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Risk factors for severe inter-sibling violence (SISV): A preliminary study of a youth forensic sample

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Abstract

The perpetration of severe inter-sibling violence (SISV) remains a largely unexplored area of family violence. This paper describes an investigation of risk factors for intentional SISV perpetration. A sample of 111 young people under the care of the Scottish criminal justice or welfare systems was studied. A SISV perpetration interview schedule was developed to measure the influence of 43 potential predictor variables. The Buss and Perry Aggression Questionnaire and Levenson's Self-Report Psychopathy Scale were also employed in this exploratory analysis.

Two distinct factors of intentional SISV perpetration i.e., SISV with weapon use and SISV without weapon use were studied as criterion variables throughout a series of multiple regression analyses. The most robust risk factors, determined by the direction and magnitude of the statistically significant beta weights, for 'SISV with weapon use' were animal abuse (.69) and physically assaulting school staff (.18). The strongest risk factors revealed for 'SISV without weapon use' included physically assaulting (.19) and verbally abusing (.12) school staff as well as low sibling empathy (-.68). The application of these research findings in practice settings is discussed.

Background

Sibling aggression and violence is a regular occurrence in many families (Boer & Dunn, 1992; Dunn & Munn, 1986; Dunn & Plomin, 1990; Gelles & Cornell, 1990; Steinmetz, 1977; Straus, Murray, Gelles & Steinmetz, 1980). Studies have illustrated the widespread prevalence of inter-sibling violence (Goodwin & Roscoe, 1990; Khan & Cooke, 2004; Roscoe, Goodwin, & Kennedy, 1987; Steinmetz, 1977). Survey data has consistently revealed that sibling assaults are one of the most common forms of family violence (for example, Federal Bureau of Investigation, 1998; Statistics Canada, 1999; 2000). Others have reported that inter-sibling violence was more common than parent-to-child or spousal violence (Roscoe et al, 1987; Wiehe, 1996). It is noteworthy that Caffaro and Conn-Caffaro (1998) estimated sibling assaults were more common than parent-to-child and domestic violence combined. Some have claimed that sibling assaults could be termed as 'pandemic' due to its prevalence in society (Caffaro & Conn-Caffaro, 1998; Finklor & Dziuba-Leatherman, 1994). Nevertheless, limited attention has been given to understanding perpetrators of intentional severe inter-sibling violence (SISV). Consequently, professionals cannot easily find reliable information about its aetiology and management.

Why investigate intentional SISV perpetration?

An understanding of the psychological processes underlying deliberate SISV perpetration in antisocial youths is an important addition to the field of family, youth and general violence in terms of providing risk markers for future violence. The significance of this is demonstrated by investigations which found sibling assaults to be correlated with self-reported violence in past situations, self-predicted violence in hypothetical scenarios, the extension of violence onto other family (including non-biologically related) and non-family members (Gully, Dengerink, Pepping & Bergstrom, 1981; Mangold & Koski, 1990; Noland, Liller, McDermott, Coulter & Seraphine, 2004; Reid & Donovan, 1990).

While such findings provide statistics and correlates of sibling violence in general populations, previous research has not investigated the occurrence of severe sibling assaults in a youth offender sample, a group in which the base rate might be expected to be high. Gelles and Cornell (1990) stressed the importance of possible intra- and interpersonal factors which may play a part in the perpetration of sibling violence. Thus, in its design, the current exploratory study considered SISV perpetration as subsuming processes which involved the interaction between individual differences and situational conditions.

Methodology

Sample: One hundred and eleven young offenders (91 males and 20 females) who had been or were presently under care of the Scottish youth criminal justice or welfare system were interviewed. The unequal gender ratio can be explained by the greater number of males placed in the participating institutions during the time in which the interviews took place. The age of the participants ranged between 10 and 19 years old (mean=14.83, SD=1.45; mode=15). All participants were of white, British origin.

Design and Procedure: All participants were interviewed using a study-specific SISV interview schedule[1] which consisted of eight sections to explore: (1) demographics; (2) parental and family background; (3) childhood psychopathic-like traits[2]; (4) schooling experience; (5) aggression[3]; (6) alcohol and substance use; (7) sibling information, and (8) community violence and criminal history.

Measures: Intentional SISV perpetration was defined as "Actual and intended acts of physical violence, perpetrated by a sibling against a brother or sister (biologically-related, step, half, adopted and/or fostered) in which the role of 'perpetrator' is distinguished by 'victim'". This was further extended to include "Threats of serious violence and/or aggression with potentially lethal weapons such as sharp, heavy, or blunt objects, guns and knives". The frequency of 10 intentional SISV perpetration and

[1] SISV interview schedule can be obtained from the first author.
[2] Self-Report Psychopathy Scale (Levenson, Kiehl & Fitzpatrick, 1995).
[3] Aggression Questionnaire (Buss & Perry, 1992).

victimization acts (based on items used in Straus et al's 1980 study) were measured in terms of affective, reactive (as opposed to proactive) aggression. Accidental harm or unintended SISV acts were not recorded.

The Buss and Perry (1992) Aggression Questionnaire was used to measure four subscales of aggression, namely physical aggression, verbal aggression, anger and hostility. The questionnaire consists of 29 items which are scored along a 5–point Likert scale, with 1 representing 'very often applies to me' and 5 representing 'never or hardly ever applies to me'. Levenson's Self-Report Psychopathy Scale (1995) was employed to measure both the personality (Factor 1) and behavioral (Factor 2) features of the psychopathy construct. Factor 1 contains the primary personality features such as selfishness and lack of concern. Factor 2 contains the behavioral features of psychopathy such as impulsivity. Each of the 26 items is rated on a 4-point Likert scale ranging from "disagree strongly" to "agree strongly." This scale was selected over the more widely used Hare Psychopathy Checklist: Youth Version (PCL: YV) (Forth, Kosson & Hare, 2003) due to ease of administration and applicability to non-criminal populations, which was considered crucial to subsequent research and diverse practice settings.

A total of 43 predictor variables, which were item responses gathered from interviews with participants, were selected for analysis. Given the large number of predictor variables, they were categorized under umbrella headings to enable six multiple regression analyses (using the stepwise method) to be conducted on the data to determine the set of variables that best predicted the two criterion variables, SISV with weapon use and SISV without weapon use (see Table 1).

Results

[Insert Table 1 here]

Of the 111 participants in the current study, 89.2% (N=99) reported intentionally perpetrating one or more intentional SISV acts whilst living with their sibling(s)

(mean=10.12, SD=7.99). SISV perpetration frequencies and percentages for each intentional SISV perpetration act are shown in Table 2.

[Insert Table 2 here]

Twenty-six participants (23.4%) claimed to have never injured their sibling(s), while thirty-five participants (31.5%) reported only having caused minor injuries, such as bruising, slight scratching which required no or minor medical treatment. Forty participants (36%) stated that they had inflicted a serious injury as a result of intentional SISV perpetration. Serious injuries included burns, broken limbs, and puncture wounds which required professional medical treatment. Ten participants (9%) had been responsible for life-threatening or life-lasting injuries against their sibling(s), which required hospitalization. No significant correlation was found between intentional SISV perpetration and the number of siblings participants resided with (r_s=.14; N=111; p=.14; 2-tailed), the birth position of participants (r_s=.02; N=111; p=.81; 2-tailed), gender of participants (χ^2=2.07; DF=2; p=.22) or perceived attachment to parents (χ^2=1.23, DF=4, p=.87). However, parental violence showed a significant positive correlation (r_s=.30; N=111; p<.01) with intentional SISV perpetration frequency and 36.9% (N=41) of participants witnessed or were aware of weapons being used during spousal assaults. Furthermore, a significant positive relationship with participant's detention charges was found (r_s=1.93; N=111; p<.001; 2-tailed) indicating that those who had more frequently perpetrated intentional SISV perpetration acts had also been detained for more serious offences. Correlation analyses also revealed that physically assaulting (r_s=.81; N=111; p<.01; 2-tailed) and verbally abusing teaching staff (r_s=.78; N=111; p<.01; 2-tailed) as well as perpetrating violence against other non-family members (r_s=.29; N=111; p<.01) were significantly and positively correlated with intentional SISV perpetration.

Intentional SISV perpetration with weapon use

Collinearity statistics (skewness and kurtosis) for each of the significant predictors in all following multiple regression models were inspected. Tolerance levels and the

corresponding VIF values did not reveal significant multicollinearity problems. Assumptions of correctness were indicated by the lack of extreme outliers. Results of the initial six stepwise multiple regression analyses for intentional SISV perpetration with weapon use can be seen in Table 3.

[Insert Table 3 here]

The Adjusted R^2 values, which indicated the percentage of the variance being accounted for in each model, for the six SISV with weapon use predictor models ranged from .05 (family violence/aggression factors) to .62 (community violence factors). In summary, all the significant X variables, (apart from X_3: parental model, and X_4: family violence and aggression model), accounted for much of the variance within each model, ranging from one-quarter to two-thirds. The significance values for four of the six models indicated an overall goodness-of-fit. This implied that these four significant models were providing a sufficient amount of information about the variation being accounted for. The achievement of each significant predictor variable in accounting for SISV perpetration with weapon use (indicated by high *t* values, low *p* values, as well as the direction and magnitude of the significant standardized beta weights) were as follows: (1) animal abuse; (2) living with non-biologically related siblings; (3) physically assaulting school staff; (4) primary psychopathy, and (5) verbally abusing school staff.

Intentional SISV perpetration without weapon use

Results of the next six stepwise multiple regression analyses series using the same predictor variables are shown in Table 4.

[Insert Table 4 here]

The AR^2 values for the significant SISV without weapon use predictor models, ranged from .16 (parental model) to .79 (sibling model). In review of these analyses, all X variables, (apart from X_3 and X_4: parental factors, and X_5: family violence and aggression factor), accounted for much of the variance in the six models, ranging from over thirty percent to almost eighty percent. However, the significance values for all six models

(including parental and family violence and aggression factors) indicated an overall goodness-of-fit. This implied the six significant models were providing an adequate amount of information about the variation being accounted for.

The standardized beta coefficients indicated that the success of the significant predictor variables in terms of accounting for SISV perpetration without weapon use were as follows: (1) physically assaulting school staff; (2) primary psychopathy; (3) animal abuse; (4) witnessing parental violence; (5) arson; (6) verbally abusing school staff; (7) living with non-biologically related sibling(s); (8) parental favoritism of other sibling(s), and (9) low sibling empathy. A different order of predictor variable success was found with regard to SISV with weapon use.

Final run of multiple regression analyses

The rationale for this run of tests was to provide an optimal and focal set of risk factors for the perpetration of SISV with and SISV without weapon use. All significant predictor variables produced from the previous series of multiple regression analyses for SISV with weapon use (ten variables), and SISV without weapon use (eleven variables) were entered into two separate multiple regression analyses, again, using the stepwise method. The employment of the hierarchical method was considered, on the basis of the differing beta weightings of each significant predictor variable. However, the stepwise method took precedence as this method allowed for the most parsimonious predictor models to be generated, thus providing the minimum number of intentional SISV perpetration risk factors. The results of the first concluding six multiple regression analyses for SISV with weapon use are shown in Table 5.

[Insert Table 5 here]

The final multiple regression analysis for intentional SISV with weapon use revealed that in model 1, X_7 accounted for 68% of the variance. The inclusion of X_5 into model 2 resulted in an additional 2% of the variance being. The final model accounted for 69% of the variance which implied that the model fitted the data well (AR^2=.69, $F_{2,}$

$_{91}$=104.85, p<.001). The significance value indicated an overall goodness-of-fit for the 2 significant risk factors, suggesting that the significant model was providing a satisfactory amount of information about the variation being accounted for. The direction and strength of the significant standardized beta coefficients indicated that animal abuse was a stronger risk factor of SISV perpetration with weapon use followed by physically assaulting school staff. The results of the next six multiple regression analyses undertaken, SISV without weapon use, are shown in Table 6.

[Insert Table 6 here]

The final multiple regression model of intentional SISV without weapon use showed that in model 1, X_1 accounted for 68% of the variance. The inclusion of X_6 into model 2 resulted in an additional 2% of the variance being explained. The final model also included X_7, which resulted in an additional 1% of the variance being explained. The final model accounted for 70% of the variance which suggested that the model fitted the data well (AR^2=.70, $F_{3, 90}$ = 276.06, p<.001). The significance values indicated an overall goodness-of-fit for the significant X variables. The direction and power of the significant standardized beta weights indicated that physically assaulting school staff was a stronger risk factor of SISV perpetration with weapon use than low sibling empathy. The values and direction of the standardized beta coefficients indicated that the significant risk factors which successfully accounted for SISV perpetration with weapon use were animal abuse followed by physically assaulting school staff. For SISV perpetration without weapon use, physically assaulting school staff was the strongest risk factor followed by verbally abusing school staff then low sibling empathy.

Discussion

Incidents of SISV perpetration was notable for a large proportion of the youths interviewed for this study, with almost ninety percent claiming to have intentionally perpetrated at least one SISV act. These findings suggested that many of the interviewees had severely victimized their siblings with intention to harm. Indeed, apart from

approximately 10 percent of cases, violent behaviors between siblings fell far beyond what Straus et al. (1980) defined as 'normal violence'. Despite the participants in the current sample consisting of young offenders and adolescents who have displayed antisocial behaviors, comparable findings have been reported in previous studies of young people in community/general populations (Felson & Russo, 1988; Goodwin & Roscoe, 1990; Khan & Cooke, 2004; Raffaelli, 1992; Roscoe et al., 1987; Steinmetz, 1977; Straus et al., 1980; Wiehe, 1990).

Multiple regression analyses revealed 10 significant predictor variables for SISV with weapon use from which the most robust risk factors were animal abuse and physically assaulting school staff. For SISV without weapon use, 11 predictor variables were shown to be significant with the strongest risk factors being physically assaulting school staff, verbally abusing school staff and low sibling empathy. These revealed optimal risk factors support previous research findings related to risk factors for general violence. However, it is noteworthy that while violence committed against non-family members was significantly correlated with deliberate SISV perpetration at bivariate correlation level analysis, it was not found to be a significant predictor of intentional SISV perpetration in any of the multiple regression models. This suggests that the revealed predictor variables were more specifically associated with intentional SISV perpetration than acts of general violence.

Nonetheless, the current findings support prior investigations which have established a relationship between abusing animals and interpersonal violence (Arluke, Levin, Luke, & Ascione, 1999; Felthous, 1980; Gleyzer, Felthous & Holzer, 2002; Kellert & Felthous, 1985; Wright & Hensley, 2003). Given the other risk factors of physically assaulting and verbally abusing staff members, these combine to support the deviance generalization hypothesis (Hirschi & Gottfredson, 1994). That is, the possibility that animal abuse was occurring prior to, after, and at the same time as incidents of SISV perpetration with weapon use.

Literature suggests that incidents of physically assaulting and verbally abusing staff members are often motivated by anger (based on affective, reactive aggression), involvement in antisocial behavior, disruptive home history, and competitiveness with and jealousy of siblings (Miller, Clayton, Miller, Bilyeu, Hunter & Kraus, 2000). All these factors were found to be significant predictor variables (although not robust risk factors) for SISV with and without weapon use. The current results also support the findings of Mushinski (1994), who found the influence of low parental involvement to be significant in occurrences of violence and abuse against school staff.

The role of low sibling empathy was shown to be a risk factor for SISV without weapon use. Empathy is an important deterrent to pre-adolescent and adolescent aggression (McCloskey & Lichter, 2003; Miller & Eisenberg, 1988). Furthermore, empathy development is a consistent component of clinical and research protocols on sibling incest and violence offenders (Friedrich, 1988; Graham-Bermann et al., 1994). The sibling offender's ability to empathize and identify with their victim(s) has been reported to be an important prognostic sign of sibling assaults (Caffaro & Conn-Caffaro, 1998; Schacter, 1985). Low sibling empathy may be linked to living with non-biologically related family members. The great diversity in sibling and parent-child relations in blended families, with both parents and children forming close relationships, suggests that biological relatedness may be important (Hetherington, 1999; Hetherington & Clingempeel, 1992). Simpson (1999) suggested that parents have a greater investment and stronger attachments with their biological offspring than to stepchildren. Biological relatedness implies greater genetic similarity between parents and their biological kin leading them to become more readily attached, what Hetherington (1999, p. 187) called "…a chip off the old block hypothesis". Research findings report that siblings residing in blended families have a higher tendency to exhibit behavioral and emotional problems, lower social competence, fewer socially responsible behaviors and problematic family member attachment than fully-biologically

related siblings who live with each other (Alison & Funstenberg, 1989; Amato, 1999; Bray, 1999).

Future Directions: This research has implications for the development of a risk assessment manual to predict (and by implication, manage) SISV perpetration. The present research provided a set of intentional SISV perpetration risk factors which could be uniformly and objectively assessed. Using the data collected from this study, future investigations could involve model development and testing. This should involve revising the interview schedule and replicating the project in order to validate the optimal set of risk markers for SISV perpetration revealed in this research. Additionally, the creation of an amalgamated score, for determining the prediction of risk for intentional SISV perpetration, would greatly improve consequent investigations. Subsequent studies could rely on the data collected in this study to test the prediction model. The final step would be to ensure an unbiased evaluation of the model's predictive ability using a new data set (one not used in model building).

With regard to possible applications of this research, the development of a risk for SISV perpetration guide could benefit families who attend counseling due to persistent sibling violence and assaults. Reid and Donovan (1990) stated that the growth of blended families in society has seen a rise in the number of parents seeking help with violent interactions between siblings and because of the conflict it causes between stepparents. Howe (1998) stated that incidents of violence between natural children and adopted children are commonplace. As such, a SISV risk assessment manual would be beneficial for blended families in which biologically-related, step, adopted and/or fostered siblings are made to live with each other. It is considered that this study is the first to report on significant predictor variables and risk factors for the perpetration of intentional SISV. However, there is a need for additional investigations to substantiate the current results and facilitate definite conclusions with regard to the perpetration of SISV perpetration and the development of a valid risk assessment guide. Further research should address the

following limitations in an attempt to validate these results. However, the present findings are a first step towards determining the psychological processes underlying intentional SISV perpetration.

Limitations: Primarily, 11 resultant models yielded very high AR^2 values, ranging from .6 to above .7. This finding should be treated with caution. It is considered that weak measurement techniques may have over explained the variance of the criterion variables. For example, low sibling empathy accounted for 75% of SISV without weapon use. However, only five items were used to determine sibling empathy levels; responses were measured on an ordinal scale with scores ranging from 0-to-4 per item and the calculated mean score was used as the final empathy score. These items were specific to sibling empathy, as opposed to general empathy, and based on clinical measures recommended by Caffaro and Conn-Caffaro (1998) for cases of sibling abuse. It was anticipated that this would increase the validity of responses. Accordingly, these items were aimed at ascertaining if a participant's sibling identity was rigidified negatively towards siblings perceived to be different from themselves. However, it is noted that there is a general consensus regarding the problematic nature of defining and measuring empathy, thereby exemplifying the complexities and ambiguities involved in this research area (Fernandez, 2002; Monto, Zgourides & Harris, 2004). Nonetheless, future studies would benefit from employing a more comprehensively validated empathy measurement scale.

While many efforts were made to highlight confidentiality and the importance of honest answers, it cannot be assumed that all respondents were without the influence of social desirability. The use of retrospective self-reports may also have increased social desirable responses in an attempt to effect the impression formed. As Hollin (1990, p. 40) stated, "[T]he offender may be withholding, elaborating, or falsifying information for perfectly rational reasons – shame, uncertainty as to the use the information is to be put, or a wish to present a certain image". Consequently, there is a possibility that reported incidences of SISV perpetration may have been exaggerated, while occurrences of

victimization may have been understated. Given the significance of primary psychopathy in predicting SISV perpetration with and without weapon use in the current study, and the 'deceitful' and 'egocentric' traits associated with this disorder, future investigations could benefit by including items which aim to reduce this potential problem. While these shortcomings may have impacted on the obtained responses, they allow subsequent studies to better design interview schedules for young people in secure settings, utilizing a more focused framework of predictor variables.

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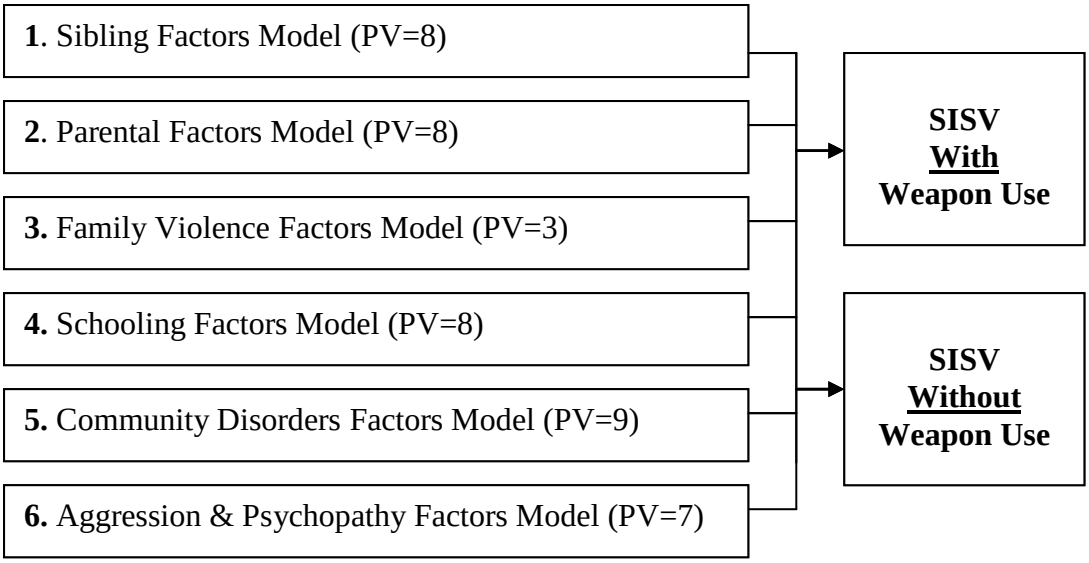
Table 1: Six multiple regression models with number of predictors variables entered for SISV with and without weapon use (criterion variables).



** PV: Number of predictor variables included in each model.

Table 2: Intentional SISV Perpetration Acts - Frequencies & Percentages (in brackets)

SISV Perpetration Acts	**Never**	**1 Time**	**2-5 Times**	**6-10 Times**	**<11 Times**
Kicked/bitten with force?	30 [27]	8 [7.2]	18 [16.2]	31 [27.9]	24 [21.6]
Punched forcefully?	22 [19.8]	11 [9.9]	18 [16.2]	40 [36]	20 [18]
Thrown heavy/sharp object?	47 [42.3]	15 [13.5]	8 [7.2]	23 [20.7]	18 [16.2]
Battered/beaten up badly?	57 [51.4]	10 [9]	3 [2.7]	16 [14.4]	25 [22.5]
Attempted to strangle?	68 [61.3]	15 [13.5]	12 [10.8]	12 [10.8]	4 [3.6]
Threatened with a knife?	77 [69.4]	14 [12.6]	9 [8.1]	10 [9]	1 [0.9]
Wounded with a knife?	89 [80.2]	11 [9.9]	6 [5.4]	5 [4.5]	0
Threatened with a gun?	89 [80.2]	8 [7.2]	9 [8.1]	5 [4.5]	0
Fired a gun?	100 [90.1]	8 [7.2]	2 [1.8]	1 [0.9]	0
Other SISV acts?	82 [73.9]	12 [10.8]	9 [8.1]	4 [3.6]	4 [3.6]

Table 3: Predictor Models 1-to-6 (using Stepwise Method): SISV with Weapon Use and Significant Situational and Individual Predictor Variables (X_1-to-X_{10})

Predictor Models (1-to-6)	**Significant Predictor Variables (X_1-to-X_{10})**	**AR^2**	**R^2 Change**	**F (DF)**	***p***	**Beta**	***t***	***p***
Sibling Factors	(X_1) Live with non-biological sibling(s)	.32	.32	$F_{2, 108}$=31.69	*p*<.001	.42	4.47	*p*<.001
	(X_2) Sibling empathy	.36	.05			-.26	-2.81	p=.006
Parental Factors	(X_3) Parental favoritism of other	.06	.07	$F_{1, 108}$=8.29	*p*<.05	-.27	-2.88	*p*<.05
Family Violence Factors	(X_4) Witness parental violence	.05	.06	$F_{1, 92}$=5.47	p=.02	.24	2.34	p=.022
Schooling Factors	(X_6) Physically assaulting staff	.47	.47	$F_{2, 108}$=59.55	*p*<.001	.42	4.17	*p*<.001
	(X_7) Verbal abusing staff	.52	.06			.36	3.53	*p*<.001
Community Violence Factors	(X_7) Animal abuse	.61	.61	$F_{2, 108}$=93.86	*p*<.001	.61	6.63	*p*<.001
	(X_8) Arson	.62	.02			.23	2.51	p=.014
Individual Factors	(X_9) Primary psychopathy	.19	.19	$F_{2, 108}$=19.03	*p*<.001	.39	4.72	*p*<.001
	(X_{10}) Hostility	.25	.06			.25	2.99	p=.003

Table 4: Predictor Models 1-to-6 (using Stepwise Method): SISV without Weapon Use and Significant Situational and Individual Predictor Variables (X_1-to-X_{11})

Predictor Models (1-to-6)	**Significant Predictor Variables (X_1-to-X_{11})**	**AR^2**	**R^2 Change**	**F (DF)**	***p***	**Beta**	***t***	***p***
Sibling Factors	(X_1) Sibling empathy	.75	.75	$F_{2, 108}$=209.59	*p*<.001	-.72	-13.54	*p*<.001
	(X_2) Live with non-biological sibling(s)	.79	.04			.25	4.76	*p*<.001
Parental Factors	(X_3) Parental favoritism of other	.13	.13	$F_{2, 108}$=11.55	*p*<.001	-.35	-3.98	*p*<.001
	(X_4) Parental involvement	.16	.04			-.21	-2.36	p=.020
Family Violence Factors	(X_5) Witness parental violence	.17	.17	$F_{1, 92}$=19.42	*p*<.001	.42	4.41	*p*<.001
Schooling Factors	(X_6) Physically assaulting staff	.71	.72	$F_{2, 108}$=200.36	*p*<.001	.54	8.06	*p*<.001
	(X_7) Verbal abusing staff	.78	.07			.41	6.04	*p*<.001
Community Violence Factors	(X_8) Animal abuse	.57	.57	$F_{2, 108}$=92.48	*p*<.001	.46	4.96	*p*<.001
	(X_9) Arson	.63	.06			.39	4.23	*p*<.001
Individual Factors	(X_{10}) Primary psychopathy	.28	.29	$F_{2, 108}$=27.16	*p*<.001	.49	6.02	*p*<.001
	(X_{11}) Anger	.32	.05			.23	2.79	p=.006

Table 5: Final Multiple Regression Models (using Stepwise Method): SISV with Weapon Use and Significant Situational and Individual Predictor Variables (X_1-to-X_{10})

Predictor Variables (X_1-to-X_{10})	**Significant Variables (New Models 1-to-2)**	**AR^2**	**R^2 Change**	**F (DF)**	***p***	**Beta**	***t***	***p***
1. Sibling empathy 2. Live with non-biological sibling(s)	1. (X_7) Animal abuse 2. (X_5) Physically assaulting staff	.68 .69	.68 .02	$F_{2, 91} = 104.85$	$p<.001$	.69 .19	8.04 2.19	$p<.001$ p=.031
3. Parental favoritism of other								
4. Witness parental violence								
5. Physically assaulting staff 6. Verbal abusing staff								
7. Animal abuse 8. Arson								
9. Primary psychopathy 10. Hostility								

Table 6: Final Multiple Regression Models (using Stepwise Method): SISV without Weapon Use and Significant Situational and Individual Predictor Variables (X_1-to-X_{11})

Predictor Variables (X_1-to-X_{11})	**Significant Variables (New Models 1-to-3)**	**AR^2**	**R^2 Change**	**F (DF)**	***p***	**Beta**	***t***	***p***
1. Sibling empathy	1. (X_1) Sibling empathy	.68	.68	$F_{3, 90} = 276.06$	$p<.001$	-.68	-10.4	$p<.001$
2. Live with non-biological	2. (X_6) Physically assaulting staff	.69	.02			.19	3.17	$p<.001$
sibling(s)	3. (X_7) Verbal abusing staff	.70	.01			.12	2.15	p=.034
3. Parental favoritism of other								
4. Parental involvement								
5. Witness parental violence								
6. Physically assaulting staff								
Verbal abusing staff								
7. Animal abuse								
8. Arson								
9. Primary psychopathy								
10. Anger								