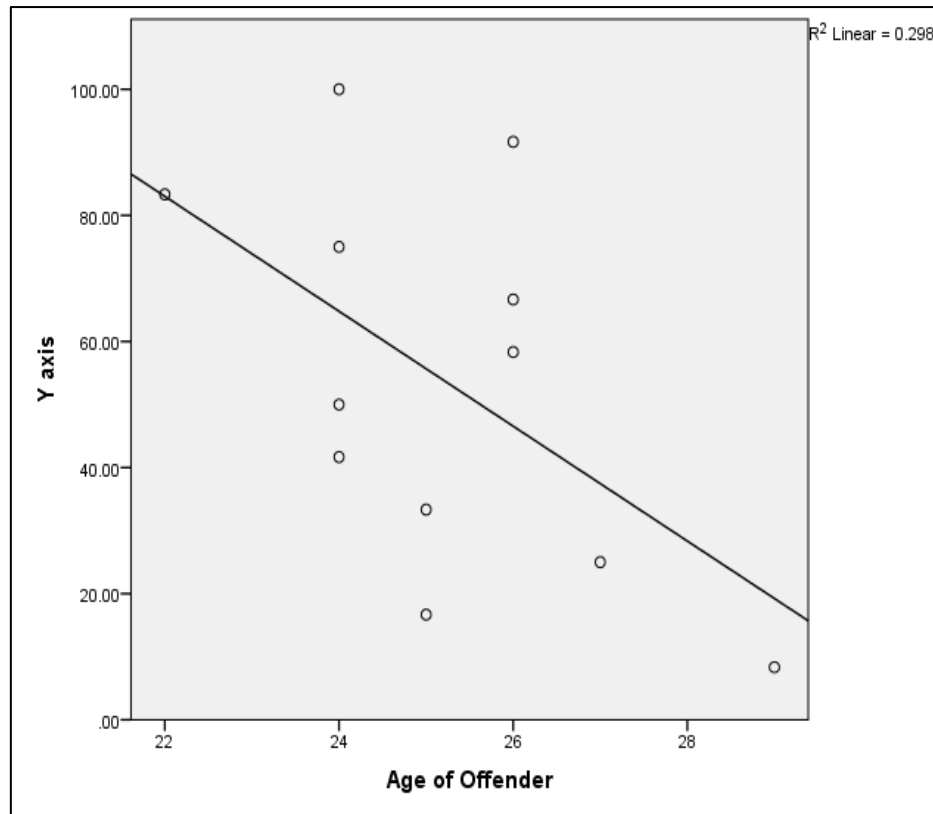
Figure 22. Scatterplot showing significant negative correlation between offender age and Y axis

The scatterplot illustrates the significant negative relationship between age of offender and the Y axis, however, it also identifies the profiles that skew the results. The findings show that profiles '2222' and '2221', towards the top of the scatterplot, do not follow the trend identified. These profiles are a mixture of offending styles, relating more to the Skilled Domestic burglary, indicating that the broader versatile offending styles will not follow a pattern of development in offender age. Profile '1212' can be seen at the bottom middle area of the scatterplot, displaying an average age of 25 and low on the Y axis. This profile indicates a Forceful – Non-Domestic offending style and is shown to sit further away from the regression line not following a pattern. As the other Non-Domestic offending styles are shown to follow a development among age, these results indicate that it is the Forceful offending style that skews the data. Findings from the previous chapter showed that the Forceful offender will be younger with less experience, therefore it is unsurprising that this profile is positioned further from the regression line.

The argument put forward was that profile groups would differ in age according to offending style, suggesting a development in experience through age. Evidence supporting

the directional hypothesis was found, indicating a distinction in age between the Skilled Domestic Burglary and the Non-Domestic Burglary styles. The results support the notion that firstly offenders targeting domestic properties will be younger than those that target commercial properties. Secondly the results provide further support to the notion that the specialist offenders will be older, relating mostly to the Non-Domestic burglars.

8.3.4. Criminal history stages of burglar development

Figure 23 displays the POSAC plot with the mean of total convictions committed by each offender within that profile placed on that space. In examining the quantitative and qualitative criminal history variations the total convictions for each offender was correlated with the X, Y, J and L axis score. It is hypothesised that a stronger development in offending styles will be found through the amount of prior convictions within their criminal history, correlating strongly towards the L axis. The results from the age of the offenders to the POSAC axes provides support of hypothesising a positive significance between the total convictions and L axis.
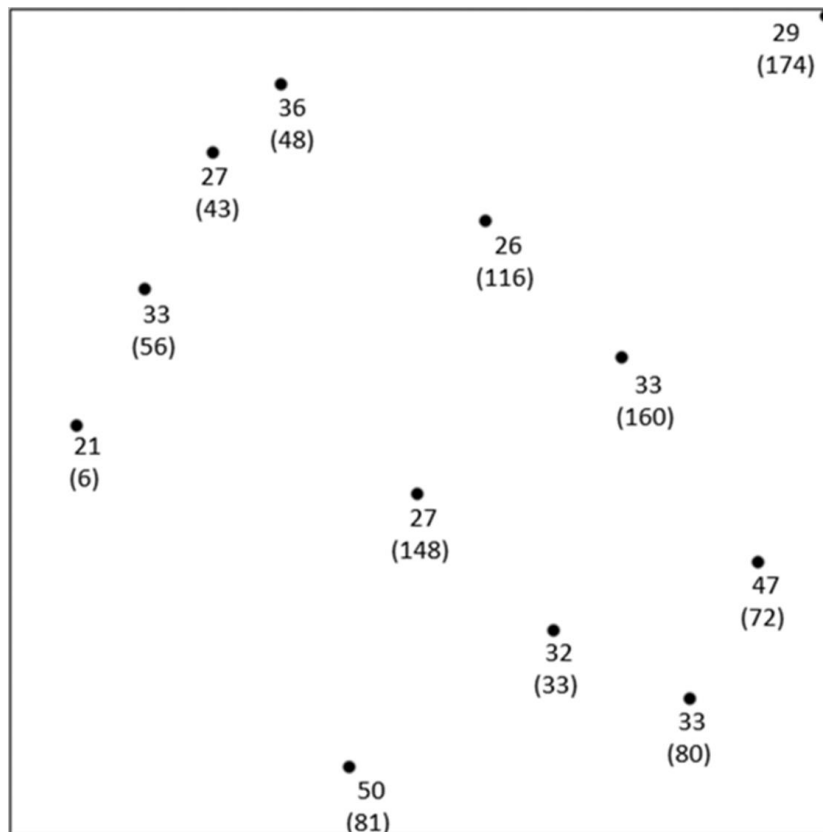
Figure 23. POSAC plot showing mean number of total convictions for profile groups

The resulting correlations (Pearson's *r*) produced a positive significance between the total convictions with the L axis ($r = .500$, $p < .05$), one-tailed. The results show that a higher frequency of the sample will have less convictions and a broader offending style than those who are specialist offenders. The relationship between the L axis score and the total convictions displays a qualitative variation in the profiles. Here, a positive correlation shows that an increase in total convictions are related to a greater tendency towards specialisation in Non-Domestic rather than domestic burglaries. This key finding adds further support to the criminal experience and development of Non-Domestic in comparison to Skilled Domestic burglaries.

The highest mean number of total convictions is observed for the Non-Domestic only offending style, with an average of 50 convictions. The lowest mean number of total convictions is shown for the Skilled Domestic only offending style, with an average of 21 convictions. This difference in total convictions between the two is highlighted by the L axis in drawing on the qualitative differences of these two profiles. Again, as discussed, they both have the same profile score of five and therefore are the same quantitatively, but just have

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underlying structural differences. The developmental route of the Non-Domestic offending style along the bottom of the plot also displays a high average amount of total convictions. With '2212' displaying 47 total convictions, '1212' displaying 33 and lastly '1112' displaying 50. Findings highlight a distinction between the Skilled-Domestic and Non-Domestic offenders with the Non-Domestic showing higher total amount of convictions.

The results are summarised in the scatterplot below (Figure 24). The scatterplot displays the positive significant relationship between the total convictions and L axis, indicating a development in burglary offending styles. However, there are some profiles that are positioned further away from the regression line, skewing the results. The profiles towards the top of the scatterplot are '1212' and '2112'. These are both exaggerated Non-Domestic burglary styles with either the Interpersonal or Forceful style. The same is shown in the exaggerated Skilled Domestic offending styles, with the profiles '2221', '2121' and '1221' positioned towards the bottom of the scatterplot. These results show that the broader offending styles will commit an average amount of offences in comparison to the Skilled Domestic offenders that will commit a low amount and the Non-Domestic that will commit a high amount. Findings again, provide support towards difference between specialist and versatile offenders in criminal experience.
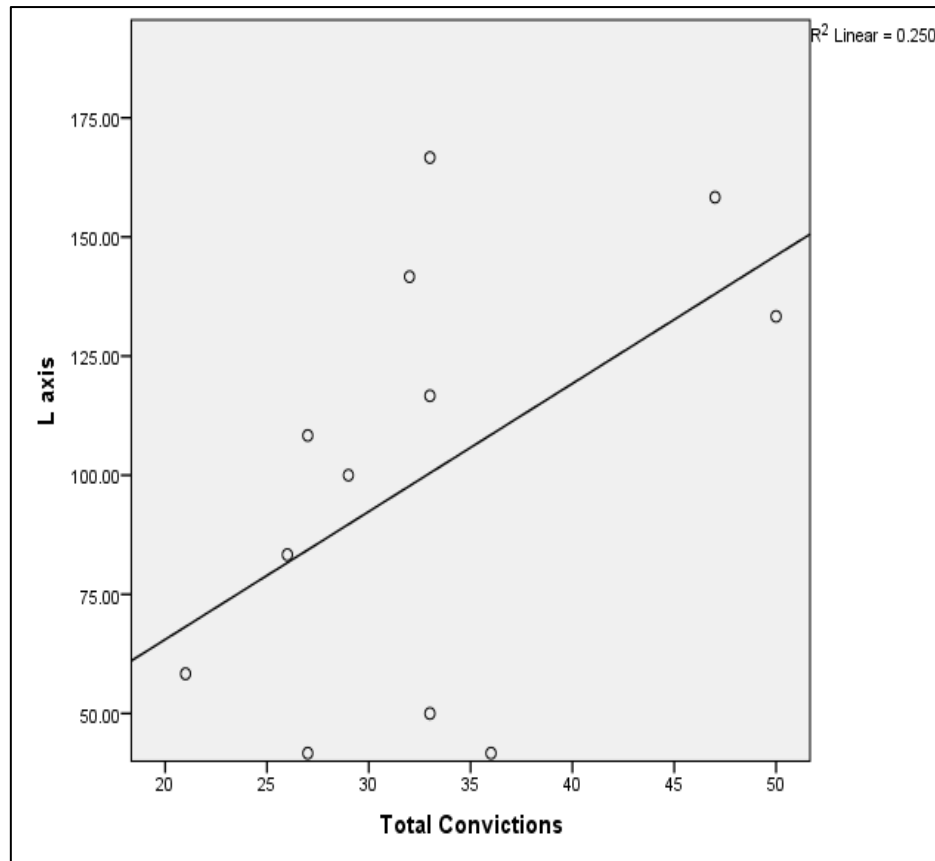
Figure 24. Scatterplot showing significant negative correlation between total convictions and L axis

8.3.5. Years active in burglar development

An important aspect of distinguishing a development in criminal activity comes from examining the total years of offending within the sample. The X, Y, J and L axis scores were examined against the total years of offending actions within the sample. It is hypothesised that a similar relationship will be found between the L axis and the years active as there was with the average total convictions. This is because with more years actively offending the offenders will have more convictions and therefore a similar development towards the Non-Domestic burglars should be identified. Figure 25 displays the average years active for each profile group on the POSAC plot.

Correlations (Pearson's *r*) resulted in a positive significant relationship between the years offending and the L axis ($r = .498$, $p < .05$), one-tailed. This result indicates that an increase in years of offending are related to a greater tendency towards specialist Non-Domestic offending rather than domestic.
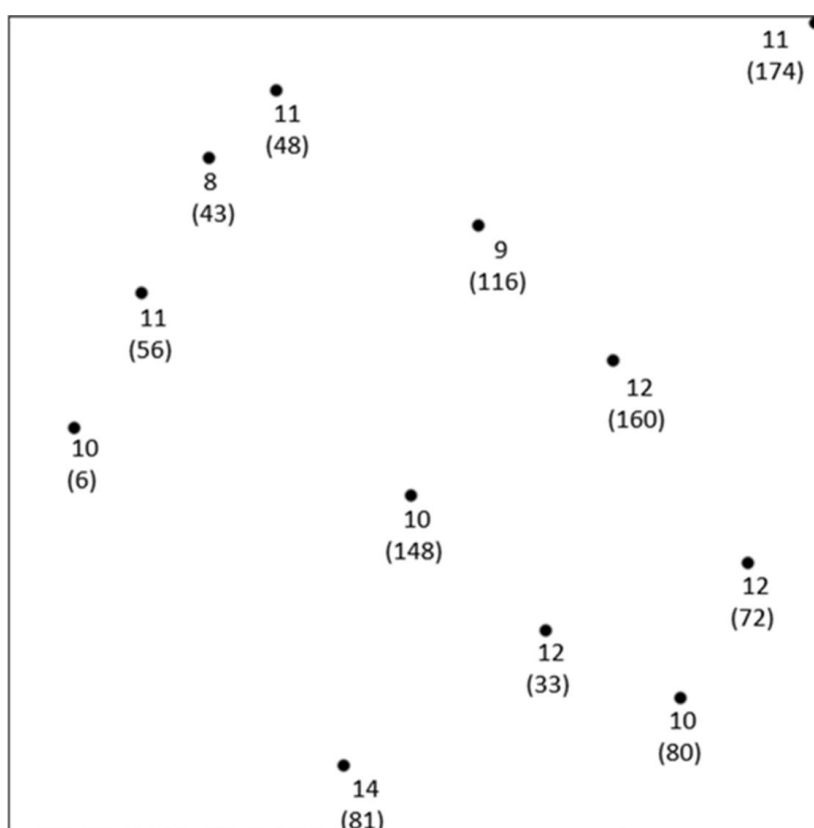
Figure 25. POSAC plot showing average active years offending for profile groups

The Non-Domestic burglary style is observed in figure 25 as the most active offending style, with 14 years average offending for this profile group. The other highest offending lengths in years relate to exaggerated Non-Domestic offending styles. Such as, profile '2112' Interpersonal – Non-Domestic and profile '2212' Interpersonal – Forceful – Non-Domestic displaying 12 years average offending. It is important to note that the lowest average years offending is for the profile '2121' Interpersonal – Skilled Domestic offending style. The findings provide further support to the notion of the domestic burglars being less experienced in comparison to the Non-Domestic.

The results are summarised in the scatterplot below (Figure 26). Similar to the relationship between the L axis and the total convictions, the scatterplot here illustrates the positive significant relationship between the L axis and years active. A similar theme across the results is that it is the exaggerated profiles that skew the results, particularly the Forceful offending style. The profiles positioned away from the regression line towards the top of the

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scatterplot are '1212' and '2212'. Whilst the profiles towards the bottom of the scatterplot are '2221' and '1221'. Both exaggerated Skilled Domestic and Non-Domestic offending styles show the Forceful style occurring most often. The findings highlight that the Forceful offending style does not fit the usual patterns within domestic and Non-Domestic offences. Therefore, burglaries committed in this way will be done by offenders not on the developmental path of burglary. This finding also relates to Moffitt's (1993) adolescent-limited offenders in that the Forceful offenders will sit within a pattern of committing offences when they are young and inexperienced. They will then not continue through the developmental path that the life-course offenders will take.
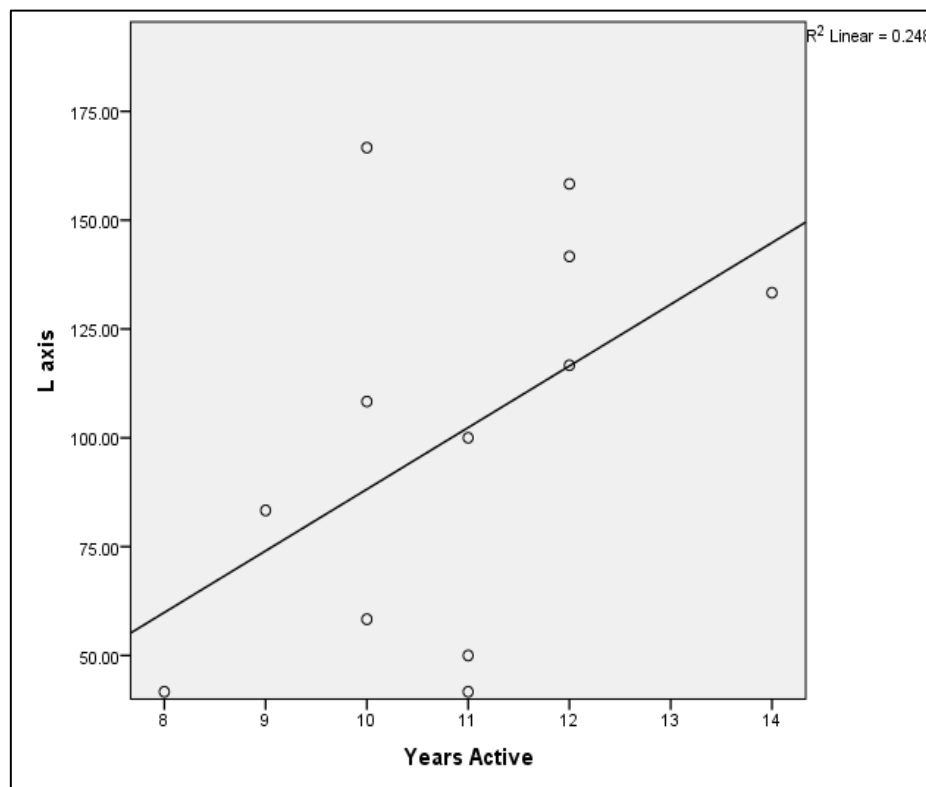
Figure 26. Scatterplot showing significant negative correlation between years active and L axis

8.4. Chapter Summary and Conclusion

This study provides a framework of modelling burglary offending styles across stages of criminal development. The results indicate that burglary can be distinguished by either Skilled Domestic or Non-Domestic offending styles, with exaggerated effects of

Interpersonal and Forceful behaviours. Interpersonal and Forceful styles will contribute to an offence, rather than acting as their own distinct style. These findings coincide with Yokota and Canter's (2004) study that displayed a clear distinction between themes of residential and commercial burglaries, with very few committing others relating to public buildings and storage units. The evidence of development in offending activity was drawn from the offender age, total previous convictions and years active. The findings show a clear distinction of offence actions and offender characteristics between domestic and non-domestic burglaries. The Skilled Domestic burglaries are shown to be committed by younger, less experienced offenders, whilst the Non-Domestic offenders are older with a high criminal experience. The younger less experienced offenders were also shown to have a broader offending style.

Hence the POSAC plot and thus profiles could be divided into four distinct regions, labelled, Opportunistic Burglary, Skilled Domestic Burglary, Versatile Burglary and Non-Domestic Burglary (see figure 20). The Opportunistic Burglary region is suggested to represent offenders committing solely Forceful and Interpersonal styles of burglary. These styles of specialist offending were not evident in the current sample, as Forceful and Interpersonal styles were shown to be exaggerating effects of Domestic and Non-Domestic offending. It is likely that the offenders within this region may be opportunistic in nature, displaying a form of burglary that is fully unplanned or thought through. This would represent a style of burglary rarely observed. The three remaining divisions represent distinct stages of development in burglary offending styles.

The three stages of burglary offending styles provide support to previous studies of criminal development. It was argued that offender age, total convictions and years offending would differ according to offending style displaying a development across crime styles. The Non-Domestic burglary stages display similarity to Moffitt's (1993) life-course persistent offenders. These offenders are shown to begin with a broad array of offending styles, as displayed in figure 14. As they get older and their criminal experience increases they will commit offences that are specialist to Non-Domestic offending. These findings display similarity to Fox and Farrington's (2016) 'chronic offenders' that have an extended history of offending, a high conviction rate and display evidence of versatile offending. This development of profiles is evidence of offenders moving from versatile offending through to a mixture of domestic and non-domestic burglaries to continue into adulthood with specialist non-domestic burglaries.

Moffitt (1993) states that life-course persistent offenders will display manifestations of antisocial behaviour throughout their lives. Changes will form as new social opportunities arise at different points in development. Life-course persistent offenders are less common due to the necessity to have stability in offending. Loeber (1982) states that stability of criminal activity into adulthood is dependent upon stability across situations and that both of which describe the characteristics of a minority of the offending population. The frequencies in brackets displayed in figure 14 show that the broader offending styles are the most common. The findings show that as the offender's age increases and the profiles become more specialist, that the frequency of occurrence also decreases.

The results also provide evidence of behavioural coherence among the Non-Domestic offenders. Arguing in line with Kagan and Moss (1962), whereby specific behaviours in early offending may not predict later offences, but it may result in an associating conceptual consistency between them. This is found in the cumulative scale of the Non-Domestic profiles, where a development begins with an exaggerated broad Non-Domestic offence, through to specialist Non-Domestic offences. Although not significant, a negative relationship between the J axis and offender age, provided further support to this notion. Younger offenders along the Non-Domestic route displayed exaggerated broad styles, with the profile '2222' displaying an average age of 24 years, profile '2212' and 1212' displaying an average age of 25 years and profile '1112' with an average age of 29 years.

The Skilled Domestic burglaries are not identified as displaying a similar development in criminal experience and offending style as the Non-Domestic burglaries. The Skilled Domestic area of figure 20 reveals a quantitative variation in offending style, however this is not reflected in an association to previous criminal activity and age. These offenders are shown to occur less frequently without the Non-Domestic behaviours than with. However, the Versatile burglaries also display broad offending styles with insignificant variation in offending experience and age. The Skilled Domestic and Versatile offending activities can be related to Moffitt's (1993) adolescence-limited offenders. These offenders make up most of offending population that represent the age-crime curve, with criminal careers of shorter duration. These offenders will likely have a more temporary involvement in antisocial behaviour. The findings suggest that domestic burglary is more likely to be committed by adolescent-limited, whilst Non-Domestic burglaries will be committed by older life-course persistent offenders.

These findings contradict previous findings of Yokota and Canter (2004) who found that more experienced offenders committed residential burglaries, whilst less experienced committed commercial. However, this can be explained from the cross-cultural variation between their sample of Japanese burglars to the current sample of burglars within the United Kingdom. Although a cross-cultural variation in findings is displayed there are also cross-cultural similarities identified. Fox and Farrington (2016) found that it was the planned organised offenders, that committed a high-rate of offences across a short time-frame, that related most to Moffitt's adolescent-limited offenders. Once again, the findings show a relationship between burglars from a major metropolitan city in the United Kingdom, to burglars from a large area of small-town America.

The model revealed in the current analysis is expected to take shape from different patterns of criminal experience. However, the social and environmental features that allow for development or ceasing in offending are unclear. For example, Moffitt (1993) highlighted that a change in contingencies is possible in early criminal careers that lead to desistence in offending. An assumption can be drawn from the high frequency of co-offending found within domestic burglary in contributing to the development in offending styles. However, of the 73% of co-offending cases within the current sample, an almost even split is evident in Skilled Domestic (31%) and Non-Domestic (33%) offending styles. Contrary to previous studies of co-offending displaying a predominance in youth crime (Reiss and Farrington, 1991; Stolzenburg and D'Alessio, 2008), this suggests that co-offending may be just as prevalent in adult offending. It may be that as co-offenders become older and more experienced, those around them will also do the same in becoming more focused on a specific job rather than any odd burglary.

A prime example of this can be seen in Maguire and Bennett's (1982) case study, interviewing a prolific burglar with over 150 charges of both domestic and commercial burglary. The offender had started out committing petty thefts at an early age, moving into a period of commercial and domestic properties later in life, then onto specialising in carefully planned country house burglaries. The burglaries were mostly committed with other offenders, with the progression into antique dealing relying more heavily on everyone's skill. In an account of the interview conducted by Maguire and Bennett (1982) the offender, later in their life, describes the skill of his driver in conducting the targeted antique burglaries.

"Now the driver's job was just to drive and remember. If we needed he had to get us out of places quick, credit where it's due, my driver can drive too. The remembering is when I'd say to him, 'I want to come back here tonight,' or 'I want to be here next Friday at 10.00 in the morning.' I can't recall him letting me down on one occasion when I asked to go back." (p. 114).

The association between groups of offenders could also have implications for the effects of development in burglary. These findings provide further evidence towards a social hypothesis of domestic burglary.

Analysis Section Introduction: The Social Nature of Domestic Burglary

From identifying a prominence of co-offending early in the thesis it is argued that domestic burglary should be treated as a social crime. Thus, the second section explores the co-offending networks within the sample. Upon analysing the co-offenders in detail, it became apparent that most of those convicted of a co-offending domestic burglary were not only acting in group but within a criminal network. Study 5 examines the organisational structure of domestic burglary co-offending networks within the sample, hypothesising that a variation in degree of organisation will relate to the criminal nature and size of network.

Study 6 examines the previous criminal history of the co-offending domestic burglary network sample to explore any thematic structure of their criminal activity. Without interviewing offenders, it is unlikely that the roles they play within a co-offending group can be derived. However, previous studies have identified that an offender's criminal history can influence the behaviours displayed in the commission of the offence (Donald and Wilson, 2000; Trojan and Salfati, 2016). Drawing on Youngs' (2006) Model of Criminal Specialisation, it was hypothesised that a thematic pattern of previous offending behaviours could be derived.

Lastly, Study 7 examines the individuals within each of the identified co-offending networks with the aim of demonstrating a social-psychological framework of domestic burglary. By encapsulating the previous findings this study can assess any evidence of role differentiation among the groups, supporting the argument of criminal specialisation. This study focused on the previous work of Donald and Wilson's (2000), in relating the roles identified within cases of ram raiding to that of domestic burglary. It is hypothesised that roles between individuals within the co-offending networks will be observed and that those will relate to their functioning within their small-scale organisation. It's likely that the findings will also display evidence of domestic burglary networks forming from role differentiation and not just an artefact of who the police have arrested together.

Chapter 9. The Developmental Structure of Domestic Burglary Co-Offending Networks

9.1. Introduction

Previous chapters have highlighted the prominence of co-offending and questioned its nature among domestic burglaries. Co-offending has shown to account for a substantial proportion of all domestic burglaries within the sample. It is therefore integral to understand the relationships between co-offending domestic burglars and how these group processes contribute to crime. Chapter eight also highlighted the presence of co-offenders in different offending styles, arguing that the association between offenders could have implications for their criminal development. It is necessary to attempt to understand the social processes of co-offending in relation to domestic burglary and how ties are maintained through underlying criminal networks.

Much of the existence of co-offending domestic burglars stems from the social nature of the crime. Early research highlighted that burglars offending within a built-up city will know one another from common 'working' areas, leading to an association between them (Shover, 1973). It is then likely that the co-offenders operating within Midlands City, a major metropolitan city within the United Kingdom, will be aware of the presence of other burglars. Goffman (1963) described how skilled burglars would develop a level of association between themselves to identify who is best to work with. These connections between offenders bring them together in forming a criminal network, creating tis between individuals and thus more opportunities for criminal activity. Not only does co-offending allow for more opportunities to offend, but it also allows for a development of skills and techniques from other offender's previous criminal experience. Maguire and Bennett (1982) addressed that if offenders want to make a reasonable income, they will have to work with other offenders. For example, having an offender as a driver or a handler to receive and store stolen goods.

Co-offending ties are not only important to study in terms of their prevalence among the domestic burglary sample, but also in terms of understanding the importance of developing criminal networks. Discussions within the literature have shown that burglary is a social crime functioning on the connections between offenders. Therefore, within much of the sample there will likely be networks of co-offending groups. There has been little examination of solely domestic burglary co-offenders using the group approach, where

interactions between individuals are explored to understand the formation of an underlying criminal organisation. Recently, studies have examined networks from an individual perspective, whereby one individual is identified and the connections are examined moving out from there (Gunnell et al., 2016). However, this type of Network exploration limits the network to focus on one individual as the central point, rather than a collection of individuals as a whole.

The current study will derive and examine the co-offending domestic burglary networks within the sample with an aim to empirically test the development of their organisational structure. Distinct organisational network features are derived from the previous literature that indicate a level of development between criminal associations. This study tests the hypothesis that as the organisational structure grows the differentiation within the structure increases. Arguing that as co-offending criminal networks increase in size important aspects in their structure in relation to the position and role of individuals within it will adapt to that change. This has important theoretical and practical implications, and as such are crucial to study in investigating the high volume, predominantly co-offending crime of domestic burglary.

9.2. Method

9.2.1. Sample

In previous chapters the volume of co-offending occurring within the database are addressed, identifying nearly sixty per cent of all solved domestic burglaries being committed as a co-offence. It is necessary for further analysis on the connections between co-offenders to use only solved domestic burglaries. This is firstly due to the lack of unsolved co-offending cases to work with (N = 14), and secondly because the accuracy of the offence details among the convicted sample provide validity in identifying connections between co-offending groups.

In order to derive any underlying social structure of domestic burglars the connections between co-offending groups had to be established. If offenders were shown to have a conviction for the same crime number, then they are identified as committing that crime together, and thus identified as co-offenders. Domestic burglary co-offending criminal

networks are established based on the shared connections between co-offenders using UCINET (Borgatti et al., 2002) and NetDraw (Borgatti, 2002). UCINET is a Social Network Analysis tool used for data analysis, whilst NetDraw is a data visualisation tool within UCINET used to illustrate and confirm network features. 62% of the sample of 408 solved co-offending domestic burglaries were identified as being associated to a criminal network. The sample included 13 co-offending domestic burglary networks, made up of 141 unique offenders.

The individuals were identified as part of a co-offending network if they had been associated by way of arrest and charge for the same crime based on their unique crime number. This raises important questions regarding where the boundary is drawn in analysing criminal networks. Criminal networks are dynamic in nature and therefore it is highly unlikely that the full extent of the organisation will ever be examined. Using only convicted domestic burglaries accounted for this limitation in attempting to examine a full network. This however does not account for the limitation in analysing crime of unreported and unsolved crimes that could be connected to the network. The boundary set for the current database is used to explore the aims regarding organisational structure and connections of solely domestic burglary networks.

The age of the individuals within the networks ranged from 12 to 63 years. The 13 networks ranged in size from 5 to 26 members. Table 20 displays the previous criminal history total for each network, including any individual's solo and co-offences. It is unlikely a network will ever be built up on solely one crime type, but for the purpose of drawing a boundary of a network, the analysis only focused on the connections of domestic burglaries. The most engaged crime type for each network was identified as either theft or burglary.

Table 22. Total criminal history for offenders within each of the 13 networks

Solved Burglary Network	Property Crimes	Violent Crimes	Other Crimes	Total Crimes	Total Convictions
A	40	8	22	70	31
B	17	1	11	29	10
C	58	16	16	90	32
D	196	40	146	382	198
E	87	11	40	138	95
F	99	18	42	159	87
G	65	9	31	105	44
H	378	46	264	688	393
I	195	25	97	317	160
J	182	20	140	342	182
K	235	57	252	544	312
L	241	35	155	431	197
M	237	35	138	410	183

9.2.2. Procedure

Social Network Analysis (SNA) techniques are designed to discover patterns of interaction between social actors, they therefore are especially appropriate for studying criminal networks. A general hypothesis for network analysis is that where an actor is situated in relation to others within their group will determine the information they receive and their opportunities for material gain (Borgatti et al., 2013). SNA has been used in many studies to empirically test various features of criminal networks (McAndrew, 2000; Canter, 2004).

As discussed, a key focus in studying structural components of social interactions is to assess the social psychology of that activity. For example, in examining features of criminal groups, McAndrew (2000) identified that where an individual is positioned can be used to identify their role among other individuals. To test McAndrew's (2000) components of structurally sound networks each of the sample's 13 networks are ran through SNA centrality calculations. These are tested in UCINET (Borgatti et al., 2002) for each network's degree, betweenness, eigenvector and closeness centrality scores. Table 21 displays a brief description of each of the centrality measures used within the analysis (for a more detailed description of the measure of centrality see Chapter 2.8.). UCINET is also used to derive the

network's cliques and n-cliques. Cliques can be described as a sub-set of strongly fully-connected individuals within a network. Whilst n-cliques are described as the more lenient measure whereby individuals do not need to be directly tied to another to be classified as connected, for example, a friend of a friend connection (Hanneman and Riddle, 2005). These are then examined to determine the presence or absence of each of the six indices, as described in Canter's (2004) study of criminal networks.

Table 23. Description of centrality measures used for analysis

Centrality Measure	Description
Degree	The higher an individual's degree score, the more direct connections they have. Degree is most commonly used as it counts how many direct ties are associated to the individual and bases the higher centrality score on those with a higher count of ties.
Closeness	An individual's closeness score will be based on their position within the network. If they are positioned on the outskirts of the network, with little influence on information to others, then they will have a high closeness score.
Betweenness	An individual with a high betweenness score can be described as the 'middle man' within a network. Those with a higher betweenness score will be more central to the network.
Eigenvector	Eigenvector is a weighted degree measure where by the individual is linked to well-connected actors and so may influence many others in the network, either directly or indirectly, through their connections.

The density score for each network is also identified using UCINET to measure group cohesion. When a group is tightly connected, meaning everyone will know everyone else in the network, a density score of 1 is given (Bichler and Malm, 2008). If a network displays a low density score it means that they may not have as tightly organised connections as a network with a high-density score. Previous literature has described density as the main indicator of measuring group cohesion (Malm et al., 2008). Essentially this highlights the

extent to which the individuals within a network are linked together. Density is measured by calculating the maximum possible ties in the network. The size of the network is then a key feature when assessing density scores and must be taken into consideration when drawing a comparison. McClusky and Wardle (2000) state that network cohesion will display the groups that share more norms and behaviours. They described a group with high network cohesion to rely on each other more than groups with low network cohesion. This suggests that those in smaller networks will naturally display higher cohesion as there is a higher level of interdependence among members of smaller groups.

A matrix of the six indices will be used for Guttman scaling analysis. The networks are then visualised using NetDraw (Borgatti, 2002), a software package for network visualisation, to confirm the six indices of each. The network features are dichotomously derived indicating their presence or absence to ensure a more reliable and robust analysis. Canter's (2004) inclusion criterion for the presence or absence of a large network was if the size of the group had 15 or more individuals. Those with less than 15 members were identified as small. The size of the network is used in later analysis to assess the degree of organisation for each network. The derivation of the network features from SNA measures are conducted as follows:

- *Subgroups* have previously been determined using cliques and n-cliques from within a network (Canter, 2004). The current study uses the stricter rule of the presence of cliques and not the more lenient n-cliques in identifying the structural feature of *subgroups* in a network.
- The *key central figures* were determined from the individual centrality scores. If anyone within the network had predominantly higher centrality scores to the others in the group, then they would be identified as a *key central figure*.
- *Mid-level members* were present when the individual's centrality scores were lower than the key central figures but were higher than the rest of the network. A visual examination of the network would confirm the *mid-level members* identified.
- The *core group* was identified where one central group was present over the rest. If a group was identified as a clique with higher centrality scores than the remaining group, then a *core group* was marked as present.

- *Isolated individuals* were identified through visual examination of the network for individuals on the outskirts of the group with only one connection. These individuals were also confirmed as isolated by examining their closeness centrality scores.
- *Subgroups as chains* were identified by examining the cliques and visually inspecting the network for a chain like configuration of groups. This would display more of a structured hierarchy of organisation, rather than just containing a subgroup.

9.2.3. Analysis of networks

Each feature of a network form a common order, in that they go from loose structures to structured criminal organisations. The differences that can be distinguished should display a morphology of domestic burglary networks through their structure using Guttman Scaling. Also known as cumulative scaling, Guttman scaling is a way of establishing whether a set of attributes measures a single theoretical construct (Loner, 2016). Each network feature will be measured to form a rank order. A Partial Ordered Scalogram Analysis (POSA) will be performed to determine the strength of the Guttman Scale. As discussed in previous chapters, POSA (Shye, 1985) is a method devised for investigating multivariate distributions in which individuals in a population are assigned specific categories on a set of variables. Each network, in this case, will have a profile obtained from the classification of features (termed structuple) consisting of the elements (termed structs) representing each variable. It is an ideal analysis to use in identifying the strength of the Guttman Scale in investigating the structural characteristics of criminal networks.

The qualitative and quantitative variations between the networks are analysed using the six different features, with the presence valued as a '2' and the absence valued as a '1'. A profile made up of six numbers can then be calculated consisting of different '1's and '2's. As mentioned previously, those organisations with the presence of the all network features will be considered the most organised and those with the absence of network features the least organised. Each network will have a profile composed of the six network features. The variables will be arranged consistently for each profile and represent the following: *Subgroup* (first digit), *Key Central Figure* (second digit), *Mid-Level Member* (third digit), *Core Group* (fourth digit), *Isolated Individuals* (fifth digit) and *Subgroups as Chains* (sixth digit). Therefore, the profile can range from '111111' (least organised) through to '222222' (highly organised), with all combinations among these two extremes empirically possible.

Table 22 displays an example of a perfect Guttman scale based on the network features. Every attribute is interesting to the network on its own, meaning that if found to be scalable, the cumulative scores will produce a framework by which to present them. This will have additional importance for efficiently predicting outside variables, and analysing other criminal networks. The scale begins with the formation of a clique (*subgroups*) that work together. As the network develops, an individual may develop and become identified as a key figure (*key central figure*) to the others in the group. This will in turn produce distinct levels to the network (*mid-level members*) that can develop a central group to surrounding individuals (*core group*). As individuals become more confident they may begin to branch out with new members creating a pattern on the outside of the group that are not fully connected (*isolated individuals*). The development of connections between groups forms connections of one subgroup to another within one network (*subgroups as chains*).

Table 24. Example of a perfect Guttman scale based on network features. A value of 1 means that the network does not have the feature, a value of 2 means that the network does have the feature

Profile	Network Features	Cumulative Score
222222	Sub|KCF|MLM|CG|II|SubC	12
222221	Sub|KCF|MLM|CG|II|0	11
222211	Sub|KCF|MLM|CG|0|0	10
222111	Sub|KCF|MLM|0|0|0	9
221111	Sub|KCF|0|0|0|0	8
211111	Sub|0|0|0|0|0	7

Sub = Subgroups; KCF = Key central figure; MLM = Mid-level member; CG = Core group; II = Isolated individuals; SubC = Subgroups as chains

9.3. Results

To test the structure of domestic burglary networks the sample was subjected to Guttman Scaling analysis. The aim was to analyse the structure of the networks to identify the importance of features within them. The findings identified a strong Guttman scale of domestic burglary network features.

Guttman (1944) stated that it is near impossible to identify a perfect scale and that case studies that aren't perfect will be highlighted within the analysis. Any violation to the perfect scale is labelled a Guttman error. Loner (2012) describes the example of a Guttman

error as when a student learns to calculate the square root of a number before an easier task, such as addition. In terms of the crime networks under study, it may be that an error occurs when a network has a key central figure with no subgroup. It makes more sense for a network to begin with a subgroup of individuals that come together that can then be guided by a key figure from the onset. The deviation from perfection of the scale is measured using a coefficient of reproducibility. Figure 27 displays the formula used to measure the coefficient of reproducibility.

$$C_R = 1 - \frac{\text{Number of errors}}{\text{Number of possible errors}}$$

Figure 27. Formula to calculate the coefficient of reproducibility

The number of errors is taken from the errors within the case studies, whilst the number of possible errors is the number of entries for each network feature in the data table (Abdi, 2010). The data table was made up of 13 networks by 7 network features, leaving 91 possible errors. Guttman highlighted that in practise, 85 percent perfect scales or more will be used as efficient approximations to perfect scales. The sample of profiles developed from the domestic burglary network features displayed 10 Guttman errors, therefore producing a coefficient of reproducibility of .89. The scale identified is shown to be acceptable based on 89% of the network features displaying a perfect scale. However, it is possible for a network to be made up of a few missed match attributes, but the network may not be as efficient as one with scalable items. The results show that the scale developed to identify the structure of domestic burglary networks based on the network features analysed is reproducible.

Table 23 displays the Guttman scale of the 13 domestic burglary networks. The table includes the profile obtained from the classification of features, the network features, the cumulative score of the profile, network size and the total number of networks for each profile.

*Table 25. Guttman scale of network features. Values with a * are considered errors*

Profile	Network Features	Cumulative Score	Network Size	Total Networks
222222	**Sub|KCF|MLM|CG|II|SubC**	12	9-26	5
222212	**Sub|KCF|MLM|CG|0*|SubC***	11	16	1
1**22222**	0*|**KCF|MLM|CG|II|**SubC*	11	7	1
222211	**Sub|KCF|MLM|CG|**0|0	10	7	1
221**12**1	**Sub|KCF|**0*|0*|**II***|0	9	5-6	2
221111	**Sub|KCF|**0|0|0|0	8	5	2
211111	**Sub|**0|0|0|0|0	7	8	1

Sub = Subgroups; KCF = Key central figure; MLM = Mid-level member; CG = Core group; II = Isolated individuals; SubC = Subgroups as chains

The Guttman scale in table 23 displays slight variations with some Guttman errors. However, the profiles display a clear degree of structure identifying a strong quantitative axis. The profiles within the scale can be given a cumulative score from each of the comparable network items. Since the values within the profiles have shown to be comparable, the cumulative score is shown to be meaningful and reproducible. For example, generally the values are comparable where the third struct in a profile relates to the second struct in another because they show a relationship. The actual relationships between the variables show to have an objective structure that has psychological and sociological significance. Meaning that the cumulative score relates back to some implicit organisational structure.

Although much of the sample follow the Guttman scale, for others the formation of tight structured networks is likely to develop through more time and communication between members. The pattern of network structure formation is not always the pattern offenders will take. Examples of scales, such as Loner's (2016) mathematical case, can be cultural by discussing an educational sequence system. For domestic burglary networks, it can be highlighted as more of a human developmental scale.

The organisational development displays the dynamics of criminal networks as each feature develops out from the next. Table 23 displays the sequence of network features starting with subgroups, which begins with ties between two co-offending groups, highlighting the basis for criminal network development. Recruitment into these co-offences cannot be obtained from the police data used. However, previous research has found that

individuals enter a criminal network either via a skill that will benefit the group or through a peer group relationship (McCluskey and Wardle, 2000).

The second attribute of the network developmental scale is the key central figure. Apart from the exception of one error, it is found that where all the networks have key central figures they will have subgroups. McCluskey and Wardle (2000) suggest that the key role within a network will be given to the individual with the most influence over group behaviour. The natural development from subgroups to key central figures would occur in quick succession to maintain the dynamics of the group. It is interesting to find that key central figures are present no matter the size of the network. As Canter (2004) stated, it would be expected that large groups have more to manage than smaller groups. However, this was not found with domestic burglary networks, highlighting their complexity of management based on any size.

The presence of mid-level members and a core group go hand in hand in the development of networks. The results show that structural levels will begin to form with the development of the network containing central groups. Although similar in their structural qualities, the mid-level members and core groups contribute towards different developments of the network. The mid-level members are recognised, based on their centrality measures, for being individuals that sit mid-way between the outskirts and the key roles. The core groups will then develop out of this by forming cliques made up of these individuals.

The differing levels identified as features leads to further development of individuals on the outside of the network as well as breakaway subgroups. Isolated individuals are observed in eight of the thirteen criminal networks. These offenders will have fewer choices than the rest of the network and will also lack the support and regular association with others. The development of mid-level members and core groups will mean isolated individuals are the least central to the network. However, a network containing them is indicative of more structure, highlighting distinct levels of development.

The most complex of attributes identified within the features are subgroups as chains, which when observed imply a much more complex structure to a network. This is because the subgroups that exist within the network will have now developed as a linked hierarchy of subgroups. These distinct levels of development will then naturally lead to a larger network of offenders and integrated network of communication between groups.

The profiles in table 23 show that as a network increases in size it will contain more organisational features. A Spearman's correlation coefficient was run to determine the relationship between the cumulative score and the size of the network. The findings displayed a positive statistically significant correlation between the two variables ($r = .781$, $p < .01$). These findings are illustrated in figure 28, showing that an increase in the size of the network leads to an increase in the cumulative score. This coincides with Canter (2004), who found that an increase in the size of a network will increase its structure. More recently, Lantz and Hutchson (2015) found that the size of the group is the most important attribute of predicting total offences and offense span. They found that co-offending burglars are at an increased risk of being caught up in committing more burglaries over a longer period within a large network of connected offenders. Although there are few errors present, overall the findings display that difference in structure to a domestic burglary network is proportionate to its size.
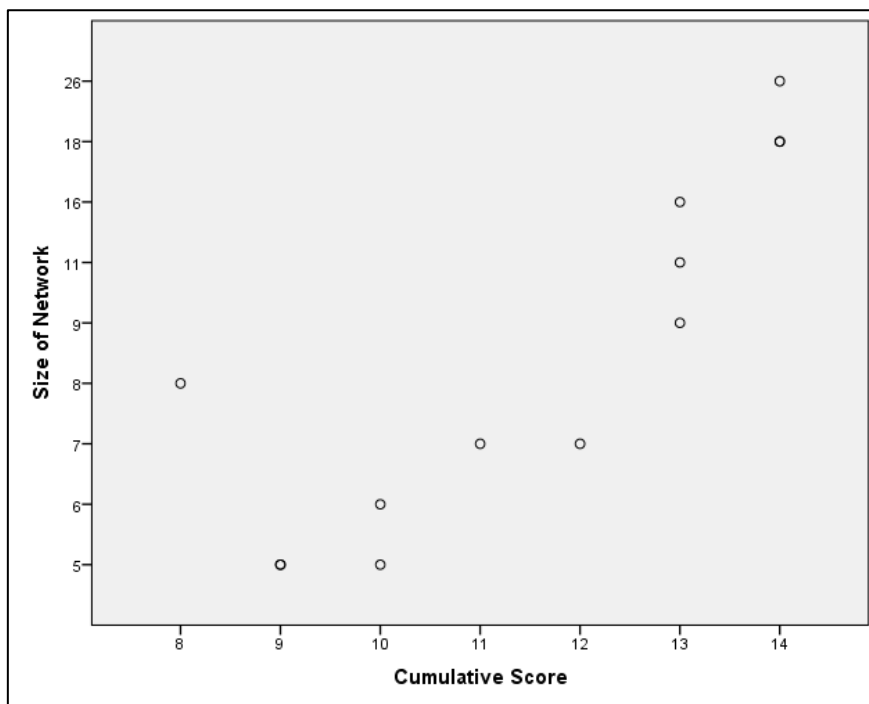
Figure 28. Scatterplot displaying relationship between size of a network and the structural cumulative score

The size of the network draws on its developmental complexity, suggesting a monotonic relationship between the two. However, there is one exception with the network displaying the lowest cumulative score and only containing subgroups. On closer inspection,

this network is made up of eight offenders that commit all but one of their five domestic burglaries together. No distinguishing centrality elements were found between the offenders within this network, which is reflected with a high-density score of 4, due to being only built up by subgroups. The strong cohesion shows that these individuals do have a tight connection with potential for future growth. However, this network is also indicative of being 'action-oriented', meaning that their connections are strong for one-off crimes.

A POSAC was performed to assess the strength of the Guttman scale produced. The results of the POSAC displayed in figure 28 show the seven profiles made up of the six features of a structured network. The coefficient of correct representation for this configuration was 0.9873 indicating that 99% of the profiles were correctly represented on the POSA plot. The clear partial order of structures illustrates the strength of the Guttman scale.

As mentioned in the previous chapter, the profiles will be positioned based on the POSAC structure described by the joint (J) and lateral (L) axes, reflecting the quantitative and qualitative variations on the construct. The strong Guttman Scale is reflected along the J axis, where the sum of each profile will go from low to high, with the lower scores towards the bottom left of the plot going up to the top right. The POSAC confirms a strong Guttman Scale with the profiles displaying a quantitative development along the J axis. The Guttman errors are also displayed within the POSAC space to sit along the L axis (from top left to bottom right), showing their qualitative difference from the structural developmental norm.
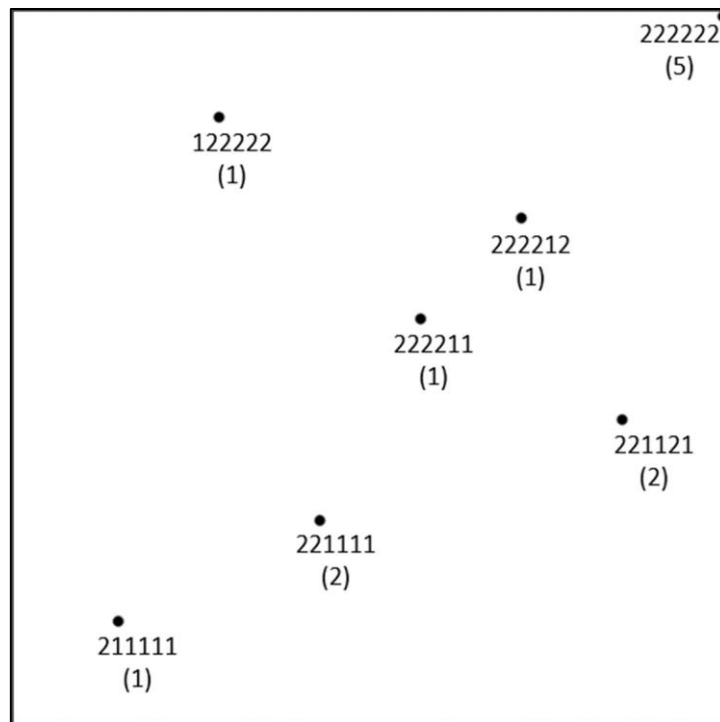
Figure 29. A partial order scalogram analysis with co-ordinates (POSAC) of 7 profiles derived from the 13 networks and the frequency of each. Note: The numbers are the profile for each network based on the presence (2) or absence (1) of the network feature.

9.3.1. Levels of organisation

The Guttman scale produced from the network features draws attention to the levels of complexity within the sample. The results display differing levels of organisation that coincide with previous studies of criminal network structure (Mars, 2000; Canter, 2004). The development of structural hierarchies is clearly identified from the scale produced, finding that as the cumulative scores increases the more structurally complex the network.

The network elements display a formation of the degree of organisation based on their structure. For example, it is unlikely that a key central figure will be present in a network if that network does not have subgroups. The less structured networks are shown to only present one or two network features such as only displaying the presence of subgroups, key central figures and isolated individuals. Those with a higher structure will contain mid-level members, a core group and subgroups as chains.

As with the Guttman scale, each profile represents a level of development within the domestic burglary network. In relation to previous studies of network organisation, the most structured that includes all the features can be compared to Mars' (2000) 'strong grid/strong group', labelled Organised Criminal Hierarchies. Mars illustrated the organised criminal hierarchy network to the Mafia. Although not drawing on a like for like comparison of the Mafia to domestic burglary co-offending networks, they do display underlying similarities. Mars described the organised criminal hierarchies as benefiting from criminal specialisation that comes from a division of labour. It is likely that the most structurally organised network will have gained enough experience to become specialised in a crime. However, the most organised networks are not flawless. All networks are dynamic in nature, but the larger the pool of individuals the more prone to instability among the ranks. Mars describes this insecurity throughout the hierarchy as a succession crisis, that are likely to have unstable repercussions throughout. Coinciding with this is Bouchard and Morselli's (2014) view that the insecurities come from the low levels of trust in larger groups, which consequently increases their risk of detection. The low levels of trust within groups is a basic problem in offenders forming mutually beneficial relationships. As Maguire and Bennett (1982) point out in most cases of interviewing thieves, that there are competing claims of actions that benefit the group and actions that benefit the individual. The later usually comes from an offender being caught by police and betraying associates for a lighter sentence, further highlighting the instability among the group.

The results highlighted networks with key central figures and different structural levels surrounding a core group. The sample of networks within this bracket display some similarities to Mars' 'weak grid/strong group', labelled the Ideological Criminal Groups. These organisations were often found to be small but controlled through strong connections between individuals. As well as the strong connections, the control will also develop from the hierarchy between the subgroups and key central figures. Similarly, Canter (2004) identified groups that were small but with strong groups across the network. These were labelled 'Type B' Oligarchy Groups because they imply a relatively loose network of people with strong groups but no strong structure. These were also able to show networks with leaders but little indication to levels in a chain of command.

The least structured networks within the sample displayed the lower scaled network features that included subgroups and key central figures. The presence of subgroups and a key central figure acts as a basis of structure to the networks. The least structured networks

on the scale resemble Canter's (2004) 'Type A', labelled Ad Hoc groups, that display no evidence of strong structural connections. Networks with only subgroups and key central figures present will be in the early stages of development, made up of smaller groups of individuals. The findings display similarity to previous studies that found that the smaller less structured networks will be strongly connected, but only coming together for a brief period before disconnecting. Bouchard and Morselli (2014) describe these as 'small action-oriented network organisations', that provide opportunity into to the social criminal connections.

The presence of levels of organisations allows for three broad types of network organisation to be specified. These levels are based on the cumulative score given from the results of the Guttman scale in table 23. The first type of network organisation is formed on the basis that a network is made up all six network features with a cumulative score of 12. This type may be thought of as a 'Structured Organisation' displaying a high amount of network features and mainly larger in size. Structurally organised networks were displayed in 38% of the sampled domestic burglary networks. Unsurprisingly, the density scores of this type were low (density score between 0.1 and 0.3), as the individuals in larger networks are not as dependent on the other members. Larger networks have the potential for more ties so it then makes it more difficult for them to know everyone within the network and essentially have a higher density score (Prell, 2012). However, this should not be misinterpreted as lack of structure for these, but lack of organisational connections between group members. As mentioned previously, the lack of organisational connections comes hand in hand with being a large network. For example, it is unlikely that the key individual of a large network will have strong connections to the isolated individuals.

The networks with a cumulative score between 9 – 11 contains a level of organisation that features strong groups with loose connections. These are labelled 'Core Organisation' networks that display leaders with strong groups but loose hierarchy and control throughout. The 'Core Organisation' networks are displayed in 38% of the current sample. A high-density score (density score between 0.3 and 0.7) was recorded for this type, highlighting the strong core groups with loose hierarchical connections.

In contrast, the least organised may be thought of as 'Starter Organisation' networks. A cumulative score of 8 or less will mean that these networks have only one or two network features. As discussed, this score would illustrate the starting point of a network that contains both a subgroup and key central figure or just a subgroup. The 'Starter Organisation'

networks make up the smallest amount of the sample (23%), highlighting the sophistication of domestic burglary networks. As expected these networks also display the highest density score (density score between 0.6 and 4), meaning stronger organisational connections within the small networks.

9.4. Chapter Summary and Conclusion

The current study is the first to display distinct developmental structural features of a domestic burglary co-offending network across a cumulative scale. The sample drew on a distinction of organised connections between individuals and organised structure based on positioning among other offenders. The results displayed the successful use of SNA and Guttman Scaling to test the organisational structure and connections of domestic burglary networks. It was hypothesised that as the structure of criminal network features grows the differentiation within the structure will increase. The findings provide evidence for development in organisational structure, in that as the features of a network increase so too does its structure. These results are shown to relate to the nature and size of the co-offending criminal network. The findings illustrate three classifications of organisations based on the cumulation of network features. These are labelled the 'Structured Organisation', 'Core Organisation' and 'Starter Organisation'.

Examining the key components of network features was a crucial first step in analysing the structure of domestic burglary networks. In previous studies the identification of subgroups within a network came from identifying cliques and the more lenient n-cliques (Canter, 2004). The current study highlighted the use of n-cliques as a problem to use as a measure of identifying sub-groups for domestic burglary networks. N-cliques were found in every network, showing that all the networks analysed could be connected through extensive less tight groups that could refer individuals as "friends of a friend". It was then decided that subgroups would be identified by only using the clique measure that insists a member to have a direct tie with another member. This resulted in identifying more closely connected ties between individuals rather than other members of the network. The results of this identified subgroups as a significant attribute to the development of a network.

The current study was also able to relate to Canter's (2004) findings of two key ways in which criminal networks can vary. The first, as discussed, is the size of the network and

how the larger the group the more evidence there is for links between individuals and therefore more structural organisation. This is evident with the presence of mid-level members and subgroups that can act in-between the key central figures and the isolated individuals. Whereas, on examining the connections between the individuals, by analysing the density of each, the findings display the opposite results. The results showed that where the networks are smaller they are more likely to have a large density score and therefore are more tightly organised in structure. However, previous work is criticised for comparing the density for networks of different sizes as it is much easier for smaller networks with less ties to reach their full potential (Prell, 2012). Thus, when examining and comparing density scores of different networks this limitation must be addressed. The second showed clear evidence towards a differentiation of networks based on their network features. Subgroups as chains were identified as the most distinguishing feature of a structured criminal organisation from the least. The networks with subgroups as chains were found to display a more sophisticated organisation built across levels and core network features. These features could distinguish the cumulative scores to divide the sample into three classifications of organisations.

Many studies attempt to form classifications of criminal organisations, as McAndrew (2000) stated, a good example of this is the use of distinguishing hierarchies. By analysing the sample of domestic burglary networks using Guttman scaling, the current study could compare the differing levels of networks to identify developmental classifications. The broad cumulation of network features identified a strong quantitative scale, such as, if a network showed to have a key central figure, then they would also have subgroups. We also know that if the network has a core group, then it will have mid-level members, which tells us a lot about group dynamics. A small network is likely to only have subgroups whilst another group may have two, three or four subgroups. This in turn creates much more to manage within a larger network and a structured system will naturally form. In the current sample, the change in complexity relates to the network size and at distinct levels the key central figures, core area and subgroups as chains. A substantial finding is the cumulation in structure of domestic burglary networks, therefore enabling co-offending criminal networks to be looked at as a hierarchy of differing structural developments.

The next crucial step in studying the structure of co-offending criminal networks is to identify the roles the individuals play within them. In the next chapter, the differing criminal activity of the thirteen co-offending domestic burglary networks will be examined to identify

patterns of previous criminal activity. Previous studies have highlighted the usefulness of exploring previous offences to reflect offending specialisation. By identifying patterns of previous offending behaviour in relation to an individual's position in a network, the likelihood of roles within co-offending can be explored.

Chapter 10. Differing Criminal Activity of Network Associated Domestic Burglars

10.1. Introduction

Without interviewing offenders, it is unlikely that the roles they play within a co-offending group can be derived. However, the behaviours displayed in the commission of the offence with others may be influenced by their previous offending experience (Trojan and Salfati, 2016). Previous research, such as Trojan and Salfati's (2016) study of homicide offender criminal histories and Donald and Wilson's (2000) study of ram raider roles within groups, highlight how individual specialisation is reflected in offending actions. Previous studies have also demonstrated clear divisional regions between general criminal offences that result in thematic patterns (Youngs, Ioannou and Eagles, 2014; Trojan and Salfati, 2016). An offender's criminal history can shed light on the likelihood of specialisation and thus identify whether offenders within groups have roles based on differing criminal activity.

Previous studies have addressed the idea of specialisation within crime, with many claiming that there is more versatility in offending, with offenders committing crimes that are available to them to fulfil their needs (Cornish and Clarke, 1989; Hirschi and Gottfredson, 1995; Eker and Mus, 2016). Although there has been much debate on the matter of whether specialisation exists, Youngs et al. (2014) states that the confusion over the matter has resulted in a lack of understanding into the nature of specialisation and versatility. Within the developmental perspective, it is discussed that throughout their lives, offenders will be affected by different variables and that offending behaviour is not as simple as one or the other. Therefore, in many offending careers a pattern of both specialism and versatility are observed over time. McGloin et al. (2011) argued that the desistance process from crime plays a huge role in what types of crime are committed. From analysing data on 4,000 Dutch offenders, McGloin et al. (2011) found that the range of crime types was reduced when they got married. With desistance comes a lower frequency of offending but a narrower field in what crime types are committed. It is therefore likely that as offenders become older, they become more specialised.

Previous literature has also discussed the likelihood of criminal specialisation coinciding with offending experience. Spelman (1994) argued that as offenders gain experience, they begin to learn the outcome of their offences and will repeat acts that are

rewarding, whilst avoiding those with increased likelihood of detection. Maguire and Bennet (1982) found that of the domestic burglars interviewed, one of the most common reasons for choosing burglary was its minimal risk of being caught. The fact that burglars are rarely caught in the act will lead offenders who commit them to have a high amount present in their offending history. Naturally, criminal experience will progress through an offender's life, which, as previously discussed, according to Moffitt (1993) could go one of two ways depending on many features.

The overall aim of the current study is to examine the criminal history of co-offending domestic burglars to identify patterns of activity from the offending behaviours. In addressing the previous literature, the current study also aims to identify whether age plays a feature in the specialisation of crime. To do this the analysis was split into two. The first part of the analysis aimed to identify co-occurrences among previous criminal offences committed by co-offending domestic burglars. The second part of the analysis aimed to associate offenders to the themes identified from the co-occurring offences. This association would then indicate whether the offenders specialise. The following hypotheses would be measured:

1. It was hypothesised that a thematic pattern, based on Bandura's (1986) fundamental incentives and using the Youngs' (2006) Model of Criminal Specialisation, could be drawn from the criminal background of the co-offending domestic burglars.

2. Secondly, it was hypothesised that offenders would be matched to offending themes highlighting an element of criminal specialisation.

10.2. Method

10.2.1. Sample

The current study consisted of analysing the co-offending domestic burglary networks found in the previous chapter. The previous study on the structure of co-offending domestic burglary networks identified 13 networks made up of 141 unique offenders committing 83 solved domestic burglaries.

To conduct analysis on the sample's full criminal history, data was extracted from the Police National Computer (PNC) database. In the current study the detailed descriptions of

offences, rather than their broad classifications, such as violence, burglary and other, were used. The criminal histories were analysed in this way to identify what detailed crime types co-occur among the sample. As with the sample used in Chapter 7, the PNC criminal histories data was merged with the Midlands City database. Once the PNC data was merged with the current sample the criminal histories of the offenders in the 13 networks could be extracted. 26 unique offenders within the sample had no prior record before committing the domestic burglary, displaying it as their first recorded offence, and were therefore not present in the PNC data. The final sample contained the criminal history of 115 unique offenders from 13 co-offending domestic burglary networks.

10.2.2. Analysis

The data was generated from the total of how many times each offender had committed each offence. Smallest Space Analysis (SSA) was used allowing the underlying structure of the set of variables to be appreciated by generating a spatial representation of the relationship between each variable. This is represented on the rank order of some index of similarity between variables. As previously discussed, the results that appear in the geometric representation simplify the analysis. The closer any two points on the data matrix are the higher the variables are to correlate, meaning that there is a higher relationship and better association between the variables in that space. For example, it could be hypothesised that someone who takes a vehicle without the owner's consent may also have a prior driving offence, such as disqualified from driving. As with previous chapters that used SSA, the regional hypothesis is used to divide the plot based on the underlying themes from the co-occurring variables within the space.

An attempt was made to use Pearsons correlation using the frequencies of offences committed for the SSA. However, the distribution of frequencies across the variables for individuals display a decay function. If the distribution of frequencies is not more or less symmetrical, then Pearsons will become distorted. This resulted in converting the database to use Jaccards for the SSA. As previously discussed, Jaccards is the most appropriate correlation to use when analysing police data formatted in this way. With the database being in a dichotomous format ('0's' for the absence of information and '1's' for the presence of information) the use of Jaccards coefficient will not take account of joint non-occurrences. It

will then ignore the co-occurrences between the absent information so not to be biased towards them, providing a clear picture from the SSA.

The SSA will also produce the coefficient of alienation (Borgs and Lingoes, 1987) which is used to show a measure of how good the fit between the spatial representation and the co-occurrences is. As mentioned in the previous chapters, the smaller the coefficient of alienation value is the closer fit between the plot and the matrix.

Initial analysis highlighted a strong co-occurrence of certain legally defined offences. The crimes in the data described 'receiving stolen goods' and 'handle stolen goods' as two separate offences. However, police representatives at the data source identified these two offences as the same crime, where an offender knowingly handles or assists in the retention or disposal of items believed to be stolen. These two separate crimes were then merged as one so that an accurate representation of the crimes committed could be used in the analysis.

10.2.3. Classification of Offending Behaviours

The classification of offending behaviours was based on Youngs' (2006) Model of Criminal Specialisation, in applying Social Cognitive principles to the distinction of crime types. Bandura's fundamental human incentives of Monetary, Power/status and Sensory are used to differentiate the criminal behaviours investigated in the current study. The Monetary incentive relates to the desired material gain of the offender and the ability to obtain that in their offending behaviour. Behaviours such as, burglary, possession of drugs, and theft all relate to the offender acquiring a material gain through criminal activity. As previously discussed, Youngs (2006) described this incentive as not necessarily driving towards a monetary value but that the possession of goods may be satisfying to the offender in other emotional or physical ways. For example, the behaviour of possessing drugs is likely to relate to a sensory material gain. As in Youngs' model, the fundamental human incentive that best depicts these behaviours is a Material incentive, since the gain of offending behaviour will relate more to the possession of goods rather than an actual monetary value. Hence the Material incentive label will be used for the current study to depict Bandura's Monetary human incentive.

The Power and Status incentive is described as the desire for control over others (Youngs, 2006). This incentive relates to criminal behaviours in many ways that ascertain

some sort of power. For example, violent and aggressive acts can be used to acquire different types of control and status. Criminal behaviours, such as a robbery, criminal damage and assault are all relevant to acquiring control.

Lastly, the Sensory incentive is a desire for pleasure and stimulating experiences. This incentive motivates human behaviours to seek what they deem exciting behaviours and avoid the non-stimulating experiences, including boredom. Sensory gains are internal and can be manifested in criminal behaviour by committing offences that associate with stimulating emotional effects. Criminal behaviours such as, driving relating offence or absconding from the police, may provide the offender with the emotional reaction they seek.

With each incentive comes a differing degree of gain, as Youngs (2006) states this is the basis for modelling criminal differentiation. The nature of the type of gain differs based on the amount, being a high or low degree of gain. In terms of criminal behaviour, different criminal history and levels of experience will contribute to the various difference incentives. The model will therefore be constructed on not only the type of gain but a degree of either high or low gain to each behaviour.

The previous crimes committed by each offender were included in the analysis. The first part of the analysis looked at identifying a thematic pattern based on the human fundamental incentives used in Youngs' Model of Criminal Specialisation. Table 24 displays the crimes committed by the sample and the frequency of those committed. The table also includes what type of gain the behaviour is (Material, Power or Sensory incentives) and the degree of gain (high or low).

Table 26. Frequency of offences with type and amount of gain based on Youngs' Model of Criminal Specialisation

Analysis Label	Offence Description	Frequency	Percent	Gain Type	Amount of Gain
1) ROB	Robbery	75	65%	Power	High
2) CRIM DAM VAL < 5000	Criminal damage to property valued under £5000	62	54%	Power	High
3) THFT SHOP	Theft from a shop	51	44%	Material	High
4) BURG DWEL INT STL	Burglary dwelling - with intent to steal	49	43%	Material	High
5) BURG OTHER DWEL THFT	Burglary other than dwelling - theft	49	43%	Material	High

6) POS CAN/CAN RES	Possess a controlled drug of Class B - Cannabis / Cannabis Resin	46	40%	Material	Low
7) THFT OTHER	Theft - other - including theft by finding	45	39%	Material	High
8) ASLT PERS	Assault a person thereby occasioning them actual bodily harm	44	38%	Power	High
9) HNDLE STOL GDS	Handle stolen goods	48	37%	Material	High
10) THFT FROM VCLE	Theft from a motor vehicle	40	35%	Material	High
11) ASLT BEAT	Assault by beating	39	34%	Power	High
12) THFT MOTOR VEH	Theft of motor vehicle	39	34%	Material	High
13) ATT BURG DWEL INT STEAL	Attempt burglary dwelling with intent to steal	38	33%	Material	Low
14) COM ASSLT	Common assault	38	33%	Power	Low
15) USE VCLE NO 3RD INSUR	Use a motor vehicle without third party insurance	38	33%	Sensory	Low
16) TAKE VCLE NO CONSENT	Take a motor vehicle without the owner's consent	35	30%	Material	High
17) FAIL SUR POL/CRT BAIL	Fail to surrender to police / court bail at the appointed time	34	30%	Sensory	Low
18) DRIV NO LIC	Drive a motor vehicle otherwise than in accordance with a licence	31	27%	Sensory	Low
19) THFT PERSON	Theft from the person of another	27	23%	Material	High
20) AFFRAY	Affray	26	23%	Power	High
21) EQUP FOR THFT	Going equipped for theft - not motor vehicle	25	22%	Material	Low
22) THR WRD/BEH ALRM	Use threatening words / behaviour to cause harassment alarm or distress	24	21%	Power	Low
23) THR WRD/BEH VIO	Use threatening / abusive / insulting words / behaviour with intent to cause fear of / provoke unlawful violence	24	21%	Power	High
24) VCLE INTERFERENCE	Vehicle interference - motor vehicle	22	19%	Material	High
25) THFT BIKE	Theft of pedal cycle	21	18%	Material	High
26) DANG DRIV	Drive a motor vehicle dangerously	20	17%	Sensory	High

27) BURG OTHER DWEL INT	Burglary other than dwelling with intent to steal	19	17%	Material	High
28) DRIV DISQUAL	Drive whilst disqualified	18	16%	Sensory	Low
29) IN MOTOR VEH TKN NO CONSENT	Carried in / on a motor vehicle taken without the owner's consent	16	14%	Material	High

The frequencies displayed show distinctions between offence types based on their occurrence within the sample. The crime 'burglary dwelling theft no violence' occurred in 93% of the sample's criminal history. This offence was removed from the following analysis as its high frequency of occurrence among the sample would not differentiate any patterns between offenders. 'Robbery' is the highest occurring offence within the sample (65%), with 'criminal damage' (54%), 'theft from a shop' (44%) and other forms of burglaries, such as 'burglary other theft' (43%) and 'burglary dwelling intent steal' (43%) all occurring in high frequency of offences. The lowest occurring offences are 'carried in vehicle without owner consent' (14%) and 'driving disqualified' (16%). As expected, many of the offences relate to the material gain type, with the highest frequency offences containing both power and material gain type. Previous studies have also identified that burglars will specialise in material offences more than other crime types (Farrington and Lambert, 1994). Within the context of analysing domestic burglary co-offending networks, it would be expected that offences will relate more to the power and material gain for offenders to assert control and efficiency within the network.

10.3. Results

10.3.1. Smallest-space analysis of offender criminal histories

Figure 30 displays the three-dimensional (vector 1 by vector 2) solution from the SSA-I. The configuration has a coefficient of alienation of 0.19 with 26 iterations, indicating a good fit of the co-occurrences of listed offence variables. The three-dimensional solution could better describe the pattern of offences than the two-dimensional solution (coefficient of alienation 0.30). The variable labels that refer to each offence are shown in table 24 for data interpretation.

FAIL SUR CRT/POL BAIL (17%)
17

VCLE INTERFERENCE (19%)
24

ATT BURG DWEL INT STEAL (33%)
13

HANDLE STOLEN GOODS (37%)
9

EQUP FOR THFT (22%)
21

BURG DWEL
INT STL (43%)
4

THFT PERSON (24%)
19

BURG OTHER
DWEL THFT (43%)
7   5

THFT OTHER (39%)

USE VCLE NO
3RD INSUR
(33%)   15

THFT FROM VCLE (35%)
10

DRIV NO LIC (27%)
18

3
THFT SHOP (44%)

1

ROB (65%)

DRIV DISQUAL (16%)
28

DANG DRIV (17%)
26

2
CRIM DAM VAL <
£5000 (54%)

11
ASLT BEAT (34%)

12

THFT
MOTOR 16
VEH (34%)

TAKE VCLE NO CONSENT (30%)

6
POS CAN/CAN RES (40%)

8
ASLT PERSON (38%)

14
COM ASLT (33%)

AFFRAY (23%)
20

BURG OTHER DWEL INT (17%)
27

IN MOTOR VEH TKN NO
CONSENT (14%)   29

25
THFT BIKE (18%)

THREAT WRD/BEH VIO (21%)
THREAT WRD/BEH ALARM (21%) 22   23

Figure 30. 1 by 2 Projection of the Three-Dimensional Smallest Space Analysis of the 115 Offender Criminal Histories. Coefficient of Alienation = 0.19

According to the regional hypothesis, variables of a common theme will appear in the same region of the SSA plot, therefore more likely to co-occur. A co-occurrence refers to a subset of crimes, out of the range of crimes and offenders, that will be committed by the same people. For example, the offences displayed in figure 30 show that an individual charged for driving without a licence will also have a previous offence for driving disqualified. Analysing the behaviours in this way highlights the commonality between previous criminal history of the sample. It also enables us to focus on behaviours that are likely not to co-occur. For example, figure 30 displays that if an offender has committed an attempted burglary with intent to steal, then they are less likely to co-occur with the use of threatening behaviour. The offence variables positioned far apart from each other within the space show that they are less likely to co-occur within an offender's criminal history.

The offence behaviours displayed in figure 30 also show many collections of offences and highlights some interesting co-occurring behaviours in the criminal history of a network associated domestic burglar. However, it is important to note when interpreting the results of a SSA that even though there may be a collective of co-occurring behaviours, a lot of the behaviours will overlap relating to different offenders and offences. Meaning that there is an underlying generalisation of criminal behaviours, with many of the offenders committing more of certain behaviours than others.

On first inspection of the criminal behaviours many are clearly shown to relate to material, violent and driving related offences. The offence behaviours 'Rob' (Robbery) 'Affray' (AFFRAY), 'Assaulting by beating' (ASLT BEAT), 'Assault a person thereby occasioning them actual bodily harm' (ASLT PERSON) and 'Common assault' (COM ASSLT) are all grouped close together at the top of the figure. These violent behaviours surround the 'Criminal damage to property valued under £5000' (CRIM DAM VAL < 5000) offence, showing that where an offender has committed a violent offence they are also likely to have committed criminal damage. These co-occurring criminal activities display a theme of related offences that describe an expressive and violent offender.

The array of driving offences present in the offender criminal histories could be due to many features, including their age and whether an offence involved a car. What is interesting is that many of the driving related offences are grouped together in the centre of the plot, highlighting the co-occurrence of these behaviours in an offender's criminal history. The driving offences include 'Driving whilst disqualified' (DRIV DISQUAL), 'Take a motor vehicle without the owner's consent' (TAKE VCLE NO CONSENT), 'Carried in/on a motor vehicle taken without the owner's consent' (IN VEH TKN NO CONSENT), 'Drive a motor vehicle otherwise than in accordance with a licence' (DRIV NO LIC) and 'Drive a motor vehicle dangerously' (DANG DRIV). Previous studies have shown that vehicle offending can relate to juveniles, organised and professional crimes (Mak, 1993; Youngs, 2006). Donald and Wilson's (2000) study showed that every offender known to be the 'driver' of the group had a previous offending history for stealing a motor vehicle. However, their findings showed that none of the 'drivers' committed antisocial behaviours, such as possession of drugs or minor bodily harm. It was the 'extra' offenders, that were an addition to the ram raiding group, that were shown to commit antisocial behaviours, indicating a less experienced and criminally immature offender. The only drug related offence in the offender criminal histories, 'Possess a controlled drug of Class B – Cannabis/Cannabis Resin' (POS CAN/CAN

RES), is positioned within the area of driving offences in the SSA plot. This supports the likelihood that these offenders will have a more delinquent and dysfunctional lifestyle.

Towards the top of the SSA are offences relating mainly to theft and burglary. The offence behaviours 'Burglary dwelling - with intent to steal' (BURG DWEL INT STL), 'Handle Stolen Goods' (HANDLE STOLEN GOODS), 'Attempt burglary dwelling with intent to steal' (ATT BURG DWEL INT STEAL), 'Going equipped for theft - not motor vehicle' (EQUP FOR THFT) AND 'Theft from a person of another' (THFT PERSON) are all positioned within the same region of the SSA. This shows that these material related offences will co-occur in an offender's criminal history.

10.3.2. Regional structure of SSA

As displayed in table 24, each offence is categorised into their type and degree of gain based on applying the Social Cognitive principles of Bandura's fundamental incentives. Differences in the type and degree of gain in offences can support a distinction between different themes of offender criminal history. Youngs' Model of Criminal Specialisation, places emphasis on differing the incentive types of gain only, rather than the degree of gain. This is because a differentiation will not come from a behaviour that is already learnt to a certain degree, but will come from where an incentive behaviour is missing.

The three incentives used within the analysis are Material, Power and Sensory. Youngs describes how these incentives are about acquiring what one desires, be that material possessions (offences include: burglary and theft), control (offences include: assault and robbery) or pleasurable, stimulating experiences (offences include: driving offences and failing to surrender to police). The difference in degree is based on the Social Cognitive argument that just as incentives will vary, so will the level of the gain from an experience. The degree of gain therefore relates to the various levels of acquired incentives the offenders have learnt through their experiences. For example, an attempt to burgle may be classified as a low gain material incentive, whereas a theft of a motor vehicle is a high gain material incentive. Youngs' Model of Criminal Specialisation highlights distinct styles of offending that relate to both the type and degree of gain. The following study therefore analysed the regional structure of the SSA based on Material Gain, Power Gain and Sensory Gain.

To interpret the incentive type and degree of gain the classifications in table 24 were superimposed onto the SSA-I plot, corresponding to the offence type. Figure 31 displays the types of gain relating to the offence variable on the SSA plot, shown as either Material, Power or Sensory gain. Figure 32 displays the degree of gain overlaying the offence variables on the SSA, showing either High or Low gain. Again, the regional hypothesis suggests variables that appear closer in the SSA region will have a common theme, allowing for the interpretation of clusters of behaviours that may have formed.
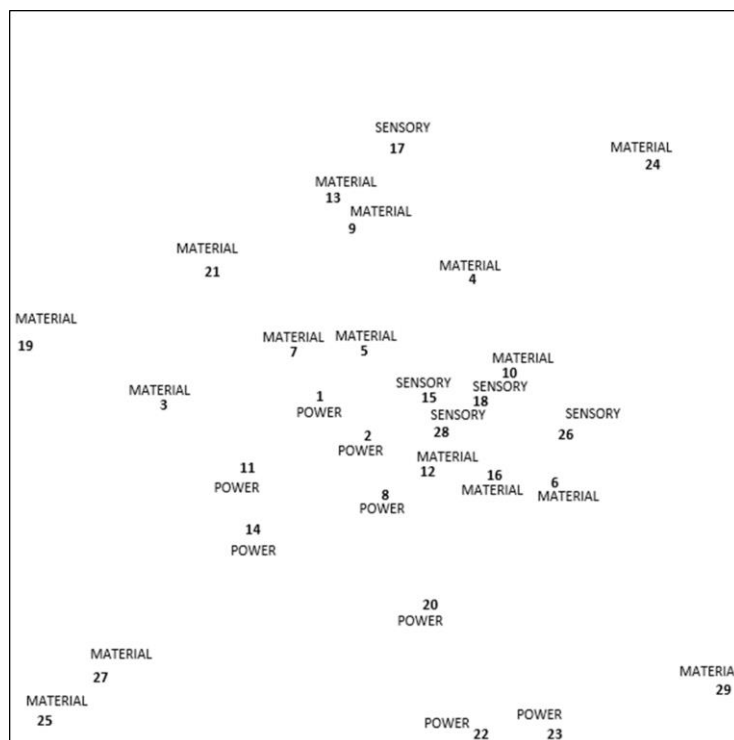
Figure 31. 1 by 2 Projection of the Three-Dimensional Smallest-Space Analysis Displaying the Type of Gain. Coefficient of Alienation = 0.19
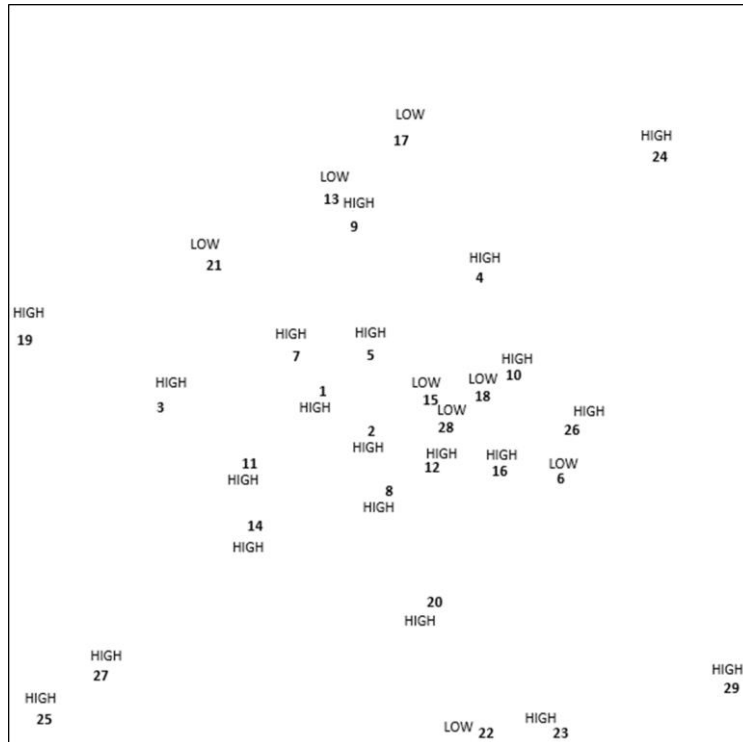
Figure 32. 1 by 2 Projection of the Three-Dimensional Smallest-Space Analysis Displaying the Degree of Gain. Coefficient of Alienation = 0.19

On examining the type of gain, figure 31 reveals broad regions of the Material, Power and Sensory gain type, with the SSA plot being made up mainly of Material gain type offences. The Material gain type can be seen to overlap with other gain types that without them could have represented clear distinct styles of criminal activity. However, this does show that every network associated domestic burglar will have an offending history that relates to Material gain, even when their main gain type is shown to be either Sensory of Power gain related.

Towards the top of the SSA is the main bulk of Material offences featured in a range of frequently occurring previous criminal histories. For example, the offence behaviours 'Burglary other than dwelling - theft' (BURG OTHER DWEL THFT) and 'Burglary dwelling - with intent to steal' (BURG DWEL INT STL) both occur in 43% of the sample. However, the offence behaviours 'Vehicle interference - motor vehicle' (VCLE INTERFEERNECE) and 'Fail to surrender to police / court bail at the appointed time' (FAIL SUR CRT/POL BAIL) both occur in less than 20% of the sample. This area shows that an offender that has committed a Material gain type offence will have another Material offence in their previous history.

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The second broad region of gain type is towards the bottom of the SSA where a collection of Power gain offences is positioned. Again, this region of Power gain offence types displays a radex of high to low frequently occurring offences, starting from the centre of the SSA and moving out towards the periphery. The offence behaviours in this region that occur in over 50% of the sample are 'Robbery' (ROB) and 'Criminal damage to property valued under £5000' (CRIM DAM VAL < £5000). Whereas the low frequency offences within this region, occurring in under 25% of the sample, are 'Affray' (AFFRAY), 'Use threatening / abusive / insulting words / behaviour with intent to cause fear of / provoke unlawful violence' (THREAT WRD/BEH VIO) AND 'Use threatening words / behaviour to cause harassment alarm or distress' (THREAT WRD/BEH ALARM).

Lastly the area towards the right of the SSA displays offence behaviours that are Sensory and Material gain, however, nearly all this area relates to driving offences. The Sensory gain offences include 'Use a motor vehicle without third party insurance' (USE VCLE NO 3RD INSUR), 'Drive a motor vehicle otherwise than in accordance with a licence' (DRIV NO LIC), 'Drive whilst disqualified' (DRIV DISQUAL) and 'Drive a motor vehicle dangerously' (DANG DRIV). Whilst the Material gain offences include 'Theft of motor vehicle' (THFT MOTOR VEH), 'Theft from a motor vehicle' (THFT FROM VCLE) and 'Take a motor vehicle without the owner's consent' (TAKE VCLE NO CONSENT). As described by Youngs (2006), the Sensory gain type behaviours relate to how an individual may be stimulated from rebellious acts. This area of crimes shows that offenders within the sample display an underlying motivational gain from driving offences. These offences also clearly show that many co-offending domestic burglary network offenders will have many previous driving offences that can contribute to the skills they bring to a group.

The degree of gain, displayed in figure 32, does not show any distinct High or Low areas. However, many of the offence behaviours observed in the sample are High gain, with very few Low gain offences. The Low gain offences that are observed mainly relate to the Sensory behaviours, showing that co-offending domestic burglars will seek offences where they can have immediate physical gain between them, rather than a sensory.

The regions proposed display broad styles of offending among the sample of network associated domestic burglars. Three themes of criminal history are identified, labelled *Material*, *Power* and *Vehicle*. Figure 33 displays the themed regions superimposed onto the original SSA-I of offending criminal history.
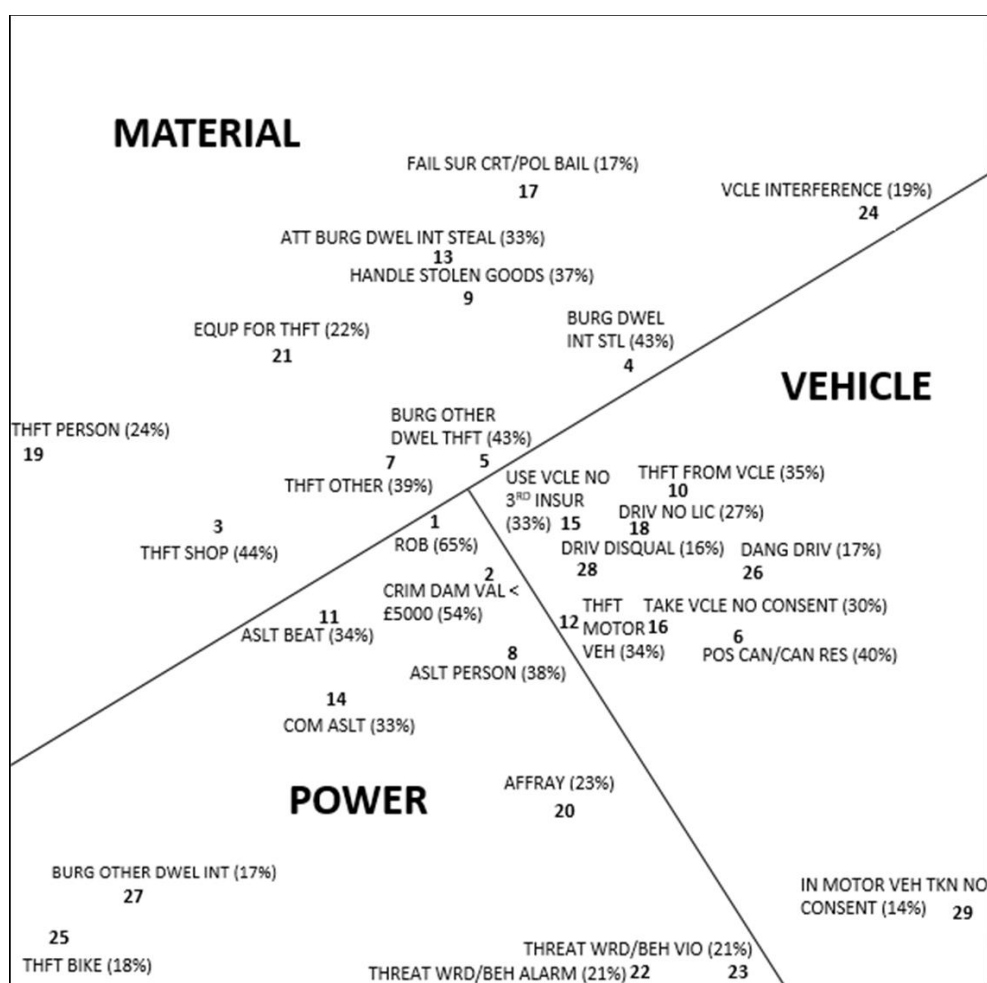
Figure 33. 1 by 2 Projection of the Three-Dimensional Smallest-Space Analysis of 115 Offender Criminal Histories with Themes Regions. Coefficient of Alienation = 0.19

10.3.3. Identifying individual specialisation

Upon identifying themes of offending criminal history, it was then hypothesised that everyone within the sample could be allocated to only one theme. In doing so, the study aims to test Youngs' Model of Criminal Specialisation to highlight an element of criminal specialisation among network associated domestic burglars.

Firstly, each themed region indicates a co-occurrence between the variables as a result of the underlying dimensions. Cronbach's alpha was used to confirm the reliability coefficient of each set of variables which makes up the theme (see table 25).

Table 27. Scales of Themes (Alpha if item deleted in parentheses)

	Theme		
	MATERIAL	**POWER**	**VEHICLE**
Items	ATT BURG DWEL INT STEAL (.53)	BURG OTHER DWEL INT (.69)	POS CAN/CAN RES (.83)
	BURG DWEL INT STL (.56)	ROB (.68)	IN MOTOR VEH TKN NO CONSENT (.80)
	BURG OTHER DWEL THFT (.53)	AFFRAY (.67)	DANG DRIV (.78)
	EQUP FOR THFT (.53)	THREAT WRD/BEH VIO (.67)	DRIV NO LIC (.77)
	THFT OTHER (.50)	THREAT WRD/BEH ALARM (.70)	DRIV DISQUAL (.79)
	THFT SHOP (.58)	ASLT PERS (.63)	TAKE VCLE NO CONSENT (.78)
	THFT PERSON (.54)	ASLT BEAT (.67)	THFT OF VCLE (.81)
	HNDLE STOL GDS/RECEIVE STL GDS (.55)	COM ASSLT (.65)	THFT MOTOR VEH (.79)
	FAIL SUR POL/CRT BAIL (.55)	CRIM DAM VAL < £5000 (.63)	USE VCLE NO 3RD INSUR (.76)
	VCLE INTERFERENCE (.56)	THFT BIKE (.70)	
Items	10	10	9
Alpha	0.57	0.69	0.81

The results indicate a good degree of association between the offence variables within each theme. The offences forming the Material theme have a Cronbach's Alpha of .57. This is quite low however, this region contains some of the lowest frequency offences and may be a consequence in part of these offences. The Power theme displayed a good degree of association between the offences with a Cronbach's Alpha score of .69. Lastly, the Vehicle theme has a strong Cronbach's Alpha score of .81. The results indicate three defined regions which, based on the Cronbach's Alpha reliability scores, display a good degree of association.

The criminal histories of the 115 offenders were examined using the percentages calculated from each of the three distinguished themes to then represent a proportion. Previous studies have used a strict criterion to allocate cases to themes in identify thematic specialisation (Salfati, 2000; Trojan and Salfati, 2016). The current study followed the same criterion to maintain consistency throughout the criminal specialisation analyses. The criterion used means that an offender can be assigned to a theme when the percentage of occurrence in the dominant theme is higher than the other two themes. An offender is assigned as a hybrid if the same percentages were calculated for more than one theme. If an

offender is assigned to the hybrid or unclassified theme, then they display a more generalised offending style. A summary of the offenders assigned to the themes is illustrated in Table 26.

Table 28. Offenders (N = 115) Assigned to Criminal History Theme Based on Criterion of Thematic Specialisation

Theme	N	%
MATERIAL	40	35%
POWER	37	32%
VEHICLE	28	24%
Hybrid	7	6%
Unclassified	3	3%
Total	115	100%

Table 26 showed that 91% of the sample could be clearly assigned to a single dominant theme of criminal differentiation. From the results of the SSA of their previous criminal history, 35% of the sample could be classified as Material offenders, 32% Power offenders and 24% Vehicle offenders. 6% of the sample are classified as Hybrid offenders, which on closer inspection are shown to be both Material and Power related. Lastly, 3% of the sample could not be assigned to a theme, labelling them Unclassified. As previously mentioned, these offenders display no noticeable pattern from their criminal history, displaying a more generalised style of offending.

The findings provide evidence towards criminal specialisation within the sample of co-offending domestic burglary networks. These results coincide with the work of Trojan and Salfati (2016) in identifying a framework that can classify offender previous history and differentiate between them. This suggests that among co-offending domestic burglar networks there will be three distinct criminal backgrounds, providing evidence towards a model of offender specialisation.

10.3.4. Age of criminal specialisation

A crucial step in analysing the patterns of offending differentiation is whether they differ based on the offender's age. Previous literature has long discussed the development in

offending through age and how that can relate to specialisation in crime types (Moffitt, 1993; Spelman, 1994; McGloin et al., 2011).

A Spearman's rank-order correlation was run to determine the relationship between the age of offenders and the themes of criminal differentiation. The results displayed a statistically significant weak positive correlation between offender age and each of the themes, Material ($r = .324$, $p < .001$), Power ($r = .203$, $p < .05$) and Vehicle ($r = .357$, $p < .001$). Although, there isn't a significant difference between each of the three themes, the results do show that as offender's age increases so too does specialisation among the themes identified.

10.4. Chapter Summary and Conclusions

These findings display a robust framework of identifying criminal differentiation between co-offending domestic burglary network offenders. By applying Youngs' Model of Criminal Specialisation a classification of offending types was identified, therefore leaning close to support an element of criminal specialisation among the co-offending domestic burglary network sample. 91% of the sample could be classified to the Material, Power or Vehicle themes of criminal differentiation, with the highest percentage displaying Material related offending behaviours. The high percentage of the sample being assigned to one of three themes provided further evidence towards criminal specialisation.

The results showed that there was an underlying theme of material offences that ran throughout the sample's criminal history. As figure 31 showed in assessing the type of gain within the SSA space that each theme of criminal differentiation contained a material gain offence. By assessing each region, the roles and likely positions the offenders play within the co-offending network can be established. The Material region of the SSA plot provides evidence of offenders that are solely focused on gaining possession of desired goods. As the types of offences show in this region, these goods are mainly of monetary value and likely to be committed by individual seeking immediate gain. It can be suggested that, within a group setting, these offenders would take control of sorting the stolen property, either acting as the handler or having the knowledge of where to dispose of goods. It's likely that these offenders will act as gatekeepers within the network setting, working with separate groups in gaining and supplying goods.

32% of the sample are assigned to the Power theme, highlighting behaviours that are concerned with obtaining control over others and the resources of others. The behaviours achieved within this theme are acts of violence, which Youngs (2006) describes as relating to a sense of enhancing their status. The Power theme suggests that there will be individuals within a group that have an enhanced status through their previous violent behaviours. In line with Donald and Wilson's (2000) findings, the offenders identified within the Power theme are likely to display some sort of "muscle" role within the group. These offenders could also coincide with Donald and Wilson's findings of a 'dishonest-violent leader'. Thus, it is hypothesised that these offenders will be situated within central positions of the co-offending networks, displaying status from previous violent acts.

The lowest occurring region of criminal differentiation is the Vehicle theme, occurring in 24% of the sample. Although many of the offences within this theme displayed a sensory gain type, the mixture of material gain type offenses within this region all relating to vehicle offences gave a clear indication of the theme. However, the theme does highlight that vehicle offences within the sample will relate to a stimulating experience. Youngs (2006) described this gain type as one that emits an emotional effect from particular actions, which in this case related to vehicle crime. Similar to Donald and Wilson's (2000) findings, it is suggested that offenders likely to specialise in vehicle related offences will bring this skill to the co-offending group. Donald and Wilson stated that the 'extra' role displays a lack of criminal maturity in their offending by committing antisocial and dishonest crimes such as driving and drugs offences. Thus, the Vehicle offenders found in this study are not likely to be positioned centrally among the co-offending network, but would be someone to call upon into a group for a specific job.

The results in this chapter outline the likelihood that the sample of domestic burglary co-offenders will have roles within their position of the network. This coincides with the focus on network structure, burglary characteristics and difference in offending style. The next chapter will investigate the co-offending domestic burglary networks further to attempt to identify a relationship between the structure of the networks and the individuals within them. As Youngs et al. (2014) states, these studies will complement each other in identifying differentiation of what the offender does in relation to the focus on how the offence is committed. It is hypothesised that the offenders within each co-offending group will display a difference in criminal differentiation, highlighting the likelihood of roles within groups based on previous criminal experience.

Chapter 11. Towards A Social-Psychological Framework of Domestic Burglary

11.1. Introduction

Many studies have noted a lack in research that focuses on the actual patterns and processes among co-offenders (McGloin and Nguyen, 2012; Ouellett et al., 2013). McGloin and Nguyen (2012) state that the primary research conducted into the area of co-offending focuses on peer influence on delinquency rather than the more pressing matter of how these individuals, of all ages, interact together in crime. The current study contributes to the examination of criminal experience within co-offending groups, as well as co-offending in adulthood, another area known to be lacking in empirical research (McGloin and Nguyen, 2012; Ouellett et al., 2013; Lantz and Hutchson, 2015).

There is also a significant gap in the literature in approaching the notion of developing individual's roles based on their previous criminal experience within co-offending groups. As discussed, Donald and Wilson's (2000) study of ram raiding is one of the only known studies to have done so. Although not legally defined as its own offence, Donald and Wilson describe ram raiding as behaviourally distinct as a more professional crime than burglary. The previous chapter identified similarities between criminal specialisations found in ram raiding to that of co-offending domestic burglary networks, providing evidence to support a higher level of professionalism among these offenders. Thus, if individuals within co-offending groups of a network are found to display different themes of criminal differentiation, then it is suggested that their previous experience and skill are important contributions to the crime.

Lantz and Hutchson (2015) state that experience, knowledge and skill are important attributes in a group towards increasing their criminal capital, which is of particular importance for burglars. Offenders within co-offending groups will face external influences from individuals around them which may facilitate the learning of techniques for additional offences. As stated by McAndrew (2000), individuals within any group that form through circumstance or towards a mutual goal will take on a role. These individuals will become actors in a loosely constructed script that continues to revolve around belonging to that group. It is therefore likely that the more complex the group the more varied the roles.

In comparing burglary to terrorist networks, Lantz and Hutchson highlighted their similarity of dispersed structures. Meaning that if one individual was detained from the network they would only be able to disrupt and identify a few others. The dispersion of network structures is done so to continue offending over extended periods of time in being able to connect with different burglars. In the current study, the dispersion of network structures is evident in differing criminal experience, allowing individuals of one network to bring certain skills to another if their network is disrupted. However, if the networks are shown to contain commonality among criminal specialisation then it is unlikely that they will co-offend with individuals specialising in other offences. It is hypothesised that the current sample will display evidence of differences in criminal experience and thus criminal specialisation, to allow for continued offending across extended periods of time throughout each network.

11.2. Method

The current study seeks to identify whether there is commonality of criminal behaviour across domestic burglary co-offending groups, as well as identifying whether groups within co-offending networks commit crimes in the same way. By exploring these issues, the current study aims in providing evidence of distinct roles within co-offending groups. As mentioned, previous studies have addressed that not only does co-offending increase knowledge and skill in a crime by learning from others but allows for long-term offending. By obtaining associations with other co-offending groups, burglars can continue offending across an extensive period even if their network is disrupted.

In exploring a social hypothesis of domestic burglary, the current study uses the 13 networks previously derived in Chapter 9. These networks include 141 unique offenders committing 83 solved domestic burglaries within the sample. As previously addressed, 26 unique offenders within this sample had no prior conviction before committing the co-offending domestic burglary, bringing the final sample to 115 unique offenders.

The previous findings have brought to light the notion that it is possible to understand the role of a co-offender and what they can offer to the group based on their previous offending background. The current analysis will draw on the offending styles and themes of criminal differentiation identified in previous chapters in exploring the possibility of roles

within each network. Firstly, the study will explore the correlations between the themes of criminal differentiation (Material, Power and Vehicle), offending styles (Skilled Domestic, Forceful, Interpersonal and Non-Domestic) and organisational structure (Starter, Core and Structured). Due to the nature of the co-offending networks it is hypothesised that there will be a significant relationship between the Skilled Domestic offending style and the Material gain theme. In previous chapters the Skilled Domestic offender was highlighted as being mostly involved with co-offending networks than the others. As the sample is made up solely through domestic burglary connections, it is not likely that many of the networks will contain Non-Domestic offending style themes. The Skilled Domestic and Forceful displayed co-offending and network associated offenders, thus indicating that these offending styles will occur in most of the networks. The Interpersonal offending style was also shown to be committed by the older offenders with more criminal experience. The previous study found that the older the offenders are the more likely they are to specialise in certain types of offences, with the Vehicle gain displaying the strongest correlation to age. Although the Interpersonal style is not likely to occur in many of the co-offending networks, it is hypothesised that where it does occur will display a relationship to the Vehicle gain theme.

The findings will be illustrated for each network, exploring the relationships between the features of an individual offender and the features of the network as a whole. Upon doing so, we will be able to address the likelihood of roles within groups based on each individual's offending history.

11.3. Results

11.3.1. Network structure and offending style in relation to criminal differentiation

A Spearman's rank-order correlation was run to determine the relationship between the themes of criminal differentiation (Material, Power and Vehicle), offending styles (Skilled Domestic, Forceful, Interpersonal and Non-Domestic) and network structure (Starter, Core and Structured). Each of these elements have been found to represent each offender's previous criminal experience, burglary offending style and structural stage of the network they are associated with.

A positive significant correlation was found between the Skilled Domestic offending style and the Material theme (r = .440, p < .001). A positive significant relationship was also identified between the Skilled Domestic offending style and the Vehicle theme (r = .321, p < .001). These results indicate that where offenders will specialise in particular offences, the Skilled Domestic style of offenders will commit more Material or Vehicle related offences than others. Previous findings from Chapter 7 displayed the Skilled Domestic offending style to be mostly related to network associated burglars. The results then identify that the co-offending domestic burglaries committed will mainly include individuals with offending experience in either Material or Vehicle related gain. If co-offending groups are shown to have similar previous offending experience, then the networks will be solely made up of individuals with Material or Vehicle related background. Thus, providing little evidence for the notion of a social framework of domestic burglars built up from the differing skills and backgrounds acquired by each individual. However, if the networks display differing themes of criminal differentiation, then this provides support to individual skills and roles for each domestic burglary.

Correlations between the Interpersonal offending style and the themes of criminal differentiation displayed a positive significant relationship to the Vehicle theme (r = .280, p < .01). Although previous findings displayed the Interpersonal offending style as mostly committed by solo offenders, the current results show that those co-offenders committing this style of burglary will have a higher background of vehicle related offences than others.

Although the offenders in this sample are involved in co-offending domestic burglary networks, the few offenders that display Non-Domestic offending styles displayed a negative correlation to the Power theme of criminal differentiation (r = -.202, p < .05). There was also no significant relationship found between the Forceful offending style and the previous criminal history of the sample. This relationship was expected as the Forceful offenders were shown to be younger and less experienced offenders, as well as the finding that specialisation will occur more in older offenders.

The cumulative scores identified in Chapter 9 for each of the co-offending domestic burglary networks in understanding their structural organisation were used to establish any relationship towards offending styles and previous convictions. The findings showed no relationship between the cumulative scores of the networks, theme of criminal differentiation and offending styles. Meaning that the structure and size of the network will play no part in

distinguishing between how the offences are carried out and the previous offending history of the individuals within them.

The centrality scores of each offender displaying their position within a network were also correlated to the offending styles and themes of criminal differentiation. The findings displayed a weak significant relationship between the Non-Domestic offending style and Betweenness centrality measure ($r = .236$, $p < .05$). This demonstrates that those who commit Non-Domestic burglary will hold power within a co-offending network from being the "middle-man". However, the Non-Domestic offenders are not shown to correlate significantly to any other centrality measure, meaning that they are likely to be loosely associated as gatekeepers between individuals. Although there were no other significant relationships found, the correlations between the centrality measures and themes of criminal differentiation displayed an interesting pattern. The pattern demonstrated positive correlations between the Material gain and centrality measures, as well as positive correlations between the Vehicle theme to the Closeness and Betweenness measure. Negative correlations were displayed between Power gain to the centrality measures and the Vehicle theme to Degree and Eigenvector measures. These findings indicate that the offenders shown to specialise in Material gain will be in a more central position within the co-offending network, whilst those related to Power will be along the outskirts. The offenders shown to specialise in Vehicle offences are shown to be connected to central individuals positioning themselves within the mid-level of the network.

11.3.2. Roles within co-offending domestic burglary networks

The following tables display each offender within the thirteen networks analysed, listed alphabetically. Each offender has been given a numerical label for ease of interpretation and anonymity. If the number of offenders within the table does not match the total offenders in the network, then the missing individuals did not have any previous criminal convictions recorded within the police national computer database to be analysed. This means that the domestic burglaries they have committed as part of the network will have been their first police recorded offence.

The previous chapter resulted in three classifications of criminal differentiation based on the previous offending behaviour of the sample. Derived from the criterion, 35% of the

sample is assigned to the Material theme, 32% to the Power theme and 24% to the Vehicle theme. 6% of the sample are displayed as Hybrid offenders (Power and Material theme) and only 3% were shown to be Unclassified. The high percentage of offenders that could be classified means that there will be information for each individual in a network regarding their criminal history.

In Chapter 7, inferences of offender characteristics from offending actions were derived, labelled Skilled Domestic, Forceful, Interpersonal and Non-Domestic. These offending styles were added to the table for each individual to establish the actions taken by each co-offending group within the network.

Table 29. Displaying the offending style and criminal differentiation theme of Network A

Network A (N = 5) Starter Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	POWER
2	1	0	0	0	HYBRID
3	1	0	0	0	MATERIAL
4	1	0	0	0	MATERIAL

Table 30. Displaying the offending style and criminal differentiation theme of Network B

Network B (N = 5) Starter Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	VEHICLE
2	1	0	0	0	POWER
3	1	0	0	0	MATERIAL
4	0	1	0	0	VEHICLE

Table 31. Displaying the offending style and criminal differentiation theme of Network C

Network C (N = 5) Core Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	1	0	0	MATERIAL
2	0	1	0	0	POWER
3	1	0	0	0	POWER
4	0	1	0	0	MATERIAL

Table 32. Displaying the offending style and criminal differentiation theme of Network D

Network D (N = 9) Structured Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	MATERIAL
2	1	0	0	0	MATERIAL
3	1	1	1	0	MATERIAL
4	1	0	0	0	MATERIAL
5	1	0	0	0	POWER
6	1	0	0	0	MATERIAL
7	1	0	0	0	MATERIAL
8	1	0	0	0	POWER
9	1	1	0	0	VEHICLE

Table 33. Displaying the offending style and criminal differentiation theme of Network E

Network E (N = 6) Core Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	1	0	0	POWER
2	0	0	1	0	HYBRID
3	1	0	0	0	POWER

Table 34. Displaying the offending style and criminal differentiation theme of Network F

Network F (N = 7) Core Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	POWER
2	1	1	0	0	VEHICLE
3	1	0	0	0	MATERIAL
4	1	0	0	0	VEHICLE
5	1	0	0	0	POWER

Table 35. Displaying the offending style and criminal differentiation theme of Network G

Network G (N= 11) Structured Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	POWER
2	1	0	0	0	MATERIAL
3	1	1	0	0	POWER
4	1	0	0	0	POWER
5	1	0	0	1	MATERIAL
6	1	0	0	0	MATERIAL
7	0	1	0	0	MATERIAL

Table 36. Displaying the offending style and criminal differentiation theme of Network H

	Network H (N = 26) Structured Organisation				
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	POWER
2	1	0	1	0	MATERIAL
3	1	0	0	0	MATERIAL
4	1	0	1	0	POWER
5	1	0	0	0	POWER
6	1	1	1	0	VEHICLE
7	1	0	0	0	VEHICLE
8	1	0	0	0	UNCLASSIFIED
9	1	0	0	0	VEHICLE
10	1	0	0	0	MATERIAL
11	1	0	0	0	VEHICLE
12	1	0	0	0	VEHICLE
13	1	0	0	0	POWER
14	1	0	0	0	MATERIAL
15	1	1	0	0	VEHICLE
16	1	0	0	0	HYBRID
17	1	0	0	0	POWER
18	1	1	0	0	MATERIAL
19	1	0	0	0	MATERIAL
20	1	0	0	0	HYBRID
21	1	0	0	0	MATERIAL
22	1	0	0	0	POWER
23	1	1	0	0	MATERIAL

Table 37. Displaying the offending style and criminal differentiation theme of Network I

	Network I (N = 7) Core Organisation				
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	MATERIAL
2	1	0	0	0	VEHICLE
3	1	0	0	0	VEHICLE
4	1	0	0	0	POWER
5	1	0	0	0	POWER
6	1	1	0	0	POWER
7	1	0	0	0	HYBRID

Table 38. Displaying the offending style and criminal differentiation theme of Network J

Network J (N = 8) Starter Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	1	0	POWER
2	1	0	0	0	VEHICLE
3	1	0	0	0	MATERIAL
4	1	0	0	0	MATERIAL
5	1	0	0	0	VEHICLE
6	1	0	0	0	VEHICLE
7	1	0	1	0	VEHICLE

Table 39. Displaying the offending style and criminal differentiation theme of Network K

Network K (N = 18) Structured Organisation					
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	MATERIAL
2	1	0	0	0	MATERIAL
3	1	0	0	0	POWER
4	0	1	0	0	VEHICLE
5	0	0	1	0	VEHICLE
6	1	0	1	0	VEHICLE
7	1	0	1	0	POWER
8	1	0	0	0	POWER
9	1	0	0	0	POWER
10	1	0	0	0	MATERIAL
11	0	1	0	0	POWER
12	0	0	1	0	VEHICLE

Table 40. Displaying the offending style and criminal differentiation theme of Network L

	Network L (N = 18) Structured Organisation				
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	POWER
2	1	0	0	0	VEHICLE
3	1	0	0	0	POWER
4	1	0	0	0	VEHICLE
5	1	0	0	0	MATERIAL
6	1	1	0	0	VEHICLE
7	1	0	0	0	POWER
8	1	1	0	0	HYBRID
9	0	1	0	0	VEHICLE
10	1	1	0	0	POWER
11	1	0	0	0	VEHICLE
12	1	0	0	0	MATERIAL
13	1	0	0	0	MATERIAL
14	1	0	0	0	POWER
15	0	0	0	1	UNCLASSIFIED
16	1	0	0	0	UNCLASSIFIED

Table 41. Displaying the offending style and criminal differentiation theme of Network M

	Network M (N = 16) Core Organisation				
Offender Label	**Skilled Domestic**	**Forceful**	**Interpersonal**	**Non-Domestic**	**Criminal Differentiation Theme**
1	1	0	0	0	VEHICLE
2	1	0	0	0	MATERIAL
3	1	0	0	0	POWER
4	1	0	0	0	MATERIAL
5	1	0	0	0	POWER
6	1	0	0	0	MATERIAL
7	1	0	0	0	MATERIAL
8	1	0	0	0	HYBRID
9	0	1	0	0	POWER
10	1	0	0	0	MATERIAL
11	1	0	0	0	MATERIAL
12	1	1	0	0	POWER
13	1	0	0	0	VEHICLE
14	1	0	0	0	MATERIAL

By studying the networks in this way, we can identify similarities and differences among the groups of individuals. As expected, the co-offending groups will mostly commit

offences in a Skilled Domestic style, followed by the Forceful offending style. The findings show that the co-offending domestic burglary networks identified in the sample are not arbitrary, but are instead a framework of differing backgrounds and therefore differing skills. The significant relationships identified between the themes of criminal differentiation and the offending styles provide further evidence towards a framework of social connections within domestic burglary co-offenders.

The figure below illustrates this point, lending support to the domestic burglary groups acting as teams instead of loose networks. The networks identified in UCINET were depicted using NetDraw visualization tool. The criminal differentiation themes were then applied to each individual as an attribute to illustrate the roles within each network. The networks are positioned based on organisational structure, from left to right, displaying the Starter, Core and Structured organisations identified in Chapter 9. The networks being positioned in this way also illustrates the fact that there is no difference between the size and structure of the organisation to their offending style and differentiation of previous criminal histories. The themes of criminal differentiation are displayed using colour (Green = Material, Red = Power, Blue = Vehicle and Black = Unclassified), whilst the network organisation structure is displayed using shapes (Circle = Starter, Square = Core and Triangle = Structured).
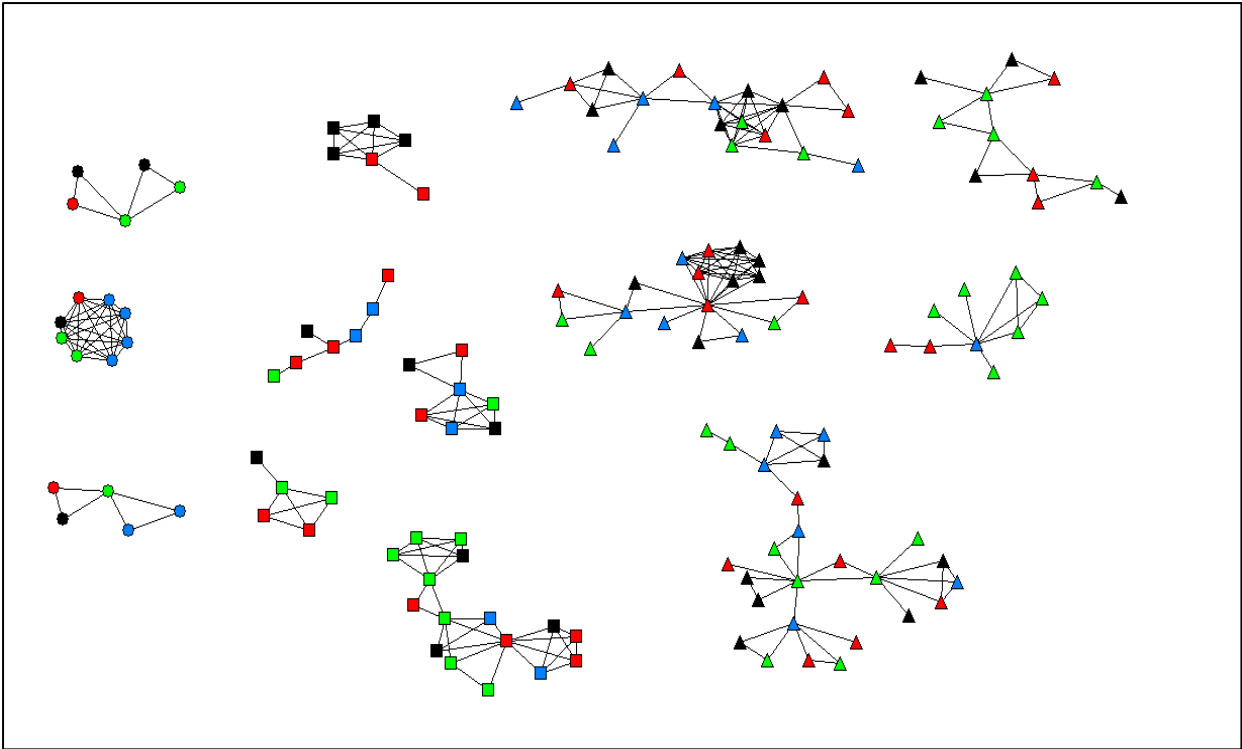
Figure 34. 13 co-offending domestic burglary networks
Note: Circle = Starter | Square = Core | Triangle = Structured
Green = Material | Red = Power | Blue = Vehicle | Black = Unclassified

Figure 34 provides a clear indication of the difference between individuals within each co-offending network. However, the database contains police reports of each incident and thus we can take a closer look at key examples of the different roles between offenders.

11.3.2.1. Case Study 1 – Network D

Network D contains nine offenders, all of which had a previous conviction before the domestic burglary in the sample and are therefore present in table 30. The offenders within this network are all male, aged between 18 and 46. The network is made up of domestic burglaries targeting house windows to break in and take the victims keys to steal their vehicle. The figure below displays offender 9 as the most central within the group (blue triangle). This offender displays evidence of specialising in vehicle crime, whilst many of the other offenders have previous offending specialising in Material gain. This illustrates how the different individuals with distinct skill sets come together to commit crimes of a particular nature. In this case being domestic burglaries motivated by targeting vehicles to steal.

Police at Midlands City were able to confirm that offender 9, aged 46 at the time of the offence and has the most criminal convictions within the network, is offender 1's father. Although there is no way of knowing from the data which member of the family was the instigator into the offences committed together, it is likely that due to his position the father would have had an influence over the son's involvement in offending. The offence in which the father and son were involved with included a group of four offenders. This co-offending group not only stole the victim's car from their driveway, but, as the offence was in December, filled the stolen vehicle with wrapped Christmas presents before making their escape.
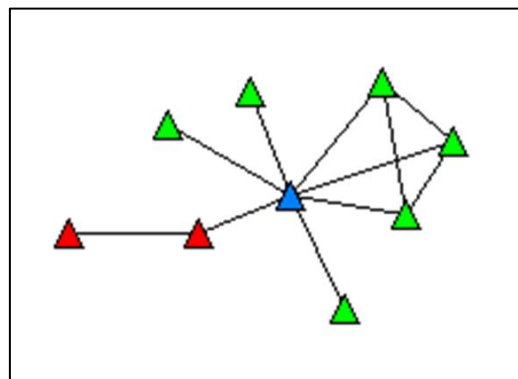
Figure 35. Network D

11.3.2.2. Case Study 2 – Network K

Like Network D, Network K also mostly commit vehicle targeted domestic burglaries. However, the difference between the two is in the offender specialisation. Although both networks are categorised as Structured Organisations, Network D is led by an individual specialised in Vehicle offences, whereas Network K's central individuals specialise in both Power and Vehicle related offences.

Network K is made up of eighteen offenders, however, for six offenders the domestic burglary associating them to the network was their first recorded offence, meaning they are categorised as unclassified. Many of the offences were shown to be committed against insecure properties, with Network K displaying a high amount of Interpersonal offending styles. In deriving inferences of characteristics based on offending actions, Chapter 7

identified that Black offenders mostly commit the Interpersonal offending style, respectively. Nearly 60% of the network were shown to be Black, with a small percentage of Asian and White offenders, respectively.

As mentioned, these domestic burglaries are mostly shown to target vehicles that are parked on the street outside the victim's home. It is likely that the homes were targeted based on the value of the cars parked outside, showing evidence of sophisticated premediated domestic burglaries. In one domestic burglary incident recorded where the offenders were unsuccessful in stealing property due to an alarm being activated, the offenders are described as spending time watching the house. The three offenders are noted as even knocking on the door of the house to confirm that the property is unoccupied. Once clear to approach the offenders climbed over a fence, dislodged the CCTV cameras using a football and then one offender climbed up to the first-floor balcony to gain access by breaking a window. Once inside the property the offender is then able to give access to the other two, however, the alarm is activated before they can continue and they make their escape. This case illustrates the use of different members of the group in carrying out tasks before and during the offence.
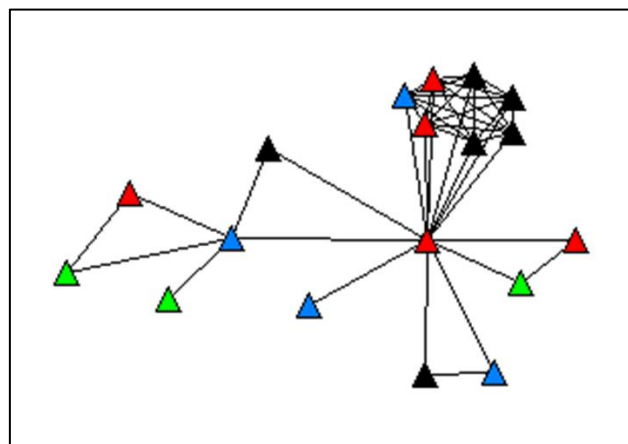
Figure 36. Network K

11.4. Chapter Summary and Conclusions

The current study identifies small-scale domestic burglary organisations with role differentiation. The differences identified between individual criminal differentiation themes within each group provide evidence of distinct roles in the sample of co-offending domestic

burglary networks. The social hypothesis of domestic burglars is tested by analysing the distinct roles individuals have. This demonstrates that the co-offending networks analysed can be considered social networks, supporting the notion that this crime should be looked at in a social context.

The social ties between individuals are illustrated in figure 34 which displays different colours, representing different themes of criminal differentiation, within each network. The figure also illustrates that there is no relationship between the themes of criminal differentiation and the individual's position within the network. This differs to Donald and Wilson's (2000) findings, whereby the role of a ram raider related to their position within the network, such as the 'leader' or 'extra' in a group. It is likely that these differences are based on a higher level of organisation and professionalism within groups of ram raiders. However, this does not distract from the likelihood that co-offending domestic burglars have a level of professionalism that is brought to the crime through the skills they have acquired.

The findings suggest that the co-offending networks identified in the sample are not arbitrary. The tables show that the individuals within each group are likely to play a role that leads to the development of an intricated framework of different skills. Again, figure 34 illustrates this point, lending support to the domestic burglary groups acting as teams instead of loosely connected networks. The case studies discussed provide evidence of the use of certain individuals for particular offences. Both case studies use Vehicle related offenders at times in their abilities of stealing the keys and cars of vehicles at the homes. Material offenders are used in the handling of stolen goods and what to take and lastly in some cases offenders are used as lookouts, or likely Power related offenders.

As discussed in the previous chapter, it is unlikely that the role and position an individual has within any group can be established without interviewing them. The current sample is made up of quantitative data which initially posed a problem with assessing any sort of framework between individuals. However, this was overcome by analysing each offender's criminal actions and previous criminal history. By establishing a picture of each offender, the current study could illustrate how offenders are likely to work together and provide evidence of different skills. The skill sets observed were examined based on the offender's personal characteristics, such as their likely age and social background established in Chapter 7 with inferring offender characteristics from offence actions. The findings using quantitative police data have significant theoretical and practical implications in future

investigations of co-offending. These implications are discussed further in the concluding chapter.

By encapsulating findings from previous chapters, the current study provides evidence of moving beyond looking at domestic burglars as a dichotomy of solo or co-offenders. In conjunction with Lantz and Hutchson (2015), the current study argues that no offender will solely commit one or the other but that instead domestic burglars are built up by a social-psychological framework.

Chapter 12. Discussion

The present thesis demonstrates a distinction between offenders and offending styles of domestic burglary. The findings indicate levels of offender development across age and criminal experience that relate to distinct styles of offending. In addition to this, further evidence is established to support the argument that domestic burglary should be treated as a social crime, functioning more frequently and perhaps more effectively through connections with others. This gives rise to an argument that researchers should move beyond studying it as a dichotomy of either solo or co-offences, but instead as a social-psychological framework of interdependence. The prominence of co-offending occurring throughout stages of offender development is a major finding. Another, in relation to previous studies of co-offending, is that domestic burglary is not highlighted as a crime committed predominantly by youth, but is instead shown to occur in the peak of criminal development. Stages of a domestic burglar's offending behaviours are examined, with the findings relating to Developmental theories of crime (Moffitt, 1993) and models of criminal specialisation (Youngs, 2006).

With very few cases of domestic burglary being detected, this thesis has drawn on the importance of establishing an overall pattern of behaviours occurring in solved and unsolved cases from the outset. Doing so does not only validate the use of solved crimes for analysis, but further validates past crime models of domestic burglary. Too many previous crime models have resorted to generalising their findings from solved cases to unsolved with little confidence in there being a viable pattern across the two samples. The results displayed a good relationship between offence behaviours found in solved and unsolved offences. This finding alone provides a major theoretical contribution to studies of domestic burglary as evidence of similarity across offending behaviours and thus likely offender samples. The findings are positive in generating crime models from solved crimes, allowing for much more reliable information to be considered. However, it still doesn't address why such a small percentage of domestic burglaries are solved. Taking this a step further, offence behaviours were examined to identify whether there are those that are more significant to solved crimes than others. The results displayed eighteen out of forty-two offence behaviours that were more prevalent in either solved or unsolved crimes (see Chapter 5 for a list of the offence behaviours). Ten of those behaviours were also shown to be significant attributes in predicting the solvability of domestic burglary.

This study brought to light an important methodological contribution to the many studies of crime models developed from solved offences. The argument is that in validating the use of police data, future research must first examine the unsolved offences in comparison to the solved. This will lead to less generalisation within the field and allow for those unable to access unsolved material to better identify the crime patterns present in comparison to their sample.

Several specific contributions emerged as a result of examining different behavioural and social dynamics of domestic burglary within a major UK city. It is important to note that because the solved and unsolved cases were examined, models of criminality drawn from the solved offences can be comparable to other burglaries within major metropolitan cities. Similar research is needed to confirm the behavioural patterns identified in the present thesis, however the proposed future developments do not disadvantage the current findings.

One important contribution of the present research to the study of domestic burglary is the identification of common thematics within offending patterns. These themes were developed based on Canter's (1995) 'profiling equation' in deriving inferences of offender characteristics from offending actions. The distinct offending patterns found are also shown to relate to offender characteristics, including age and criminal experience. Domestic burglars are shown to sit within one of three themes of offending: Forceful, Skilled or Interpersonal. Upon studying both domestic and commercial burglaries and inferring patterns of offender characteristics from offending behaviours, the Non-Domestic theme was present as an entity, away from the burglaries against dwellings. Although previous studies have attempted to predict offender characteristics in a comparable way, these have grouped offences rather than account for their natural co-occurrence. However, cross-cultural comparisons are evident between the current findings and Fox and Farrington's (2012) study of developing burglary profiles. The offence behaviours and offender characteristics, in particular the offender's criminal experience, are shown to be comparable. For example, the Forceful burglar relates to their 'disorganised' burglar, the Interpersonal to theirs and the Skilled to their 'organised burglar. A surprising resemblance is present between small town American burglars to those of a dense metropolitan city in the United Kingdom. This comparison highlights that it is likely that the classifications derived within this study can be applied to burglaries occurring in different countries, as well as less densely populated areas.

A further contribution in deriving inferences of offender characteristics is the development of a decision tool for predicting developmental stages of offending experience from their actions. The inferences derived in Chapter 7 were then followed up in Chapter 8 to provide evidence towards a model of burglary offending styles across criminal development. Drawing on Moffitt's (1993) Developmental theory of crime, offender characteristics are assumed to be categorised efficiently by offender age, rate of offending and total convictions. Using Partial Order Scalogram Analysis, the findings demonstrated that the main distinction in burglary development is whether they are domestic or non-domestic. These differing burglaries included exaggerated effects of Interpersonal and Forceful behaviours, however, these behaviours were shown not to occur as their own entity. Coinciding with Mawby (2001), the findings show that domestic burglary is rarely opportunistic or unplanned, with much of the same displaying evidence of some sort of premeditation in their actions.

An important theoretical contribution made to studies of domestic burglary and group crime within this thesis comes from demonstrating co-offending as a distinctive marker of development. Previous studies have regularly demonstrated that co-offending is predominantly a youth crime, whereby individuals are usually more easily influenced by their peers (Breckenridge and Abbott, 1917; Reiss and Farrington, 1991; McPherson et al., 2001; Stolzenburg and D'Alessio, 2008; Andreson and Felson, 2012; Schaefer, 2012), whilst also committing more opportunistic crimes out of convenience (Quellet et al., 2013; Tillyer and Tillyer, 2014). However, the present thesis addresses co-offending across youth and adulthood, an area known to be lacking in empirical research (Carrington, 2002; McGloin and Nguyen, 2012; Lantz and Hutchson, 2015). As discussed, previous studies had questioned whether the youth co-offending phenomenon is one that has been exaggerated over the years (Andreson and Felson, 2012). The present research identifies that co-offending is spread across different ages, and although more commonly shown to be committed by younger offenders, is argued to be instrumental in later years.

Rather than stating that youths predominantly commit co-offending domestic burglaries, the following results expose them as occurring during various stages of criminal development. The themes identified in Chapter 7 display co-offending and network-associated offenders as occurring mostly among those displaying different offending styles. Co-offending is shown to be committed more frequently by those demonstrating a Forceful offending style, identified here as younger individuals with less experience. On the contrary, network associated offenders are shown to be committed by more experienced individuals

demonstrating a Skilled Domestic offending style. The stages of development discussed throughout Chapters 7 and 8 indicate that offenders will begin at an early age committing domestic burglaries in the style of a Forceful offender. These offenders are then likely to develop through experience and being to offend in a Skilled Domestic style. The findings show that co-offending occurs within the sample of inexperienced younger offenders, also showing however that it does occur with adult, experienced offenders. This research identifies that as groups of offenders work together, they will move beyond the group, connecting with other individuals and thus forming a co-offending criminal network of individuals.

Social Network Analysis and Guttman Scaling used in the present thesis have demonstrated a strong methodological approach for deriving a measurable scale of structural development in co-offending criminal networks. Early research addressed the existence of connections between "working" burglars within an area (Goffman, 1963; Shover, 1973). More recently, studies have worked towards identifying specific network features and how they can be used in demonstrating network structure and efficiency (McAndrew, 2000; Canter, 2004). However, what the findings have displayed is that network features not only demonstrate structure and efficiency, based on the task of the group, but can be positioned along a developmental scale. The cumulative development of domestic burglary networks enables co-offending criminal networks to be looked at as a hierarchy of differing structures. This substantial finding allows researchers, and investigators alike, to understand the levels of complexity a network may be functioning at. This thesis, as well as other studies of domestic burglary, have identified the importance placed on ties between domestic burglars. The criminal network analysis provided here is therefore crucial to investigations of domestic burglary within major cities.

An important contribution of the present findings to the debate of criminal specialisation versus versatility, is the identification of criminal differentiation between co-offending domestic burglary network offenders. The present thesis was the first in applying Youngs' (2006) Model of Criminal Specialisation to a sample of this kind, providing evidence to support specialisation among the co-offending sample. This also allows for the further validation of using such a model on different samples to that used by Youngs. The findings demonstrated that the sample of offenders within co-offending domestic burglary networks could be differentiated based on offences relating to Material, Power or Vehicle gain. These themes of specialisation could be differentiated according to Youngs' Model of

Criminal Specialisation in relating to Bandura's (1986) Material, Power and Sensory incentives. As previously stated by Youngs (2006), these distinct differentiations identified within the sample allow for the concept of criminal motive to be understood. In the present findings, the motives of everyone within a group can be associated with the role they may provide from their previous offending skill sets.

The identification of differences in specialisation within co-offending groups, is a further development important in establishing a social-psychological framework of domestic burglary. The findings identified small-scale domestic burglary organisations with role differentiation, providing evidence of distinct skills within the groups. Meaning that the behaviours and roles of individuals within a group are shown to be influenced by their previous offending experience. Unfortunately, it is unlikely that the exact roles played within a group can be established without interviewing each offender. However, the findings are a step forward in empirically examining the social connections between individuals of a co-offending group. The major implications of drawing these psychological interpretations from quantitative co-offending data are discussed below.

In conclusion, upon investigating different dimensions of offence and offender characteristics and the underlying ties between individuals, the present thesis has contributed methodologically, theoretically and practically to our understanding of domestic burglary. This thesis has proved that by continuously investigating domestic burglary within different settings, researchers can unravel the psychological bases of this crime. In so doing, the findings suggest a model of domestic burglary for future researchers to draw on that focuses on a social-psychological framework for understanding this crime.

12.1. Implications

The argument put forward that domestic burglary should be treated as a social crime raises several important theoretical and practical implications. From a theoretical perspective, the findings have established an understanding of domestic burglary from a social-psychological view, as well as approaching offending behaviours from a social cognitive perspective. These suggest that this crime should be approached as one that is committed by different offenders of distinctive styles at differing stages of their offending development. From a practical perspective, the findings allow the police to establish an understanding in

the likely characteristics of offenders from unsolved crime. This highlights a major contribution in shedding light on what is described as the 'dark figure of crime'. There are also many implications to investigative techniques of identifying and analysing criminal networks using a police database.

Results from this study raised several important questions about the variation of organisational crimes and the implications these have. With regards to investigative purposes, this study has provided evidence for levels of structural human development within organisations of burglary networks. More importantly, the identification of criminal networks using a quantitative police dataset has major implications for investigators and researchers alike. The findings were successful in identifying networks of individuals connected only through the knowledge that they had previously offended together. This demonstrates value in understanding criminal networks within law enforcement and intelligence agencies for effectively investigating and disrupting them. The importance of using social network analysis in investigating criminal networks is increasing within law enforcement and using it efficiently will allow for a better understanding of these offenders.

The findings have also shown that it is not only crucial for investigators to examine the central figures of a network, but focus on the whole group. A 'Core Organisation' network demonstrates individuals that are connected on the main foundation of mid-level members and core groups. Targeting and removing the key central figure within these organisations may not disrupt the network, as others within the group are likely to be equally qualified for the role to keep the network going. This is also demonstrated in a 'Structured Organisation' that form a strong hierarchy and, whilst taking out the key central figure would cause temporary disruption, an experienced sub-group could be ready to take on the role. This shows that, from an investigative perspective, it is important to examine each structural component of a network in order understand the individuals and groups. The social network analysis centrality measures have been widely tested and can provide useful information about individuals within a network. When using different methods of centrality, investigators may identify key players and subsequently investigate them. This practical contribution allows police investigators to derive relevant information of large criminal networks within their databases.

The findings provide evidence to support the theoretical position of burglary as a social crime, with the sample displaying that nearly 60% of cases were committed by a co-

offending group. These findings coincided with previous studies, for example, Santilla et al. (2004) found that over half of their sample of 633 solved burglaries were co-offences. The early work of Shover (1973) identified burglary as a socially active crime, highlighting that even if the offenders are not working together, they will know of one another within an area. More recently, McGloin and Nguyen (2013) argued that co-offending is still not approached as holding unique meaning, its prominence however implies that these perceptions need to be changed. Co-offending is shown to not just offer some sort of material exchange between individuals, but also act as a dynamic environment of influence and opportunities to learn and develop. It is also shown to occur within early developmental stages of offending leading to associations between other offending groups in later life. These findings contribute to important theoretical implications in understanding how co-offending among domestic burglars can act as a gateway to further offending and an easy opportunity to enter a criminal lifestyle.

The findings within the present thesis have further theoretical relevance in relation to studies of offender profiling, in predicting the characteristics of offenders from offence actions. One of the concerns of this research is in identifying individuals that suit one style of offending. Previous studies have implied that offenders can be grouped into specific offending patterns, however that has been addressed in the present thesis as lacking in accounting for the significant amount of co-occurring behaviours across offending styles. For example, the Interpersonal offenders are shown to target insecure properties, however this does not confine them to committing burglaries in this way. If the Interpersonal burglar arrives at a property they think is insecure and turns out not to be then either their use of force to break in or fleeing the scene is instinct. It should be stressed that we are dealing with human beings and as such there is a natural tendency to change behaviours according to environmental surroundings. By establishing a scientific model of domestic burglary based on observable behavioural data, the findings have direct policy implications relevant to police investigations. This includes relevant investigative information to unsolved offences that allow for insight into an unknown offender.

Another theoretical implication relevant to this was the identification of distinct offending patterns from previous criminal experience in depicting possible specialisation within the sample. The findings provide support towards the usefulness of applying the Social Cognitive approach in relation to crime. Youngs' Model of Criminal Specialisation can be used in other crime settings to explore the notion of specialisation among offenders. The

specialisation identified in the present thesis imply the existence of "skills" that are used within co-offending groups and how these can influence their behaviours. The findings imply that the associations between individuals in co-offending groups are not arbitrary. It is suggested that the more experienced the offenders, and thus relying on individual skillsets in committing a domestic burglary, the more fruitful the offence will be. On a practical level, these findings have implications in the explanation of group dynamics involved in co-offending. The specialisation among individuals within a co-offending criminal network was also shown to occur at different developmental stages of offending. The differences found in offender actions that relate to offender characteristics and criminal specialisation have implications for police investigations in understanding offending decision making. For example, domestic burglaries that occur at night-time were shown to be committed by offenders of an interpersonal nature, targeting insecure, likely occupied residences. These offenders were also highlighted as older in age and more criminal experienced than other offending styles. Although the Interpersonal offenders were shown to occur later in adulthood among mostly solo offenders, those that appeared within the co-offending criminal networks were shown to specialise towards vehicle related offences. This demonstrates a higher stage of criminal development among the Interpersonal offenders, opening their possibilities to gain more from each offence.

12.2. Limitations

Although there is immense value in using data straight from the source, the present thesis addresses the use of police data within the social sciences, highlighting some important limitations. The co-offending sample was drawn from domestic burglary crimes made up of two or more individuals, with those who commit a crime together having identical crime numbers to their own unique reference number. These were run through UCINET to determine the presence of any networks. However, if a different criterion is used, then there can be a different outcome from the data. For example, identifying isolated individuals on the periphery of a criminal network is achieved by drawing from the network inclusion criteria to create the sample. This is because it is almost impossible to draw a cut-off in identifying the periphery of who is included in a criminal network. Although this highlights a limitation in addressing criminal networks within police databases, it also draws attention to examining dynamic networks using these methodologies. Due to the amount of unsolved and unreported

offences the reality is that there is a considerable limitation to studying any network of offenders, thus further negating efforts to uncover the 'real crime picture'.

What is also evident in many studies that use police data is that the amount of crimes that go unreported or undetected is vastly more than the convicted. As discussed previously, when working with solved offences it is likely that the researcher is not working with the data that reflects the full crime pattern. This limitation is one which should be highlighted within all studies of crimes, as it is almost impossible to collect all possible individuals that are involved. It is also impossible to collate the amount of crimes that go unreported, be that due to community issues of trust within the police force, prior involvement in crime or possible fear of retaliation. Many of these issues revolve around the study of crime, but it is how this is dealt with within the analysis that it of most importance. Much of the assumptions made from previous studies in generalising their findings have been tested within the present thesis to insure a rich contribution to the study of domestic burglary.

Further limitations of examining difference in solved and unsolved offences comes from the differences of reporting between police forces. As addressed in early chapters, the validity of crime statistics can differ based on the recording techniques of one police force to the next. There are no force wide solvability criteria and thus, the findings in the current analysis could be affected by how the crimes were originally recorded. Farrington and Dowds' (1985) early study on crime statistics within three demographically similar areas showed major variations in the way crimes were recorded, which caused considerable inflation of crime stats in one area compared to others. Farrington and Dowds stated that if crime recording techniques were uniform across forces then the figures shown would have been more on the same level rather than some cities displaying higher amounts than others.

Further to this, there are many blurred definitions in crime recording practices. For example, shed break-ins can be recorded as domestic and non-domestic burglaries. Multi-occupancy domestic burglaries also cause problems in crime recording, as each crime against a person will likely be recorded as separate incidents. For example, if a burglary is committed against a student property where six individuals reside and all six of their laptops are stolen, the one offence will be recorded as 6. This causes limitations in analysing police data of this kind in addressing the actual figures of the offences.

Although working with police databases comes with its limitations, it is still information that has come from genuine records, collected for statutory and crime

management purposes. Bennell and Canter (2002) thus state that the findings from such data "can claim some important ecological validity and consequent practical relevance." (p. 156).

12.3. Future research

A crucial component of this thesis was the development of salient features of domestic burglary offending styles and offender characteristics. Many studies have been successful in classifying styles of domestic burglary based on grouping offence actions in predicting characteristics of offenders. However, the thematic approach to studying offending styles proposed, in considering themes along which crimes can be differentiated, displays a more realistic approach to considering dynamic human nature. As discussed, the use of multidimensional scaling techniques in understanding human behaviours allows for the interpretation of themes, rather than placing an individual into one conceptual box. Future research would benefit from further exploration of the use of multidimensional scaling procedures in classifying patterns of domestic burglary.

Another area of study that would benefit from further research is the use of social network analysis on different crime types to identify how their structures compare to domestic burglary. Previous studies of criminal networks have tended to concentrate on the relationships between offenders (spouse, siblings, friendships etc.), whereas the present thesis based the examination of connections purely on the structure of those ties. The classifications of network organisations developed are determined by network features derived from SNA measures, based on only domestic burglary offences. It would be beneficial for future research to test the network features used on other criminal network types. The measures used are widely tested, making it possible for this study to be replicated on other crime types where co-offending is present. It is also possible for further studies to apply the same framework of network features to assess whether different criminal networks display the same developmental stages. The results displayed a coefficient of reproducibility of .87, meaning that the scale identified is acceptable based on 87% of the network features displaying a perfect scale. This highlights the need for reproducing the scale on different criminal networks for further validation.

The present thesis uses a cross sectional approach in studying the developmental stages of offending actions, criminal networks and criminal specialisation. However, future

research would benefit from a longitudinal methodology to assess changes in criminal development. A longitudinal study could assess the developmental specialisation of each individual within a co-offending criminal network in how ties between individuals at different stages could change the dynamics of the group criminality.

Much of the analysis was conducted based on offender-offence combinations of domestic burglary cases, rather than unique offender or offence cases. Using offender-offence combinations can inflate the offender and offence characteristics being examined. Therefore, future research should aspire to replicate the analysis conducted using unique offender characteristics, allowing for a more precise exploration of the sample.

Lastly, the overarching topic that is consistently discussed among studies of domestic burglary is its solvability. It is crucial that researchers with access to solved and unsolved domestic burglary police databases test the differences between the behaviours that occur in both. To the best of the author's knowledge, there has yet to be a study that compares solved and unsolved cases of domestic burglary as shown in the present thesis. In the review of the literature it came as a surprise that a crime type that is well known for being undetected had not first been explored in this way before analysing solved cases. Many studies that form assumptions about the offender are done so without first testing if behaviours are consistent across all cases. The current findings validate that behaviours across solved domestic burglaries are similar to those that are unsolved. Meaning that the offenders are likely to be similar and the findings from solved offences can be generalised across unsolved. Research developing models from solved offences using different crime types could also benefit from firstly assessing the validity of using such data to generalise across a sample.

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Appendices

Appendix 1 – Data consent form

IRCIP

INTERNATONAL RESEARCH CENTRE FOR

INVESTIGATIVE PSYCHOLOGY

UNIVERSITY OF HUDDERSFIELD, UK
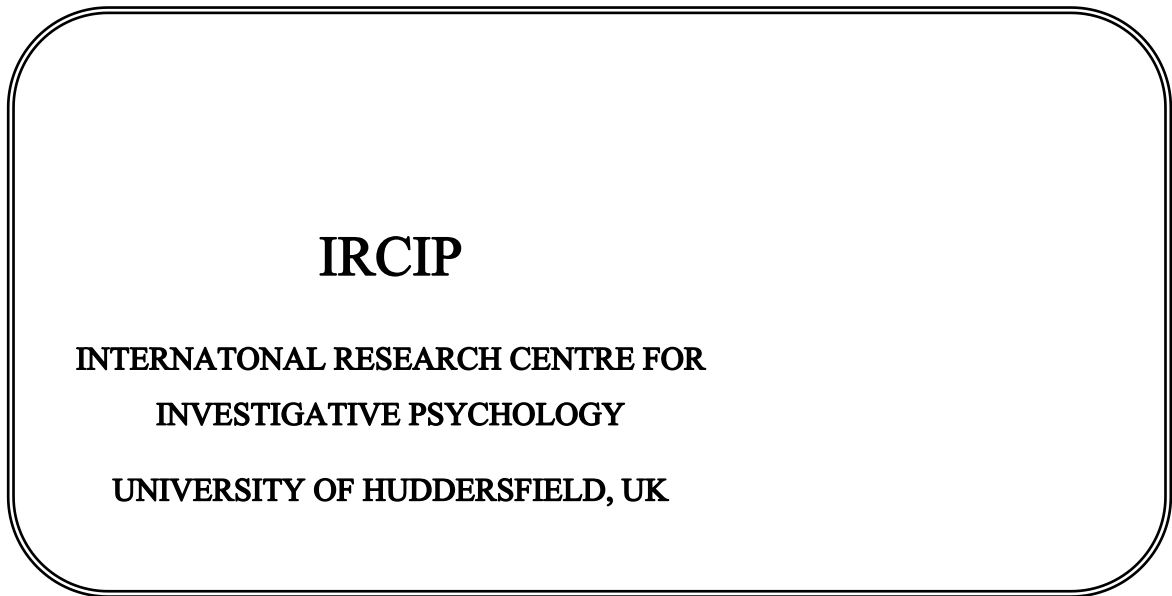
DATA AGREEMENT FOR IRCIP ARCHIVE DATA

Name:

Organisation / University:

Occupation:

Data type (please provided full details of data requested from archives, each different data type should have separate request form):

Purpose of study (please give details of why you are accessing the data and intentions for the research):

Please discuss how you will protect against anonymity whilst using this data:

Estimated time of use and return date:

Terms and conditions of use:

I agree to use the data for the intentions of the proposed research only.

Dissemination of the data, apart from use with the named researcher and direct research team, will only be done with written permission from IRCIP director or Associate director only.

Data must be returned to IRCIP, in its original condition, by the date states above, a written request for extension of use must be provide.

Any publications from the data are to be reviewed by IRCIP team, unless agreement not to do so has been granted by the director or associate director only.

Work with IRCIP directors and staff publications and cite directors as co-authors on publications and presentations.

Data can be used for unpublished student work, including PhD, MSc and undergraduate theses.

IRCIP reserve the rights to revoke the data at any time.

If you agree to the terms and conditions, please sign and date below.

Sign……………………………………………………….

Date…………………………………………………………

Consent to use IRCIP archive data (to be signed by the above-named director or associate director ONLY).

Sign…………………………………………………………

Date…………………………………………………………..

Appendix 2 - Binary Logistic Regression with Co-Offending Variable

Although co-offending occurs in over half of the solved offences within the database, it could not be used in the analysis from Chapter 5 as there is uncertainty around the undetected within the sample. However, a binary logistic regression was run with the co-offending offence behaviours and found it to be a significant indicator of solvability in domestic burglary. Using 10 offences behaviours from the sample (9 statically significant characteristics used in the analysis in Chapter 5 plus the co-offending variable) the logistic regression was testing the model constructed using training and validation data.

This resulted in the model containing the 10 statistically significant predictors (X^2 (10, n = 6,793) = 1926.58, $p < .001$), indicating that the model could distinguish between offence characteristics observed in solved and unsolved cases. Together, the features accounted for 58% of the variation in detection outcomes (Nagelkerke's $R^2 = .575$). The significant features observed for solving offences were whether the domestic burglary was a co-offence, the offender entered through the window, audio/visual equipment was stolen and keys/locks/safes were stolen. The results from the ROC analysis displayed the AUC as .856 with 86% confidence interval (.836, .877).
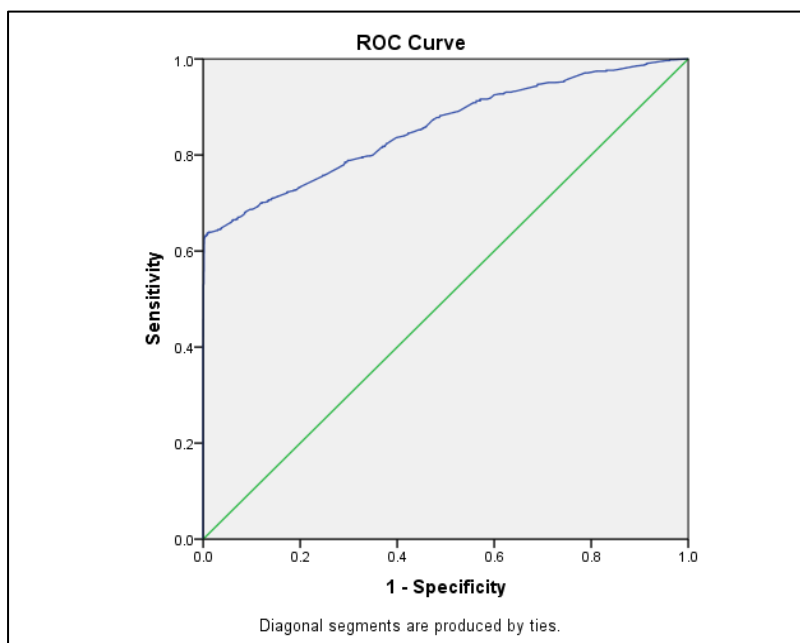
ROC graph representing the degree of accuracy in predicting whether a domestic burglary is likely to be solved or unsolved
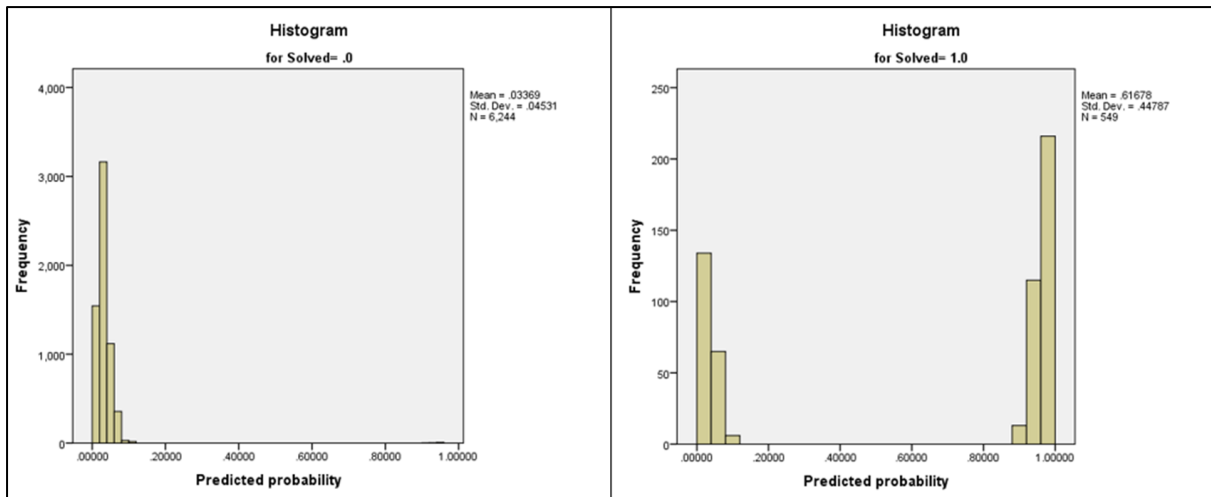
Predicted probability density distribution by solved class

The ten domestic burglary characteristics were again used to conduct a binary logistic regression using the validation data. The model was shown to be statistically significant (X^2 (10, n = 1,698) = 381.51, $p < .001$), indicating that using a different sample, the model can distinguish between solved and unsolved characteristics. The model explained 47% (Nagelkerke R^2 = .469) of the variance in solvability and correctly classified 96% of cases. The validation data-set was then put through the same analysis as the training data-set to validate the model. The results for the validation data-set displayed almost identical results as the training data with an AUC of .824 with 82% confidence interval (.781, .867).
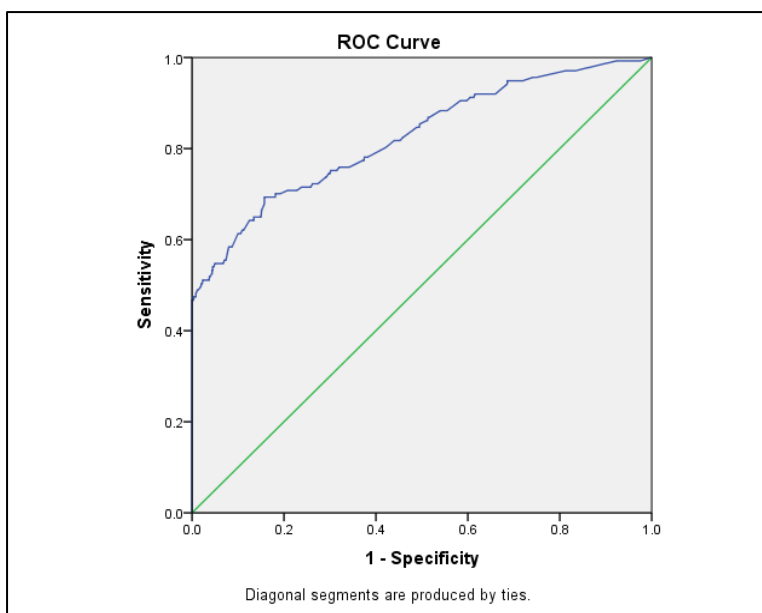
ROC graph representing the degree of accuracy from the validation data-set
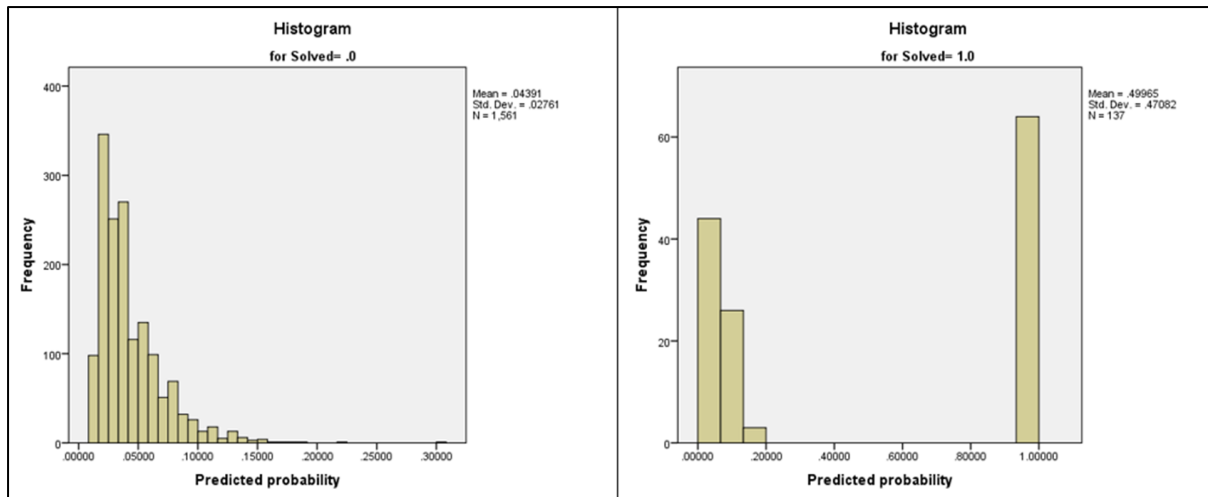
Predicted probability density histogram of validation data by solved class

The results indicate an overall good fit of the model when predicting solved domestic burglaries. The offence being committed as a co-offence was identified as a significant characteristic of solvability. It is important to note that this offence behaviour was removed from the analysis and when doing so a less significant result is displayed. This highlights the importance of co-offending in distinguishing solved from unsolved domestic burglaries. However, as co-offending is shown to occur in a very small amount of unsolved cases (N = 14) it remains and unknown offence behaviour until an arrest is made.

Appendix 3 - Burglary Content Dictionary

Criminal History	
Criminal Record	Offender displayed previous charges in criminal record
No Record	Offender displayed no record of previous criminal charges
Age of criminal onset was calculated by subtracting the offender's date of birth from the date of the earliest arrest recorded in the official records.	
Early Onset	Earliest recorded offence between ages 7.0 to 14.0 years
Adolescent Onset	Earliest recorded offence between ages 14.1 to 21.0 years
Late Onset	Earliest recorded offence between ages 21.0 to 65.0 years
No Prior Offences	No offences recorded prior to burglary
1-2 Prior Offences	1-2 offences recorded prior to burglary
3+ Prior Offences	3+ offences recorded prior to burglary
0.0 Years Offending	0 years of criminal career
0.1-5.0 Years Offending	0.1-5.0 years of criminal career
5.1-30.0 Years Offending	5.1-30.0 years of criminal career
30.1+ Years Offending	30.1+ years of criminal career
Past Burglaries	Previous burglary offences recorded
No Burglaries	No previous burglary offences recorded
Past Drug Offences	Previous drugs offence recorded
No Drug Offences	No previous drugs offence recorded
Past Thefts	Previous theft offence recorded
No Thefts	No previous theft offence recorded
Past Violent Crimes	Previous violent offence recorded
No Violent Crimes	No previous violent offence recorded
Co-Offend	Offender committed burglary alongside one or more accomplices.
Solo Offended	Offender committed burglary alone
Knew Victim	Offender knew victim e.g. partner, friend, family
Did not know victim	Offender did not know victim
Offender Traits	
Offender Male	Offender Male
Offender Female	Offender Female
Adolescent	Offender aged between 11.0 and 17.9 years
Young Adult	Offender aged between 18.0 and 24.9 years
Adult	Offender aged between 25.0 and 63.0 years
White European	Offender White European
Black	Offender Black

Asian	Offender Asian
Offender Short Height	Offender height between 3.5-5.2 ft. tall
Offender Average Height	Offender height between 5.3-6.1 ft. tall
Offender Tall Height	Offender height between 6.2-6.9 ft. tall
Offender Brown Eyes	Offender has brown eyes
Offender Green Eyes	Offender has green eyes
Offender Blue Eyes	Offender has blue eyes
Offender Brown Hair	Offender has brown hair
Offender Black Hair	Offender has black hair
Offender Blonde Hair	Offender has blonde hair
Offender Other Colour Hair	Offender has other colour hair
Offence Characteristics	
Forced Entry	Offender uses force to gain entry to property e.g. using object to smash window, bodily pressure, kicking, throwing etc.
Unlawful Entry	Offender unlawfully enters property when they are not invited by victim and enter without permission.
Brought Tools	Offender brought tools to scene of offence
No tools brought	Offender did not bring tools
Tools used left at scene	Offender left tools at scene
Tools used taken from scene	Offender took tools used at scene with them
Evidence left at scene	Evidence left at scene e.g. blood from cut, offender shoe etc.
No evidence left at scene	No evidence left at scene
Disarray at scene	Offender made untidy search of property or damage from entry causing disarray at scene.
Tidy scene	Offender made tidy search of scene
Crime Successful	Offender made off with goods successfully
Not Successful	Offender was arrested at scene or disturbed and did not make entry.
Premise Occupied	Individuals were in property when offence took place
Unoccupied	Property was unoccupied at time of offence
Daytime Burglary	Offence occurred between 6.00am and 7.00pm
Night Time Burglary	Offence occurred between 7.01pm and 5.59am
Residential Burglary (Dwelling)	Burglary in dwelling
Commercial Burglary (Non-dwelling)	Burglary in non-dwelling
High-Value Stolen	Value of items stolen over £300
Low-Value Stolen	Value of items stolen £300 or less
Nothing Stolen	No items stolen
Drugs Stolen	Drugs stolen

Appendix 4(i) - Cluster Analysis of burglary criminal history

		High Rates		Low Rates	
		N	**%**	**N**	**%**
Criminal Career	0 Years Offending	0	0	**19**	**5.8**
	1-5 Years Offending	0	0	**283**	**86.3**
	6-30 Years Offending	**634**	**92**	26	7.9
	30+ Years Offending	**55**	**8**	0	0
Past Total Offences	No Prior Offences	0	0	**28**	**8.5**
	1-2 Prior Offences	0	0	**59**	**18**
	3+ Prior Offences	**689**	**100**	241	73.5
Previous Criminal Convictions	Burglary	**671**	**97.4**	304	92.7
	Violence	**559**	**81.1**	158	48.2
	Theft	**678**	**98.4**	264	80.5
	Criminal Damage	**526**	**76.3**	131	39.9
	Drugs	**542**	**78.7**	137	41.8
	Indecent Assault	**10**	**1.5**	0	0
	Driving Offence	**421**	**61.1**	65	19.8
	Shoplifting	**388**	**56.3**	146	44.5
	Firearms	**127**	**18.4**	34	10.4
	Arson	**60**	**8.7**	17	5.2
	Murder	**24**	**3.5**	4	1.2
	Rape	**59**	**8.6**	19	5.8
	Sexual Offence	**53**	**7.7**	22	6.7
	Fraud	**96**	**13.9**	12	3.7
Age of Onset	Early Onset	**534**	**77.5**	212	64.6
	Adolescent Onset	142	20.6	**94**	**28.7**
	Late Onset	13	1.8	**22**	**6.7**
Co-Offending	Co-Offender	465	67.5	**282**	**86**
	Network Association	299	43.4	**219**	**66.8**
Know Victim	Offender Knew Victim	34	4.6	**20**	**6.1**
Total		**689**	**68**	**328**	**32**

Note: highest percentage in bold

Appendix 4(ii) - Cluster Analysis of burglar offender traits

		Adult Minority Male		Younger White Male		Adult White Male	
		N	**%**	**N**	**%**	**N**	**%**
Race	White	49	20	245	78.8	**454**	**98.5**
	Black	**163**	**66.5**	5	1.6	2	0.4
	Asian	**30**	**12.2**	1	0.3	0	0
Sex	Offender Male	226	92.2	281	90.4	**441**	**95.7**
Age	Offender Adolescent	23	9.4	**96**	**30.9**	35	7.6
	Offender Young Adult	118	48.2	125	30.2	**244**	**52.9**
	Offender Adult	**104**	**42.4**	90	28.9	182	39.5
Hair Colour	Brown Hair	28	11.4	0	0	**461**	**100**
	Black Hair	**203**	**82.9**	25	8	0	0
	Blonde Hair	0	0	**88**	**28.3**	0	0
	Other Hair Colour	14	5.7	**198**	**63.7**	0	0
Eye Colour	Brown Eyes	**242**	**98.8**	37	11.9	177	38.4
	Green Eyes	0	0	3	1	**9**	**2**
	Blue Eyes	1	0.4	137	44.1	**210**	**45.6**
Height	Offender Short	32	13.1	71	22.8	**108**	**23.4**
	Offender Average	**188**	**76.7**	188	60.5	333	72.2
	Offender Tall	**19**	**7.8**	1	0.3	16	3.5
Occupation	Offender Unemployed	143	58.4	110	35.4	**281**	**61**
	Offender Student	6	2.4	**23**	**7.4**	0	0
	Offender School Child	0	0	**19**	**6.1**	5	1.1
	Offender Occupation Unknown	**10**	**4.1**	10	3.2	10	2.2
Deprivation % of Home Location	5% Dep Area	**70**	**28.6**	63	20.3	124	26.9
	10% Dep Area	17	6.9	38	12.2	**71**	**15.4**
	20% Dep Area	**44**	**18**	49	15.8	53	11.5
	30% Dep Area	8	3.3	**24**	**7.7**	14	3
Total		**245**	**24**	**311**	**31**	**461**	**45**

Note: highest percentage in bold

Appendix 4(iii) - Cluster Analysis of offence characteristics

		Non-Domestic		Forceful		Interpersonal		Skilled Domestic	
		N	%	N	%	N	%	N	%
Premise Type	Commercial Burglary	**249**	**100**	27	25.7	20	6.2	2	0.6
	Residential Burglary	0	0	76	72.4	298	92.5	**336**	**98.5**
Time of Offence	Daytime	97	39	43	41	0	0	**341**	**100**
	Night time	152	61	62	59	**322**	**100**	0	0
Entry	Entry Front	20	8	**104**	**99**	73	22.7	38	11.1
	Entry Window	30	12	12	11.4	**202**	**62.7**	206	60.4
	Entry Rear	55	22.1	1	1	163	50.6	**232**	**68**
	Entry Door	126	50.6	**101**	**96.2**	89	27.6	96	28.2
	Entry Side	**21**	**8.4**	0	0	22	6.8	27	7.9
Exit	Exit Front	1	0.4	**104**	**99**	51	15.8	30	8.8
	Exit Window	4	1.6	5	4.8	**87**	**27**	91	26.7
	Exit Rear	31	12.4	1	1	140	43.5	**186**	**54.5**
	Exit Door	63	25.3	**102**	**97.1**	105	32.6	130	38.1
	Exit Side	14	5.6	0	0	12	3.7	**20**	**5.9**
	Exit Same as Entry	55	22.1	**90**	**85.7**	130	40.4	145	42.5
M.O.	Smash	27	10.8	20	19	72	22.4	**136**	**39.9**
	Insecure	51	20.5	23	21.9	**144**	**44.7**	80	23.5
	Unlock	8	3.2	**21**	**20**	57	17.7	44	12.9
	Force Lock	**31**	**12.4**	4	3.8	11	3.4	9	2.6
	Climb	24	9.6	0	0	31	9.6	**41**	**12**
	Force	76	30.5	**34**	**32.4**	65	20.2	73	21.4
Weapon	Weapon Foot	10	4	**19**	**18.1**	10	3.1	9	2.6
	Weapon Key	3	1.2	20	19	**91**	**28.3**	38	11.1
	Weapon Unknown Instrument	61	24.5	23	21.9	73	22.7	**89**	**26.1**
Alarm	Alarm Fitted	26	10.4	**21**	**20**	37	11.5	54	15.8
Items Stolen	Credit Card	2	0.8	5	4.8	**37**	**11.5**	23	6.7
	High Value Stolen	34	13.7	22	21	54	16.8	**95**	**27.9**
	Low Value Stolen	**215**	**86.3**	83	79	268	83.2	246	72.1
Total		**249**	**25**	**105**	**10**	**322**	**32**	**341**	**33**

Note: highest percentage in bold

Appendix 4(iv) - Chi-square of offender trait type versus offence characteristic type

Offence Characteristic Type	Offender Trait Type			Total
	Adult Minority Male	Younger White Male	Adult White Male	
Non-Domestic Burglar	40 [b]	**99** [a]	110	249
	16%	**40%**	44%	100%
	16%	**32%**	24%	24%
Forceful Burglar	24	37	44	105
	23%	35%	42%	100%
	10%	12%	10%	10%
Interpersonal Burglar	**100** [a]	81 [b]	141	322
	31%	25%	44%	100%
	41%	26%	31%	32%
Skilled Domestic Burglar	81	94	166	341
	24%	28%	49%	100%
	33%	30%	36%	34%
Total	245	311	461	1017
	24%	31%	45%	100%
	100%	100%	100%	100%

Note. $X^2 = 27.21$, $p < .001$, $df = 6$. Column and row percentages are shown with observed cell counts. a Indicates a positive Adjusted Standardised Residual (ASR) value at the $p < .05$ level. b Indicated a negative significant ASR value at the $p < .05$ level.

Appendix 4(v) - Chi-square of offender trait type versus criminal history type

Offender Trait Type	Criminal History Type		Total
	High Rates	**Low Rates**	**Total**
Adult Minority Male	171	74	245
	70%	30%	100%
	25%	223%	24%
Younger White Male	165 [b]	**146** [a]	311
	53%	**47%**	100%
	24%	**45%**	31%
Adult White Male	**353** [a]	108 [b]	461
	77%	23%	100%
	51%	33%	45%
Total	689	328	1017
	68%	32%	100%
	100%	100%	100%

Note. $X^2 = 47.63$, $p < .001$, $df = 2$. Column and row percentages are shown with observed cell counts. [a] Indicates a positive Adjusted Standardised Residual (ASR) value at the $p < .05$ level. [b] Indicated a negative significant ASR value at the $p < .05$ level.

Appendix 4(vi) - Chi-square of Offence characteristic type versus criminal history type

| Offence Characteristic Type | Criminal History Type | | Total |
	High Rates	Low Rates	
Non-Domestic Burglar	158	91	249
	63%	37%	100%
	23%	28%	24%
Forceful Burglar	72	33	105
	69%	31%	100%
	10%	10%	10%
Interpersonal Burglar	223	99	322
	69%	31%	100%
	32%	30%	32%
Skilled Domestic Burglar	236	105	341
	69%	31%	100%
	34%	32%	34%
Total	689	328	1017
	68%	32%	100%
	100%	100%	100%