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GERARD, F.J., WHITFIELD, K.C. <http://orcid.org/0000-0001-9208-9484>, PORTER, L.E. and BROWNE, K.D.

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F.J. Gerard [a] and K.C. Whitfield [b] and L.E. Porter [c] and K.D. Browne [d]

[a] Centre for Research in Psychology, Behaviour and Achievement, Coventry University, Coventry, United Kingdom; [b] Division of Psychology, Birmingham City University, Birmingham, United Kingdom; [c] Centre of Excellence in Policing and Security, Griffith University, Brisbane, Australia ; [d] Division of Psychiatry and Applied Psychology, University of Nottingham, Nottingham, United Kingdom

Authors

Corresponding author: [a]Jeane, F. Gerard. MSc; Postgraduate research student, Senior Research Assistant.

Address for written correspondence: Jeane Gerard, Centre for Psychology and Behavioural Sciences. Coventry University. Priory Street. Coventry. CV1 5FB. Telephone: +44 02477659368. Email: jeane.gerard@coventry.ac.uk or jeane_gerard@yahoo.co.uk

Kate C. Whitfield, Division of Psychology, Birmingham City University, 2.21 Dawson Building, Birmingham, B42 2SU, United Kingdom. Email: Kate.Whitfield@bcu.ac.uk

Louise E. Porter, Centre of Excellence in Policing and Security, Griffith University, 176 Messines Ridge Road, Mt Gravatt QLD 4122, Australia. Email: l.porter@griffith.edu.au

Kevin D. Browne, Division of Psychiatry and Applied Psychology, University of Nottingham, Floor B Yang Fujia Building, Jubilee Campus, Nottingham, NG8 1BB, United Kingdom. Email: kevin.browne@nottingham.ac.uk

Abstract

School shootings are a concern due to their impact in the local community. This paper aimed to (a) establish frequent characteristics of the offender and offence, (b) explore the differences between offenders who are over the age of 18 years and those who are younger, and (c) consider the underlying themes of the offence characteristics. Data were collected on 28 cases through accessing resources such as West Law and case studies. The majority of the offenders were Caucasian and US citizens and suffered from depression. Their offences were primarily well planned, involved more than three deaths, and resulted in the offender committing suicide. Pearson's chi-square test and Fisher's exact test identified significant differences between the two age groups. Offenders who were 18 years of age or under were more likely to experience depression, be US citizens and be linked to the school. Additionally, offenders who were 18 years of age or under were more likely to have stolen their weapons and made threats prior to the incident. Smallest space analysis revealed four thematic regions in relation to the offence characteristics: making an impact, delivering a message, doing unrestrained activity, and targeting specific individuals. These findings have implications for risk assessment and furthering understanding.

Key words: school shooting; juvenile; offence characteristics; multidimensional scaling; school violence.

Offender and Offence Characteristics of School Shooting Incidents

Shootings that take place in school settings have recently generated a great deal of media and public interest. However, this phenomenon is not limited to the US. In 1996, 16 children and one adult were shot at a primary school in Scotland, which resulted in the recommendation of banning individual ownership of Section 1 firearms in the United Kingdom (UK; Cullen, 1996). Additionally, in 2009, nine children and three teachers were shot at a school in Germany.

Whilst school shooting incidents are relatively rare events in comparison with other crimes, they are a significant cause for concern due to their impact, not only on the victims but also on the local population, as well as the fear they create in schools. Although a number of studies have examined the phenomenon of school shootings, these mainly comprise of case studies (e.g., Leary, Kowalski, Smith & Phillips, 2003) or focus on understanding the motivations of the offender (e.g., Fritzon & Brun, 2005). Very few empirical studies exist that focus on the offender's characteristics or the characteristics of the actual offence (e.g., Fritzon & Brun, 2005). Such studies are important, as understanding the attributes of an individual who will open fire in a school setting, as well as finding common features of the offence, may assist in identifying risk factors and developing prevention strategies. The purpose of this paper is to determine frequent characteristics of both the offender and the offence. Additionally, the paper aims to examine the characteristic differences between offenders who are over the age of 18 years versus those who are 18 years of age and under. It will also consider the potential underlying themes of the offence characteristics.

1. A problem of definition

A key issue when conducting research regarding school shootings is that there is no agreed definition in the literature of what constitutes a school shooting incident (Harding, Fox &

Mehta, 2002). Definitions vary across studies, causing differing populations to be considered (Langman, 2009). Harding et al. (2002) suggest that this problem of definition is due to the research question being asked, as researchers tend to employ definitions that fit their particular study. Another potential reason is that there are different types of school shooting incidents (see Muschert, 2007, for a summary), but no universal umbrella definition that encompasses them all. Additionally, there is a proliferation of terms used to refer to school shooting incidents, such as 'massacre', 'rampage', and 'mass murder'.

At the most basic level, it could be argued that a school shooting incident consists of at least one person intentionally using a firearm and shooting at least one other person on school grounds. However, as can be observed in the existing literature (e.g., Buerger & Buerger, 2010; Harding et al., 2002), anything beyond this basic definition adds further complexity to it. For instance, the offender may be a current student at the school or an adult who is either linked to the school in some way or who has no connection to the school. In terms of the victims, they may only be students at the school or they may also consist of teaching and administrative staff. In some instances, the victims are randomly targeted, whilst in others, the offender may seek out and focus on specific individuals (Buerger & Buerger, 2010; Muschert, 2007; Preti, 2008). A further matter to consider is the context of the shooting. For example, it has been suggested that shootings resulting from gang-related violence or fighting over a drug deal do not constitute a school shooting, even if they take place in a school setting (Langman, 2009; Larkin, 2009).

For the purposes of this study, a school shooting incident is defined as an attack by someone (regardless of whether or not it was lethal) against two or more victims with at least one firearm on school grounds. This broad definition will be adopted in order to include as many cases as possible in the sample; because of the rare nature of school shooting incidents, few cases are available.

2. Offender characteristics of school shooting incidents

Research has shown that the offenders in school shooting incidents tend to be white males (Harding et al., 2002; Muschert, 2007; Vossekuil, Fein, Reddy, Borum & Modzeleski, 2002). Their family background varies, with some offenders living in effectively functioning, intact families and others living in dysfunctional families with a history of abuse (Langman, 2009; Vossekuil et al., 2002). A study was carried out by Vossekuil et al. (2002) in the US on 41 offenders who were responsible for 37 incidents and who targeted someone at their school with lethal weapons, such as guns or knives. The student offenders deliberately chose their school to commit the school shooting. Vossekuil et al. (2002) found that 44% lived with both their biological parents, 19% lived with one biological parent, 19% lived with a biological parent and a step-parent, and 5% lived with a foster parent or legal guardian. These findings suggest that the majority of the offenders in their sample (63%) came from two-parent homes. However, studies have found that within offenders' families, there is frequently a lack of supervision (Verlinden, Hersen & Thomas, 2000), low emotional closeness and intimacy (O'Toole, 2000; Twemlow, Fonagy, Sacco, O'Toole & Vernberg, 2002), and parents having little knowledge of their children's activities (Twemlow et al., 2002). With parents knowing little about their children's interests, peers, and school performance, limits and boundaries are either missing or set by the children themselves (Twemlow et al., 2002).

Despite being interested in violence, most offenders have no history of violent behaviour or criminality (McGee & DeBernardo, 1999; Vossekuil et al., 2002). Indeed, Vossekuil et al. (2002) found that 59% of the 41 offenders in their study were interested in violence (e.g., in movies, video games, books, or their own writing). However, only 31% had displayed violent behaviour in the past, and 27% had been arrested. In addition to offenders having a history of violence, they tend to exhibit anger management problems (O'Toole, 2000; Verlinden et al., 2000). According to O'Toole (2000), offenders tend to easily become

angry and express their anger in an inappropriate manner, sometimes towards individuals who are not even involved in the matter. O'Toole (2000) defined anger management problems as follows:

> Rather than expressing anger in appropriate ways and in appropriate circumstances, the student consistently tends to burst out in temper tantrums or melodramatic displays, or to brood in sulky, seething silence. The anger may be noticeably out of proportion to the cause, or may be redirected toward people who had nothing to do with the original incident (p. 19).

Studies have found that offenders in school shooting incidents commonly show symptoms of depression (Harding, Mehta & Newman, 2003; Leary et al., 2003; McGee & DeBernardo, 1999; Verlinden et al., 2000) and suicidal ideation (Verlinden et al., 2000; Langman, 2009). Indeed, Vossekuil et al. (2002) found that 61% of the 41 offenders who carried out school-based attacks had a history of depression, and 78% had either attempted suicide or expressed suicidal thoughts prior to the incident.

According to Wike and Fraser (2009), offenders are often subjected to teasing, bullying, or victimisation at some point prior to the incident. This is supported by research conducted by Verlinden et al. (2000), Vossekuil et al. (2002), and Leary et al. (2003). In the study by Verlinden et al. (2000), all of the offenders across the nine cases they examined in American secondary schools had been teased and marginalised by peers. Similarly, Vossekuil et al. (2002) found that 71% of the 41 offenders in their sample felt bullied and persecuted by others, whilst Leary et al. (2003) identified that in 80% of the 15 cases they examined the offenders were teased and ostracised by their peers. However, Weisbrot (2008), who looked at the case studies and previous research on the subject, points out that there is a lack of evidence regarding whether the offenders are victimised more than others who do not go on to offend.

Wike and Fraser (2009) also propose that rejection by peers may have an effect on the offender's behaviour. Three-quarters of the offenders in the study conducted by Vossekuil et al. (2002) had experienced rejection by peers (including romantic breakups). Similar findings were identified by Leary et al. (2003), who found that in 50% of the cases, the person who rejected the offender subsequently became a victim during the incident. Leary et al. (2003) carried out their study on 15 cases of school shooting incidents committed between 1995 and 2001. They gathered their data through archival sources, such as national news media. Whilst not every person who experiences rejection will seek revenge through opening fire on school grounds, Wike and Fraser (2009) suggest the rejection may act as a proximal risk factor in individuals who already possess existing dynamic risk factors.

Offenders in school shooting incidents are frequently considered loners (McGee & DeBernardo, 1999; Weisbrot, 2008). However, O'Toole (2000) states that the 'sense of separateness is more than just being a loner. It can involve feelings of isolation, sadness, loneliness, not belonging, and not fitting in' (p. 18). According to Vossekuil et al. (2002), the 41 offenders in their study varied in terms of their social relationships. Only 12% had no close friends, and 34% were perceived (either by themselves or others) as loners. Indeed, 41% of the offenders socialised with mainstream students, and 44% participated in organised social activities (e.g., team sports and school clubs).

In terms of the offenders' education, Vossekuil et al. (2002) found that where information was available ($n = 34$), academic achievements varied. The majority of offenders (41%) were receiving good grades (i.e., As and Bs) at the time of the offence, and only 5% were known to be failing.

Only one study has specifically investigated the age contrast between offenders of school shootings in US high school settings ($n = 4$) versus those in college settings ($n = 5$;

Newman & Fox, 2009). Their findings show that college offenders are older and differ in terms of higher prevalence of serious mental illness. According to Newman and Fox (2009), age is an important factor to consider, as it relates to social dynamics and the interactive context in which the offender is based. Additionally, Meloy et al. (2004) compared North American adolescent (*n* = 34) with adult (*n* = 30) mass murderers and found that a higher proportion of adults (53%) commit suicide after the attack in comparison to adolescents (9%). They also found that adults are twice more probably to have a psychiatric history than adolescents.

The lack of research regarding offender age differences needs to be addressed, as important practical dilemmas ensue. Findings from an exploration of age differences may help assess threats, evaluate risk factors, and tailor appropriate interventions.

3. Offence characteristics of school shooting incidents

Research has shown that school shooting incidents are rarely impulsive events and have usually been carefully planned by the offender (McGee & DeBernardo, 1999; Meloy, Hempel, Mohandie, Shiva & Gray, 2001; Newman, 2004; Vossekuil et al., 2002). These plans are occasionally shared with other people through direct or indirect threats, drawings, diaries, and school essays (Weisbrot, 2008). This concept of telling others is also known as leakage. O'Toole (2000) defines leakage as the offender intentionally or unintentionally leaving clues (e.g., through essays, poems, letters, or videos) that reveal thoughts or intentions concerning the shooting. According to Vossekuil et al. (2002), in 81% of the school shooting incidents studied, at least one person knew that the offender was thinking about or planning the attack, and in 93% of these cases, that person was a friend, schoolmate, or sibling.

A particular event is sometimes thought to cause the incident. These triggering events tend to occur in the immediate weeks prior to the shooting (McGee & DeBernardo, 1999). McGee and DeBernardo (1999) studied 16 cases of school shooting incidents carried out in US middle and high schools between 1993 and 2001. They focused on offenders who might have been rejected, bullied, or humiliated, with the principal motive of the attack being vengeance, carrying out a premeditated shooting with targeted victims. They found that their sample of 'classroom avengers' ($n = 18$) had experienced precipitating events, either real or imagined, involving loss, rejection, and frustration. Verlinden et al. (2000) found that 50% of their sample also experienced a precipitating event, such as loss of a relationship, drop in status, or stressful situation. Additionally, Meloy et al. (2001) established that rejection from peers or a disciplinary action preceded the incidents included in their research. Thus, school shooting incidents may be used by the offenders to send a message to those individuals who hurt or excluded them (Newman, 2004). The existing literature indicates mixed findings regarding the relationship between the victim and offender. In some instances, particular teachers or students are targeted (especially if the offender feels wronged by them), whilst in others, there appears to be no specific target (i.e., victims are selected at random). Additionally, there are also occasions where the attack seems to be against the school as a whole (Harding et al., 2002; Newman, 2004).

The lethality of a school shooting incident is informed by the type of weapon used (Crichton, 2012). According to Meloy et al. (2001), the choice of using firearms provides the offender with the potential to kill as many victims as possible in a short space of time. Vossekuil et al. (2002) found that in 68% of the cases in their sample, the offenders used a firearm that was found in either their own home or in the home of a relative. Additionally, 63% of the offenders had a history of using weapons, such as knives, firearms, and bombs.

During some school shooting incidents, the offender may commit suicide. This tends to occur more frequently if the offender is an adult, rather than an adolescent (Meloy et al., 2001). The reason why fewer adolescents commit suicide is possibly due to them undertaking the school shooting because they feel that they have been wronged. The hostility arising from this perception is aimed outwards, thus selecting to kill others rather than themselves (Palermo & Ross, 1999). However, according to Moore, Petrie, Braga and McLaughlin (2003), offenders may commit suicide after similar incidents have received a great deal of attention in the media, thus encouraging copycat behaviour in an attempt to become infamous.

4. Differentiating offence characteristics into themes

Recently, there has been an effort to move away from motivation-based typologies in order to produce empirical classification systems for specific use in police investigations. Rather than classifying offenders on the basis of what may motivate them, models are developed based on the systematic analysis of the offence behaviours themselves. These models aim to complement the findings from the motivation-based studies (Canter, Bennell, Alison & Reddy, 2003), and are often referred to as the 'Statistical Approach' (Alison, Goodwill, Almond, van den Heuvel & Winter, 2010). This approach is based on 'the multivariate analysis of behavioural and other information found at the crime scene to infer an offender's characteristics and psychological processes' (Alison et al., 2010, p. 118). The Statistical Approach has been used to analyse a range of crimes to determine whether themes exist in criminal behaviour and how these themes relate to offender characteristics. It has been used to understand offences such as rape (Canter & Heritage, 1990), arson (Canter & Fritzon, 1998), robbery (Woodhams & Toye, 2007), and homicide (Salfati & Canter, 1999; Salfati, 2000; Salfati & Haratsis, 2001; Salfati & Dupont, 2006).

With regard to school shootings, Fritzon and Brun (2005) studied 93 school-associated violent deaths that occurred in North America between 1992 and 1999. They considered action systems theory (Shye, 1985) in relation to this school violence and, using multidimensional scaling analyses, found four themes that were in line with Shye's (1985) model, namely, adaptive, conservative, expressive, and integrative. These four themes appear to mirror the themes identified in the study of McAdams' (1988, cited in Fritzon & Brun, 2005) theory of power (i.e., strength, impact, action, and status).

The adaptive and conservative themes both refer to the offender responding to an external event, but the adaptive theme is about attempting to change the external situation, whilst the conservative theme is about trying to make internal psychological changes. The expressive theme refers to the offender outwardly expressing internal characteristics (e.g., power), and the integrative theme is about the offender trying to change an internal conflict (resulting in an emotionally charged act). These themes assist in understanding the interaction between offenders and their environment. Fritzon and Brun's (2005) classification model is validated by the majority of their cases being classified within one of the four themes identified.

When identifying themes using the Statistical Approach, the themes should reflect psychological emphases identified within the literature, thus basing the themes' roots in theoretical models that reflect the interactions the offender has with his environment. The present study uses a quantitative approach to explore the context of the crime scene and how it relates to the existing literature.

As can be observed in the research described previously, small samples and US-based studies focusing primarily on offender characteristics constitute the majority of the literature in this field. Most studies are only descriptive, using qualitative case studies to explore the

incidents. In order to advance understanding in terms of the offender and offence characteristics, this paper highlights the common characteristics of both the offender and the offence, drawing on incidents that occurred in several different countries. Specifically, it outlines the differences between offenders who are over the age of 18 years and offenders who are 18 years of age and under, as this may assist in assessing threats and risk factors, as well as tailoring appropriate interventions. Additionally, the paper presents some potential underlying themes of the offence characteristics.

5. Method

5.1. Sample

The sample consisted of 28 cases of shooting incidents that took place in school settings between 1988 and 2009. The majority of incidents (79%) happened after 1996. The incidents occurred in a number of countries, including the US (71%), Canada (7%), Finland (7%), Germany (7%), Scotland (4%), and Australia (4%). In each case, there was a minimum of two victims, who were either injured or killed. Additionally, in 14% of the cases there was more than one offender.

5.2. Data collection

Data were collected through a number of unobtrusive means, including West Law, news media, published reports, and books containing case studies. West Law is an online legal research service that encompasses UK case law, UK legislation, full text journals, and US legal materials. News media that were drawn upon consisted of news websites (i.e., BBC News, CBC News, ABC News, CNN News, TF1 News, RTBF1/RTL News, and RTE News), online newspapers (i.e., The Times, The Telegraph, The Daily Mail, The Independent, The Guardian, The Daily Express, The Observer, The Herald, The New York

Times, USA Today, The Washington Post, The Irish Times, The Scotsman, Scotland on Sunday, Le Monde, Le Figaro, and Liberation), and news magazines (i.e., Time and Newsweek). The published reports used during data collection were The Cullen Report (Cullen, 1996) and the report of the Virginia Tech Review Panel (2007). Finally, recently published books that contained case studies were also considered during data collection. These included the studies of Harding et al. (2002), Newman (2004), and Langman (2009).

When data are collected through unobtrusive means, no direct contact is made with the subjects of the research (Lee, 2000). There are two key disadvantages of collecting data in this manner. First, the sources of data used are not written for the purposes of research. Second, there is no scientific control (Alison, Snook & Stein, 2001). Despite these disadvantages, because multiple sources of data were used for each case, it was possible to verify facts and ensure there were no contradictions. Additionally, each case was thoroughly researched and scrutinised (as far as was possible using the resources listed earlier), in order to safeguard against missing particular details.

In order to search for cases to be included in the sample, specific search terms were employed when sifting through the material made available by the aforementioned resources. The search terms used were the following: 'school and shooting', 'rampage', 'homicide', 'murder', or 'massacre'. Boolean operators and double quotation marks were used where applicable to determine whether there were more possible hits. When cases were identified, the name of the offender was then also used to search for further data. Through this process, approximately 50 cases were collected. However, cases were then excluded from the study if (a) there was insufficient information available to verify details, (b) victims had been sexually assaulted, and (c) the type of weapon used was not a firearm.

Based on a review of the existing literature (e.g., Salfati, 2000; Salfati & Haratsis, 2001; Salfati & Dupont, 2006), common homicide offender and offence characteristics were recorded from the data. Additionally, upon reading through the 28 cases, further characteristics were identified. All of the noted offender and offence characteristics were then incorporated into a coding dictionary, where they were clearly defined. Where certain characteristics existed that were very similar, these were merged into one variable. Data were then coded dichotomously, such that when particular characteristics were present in a case, they were ascribed a code of 1, whilst when they were not present, they were ascribed a code of 0.The inter-rater reliability of the coding dictionary was established: Cohen's κ = .61. As a Cohen's κ score between .60 and .75 is considered good (Fleiss, 1981), the reliability of the coding dictionary was considered acceptable.

5.3. Data analysis

Once the data had been coded, Pearson's chi-square test (Pearson, 1900) was used to determine whether there were any significant differences between offenders aged 18 years or under and offenders who were over the age of 18 years in terms of their personal characteristics and offence characteristics (as identified by the coding dictionary). Where the expected frequency in a cell was less than five, Fisher's exact test (Fisher, 1922) was employed. For both Pearson's chi-square test and Fisher's exact test, a p-value smaller than .05 was considered statistically significant. However, because of the multiple tests that were conducted, an adjusted alpha level was adopted (Bonferroni correction: $p = .0035$).

In addition, Smallest space analysis (SSA; Guttman, 1954) was used to analyse the 14 offence characteristics, as it is a form of structural hypothesis modelling that can assist in developing a model of the characteristics present during incidents of shootings in school settings. SSA is a non-metric multidimensional scaling procedure that transforms a

correlation matrix into a visual representation of points in a geometric space. Each point represents an offence characteristic, and the rank order of the distance between each point inversely represents the ranks of the correlations between variables. This means that the higher the correlation between the offence characteristics is, the smaller the distance between them in the related space. SSA provides a spatial representation of the variables in a form that is easy to interpret and examine the patterns in the data. In this study, the variables were inter-correlated using Jaccard's coefficient, as this calculates the correlations between dichotomous variables and decreases the impact of missing data. Guttman-Lingoes' coefficient of alienation represents the degree of fit between the representation in the SSA plot and the actual correlations. A smaller (closest to zero) coefficient of alienation and fewer iterations generally indicate a better fit (Shye, Elizur & Hoffman, 1994).

After conducting SSA, cases were allocated to a particular thematic region following the procedure used by Häkkänen, Lindlof and Santilla (2004) and Salfati and Canter (1999), where a case is assigned to a dominant single thematic region by using a method of proportionality. The variables present for each thematic region were added together in each case to get a score. These scores were converted to percentages, as the four regions contained different numbers of variables. A case was then classified as belonging to a dominant thematic region if the percentage of variables in that region was greater than the sum of the other regions. Cases were considered a hybrid of two thematic regions if they contained approximately the same proportion of variables for each of the regions. Cases were classified as having 'no theme' or hybrid if they contained less than a third of the variables in any region or if they had a roughly equal number of variables from more than two thematic regions.

6. Results

6.1. Offender characteristics

Twenty-seven of the offenders were male and one was female. Of the 28 offenders, 25 were Caucasian, two were Asian, and one was American Indian. Additionally, 79% of the offenders were from the US and Canada, whilst the remaining 21% were from other countries (i.e., Australia, Finland, Germany and Scotland). In 36% of the cases, the offenders came from families where the parents had separated, whilst in no cases were the offenders from large families (i.e., more than three children). The offenders' age ranged from 11 to 43 years, with a mean age of 21 years (SD = 7.76). Half of the offenders (n = 14) were over the age of 18 years, with a mean age of 27 (SD = 7.09). Those offenders who were 18 years of age or under had a mean age of 15 (SD = 1.98). Table 1 shows the percentage of offenders' characteristics, as identified by the coding dictionary. It also indicates the percentage of offenders who have these characteristics and are 18 years of age or under, as well as the percentage of those who have these characteristics and are over the age of 18 years.

Table 1. Offenders' characteristics in terms of total sample and age group

[Insert Table 1 about here.]

The results of the Pearson's chi-square test and Fisher's exact test identify the significant differences (where $p < .05$) between the offenders who were 18 years of age or under and those who were over the age of 18 years in terms of three of the characteristics listed in Table 1. Fisher's exact test results show a significant difference between the two age groups in terms of depression (p = .033), with 93% of the offenders aged 18 years and under experiencing depression and suicidal thoughts as opposed to 50% of those offenders who were over the age of 18 years. Pearson's chi-square test results indicate a significant difference between the two age groups with regard to US citizenship (χ^2 (1) = 5.6, p = .018), as 86% of the offenders who were aged 18 years and under were from the US. According to the Fisher's exact test results, there was a significant difference between the two age groups

in terms of being linked to the school (p = .016), with all of the offenders aged 18 years or under being linked to the school, as opposed to 57% of those who were over the age of 18 years. However, none of these characteristics remained significant when applying the Bonferroni correction.

In relation to all of the offenders (n = 28), and with no significant differences between the age groups, Table 1 shows that 61% of all the offenders had a history of violence. This includes hostile and aggressive behaviour, problems with anger management, threatening others, and participating in fights. In 7% of the cases, the offenders had tortured animals (all of these offenders were under the age of 18 years). Table 1 also shows that 57% of all the offenders had a psychiatric history. This refers to them presenting with specific symptoms, having a diagnosis of a mental illness, or undergoing some form of mental health treatment prior to the shooting.

Of all 28 offenders, 54% had been victimized through bullying, abuse (i.e., mental, physical or sexual), or neglect. Additionally, half of the offenders (n = 14) had experienced some form of rejection. Of these 14 offenders, 28% had been rejected by an organisation (e.g., school, navy, army, place of work), while 25% had been rejected by a person (e.g., a romantic breakup or a *perceived* rejection by someone).

6.2. Offence characteristics

Table 2 shows the percentage of offence characteristics (as identified by the coding dictionary).

Table 2. Offence characteristics in terms of total sample and age group

[Insert Table 2 about here.]

A firearm was used in all of the cases. Additionally, some offenders (14%) also used a bomb and/or fire, whilst 11% of the offenders also used a knife. In 29% of the cases, the weapons were stolen. Fisher's exact test results show a significant difference between the two age groups with regard to weapons being stolen ($p = .002$), with 57% of the offenders aged 18 years and under stealing weapons as opposed to 0% of those offenders who were over the age of 18 years.

In 43% of the cases, verbal threats were made prior to the incident. Pearson's chi-square test results indicate a significant difference between the two age groups with regard to making threats ($\chi^2 (1) = 5.25$, $p = .022$), as 64% of the offenders who were aged 18 years and under made threats, as opposed to 21% of those offenders who were over the age of 18 years. Additionally, in terms of the offenders who committed suicide, the difference between the two age groups was approaching significance ($\chi^2 (1) = 3.74$, $p = .053$), as 43% of the offenders aged 18 years and under committed suicide as opposed to 79% of those offenders who were over the age of 18 years. When applying the Bonferroni correction, only the difference between the two age groups with regard to stealing weapons remained significant.

The SSA plot (Figure 1) shows the correlations between the offence characteristics listed in Table 2. The SSA plot is the vector 1 by vector 2 (front face) projection of the three-dimensional representation. The study used the three-dimensional representation because it had the lowest Guttman-Lingoes' coefficient of alienation, namely, .07 in 18 iterations. The frequency of each characteristic occurring is presented in parentheses in the plot.

Figure 1. Smallest space analysis plot of the offence characteristics of all offenders (n = 28)

[Insert Figure 1 about here.]

The SSA plot depicts four regions of offence characteristics that occurred during the incidents used in the study. As a result of the groupings of characteristics in each region, they can be labelled from right to left as follows: Impact, Message, Unrestrained, and Targeted (each will be detailed in turn in the succeeding texts). Although the plot has been partitioned into regions, it is important not to view the regions as completely separate from one another. The regions reflect the different thematic emphases within the data. As such, the dotted lines should not be viewed as rigid borders, but rather reflecting gradual distinctions that relate to an offence that makes an impact, an offence that delivers a message, an offence that is unrestrained, and an offence that focuses on a specific target. The development of each region was informed by the Kuder–Richardson Formula 20, as it determines internal consistency.

The region entitled 'Impact' ($\alpha = .65$) encompasses three offence characteristics. These are the following: the incident was carefully planned (75%), there were more than three victims who died (61%), and it was followed by the offender committing suicide afterwards (61%). These three characteristics are the most frequently occurring offence characteristics in the study's sample. Their close grouping suggests that a key theme of school shooting incidents is that of making an impact and 'going out with a bang'.

The 'Message' region ($\alpha = .52$) includes offence characteristics such as the offender wearing combat gear (54%), threatening others (43%), and a minority leaving a video message (18%). By grouping together, these characteristics suggest a central theme of using the offence to deliver a message, both in terms of the clothing worn by the offender and the actual verbal messages delivered.

The 'Unrestrained' region ($\alpha = .44$) includes a number of offence characteristics, such as stealing the weapons to be used during the incident (29%), going on a shooting spree (25%), and using additional weapons with the firearm (e.g., a bomb/fire (14%) or knife

(11%)). The frequency of the characteristics in this region is less than that of the previous two regions. Nevertheless, the offence characteristics grouped in this region do reflect a less frequently occurring theme of unrestrained activity. It suggests a lack of control, both in terms of acquiring the weapons and using the weapons.

Finally, the 'Targeted' region ($\alpha = .82$) highlights the more personal nature of the offence, such as specifically focusing on certain victims (36%) or having an individual dispute with one or some of the victims (21%). Thus, this region draws attention to a theme of targeted action. By observing the frequencies of the offence characteristics in Figure 1 (indicated in parentheses after each characteristic), it can be noted that the offence characteristics, and indeed thematic regions, decrease in terms of how frequently they occur from right to left. As such, based on the cases used in this study, school shooting incidents are frequently about making an impact, followed by delivering a message, doing unrestrained activity, and targeting specific individuals.

The low Kuder-Richardson Formula 20 values of some of the regions can be explained because of the values' sensitivity to the number of variables within the analysis (Häkkänen et al., 2004). Additionally, Alison et al. (2001) found that when the regional interpretations are divided into four or more themes, the alpha coefficients are significantly reduced.

Table 3 indicates the number of cases that can be classified according to the model (Figure 1). It shows that, of the 28 cases, 15 (54%) belong to a dominant thematic region, whilst two (7%) are considered a hybrid of two thematic regions (Message/Impact and Impact/Targeted). The majority of offence characteristics refer to making an impact (67%), followed by targeting specific individuals (27%) and delivering a message (6%). 'Unrestrained' was not found to be a dominant theme in any of the cases. Additionally, Table

3 shows that the offenders aged 18 years and under tend to participate in offence characteristics that make an impact (50%) and target specific individuals (50%). The majority of offenders who were over the age of 18 years tend to engage in offence characteristics that make an impact (78%), followed by targeting specific individuals (11%) and delivering a message (11%).

Table 3. Allocation of cases that can be classified as dominant crime scene theme

[Insert Table 3 about here.]

7. Discussion

This paper provides an overview of frequent characteristics of school shooting incidents, as well as common characteristics of the offenders. School shooting incidents cause fear in communities due to their unpredictable and sudden nature (Palermo & Ross, 1999). As such, it is important to understand the individual attributes of the offenders, as well as the characteristics of the offence, so that risk factors can be identified and prevention strategies can be developed.

In terms of the offender characteristics, the current study found that 71% of the offenders experienced depression and suicidal thoughts. Similar results have been noted in the existing literature (Langman, 2009; McGee & DeBernardo, 1999; Verlinden et al., 2000). Indeed, Vossekuil et al. (2002) observe that the majority of the individuals in their sample made suicidal threats, gestures, or attempts prior to their offence. In addition, the current findings show that 93% of the offenders aged 18 years or under reported feeling depressed and/or having suicidal ideation. Less of the offenders who were over the age of 18 years (50%) described similar feelings. Despite this finding, more of the older offenders actually committed suicide after the offence (79%), as opposed to those who were 18 years or under

(43%). This is similar to what Meloy et al. (2004) found, who suggest that it could be due to younger offenders being restrained by the police and arrested. According to Newman (2004), the offenders may commit suicide because they feel trapped in an unbearable situation and death presents a way to end all of their problems. However, as they wish to leave with 'a bang', they try to take as many lives with them as they can. Alternatively, some offenders may view the incident and their suicide as a way of gaining fame and notoriety (Langman, 2009).

The results of the current study show that 54% of the offenders had been victimised through bullying, abuse, or neglect. This supports Wike and Fraser's (2009) suggestion that offenders are frequently subjected to bullying and victimisation before committing the offence. Additionally, it is in line with the results of studies conducted by Verlinden et al. (2000), Vossekuil et al. (2002) and Leary et al. (2003). The current study also found that half of the offenders had experienced (or had *perceived* to have experienced) some form of rejection, either by an organisation or an individual. Previous research suggests that this rejection or perceived rejection may have an effect on the offender's behaviour (Wike & Fraser, 2009).

Sixty-one per cent of the offenders in the current study had a history of violence. Whilst all of the offenders used a firearm during the offence, some also used bombs and/or fire (14%) or knives (11%). Additionally, 57% of the offenders who were aged 18 years or under stole their weapons, whilst none of the older offenders did so. This may be due to the older offenders being able to legally own their weapons. Indeed, this would tie in with the findings of Vossekuil et al. (2002), where 68% of the offenders in their sample used weapons that were in their own home.

As noted by Vossekuil et al. (2002), school shooting incidents are seldom impulsive events. This is supported by the findings of the current study, as 75% of the offenders had planned and prepared for their offence by acquiring weapons, writing notes in relation to the offence, and making threats. Other research agrees that the offender tends not to 'snap' and suddenly shoot anyone at random. Rather, it is a carefully planned, prepared and organised incident (Fein & Vossekuil, 1998, 1999; Meloy et al., 2001). The offender making threats of violence (or leakage) has been largely recognised in other studies (Hardwick & Rowton-Lee, 1996; O'Toole, 2000). However, despite individuals being aware of the threats, they tend not to react in such a way as to prevent the incident. This may be due to fear of the offender, retribution, not being taken seriously, or thinking that the authorities may not respond (Verlinden et al., 2000). Additionally, individuals might use psychological defences such as denial, minimization or rationalisation to manage their anxiety and cope with the knowledge of a potentially lethal and imminent event (Meloy et al., 2004). Furthermore, a code of silence may be present at the school, or the gun culture in the community may make such threats seem normal. This presents an avenue for future research.

The SSA plot produced as a result of the current research provides a thematic model of the offence characteristics during school shooting incidents. It shows that the majority of incidents in the sample involved making an impact and 'going out with a bang'. This theme characterised 67% of the sample that could be assigned to a dominant theme. This ties in with Langman's (2009) suggestion that some offenders may see the offence as a way of making an impression and gaining infamy. The SSA plot also suggests that the offence may often be used as a mechanism for delivering a message. Due to the media attention that school shooting incidents attract, offenders can be confident that their message will be heard. This is in line with Muschert's (2007) findings regarding rampage shootings and mass murders, such as the ones that occurred at Columbine, Erfurt (Germany), and Dunblane (Scotland), which

were aimed at the school or a group of students who were selected for their symbolic significance. Such incidents can also be about getting revenge on a community or accessing power. This theme represented 6% of the sample who could be assigned to a dominant theme. All of the offenders in these cases were over the age of 18 years.

The 'Unrestrained' theme was not found to be dominant in any of the cases. This might be due to the small number of variables that were entered in the analysis. The lack of control and unrestrained activity stands in contrast to the careful planning that many offenders put into their offence (McGee & DeBernardo, 1999; Meloy et al., 2001; Vossekuil et al., 2002).

Targeting certain individuals was a dominant theme in 27% of the cases. The victims may be selected because of their symbolic significance to the offender or because they may have had a disagreement with the offender in the past (Harding et al., 2002). The way in which the thematic regions are ordered in the SSA plot (where making an impact is on one side and targeting specific individuals is on the other) can be linked to the continuum proposed by McGee and DeBernardo (1999), where on the one end is the search for notoriety and on the other is revenge. A way to decrease the possibility of achieving fame through these incidents would be to reverse the focus of the media attention on the victims and their identities, emphasising the loss of these victims, who they were and how much they will be missed.

The finding that 54% of the cases can be allocated to a single dominant theme is in line with previous studies exploring the offence characteristics of homicide. Santilla, Canter, Elfgren and Häkkänen (2001) found that they could classify 46.4% of their homicide cases in Finland according to a single dominant theme, and a further 10.6% according to two or three

themes. Additionally, Fritzon and Brun (2005) found that 54% of the 93 offenders in their sample showed a dominant theme, whilst 31% were hybrids.

The model identified in the current study can be viewed in parallel with McAdams' (1988) theory of power, which he divided into four themes: Action, Strength, Status, and Impact. Similarities can be viewed between the theme of power through action and the physical actions found in the 'Unrestrained' region of the SSA plot (i.e., the use of diverse weapons and killing spree). The power from strength theme in McAdams' (1988) theory can be internal strength (e.g., psychological or philosophical strength) or external strength (e.g., physical strength), which also have similarities with the variables in the 'Unrestrained' region. The desire to achieve power through status in McAdams' (1988) theory, described as achieving fame and recognition, can be compared with the 'Message' region of the SSA plot, as it comprises of social factors such as dressing up and sending a video message. Differences can, however, be found in terms of how McAdams (1988) assessed the power of impact (which he saw as influencing and manipulating others) as opposed to how impact is viewed in the current study (e.g., killing more than three people and committing suicide).

The implications of the study's findings can support clinical intervention based on the recognition of risk factors in the background of youths. The four regions of offence characteristics suggest a quest by the offenders to achieve power through making an impact, getting their message across to other people, acting in an unrestrained manner, or targeting specific individuals. The clinical implications are that working with these offenders should take into account the aforementioned features and aim to redirect their thirst for power to more positive and constructive activities.

Prevention should be the first line of defence against the occurrence of school shooting incidents. Threat assessment programmes should be put in place at schools, as 43%

of the current sample had made threats and told other people at the school about their plans. According to Twemlow et al. (2002), factors such as easy access to weapons or to violent and and hate-laden media, internet websites relating to terrorist attacks, or even the school response to bullying and aggression between students, should be taken into account when assessing the risk of violence escalation. Prevention also involves encouraging high risk individuals to find positive ways of managing internal conflicts so that they do not put their violent plans into action.

The current study was limited in terms of availability and access to data. Because of the small sample size, the number of variables that could be included in the SSA was limited. If a larger sample could be attained, more variables could be included in the analysis to further clarify the meaning of the thematic groupings (Canter & Heritage, 1990). Future research could also consider interviewing those offenders who do not commit suicide or their families in order to gain further insight regarding their family background and personal situation.

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Table 1. Offenders' characteristics in terms of total sample and age group

Characteristics	% (all offenders) $n = 28$	% (18 years and under) $n = 14$	% (over 18 years) $n = 14$
Caucasian	79	86	71
Depression	71	93	50*
US citizen	64	86	43*
History of violence	61	64	57
Psychiatric history	57	64	50
Victimised	54	64	43
Rejected	50	64	36
Loner	43	29	57
Good grades	39	43	36
Parents separated	36	43	29
Drug/alcohol use	29	43	14
Not linked to school	21	0	43*
Criminal family	14	29	0

*Note: $p < .05$.

Table 2. Offence characteristics in terms of total sample and age group

Characteristics	%	%	%
	(all offenders)	(18 years and under)	(over 18 years)
	$n = 28$	$n = 14$	$n = 14$
Planned incident	75	71	79
Committed suicide	61	43	79*
More than three deaths	61	57	64
Wore combat gear	54	57	50
Made threats	43	64	21*
Targeted victims	36	36	36
Stole weapons	29	57	0*
Spree	25	29	21
Dispute with victim	21	29	14
Made video	18	7	29
Used bomb and/or fire	14	14	14
More than one offender	14	29	0
Killed family member	14	21	7
Used knife	11	14	7

*Note: $p < .05$.

Table 3. Allocation of cases that can be classified as dominant crime scene theme

Classification	18 years and under f	18 years and under %	Over 18 years f	Over 18 years %	f	%
No theme/hybrid	8	57	3	21	11	39
One dominant thematic region	6	43	9	64	15	54
Hybrid of two thematic regions	0	0	2	14	2	7
Thematic region						
Impact	3	50	7	78	10	67
Targeted	3	50	1	11	4	27
Message	0	0	1	11	1	6
Unrestrained	0	0	0	0	0	0

Figure 1. Smallest space analysis plot of the offence characteristics of all offenders (n = 28)