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The consistency of sexual homicide characteristics and typologies across countries: a comparison of Canadian and Scottish sexual homicides

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ABSTRACT

Although similar subtypes of sexual homicide have been described cross-nationally, no study has directly examined whether two samples from different jurisdictions are comparable. This study therefore aimed to examine whether any substantively meaningful subtypes of sexual homicide cases could be identified in each sample, and if so, whether these subtypes were similar across jurisdictions. Two samples of male sexual homicide offenders were compared: a Scottish sample ($n = 89$) and a Canadian sample ($n = 150$). Subtypes were identified in each sample using LCA, identifying a 3-class solution in each sample. Despite differences between samples on the bivariate level, two very similar subtypes (*Controlled-Organized* and *Diverse*) emerged in both samples. Despite differences at the bivariate level, the similarities at the multivariate level indicate similarities in underlying offence pathways which underpin heterogeneity in sexual homicide offenders. The similarities between the subtypes identified suggests potential universality of types of sexual homicides cross-nationally.

Introduction

Sexual homicide occurs where there is sexual arousal, behaviour or assault by a perpetrator just before, during or after killing a victim. While the definition of sexual homicide has been debated (Chan, 2015), and is often determined by police officers, leading to differing definitions in different jurisdictions, researchers in both North American and European countries have started to use a definition based on the FBI criteria (Ressler, Burgess, & Douglas, 1988). While sexual homicide is described in many jurisdictions (Proulx et al., 2018), but is uncommon, accounting for 1–4% of homicides (Chan & Heide, 2008; James & Proulx, 2014). It is unclear whether sexual homicide offences and offenders differ between jurisdictions, and if so how and why. Sexual homicide offenders cause great concern to society, policy makers and professionals internationally, in relation to investigations, criminal justice response, risk assessment, treatment and management of cases. Empirical evidence needs to inform these, but as cases are rare, most samples have been small. Question marks remain over whether findings from one country apply in another, and whether samples can be pooled into large international cohorts, to allow for more substantiated and generalisable findings, and more

sophisticated analyses. For instance, only three previous studies (Balemba, Beauregard, & Martineau, 2014; Healey, Beauregard, Beech, & Vettor, 2016; Mjanes, Beauregard, & Martineau, 2018) have used statistically sophisticated methods such as Latent Class Analysis (LCA) to identify subtypes of sexual homicide. Unlike more traditional cluster analysis which is distance-based, LCA is a probability-based method with several statistical advantages, including improved ability to handle categorical data (Magidson & Vermunt, 2004) and improved clustering accuracy (Serban & Jiang, 2012). This study therefore aims to add to the international literature on sexual homicide by examining the comparability of sexual homicide types across jurisdictions using LCA as a method.

International comparative research

International comparisons allow researchers to establish to what extent theories and results are generalisable, and the trans-national conditions under which such generalisations do and do not hold (James, Proulx, & Lussier, 2018). This allows for a better understanding of the phenomenon under consideration, and also the impact of factors that differ between jurisdictions, such as societal, cultural, demographic, legal and geographic factors. This means not only differences pertaining to age or gender, but also differences in motivation, execution, location and definition of the crime. There may be challenges in ensuring the comparability of cases and data across jurisdictions. Before samples can be combined it is important to elucidate whether and how they differ. If there are few differences this would suggest samples can be combined relatively easily, if cases and variables are defined and identified similarly across jurisdictions. If there are significant differences, it is important to understand if this is due to fundamental differences in the underlying crime process (e.g., differences in motivation, psychopathology, sexual functioning or developmental antecedents) or differences in more general cross-national factors (e.g., culture, demographics, geography, laws, social factors or climate) which may affect overt manifestations despite the underlying process being the same. If there were such trans-national differences, then pooling samples across jurisdictions would be more complex.

Only a handful studies have directly and empirically compared sexual homicide offenders across jurisdictions. In a study comparing 72 murderers from Canada and 56 from France, James et al. (2018) found the samples to be more similar than different with respect to most variables (43 differences in 149 comparisons) covering: developmental antecedents; general and sexual lifestyle; precrime, crime and postcrime factors; and victim characteristics and lifestyle. When applying a Bonferroni correction for multiple comparisons the significant differences went down to 16, or about 1 in 10 variables. The small number of differences were suggested to reflect a higher degree of childhood dysfunction, substance misuse, criminality, impulsivity and anger in the Canadian cases, as opposed to a higher degree of sexual problems and sexual deviance in the French cases, with these due to differences between countries and differences in family environment, perhaps influenced by cultural differences, such as drug availability and criminalisation processes (James et al., 2018). Chopin and Beauregard (2019) also compared Canadian and French sexual homicide in order to determine whether the datasets could be combined cross-nationally. While there were some bivariate differences, for instance in regards to the use of restraints and the destruction of evidence, the two samples overall displayed stark similarities. Similarly, Sea, Beauregard, and Martineau (2019) compared Canadian and North Korean sexual homicide, demonstrating an overall similarity between countries, despite bivariate differences such as forensic awareness, type of weapon used and age of offender. However, no multivariate or typological analyses were undertaken in either study, highlighting the need for more sophisticated methodology in comparative research. . Since previous homicide research has shown similar underlying patterns might emerge when homicide is examined on the multivariate level, despite differences on the bivariate level (Messner & Savolainen, 2001), it is highly important to conduct multivariate analysis when comparing between countries. Two additional studies have made comparisons across jurisdictions, but have been limited to comparing the murders of an Italian and American serial sexual murderer who both killed elderly females (Morton et al., 2010), and to visually comparing descriptive data between Canadian and Scottish sexual homicides without any statistical

analysis (Darjee & Baron, 2015). While limited in generalisation due to the lack of statistical analysis, both studies concluded that cases from different jurisdictions were very similar.

These studies tentatively and preliminarily suggest findings are generalisable, sexual homicide is internationally uniform and researchers can pool cases across countries, but there is a lack of direct cross-national comparisons and significant methodological weaknesses. In addition, there appear to be a minority of variables that do differ between North American and European jurisdictions, although it is unclear whether these represent true and valid findings, general differences between jurisdictions, or specific differences in the sexual homicide process.

In homicide research, studies have demonstrated that subtypes vary across covariates and other variables and have pointed to the necessity of disaggregating this crime to understand these relationships (Lehti, 2014; Messner & Savolainen, 2001; Thompson, 2015). Although overt differences in homicide characteristics are found between two countries, similar underlying patterns have emerged when samples are disaggregated into underlying subtypes. For example, comparing homicides in the USA and Finland, Messner and Savolainen (2001) found that although the gender gap (ratio of male to female rate) was significantly larger in the USA, similar patterns were observed when homicides were divided into subtypes based on victim-offender relationship. Men were victimised more in both countries across all subtypes except intimate partner homicides, in which female victims were more common in both countries. The identification of subtypes might therefore reveal similar underlying patterns not observed on more superficial examination.

Typologies of sexual homicide

Sexual homicide cases are heterogeneous, and this is partly explained by the existence of subtypes (Higgs, Carter, Stefanska, & Glorney, 2017). Although there are similarities in typologies from different countries, no study has directly ascertained and compared empirically derived typologies across international samples. Extensive reviews of sexual homicide typologies have been described elsewhere (see Chan, 2019; Chan & Heide, 2009; Higgs, Carter, Tully, & Browne, 2017; Stefanska, Beech, & Carter, 2016), but some of the most influential are outlined here.

Both von Krafft-Ebing (1886) and Hirschfeld (1944) recognised there were cases where the homicidal violence was sexually arousing, but there were also cases where the primary intention was to commit a sexual assault and the killing was secondary. The former cases have been labelled lust or sadistic murders, the latter rape-murders (Podolsky, 1966; Rada, 1978). Revitch (1957, 1965) differentiated sadistic sexual homicides (which he termed compulsive) and rape-murders (termed impulsive), from a third type of sexual homicide labelled catathymic. Catathymia, as defined by Schlesinger (1996, p. 307) is "an underlying emotional conflict creates an enormous amount of psychological tension, which is released through the violent act". Catathymic sexual homicides were characterised by explosive rage towards a victim who triggered the reaction in the offender, or on whom the reaction was displaced from another woman or women generally (Revitch & Schlesinger, 1981; Schlesinger, 2003). Further developed by the FBI in the 1970s (Ressler et al., 1988), the study of 36 mostly serial sexual murderers suggested two types: organised and disorganised. Organised cases displayed more planning, social competence, control and had stranger victims, whilst disorganised cases displayed social incompetence, spontaneity, disinhibition and tended to have known victims. There were clearly many similarities between organised and sadistic, and disorganised and catathymic cases. There have been a number of criticisms of the FBI classification in terms of the research methodology used, the types of cases and the classification not standing up to statistical testing. However, this was the first time empirical data was presented on types of sexual homicide, most other research had described similar types, and in the original description the authors acknowledged there were cases that did not fit neatly in to one type or the other (Ressler, Burgess, Douglas, Hartman, & D'Agostino, 1986). Other classifications of sexual homicide have been suggested based on rapist typologies (Keppel & Walter, 1999) or on a review of serial murder cases (Holmes & Holmes, 1998). Until the 1990s, typologies of sexual homicide were mainly based on motive, clinical

characteristics or crime scenes, derived based on practice experience and/or theory, without robust empirical or methodologically sound approaches to classification (Chan, 2015), albeit that most suggested similar typologies (Beauregard & Martineau, 2016).

Only relatively recently have classificatory studies been undertaken using empirical data from non-serial sexual homicide cases subjected to quantitative or qualitative analysis. Most studies tend to find between two to four subtypes of sexual homicide. When examining Canadian sexual homicides, Beauregard and Proulx (2002) identified two types, sadistic and angry. The sadistic type, corresponding to some extent with the FBI's organised type, were premeditated, victims were usually strangers, often mutilated victims, tended to use restraints and moved bodies after the killing. The angry type, corresponding to some extent with the FBI's disorganised type, were usually unplanned, and did not involve controlling victims or moving bodies. Three types of homicide offense patterns were identified in Canada by Balemba et al., (2014) using latent class analysis (LCA): sloppy/reckless (displaying a lack of planning and were likely to be apprehended by the police), violent/sadistic (displaying violence, torture and mutilation), and forensically aware (where the murder seemed instrumental in order to avoid police apprehension). Also using LCA analysis, Mjanes et al. (2018) attempted to empirically test the organised-disorganised typology of the FBI. They found two classes that closely matched the FBI dichotomy: controlled and impetuous. In England, two studies found three types of sexual homicides. Beech, Fisher, and Ward (2005) types were based on motive: urges to rape and/or murder, grievance, or motivated to sexually offend. Similarly, Stefanska, Carter, Higgs, Bishop, and Beech (2015) identified deviancy driven, grievance driven and sexually driven types. While attempting to test two different typologies, Sewall, Krupp, and Lalumière (2013) found three different types of serial sexual homicide offenders using cluster analysis labelled sadistic, competitively disadvantaged and slashers, as well as a fourth heterogeneous group. This sample however included serial offenders and offenders from different countries.

Rather than looking directly to ascertain subtypes, other researchers have examined the heterogeneity of sexual homicide by studying crime scene behaviours and their underlying themes, using Multi-Dimensional Scaling (MDS). Although strictly speaking these studies do not derive or examine typologies, the crime scene themes identified appear to overlap with the subtypes identified in typological studies. In Belgium, Gerard, Mormont, and Kocsis (2007) identified two themes of serial and non-serial sexual homicides; sadist-calculator and opportunistic-impulsive. An Australian study by Kocsis, Cooksey, and Irwin (2002) examining serial and non-serial sexual murders, identified four themes: predator, fury, rape and perversion. In China, Chan, Li, Liu, and Lu (2019) also identified four main motivational themes; sex, power and control, anger and financial gain. In Scotland, Darjee and Baron (2018a) identified three themes: sadistic, rage and criminal. Using a UK sample of rapes and sexual homicides, Salfati and Taylor (2006) identified three themes: exploit, control and violent. There have been similar studies of crime scene themes in serial sexual killers (Canter, Alison, Alison, & Wentink, 2004; Canter & Wentink, 2004; Godwin, 1999), but these are less relevant given the preponderance of sadism in serial cases (James & Proulx, 2014).

In a systematic review of empirically derived typological studies, Higgs et al. (2017) concluded that there were probably three types of sexual homicide offender: sexualised murder, grievance murder and rape murder. Sexualised murders corresponded with sadistic, deviant, lust or compulsive cases from other typologies; grievance murders corresponded with angry, fury, rage, and catathymic cases; and rape murders with forensically aware, sexually motivated, instrumental, and criminal cases. Perhaps where two types are identified the third group fall in with the second group, or a small number of the third group, who are more controlled and organised, fall in with the first group.

Although previous studies have compared different types of sexual homicide across countries (Higgs et al. 2017), no previous study has empirically compared sexual homicides across countries using a sophisticated method such as LCA to improve classification accuracy. Many of the previously identified typologies furthermore utilises variables unlikely to be available to the police at the time of investigation, particularly relating to the offender, such as for instance social skills or school performance (Sewall et al., 2013), psychometric measures (Stefanska et al., 2015) or affect associated with the

crime (Beauregard & Proulx, 2002). While valuable when identifying types of sexual homicide, the investigative utility of such typologies is limited. The current study therefore aims to examine whether substantively meaningful subtypes could be discerned using a limited number of variables readily available to the police at time of investigation. By examining whether typologies are comparable across different jurisdictions, this study will explore whether universality in latent sexual homicide pathways can be found.

Aim of the current study

The aim of the current study is therefore: firstly, to compare sexual homicides committed in Scotland and Canada to examine whether they are similar with regards to victim and offence characteristics; and secondly, to examine whether any substantively meaningful subtypes of sexual homicide can be identified in each sample using variables available for the police, and, if so, whether these are comparable.

Methods

Sample and procedure

Two samples of sexual homicide were gathered for the current study; one Scottish sample from the Scottish Homicide Database (SHD) held by Police Scotland, and one Canadian sample from the national database held by the Royal Canadian Mounted Police (RCMP). Cases in both samples were identified as sexual if the case met the definition of sexual homicide provided by the FBI: that is, the case had to include at least one of the following: (a) victim's attire or lack of attire, (b) exposure of the sexual parts of the victim's body, (c) sexual positioning of the victim's body, (d) insertion of foreign objects into the victim's body cavities, (e) evidence of sexual intercourse, or (f) evidence of substitute sexual activity, interest, or sadistic fantasy (Ressler et al., 1988).

The Scottish Sample consisted of 89 male sexual homicide offenders over 78 cases, committed between 1990 and 2015. Due to changes in the construction of the SHD and changes in recording, the missingness in the data is substantially higher before the year 1990. Only data from 1990 and onwards was therefore used in the current study. Since culpable homicide in the SHD included cases where the death did not result from a violent act of another person, such as for instance the self-administration of drugs, only cases classified as murders were included in the current study. Although rare, there may be nonserial cases included in the Scottish dataset.

The Canadian sample includes a total of 350 cases of non-serial sexual homicide committed between 1948 and 2010 in Canada. All offenders were male. In order to be included in the current sample, all homicide cases had to be identified as completed real incidents (no attempts), and had to involve a sexual element (i.e., there was evidence of sexual activity and/or the crime was sexually motivated). Information on all cases of sexual homicide was collected from a national database operated by the Royal Canadian Mounted Police (RCMP). In order to match the Scottish sample, only cases that occurred after 1990 were kept, which brought the database to 150 cases, over 150 offenders.

The data in the current study is based on the offender, with victim variables summarised at the incident-level. All missing values was coded as "0" for not present. Any homicide case in the SHD can involve more than one offender and more than one victim.

Variables

Independent variable
Since the current study aims to examine the differences between Scottish and Canadian sexual homicides, the independent variable used in the bivariate analysis was which country the offender was from.

Dependent variables

There were two groups of dependent variables relating to the victim and the incident itself (see Table 1). All dependent variables were dichotomous (1 = yes, 0 = no).

As has been argued elsewhere (Flewelling & Williams, 1999; Skott, 2019) homicide typology research has theoretically been divided into a deductive, *a priori* approach where types of homicide are identified based on previously known subtypes (see for instance Pizarro, 2008), and an inductive, explorative approach which allows for the identification of new, previously unknown subtypes (see for instance Bijleveld & Smit, 2006). While the deductive approach might eventually help create a common classification system of homicide, including sexual homicides, cultural differences in homicide types needs to be fully understood and examined using inductive approaches before any conclusions on such a system may be drawn. Thus, the deductive approach, while valuable, essentially only identifies already known subtypes and does not allow the examination of different combinations of important variables to subtypes of homicide. The current study therefore takes an inductive, exploratory approach to identifying sexual homicide subtypes, using variables that previous research has shown to be important when examining sexual homicide (Chan & Heide, 2009; Dietz, Hazelwood, & Warren, 1990). As such, the variables were chosen since they theoretically are assumed to disaggregate sexual homicide etiologically. Similarly to previous studies (see Balemba et al., 2014; Skott, Beauregard, & Darjee, 2019), the variables chosen were furthermore included in the analysis since they are variables readily available to the police at time of investigation (see Skott, Beauregard, & Darjee, 2018; 2019). This was decided in order to enhance the utility of a sexual homicide typology for future investigative work and crime prevention.

The *Victim variables* included 8 binary variables: (1) Gender; (2) White ethnicity; (3) Employed (which also included students, people at school and people who are retired); (4) If the victim was engaged in prostitution; (5) If the victim was under 16 years old; (6) If the victim was between 16 and 30 years old; (7) If the victim was between 31 and 60 years old; and (8) If the victim was older than 61 years old. While these age categories are quite coarse, the age spans were decided based on comparability issues between datasets.

Table 1. Chi-Square analyses between victim and incident characteristics and the type of homicide.

Variables		Total sample (n = 239)	Scotland	Canada	Cohen's d
Victim Gender	Male	47 (19.7%)	26 (29.2%)	21 (14.0%)	0.38**
Victim Ethnicity	White	145 (60.7%)	66 (74.2%)	79 (52.7%)	0.44***
Victim Employment status	Employed	73 (30.5%)	9 (9.0%)	65 (43.3%)	0.77***
Victim engaged in prostitution	Yes	23 (9.6%)	6 (6.7%)	11 (11.3%)	0.15
Victim Age	Under 16 years old	28 (11.7%)	6 (6.7%)	22 (14.7%)	0.24†
	16–30 years old	112 (46.9%)	40 (44.9%)	72 (48.0%)	0.06
	31–45 years old	55 (23.0%)	20 (22.5%)	35 (23.3%)	0.02
	46 years or older	46 (19.2%)	25 (28.1%)	21 (14.0%)	0.35*
Method of Killing	Sharp instrument	70 (29.3%)	25 (28.1%)	45 (30.0%)	0.04
	Shooting or firearm	7 (2.9%)	0 (0.0%)	7 (4.7%)	0.27*
	Strangulation or ligature	111 (46.4%)	36 (40.4%)	75 (50%)	0.19
	Physical assault	102 (42.7%)	23 (25.8%)	79 (52.7%)	0.54***
	Other	55 (23.0%)	29 (32.6%)	26 (17.3%)	0.36*
Relationship between offender and victim	Known or Acquaintance	87 (36.4%)	18 (20.2%)	69 (46.0%)	0.54***
	Familial	31 (13.0%)	4 (4.5%)	27 (18.0%)	0.40**
	Stranger	50 (20.9%)	13 (14.6%)	37 (24.7%)	0.24†
	Unknown	72 (30.1%)	54 (60.7%)	18 (12.0%)	0.44***
Rural or urban location	Rural	17 (7.1%)	5 (5.6%)	12 (8.0%)	0.09
Public or private location	Private	111 (46.4%)	38 (42.7%)	73 (48.7%)	0.12
Inside or outside location	Inside	109 (45.6%)	40 (44.9%)	69 (46.0%)	0.02
Evidence destruction	Evidence destroyed	95 (39.7%)	15 (14.7%)	81 (54.0%)	0.82***
Selection of Weapon	Improvised	52 (21.8%)	15 (16.9%)	37 (24.7%)	0.18
	Brought to scene	39 (16.3%)	7 (7.9%)	32 (21.3%)	0.36**
Multiple location	Yes	55 (23.0%)	6 (6.7%)	49 (32.7%)	0.62***

Note: degrees of freedom = 1.
*p < 0.05; **p < 0.01; ***p < 0.001; †p < 0.1.

The *Incident variables* included 15 variables: (1) Whether the victim was stabbed to death with the use of a sharp instrument; (2) Whether the victim was shot to death with the use of a firearm; (3) Whether the victim was strangled or asphyxiated to death with or without the use of a ligature; (4) Whether the victim was killed by physical assault; (5) Whether the victim was killed by other methods (which include drowning, poisoning, drugs and cause of death cannot be established, or cases where the it was uncertain what weapon was used); (6) Whether the victim and offender were acquaintances or known to each other; (7) Whether the victim and offender were family members or intimate partners; (8) Whether the victim and offender were strangers; (9) whether the relationship between the victim and offender was unknown; (10) Whether the homicide took place in a rural location; (11) Whether the homicide took place in a private location; (12) Whether the homicide took place in an indoors location; (13) Whether any evidence had been attempted to be destroyed (which include any of the following; the body had been moved more than walking distance from the place of the murder; the body was covered but not buried; the body had been buried; the body had been burned; and/or whether the body had been dismembered); (14) Whether the weapon was brought to the scene; and (15) Whether the homicide involved multiple locations.

Statistical analysis

All dependent variables were initially compared between the two samples defined by the independent variable using bivariate analysis via chi-square tests. Effect sizes were reported using Cohen's d (Cohen, 1992), where 0.2 = small effect, 0.5 = moderate effect and 0.8 = large effect size. All dependent variables were subsequently used as classifying variables in two separate latent class analysis (LCA) models, one for each sample, in order to identify subtypes of sexual homicide in Scotland, and in Canada, respectively. LCA is a probabilistic clustering technique designed to identify latent subgroups in the data, based on the respondents' response pattern on categorical classifying variables (McCutcheon, 2002). The technique assumes that the observed heterogeneity in the data can be explained by an unobserved latent variable with a finite number of classes. This technique has also been used previously when identifying subtypes of sexual homicide (Balemba et al., 2014; Healey et al., 2014; Mjanes et al., 2018). Two model parameters are estimated; (1) Individual probability (which is an estimate of every offender's probability of appearing in each class) and (2) Class probability (which is an estimate for each class's average score on each of the observed classifying variables). Both of these parameters were used to describe the characteristics of the classes.

The decision on the number of classes was guided by the Bayesian Information Criteria (BIC) since this fit statistic has previously been shown to be a superior indicator of model fit (Hagenaars & McCutcheon, 2002; Yu & Park, 2014), along with the substantive interpretation of the classes. Due to the relatively small n, latent class models were run only up to four latent classes. These were then compared in each sample to identify the model with the lowest BIC value. The LCA modelling in the current study was conducted in the software program MPlus version 7.4 (Muthén & Muthén, 1998-2012). The victim and incident variables were used as classifying variables for the LCA models since the main focus was to identify subtypes of sexual homicide events. A few variables were however excluded from the analysis since they failed to disaggregate between the classes. These excluded variables include: victim employment status; victim age 16-31; victim age 31-45; method of killing by shooting or firearm; "other" as method of killing (i.e., not using a firearm, sharp implement, strangulation/asphyxiation or blunt force trauma); inside location; and rural or urban location. Since these variables could be removed without affecting the model they were deemed superfluous. Victim prostitution was however kept in the model since removing this variable did affect the probabilities of the model. While some variables have a stronger impact on the disaggregation than others, all variables which remained in the final model shaped the classes since LCA takes all classifying variables into account when identifying classes.

Results

Bivariate comparisons

When examining the victim characteristics, it was found that the Scottish and Canadian sexual homicides were significantly different on almost all variables (Table 1). Sexual homicides in Scotland were significantly more likely to include a male victim (29.2%) compared to the Canadian sample (14.0%, *p* = 0.007, small effect size), and were also significantly more likely to be white (74.2% in the Scottish sample, 52.7% in the Canadian sample, *p* = 0.001, small effect size). The Canadian victims of sexual homicides were however more likely to be employed (9.0% in the Scottish sample, 43.4% in the Canadian sample, *p* < 0.001, medium effect size). It was also found that the Scottish victims were more likely to be older than 46 years old (28.1% in the Scottish sample, 14.0% in the Canadian sample, *p* = 0.011, small effect size), and while it was more common for the Canadian victims to be younger than 16 (14.7%) compared to the Scottish victims (6.7%), this only approached significance (*p* < 0.1).

Table 1 also presents the results of the chi-square analyses between the incident characteristics and the country of the sample. As can be seen, the use of a firearm was significantly more common in the Canadian sample (4.7%) compared to the Scottish sample (0.0%, *p* = 0.048, small effect size). Killing the victim only using physical assault was also more common in the Canadian sample (25.8% in the Scottish sample, 52.7% in the Canadian sample, *p* < 0.001, medium effect size), whereas "other" as method of killing was more common in the Scottish sample (*p* = 0.011, small effect size).

It was also more common for the offender and victim to be known to each other (such as friends or acquaintances) (46.0% in the Canadian sample, 20.2% in the Scottish sample, *p* < 0.001, medium effect size) and to be family members (intimate partners or relatives) (18.0% in the Canadian sample, 4.5% in the Scottish sample, *p* = 0.002, small effect size) in the Canadian sample compared to the Scottish sample. It was however significantly more common that the relationship between offender and victim was unknown in the Scottish sample (60.7% in the Scottish sample, 12.0% in the Canadian sample, *p* < 0.001, small effect size). Although it was also more common for Canadian sexual homicides to be committed against strangers (24.7% in the Canadian sample, 14.6% in the Scottish sample), this only approached significance.

Although there was no significant difference between the two samples regarding the location of the crime, it was more common for the Canadian sexual homicides to include multiple locations (32.7%) in comparison to the Scottish sexual homicides (6.7%. *p* < 0.001, medium effect size). It was furthermore more common that the weapon was brought to the scene by the offender in the Canadian sample (21.3%) compared to the Scottish sample (7.9%, *p* = 0.006, small effect size). Finally, the results show that evidence destruction was significantly more common among the Canadian sexual homicides (14.7% in the Scottish sample, 54.0% in the Canadian sample, *p* < 0.001, large effect size).

Overall, these findings would indicate that Scottish and Canadian sexual homicides in fact are quite different on a number of variables relating to the victim and to the incident itself. In order to examine subtypes of sexual homicide it was therefore decided to examine this separately in the two different samples of sexual homicides.

Latent class analyses

LCA models of 1–4 classes of both Scottish and the Canadian samples were conducted separately, and as can be seen from Table 2, the BIC indicated the 3-class model to be the best solution in the Canadian sample and the 2-class solution in the Scottish sample. However, the Scottish 2-class solutions included one quite diverse class and one class with high levels of "unknown" variables, indiciating this could be a statistical artefact (Skardhamar, 2009). Since the three-class solutions were the substantively most interpretable and straightforward of the various models run, they were therefore chosen for both samples.

Table 2. BIC and entropy for 1–4 class models of Scottish and Canadian subtypes.

Number of classes	Scotland BIC	Entropy	Canada BIC	Entropy
1	1409.65	–	2746.41	–
2	**1379.05**	1	2703.45	1
3	1403.82	0.989	**2673.52**	1
4	1437.33	0.966	2679.61	1

Note: Best fitting models indicated in bold.

Scottish sample

As can be seen from Table 3, the Scottish sample was divided into three classes labelled *Controlled-Organized* (27.3%), *Diverse* (12.0%) and *Unknown* (61.0%). The first class was labelled *Controlled-Organized* since this type of homicide had a higher probability of bringing the weapon to the scene, had a higher probability of using multiple locations and had a higher probability of targeting prostitutes and strangers compared to the other type of sexual homicide (see Table 3). All of these characteristics would therefore indicate a controlled or organised type of behaviour as described in for instance Ressler et al. (1988) and Mjanes et al. (2018).

Overall, this type of sexual homicides suggested a controlled or organised type of behaviour. These homicides were most commonly committed between strangers (53%) and the victim was most commonly strangled or asphyxiated to death (58%). The victims were predominantly female (96%) and sometimes a prostitute (16%). The majority (59%) of the *Controlled-Organized* sexual homicides were committed in a private location. The homicide sometimes included multiple locations (21%) and it was not uncommon for the offender to bring the weapon to the scene (21%) destroy evidence of the crime.

The second subtype was labelled *Diverse* sexual homicide since the characteristics of this type would indicate a more diverse type of behaviour. Overall, this was a diverse subtype, characterised by sexual homicides committed between people who mostly knew each other in a non-family capacity (100%) with the use of a sharp instrument (35%) or physical assault (28%). The victim was often older (65%), and in half (56%) of the cases the victim was male. In 63% of the cases the *Diverse* sexual homicides were committed in a private place, and none of the cases in this subtype included multiple locations. In none of these homicides did the offender try to destroy the evidence of the crime. Similarly to the *Controlled-Organized* sexual homicides, most of the victims were white (91%), however, none of these victims were prostitutes.

Table 3. Class probabilities for the Scottish and Canadian types.

Classifying variable	Scottish sample Class 1 *Controlled-Organized*	Class 2 *Diverse*	Class 3 *Unknown*	Canadian sample Class 1 *Controlled-Organized*	Class 2 *Diverse*	Class 3 *Familial*
	24 (27.3%)	11 (12.0%)	54 (61.0%)	37 (24.7%)	68 (45.3%)	45 (30.0%)
Victim gender	0.04	0.56	0.35	0.05	0.24	0.07
Victim <16 yrs	0.16	0.00	0.04	0.19	0.16	0.09
Victim >46 yrs	0.13	0.65	0.28	0.03	0.19	0.16
Victim white	0.84	0.91	0.67	0.60	0.57	0.40
Victim prostitute	0.13	0.00	0.06	0.20	0.10	0.07
Sharp weapon	0.30	0.35	0.26	0.24	0.31	0.33
Strangulation	0.58	0.00	0.41	0.65	0.46	0.44
Physical assault	0.17	0.28	0.30	0.51	0.53	0.53
Known	0.30	1.00	0.00	0.03	1.00	0.00
Familial	0.17	0.00	0.00	0.00	0.00	0.60
Stranger	0.53	0.00	0.00	1.00	0.00	0.00
Unknown relationship	0.00	0.00	1.00	0.15	0.00	0.40
Private location	0.59	0.63	0.32	0.14	0.57	0.64
Weapon brought to scene	0.21	0.00	0.04	0.24	0.22	0.18
Multiple location	0.21	0.00	0.02	0.43	0.31	0.27
Evidence destruction	0.37	0.00	0.09	0.38	0.57	0.62

The third class in the Scottish sample was labelled *Unknown*, since the most common relationship between the victim and the offender was unknown (100%). This could be the result of cases being unresolved (this class had the highest level of unresolved cases) or that this information simply is unknown to the police, or missing. Approximately 35% of the victims of this type were male, and this type had the highest number of non-white victims with approximately 33% of the victims belonging to another ethnicity than white. Similar to the *Diverse* sexual homicides, these cases had a varied method of killing, with strangulation being the most common (41%). If a weapon was used, it was very seldom brought to the scene by the offender (4%). Unlike the other two types, most of the *Unknown* sexual homicides were committed in a public setting, with only 32% of cases committed in a private location. This type was overall more similar to the *Diverse* sexual homicides than the *Controlled-Organized* type.

Canadian sample

Similar to the Scottish sample, the Canadian sample was divided into three classes. Class 1 was labelled *Controlled-Organized* (55.4%) sexual homicides since, similar to the Scottish sample, this type of sexual homicide was characterised by a controlled, organised type of behaviour. Overall, the *Controlled-Organised* sexual homicides were characterised by attacks on female victims using physical assault (51%) or strangulation (65%) between strangers (100%). Unlike the Scottish sample, this type was most commonly committed in public (86%) settings In 20% of the cases, the victim was a prostitute. The homicide often involved multiple locations (43%) and in about a quarter (24%) of the cases, the offender brought the weapon to the scene. The offender often destroyed evidence of the crime (38%). All of this would indicate a type of sexual homicide involving a controlled or organised offender. The second type was labelled *Diverse* (45.3%) sexual homicide because, as Table 3 indicates, the characteristics of this type of sexual homicide was more diverse, similar to the same type in the Scottish sample. Overall, the *Diverse* sexual homicides were most commonly committed between people who knew each other (100%), in a private setting (57%). The victims were predominantly female, although this type included the highest number of male victims (24%), and the method of killing was quite diverse, with physical assault being most common (53%). The offender also used multiple locations in almost a third of the cases (31%), and destroyed evidence of the crime in the majority (57%) of these cases.

The third and final type of sexual homicide in the Canadian sample was labelled *Familial* (30.0%), since the majority of cases in this type occurred between family members (60%), targeting female victims (76%). In about 40% of the cases, the relationship between victim and offender was unknown, however. Similar to the *Diverse* type, the method of killing was quite diverse, with physical assault being the most common method of killing (53%). The vast majority of cases occurred in a private setting (64%), and evidence was destroyed by the offender in 62% of the cases.

Discussion

The bivariate analyses suggested that the Scottish and Canadian samples were quite different. The Scottish sexual homicide victims were more likely to be male, white and older (over 45), while the Canadian sexual homicide victims were more likely to be employed. The Canadian sexual homicides were more likely to involve a firearm, the use of physical assault to kill, and people who knew each other including family members. The Canadian sexual homicide offenders more often brought the weapon to the scene. Both multiple locations and evidence destruction were more common in the Canadian sample. However, despite these bivariate differences, when subtypes were identified through LCA, many similarities was apparent across jurisdictions. A three-class solution was the best fitting model in both samples, and then when these subtypes were compared it was evident that they reflected very similar underlying patterns in the two countries.

The bivariate differences may represent general differences between the jurisdictions in relation to issues such as culture, ethnicity, weapon availability and laws, rather than the underlying sexual

homicide process, which may actually be the same regardless of jurisdiction. Scotland has for instance stricter firearms regulations compared to Canada (Law Library of Congress, 2015), where gun-related violence is also generally more common (Hemenway & Miller, 2000). Such factors may affect the bivariate differences observed in the current study, along with other facts such as drug availability and criminalisation (James et al., 2018). Using bivariate analysis only, James et al., (2018) found few differences between Canadian and French sexual homicide cases, although a greater proportion of the Canadian cases resembled the *angry* (Beauregard & Proulx, 2002) and *disorganised* (Ressler et al., 1988) types, whereas the French cases more closely resembled the *sadistic* and *organised* types (James & Proulx, 2014). This pattern was also found in the descriptive comparison by Darjee and Baron (2015) when comparing Canadian and Scottish cases, using data from clinical assessments in Scotland and from the same Canadian police cases as used in the current study. Although this may suggest certain intrinsic differences between North American and European sexual homicides, the differences in data collection, the lack of elucidation of underlying typologies and the early stage of current research make any firm conclusions premature. A higher prevalence of sadistic types in European cases versus anger in North American cases, does not appear to fit with the current study's finding that the *Controlled-Organized* types, which appear quite similar to the sadistic type, as discussed below, are in minority.

Both the Scottish and the Canadian *Controlled-Organised* sexual homicides were characterised by a greater likelihood of bringing the weapon to the scene, of using multiple locations, and of targeting strangers and prostitutes. Victims of *Controlled-Organised* sexual homicides were predominantly female and were commonly strangled or asphyxiated to death. Destroying evidence of the crime was common in these cases. Although this type differs in some regards across jurisdictions, for instance regarding the location of the crime, the overall profile of this type is similar across countries. Bearing similarities to the organised (Ressler et al., 1988) and angry (Beauregard & Proulx, 2002) types of sexual homicide offenders, this type is characterised by control and organisation, which suggest planning and preparation prior to commission. This also suggest that these homicides were likely instrumental (Block & Block, 1992; Salfati, 2000). The level of control in these cases may also be indicative of sexual sadism, since power and control are key aspects of sexual sadism (Mokros, 2018).

The *Diverse* types were also similar across the two samples. The *Diverse* types were most commonly committed between people who knew each other in a private setting with the use of a sharp instrument or by physical assault in both samples. The victims were predominantly female although this type included the highest number of male victims in both samples. As with the *Controlled-Organized* type there are some differences between jurisdictions, particularly regarding the age of victims. But overall these homicides had hallmarks indicating impulsivity, opportunity, lack of planning and disorganisation, similar to the angry (Beauregard & Proulx, 2002) and disorganised (Ressler et al., 1988) types of previous typologies.

Finally, the *Unknown* and the *Familial* types were also similar across jurisdictions. Although the majority of the *Familial* sexual homicides were committed between family members, the relationship between offender and victim were unknown in 40% of these cases. Both these types had furthermore the highest level of non-white victims in each jurisdiction and had very diverse methods of killing. Due to the nature of LCA as a technique, it is possible that the *Unknown* subtype in the Scottish sample may be considered something of a statistical artefact (Skardhamar, 2009) with limited practical implications. Seeing how important the relationship between offender and victim appears to be in disaggregating sexual homicide, as sexual homicide studies have demonstrated more generally (see for instance Skott et al., 2019) it is possible that these *Unknown* cases represent an underlying subtype with a specific relationship, such as family members, that remains undetected.

Despite the small number of differences between the same types in each jurisdiction, which were also significant at the bivariate level before applying LCA, the patterns in terms of types of sexual homicides are similar in both samples. For instance, although the percentage of offenders bringing a weapon to the scene of the crime was much higher in the Canadian sample, the proportion of this was the highest in the *Controlled-Organised* types in both samples. Similarly, both of the *Controlled-*

Organised types included all of the cases committed by a stranger, and both of the *Diverse* types had the highest proportion of male victims. It is therefore arguable that the similarity of the subtypes identified in the two samples reflects an underlying latent similarity of sexual homicides across the two countries, and that the differences observed are related to general jurisdictional differences unrelated to sexual homicide specifically. Considering how different the two samples appeared at the bivariate level, the similarities of the typologies identified in each country suggest a universality of the underlying sexual homicide process. This in turn would indicate fundamental similarity of the samples, despite the apparent differences at a bivariate level.

The three-class solution found in the current study is in line with previous research on subtypes of sexual homicide. As Beauregard and Martineau (2016) noted, most studies tend to find between two and four types of sexual homicide, with the *Anger* and *Sadistic* (Beauregard & Proulx, 2002) types being consistently reported across various studies in various countries (see for instance Gerard et al., 2007; Mjanes et al., 2018). Two of the types identified in the current study (*Controlled-Organised* and *Diverse*) bear some resemblance to the types identified by Beauregard and Proulx (2002). Similar to the *Diverse* type in the current study, the *Anger* type was characterised by explosive violence using multiple types of weapons, as well as being unplanned and improvised (Beauregard, 2017; Beauregard & Proulx, 2002). This type also more commonly attacked someone known to them (Gerard et al., 2007). Similar to the *Controlled-Organised* type in the current study, the *Sadistic* type most commonly attacked strangers, tended to plan the attack, and most often killed victims by strangulation (Beauregard, 2017; Beauregard & Proulx, 2002; Gerard et al., 2007; Mjanes et al., 2018). The two types are also similar to the original description of organised and disorganised sexual homicides by the FBI using a sample of mostly serial sexual killers (Ressler et al., 1988), and to the catathymic and compulsive types described clinically by Schlesinger (2003). They may also be considered similar to instrumental and expressive types described with homicides more generally (Salfati, 2000). Expressive homicides are usually defined as directed to hurt the victim specifically, whereas the victim in instrumental homicides functions as a tool for the offender to attain an ulterior aim such as money or sex (Salfati, 2000).

So why have some other studies described or found four types, rather than three? Higgs et al. (2017) systematically reviewed empirical studies of sexual homicide types and concluded that there were probably three underlying types: sexualised (analogous to sadistic), grievance (analogous to angry) and rape murder (elsewhere described as instrumental or incidental). In clinical practice there appears to be validity to these three types in terms of assessment, treatment and management (Beech et al., 2005; Darjee & Baron, 2018b; Revitch, 1965). The current study used a limited number of homicide incident and victim variables with a sample size that was reasonable, given the dearth of sexual homicide cases, but still statistically small. If the current study would have had a richer data set including more detailed crime scene variables and information on perpetrators including clinical characteristics, it is possible that we would have found another type of solution. However, this study aimed to examine what subtypes that could be identified using a limited number of variables readily available to the police when investigating such crimes in order to provide a typology with maximum utility for the police in such situations. The fact that this study found types similar to the sadistic/anger types further supports the validity of said typology, as well as its investigative utility.

Another way of looking at this may be to consider that the three-type solution is primarily based on how the crime was committed rather than why it was committed. Sadistic sexual killers are predominantly controlled and organised, although a few, as described in the FBI sample (Ressler et al., 1988) are impulsive. Angry sexual killers are invariably impulsive and disorganised, although a few are instrumentally vengeful. Some rape murderers are instrumental (e.g., planning to rape then execute victims so they cannot report the crime) whilst others are more impulsive (e.g., killing the victim reactively to silence them after panicking when the victim screams during a sexual assault), whilst others are instrumental in relation to their sexual assaults but reactive in relation to their homicidal violence. Perhaps there are two ways how (instrumental vs. impulsive) and three reasons why (sadism, anger or incidental) sexual homicides are committed, which overlap to some extent, particularly sadistic-

instrumental and impulsive-angry, but are reflected in different specific variables. Perhaps future typology research on sexual homicide should attempt to elucidate the potential differences between "how" and "why", as well as examine various ways for these to be combined. This could perhaps provide some unity to a field which suffers from a wide and complex terminology in relation to sexual homicide types.

There appear to be only a limited number of scripts used by offenders when committing a sexual homicide (Beauregard, Proulx, Rossmo, Leclerc, & Allaire, 2007), regardless of jurisdiction. What are the implications of our findings for potential future research combining samples from different jurisdictions? On the one hand the bivariate differences may suggest that combining samples needs to be done cautiously, taking into account jurisdictional differences when including cases and undertaking analyses, so that findings are not skewed or true underlying relationships between variables are not obscured when using more sophisticated techniques such as structural equation modelling (Proulx, 2018a). However, the similarity of underlying types found empirically in the current study and the finding reported by James et al. (2018) of bivariate similarities between jurisdictions, may suggest that combining samples is more straightforward, perhaps with the most important issue being controlling for typology of cases. It appears that certain variables relating to cultural, social, legal, geographical and demographic differences are more likely to vary considerably between jurisdictions, whereas underlying types and related variables are less likely to. Combining datasets will be important in future research on sexual homicide, as solidifying current findings and looking beyond characteristics to empirically examining issues such as prevention, investigative pathways, treatment, risk assessment and recidivism will only be possible with far larger samples necessitating international collaboration.

The findings of the current study may have implications for police investigations of sexual homicide cases. Since investigators are unlikely to have access to clinical data relating to the motive or characteristics of the offender, the subtypes identified, which are based on variables available to the police at the time of investigation, may be helpful in classifying cases and prioritising investigative actions. For example, a controlled-organised crime scene may suggest prioritising stranger suspects, whereas a diverse crime scene may suggest prioritising suspects known to the victim. When using research from other countries to inform an investigation, it would appear important to consider the types of variables that differ between countries (for example ethnicity, rurality, weapon use/availability), where extrapolating between jurisdictions may problematic; versus those indicating underlying consistency between jurisdictions related to, for example, instrumentality vs. impulsivity.

Although this was the first study of its kind to compare sexual homicide offenders across different countries using both bivariate and multi-variate statistical analyses, the relatively low number of cases in each sample and the nature of the variables available in the police data sets limited the number of classifying variables available for the analysis. Larger samples and richer datasets would allow for comparison between countries or contexts using a richer set of variables covering multiple-relevant domains, such as crime scene characteristics, criminal history, clinical factors, victim characteristics, situational factors, modus operandi and proximal behavioural factors. Additionally, the small sample size of the current study meant that LCA solutions with a high number of classes were unlikely. Analyses with larger sample sizes may have been able to identify more distinct types in the data, perhaps even four types as found in other studies. For instance, although both the *Diverse* and the *Controlled-Organized* types were quite similar across samples, the *Unknown* and *Familial* types varied more between the Scottish and the Canadian samples. Perhaps this reflects an underlying universality of the *Controlled-Organized* and *Diverse* types whereas the third type is more culturally dependent or is actually a more heterogeneous group, perhaps reflecting further types (for example angry and incidental offenders). Another limitation to the study is the differences between the two datasets, for instance regarding years examined, police data coding and number of offenders per case. While this might have affected the results slightly, differences in data management across jurisdiction is a real problem in comparative research that future studies should aim to overcome.

Most the research published on sexual homicide has been undertaken in developed westernised countries (North America, Australia and Europe). Perhaps the underlying scripts in sexual homicide are similar across such countries, but different in the countries of South and Central America, Africa and Asia (see for instance Chan et al., 2019; Chan & Li, 2019). Or the scripts may be the same but manifest in fundamentally different ways due to differences in factors such as culture, geography, law and demographics. Research in these countries is required to take our understanding of sexual homicide further. In all of these continents cases of serial sexual murder, similar to "Western" cases have been described (Hickey, 2015). However, there may be fundamental differences in the processes underlying cases such as the group rape and killing of females in India (Kumar, 2016), the killing and genital mutilation encountered in Muti murders in Southern Africa (Labuschgne, 2004), and sexual murder committed in the context of organised crime in Central America (Sanford, 2008).

Conclusion

These findings highlight the need to conduct multivariate sophisticated analysis such as LCA to examine the underlying latent construct when comparing samples from different countries with respect to homicide or other offending behaviour. Although stark differences might appear at the bivariate level, this does not exclude the possibility of similarities in the underlying offence construct or pathways. The current study suggests that there is universality in the underlying latent pathways of sexual homicide, across a North American and a Western European jurisdiction. These latent pathways then find manifestation in overt homicidal sexual behaviour, with this overt expression effected by factors which may differ between jurisdictions, such as cultural, social, geographical, demographic and legal differences. Such comparative international research helps advance our theoretical understanding of sexual homicide, the cross-jurisdictional implications of empirical findings, and whether and how international samples can be combined to allow for more statistically powerful and sophisticated future research, to further help elucidate this rare, extreme and important form of sexual violence (Proulx, 2018b).

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