Lethal Combinations:
A Conjunctive Analysis of Crime Scene Behavior Associated with Sexual Homicide

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Introduction

Prior research on nonsexual homicide has found that certain factors related to the criminal event can be used to explain an escalation from a violent crime to homicide (Felson, 1986; Felson & Steadman, 1983; Wolfgang & Ferracuti, 1967). Specifically, studies have shown that violent crimes, such as robberies and physical assaults were much more likely to escalate to homicide with the presence of a lethal weapon (e.g., knife or gun versus blunt object), active victim resistance (Zimring & Zuehl, 1986) and if the victim is known to the offender (Felson & Messner, 1996). Moreover, other studies have found that whether the offender was intoxicated during the offence (Felson & Steadman, 1983) and the reaction of the victim during the assault (i.e., whether the victim retaliates during the crime, see Felson & Steadman, 1983; Wolfgang & Ferracuti, 1967) were both associated with an increased likelihood of a lethal outcome in nonsexual physical assaults.

Although considered as a hybrid offense – combining homicide with a sexual assault – (Chopin & Beauregard, 2019d) – sexual homicide (SH) can be partly explained as an escalation of violence. Although there is evidence that some sexual murderers kill because of individual psychopathology (i.e., sexual sadism) or excessive rage, there is also mounting evidence that SH may be one of many outcomes of a rape (Beauregard & Mieczkowski, 2012; Beech, Fisher, & Ward, 2005; Beech, Oliver, Fisher, & Beckett, 2005; Mieczkowski & Beauregard, 2010). Mieczkowski and Beauregard (2010) found that the likelihood of a sexual assault escalating to SH was influenced by a complex combination of victim characteristics, situational characteristics, and crime scene characteristics. The most lethal combination of event characteristics identified were when the offender uses a weapon during the crime (see also Chan & Heide, 2009), does not commit intrusive sexual acts on the victim, but spends more than 30 minutes with the victim. It was suggested that this inability to perform sexually
despite a long time with the victim enrages the offender and with ready access to a weapon, the sexual assault is very likely to end with murder. The current study uses a similar approach to determine the most lethal combination of offender and crime characteristics that may explain the escalation of a rape to SH.

**Differences Between SHOs and NHSOs**

Over the years, some studies have compared groups of sexual homicide offenders (SHOs) and nonhomicide sexual offenders (NHSOs) in order to identify their differences and similarities. Recently, Chan and Heide (2016) as well as Stefanska, Beech, and Carter (2016) published respectively a literature review and a systematic review of those differences and similarities between the two groups of offenders. In the systematic review by Stefanska et al., (2016) which examined 10 studies, the authors found some differences between SHOs and NHSOs as to their characteristics. Namely, SHOs were more likely to have reported loneliness problems (see Grubin, 1994; Higgs, Carter, & Stefanska, 2015; Marshall, 1989; Milsom, Beech, & Webster, 2003; Nicole & Proulx, 2007; Palermo, 2008) as well as anger issues (see Chene & Cusson, 2007; Grubin, 1994). However, both groups similarly shared the presence of mental disorders (see Grubin, 1994; Oliver, Beech, Fisher, & Beckett, 2007; Proulx & Sauvêtre, 2007), a criminal history of sexual and violent offense (Grubin, 1994; Nicole & Proulx, 2007; Oliver and colleagues, 2007; Vettor & Beech, 2014), dysfunctional family structure (see Nicole & Proulx, 2007; Oliver and colleagues, 2007), and sexual victimization (Grubin, 1994; Nicole & Proulx, 2007; Oliver and colleagues, 2007). Findings from these studies were inconclusive as to whether SHOs and NSHOs differed in physical victimization, relationship status at the time of the crime, low self-esteem, and age at the time of crime (Stefanska and colleagues, 2016). As to the crime scene behaviors, Stefanska and colleagues (2016) analysis revealed that NHSOs were more likely to have committed vaginal penetration, to plan the crime (see Higgs and colleagues, 2015; Salfati & Taylor, 2006; Vettor
& Beech, 2014), and to humiliate the victim (Healey, Lussier, & Beauregard, 2013; Higgs and colleagues, 2015). The findings were inconclusive as to whether the victim was restrained.

As to the literature review conducted by Chan and Heide (2016), their analysis of 17 studies also revealed significant differences as to their characteristics. Thus, the childhood and adolescence of SHOs seemed to be more problematic and they were more frequently diagnosed with personality disorders (i.e., antisocial, schizoid), maladaptive personality traits, sexual sadism, as well as paraphilias (other than pedophilia) compared to NHSOs. Moreover, SHOs were more often living alone at the time of the crime, had fewer intimate relationship experiences, and were less likely to have been married compared to NHSOs. SHOs were more likely to have reported deviant sexual fantasies, especially prior to the crime as well as consuming alcohol during the crime. As to the crime scene behaviors, SHOs were less likely to have selected a victim based on his/her attractiveness but were more likely to have selected a victim who lived alone, and with whom they had no prior contact. SHOs were also more likely to have been engaged in non-controlled violence and to inflict multiple wounds on their victims, as well as inflicting mutilations to their victims (Chan & Heide, 2016).

These findings are useful to summarize the knowledge available to date as to the differences and similarities between SHOs and NHSOs. However, as mentioned by Stefanska and colleagues (2016), some of these studies present several limitations. For instance, some studies included both serial and nonserial SHOs, despite these two groups of offenders presenting important differences (see James & Proulx, 2014). Other studies have included a mix of victim types in their group of SHOs, merging together female, male, and child victims despite clear differences between these groups (e.g., Beauregard & Martineau, 2015; Beauregard & Proulx, 2007; Beauregard, Stone, Proulx, & Michaud, 2008). Probably the greatest limitation that could be responsible for the inconclusive findings observed in the two reviews discussed above is the fact that previous studies have compared groups of SHOs with
very heterogeneous groups of NHSOs, including violent and non-violent cases (Healey, Beauregard, Beech, & Vettor, 2016).

Beauregard and colleagues (Beauregard & DeLisi, 2018a, 2018b; Beauregard, DeLisi, & Hewitt, 2017; Beauregard & Martineau, 2017; Chopin & Beauregard, 2019d) have overcome this limitation by splitting their group of sex offenders into violent and non-violent subgroups. In their study examining the criminal career, Beauregard and colleagues (2017) have found that the NHSOs had more convictions for rape/sexual abuse and other sexual offenses relating to exhibitionism, they were also more specialized in their offending repertoires. On the opposite, violent NHSOs were more versatile in their offending patterns and perpetrated more often assaults, homicides, kidnappings, and aggravated sexual assaults. Similarly to violent NHSOs, SHOs were also more versatile in their offending repertoires and had extensive histories of armed robbery, kidnapping, and homicide.

In another study, Beauregard and DeLisi (2018a) compared the same three groups of offenders but this time on developmental factors. Their findings showed that SHOs present a background characterized by abuse and a variety of problematic behaviors, such as chronic lying, angry temperament, running away and reckless behaviors. Moreover, SHOs were more likely to have reported cruelty against animals, whereas the violent NHSOs were more likely to have reported rebellious attitude and neuropsychological deficits compared to offenders committing SHs.

Beauregard and DeLisi (2018b) also compared the three groups of offenders as to their personality disorders, while taking into account crime scene behaviors. They showed that SHOs were more likely to be characterized schizoid and borderline personality disorders and chose to select a victim, use a weapon, and use drugs and alcohol before their offenses. However, SHOs were less likely to have forced their victim to engage in sexual acts or humiliate them. As to the violent NHSOs, they were more likely to have presented an
antisocial personality disorder, whereas the nonviolent NHSOs were characterized by avoidant and dependent personality disorders.

Chopin and Beauregard (2019d) used a similar approach but compared SHOs with a group of violent NHSOs and a group of nonsexual homicide offenders. Among all the comparisons conducted, they identified 16 variables where SHOs were different from the other two groups. For instance, as to the offender characteristics, they found that SHOs were more likely to be of large build, present paraphilic behavior, possess a sexual collection involving children (i.e., pictures of nude children, pedopornographic movies), report sexual dysfunctions, and use psychoactive substances. Moreover, Chopin and Beauregard (2019d) found that some SHOs were more likely to be engaged in frequent social activities while some others were more likely to have avoided contact with other people. As to the crime scene behavior, their findings showed that SHOs were more likely to have used a con or a surprise approach, to commit the crime in a residence, to beat the victim, use asphyxiation, and use a weapon intentionally.

**Aim of Study**

These studies have shown that SHOs and NHSOs present several differences as to their personal characteristics as well as their crime scene behavior. However, most of these studies have considered these factors individually, neglecting to examine the potential interactions between these factors and the impact this could have on the likelihood of a rape escalating to SH. Moreover, of the few studies that have considered these potential interactions, none have combined factors from different categories of variables to look at how one type of factor can impact the specific combination of factors from another category of variables. Therefore, the aim of the study was to examine the potential interactions between the crime scene behavior and some offender characteristics to estimate the likelihood that these combinations led to an escalation from rape to SH. Using a conjunctive analysis, the findings allowed for the
identification of specific combinations that are more likely to have escalated to SH as well as those combinations that may prevent a lethal outcome.

**Method**

**Sample**

Data used in this research is from a French national police database. This database included all cases of violent extrafamilial crimes occurring in France between 1979 and 2018. Case characteristics suggest that there are no cases where offenders and victims have a familial or conjugal relationship. The two possibilities can be stranger or acquaintance relationship. In this database information files are collected throughout the investigation by multiple actors (police detective, coroner, psychologist, etc.). In order to avoid missing data, information is compiled in the database by crime analysts that are experts in extrafamilial violent crimes. To answer our research question, we choose to compare two types of crime that are close in their characteristics and context: Violent rapes and SHs. Our sample is based on 1263 cases of violent rapes and 303 cases of SHs. In order to increase the comparability between the cases, we decided to select only those involving a female victim aged 16 years old and more. Most of research in the field of sexual crime showed that assaults involving child victims are very different in terms of crime process (see for example Beauregard & Martineau, 2015; Beauregard and colleagues, 2008; Chopin, 2017; Chopin & Beauregard, 2019c; Chopin & Caneppele, 2018, 2019; Gravier, Mezzo, Abbiati, Spagnoli, & Waeny, 2010; Proulx and colleagues, 2018). We also included only cases solved by the police.

To be included in our sample, violent rape cases are characterized by two characteristics. Firstly, cases involved at least one act of sexual penetration with a penis (vaginal and/or anal penetration). Secondly, cases must have been characterized by the presence of grave, severe or extreme injuries. Generally, these victims went to the hospital after being assaulted. Injuries could have different origins and may be due to blows given
during assault, the use of a weapon by offenders during assault, sexual injuries and/or contextual injuries (i.e., the offenders bang the victims’ heads, broken limbs during the assault, etc.).

To be included in our sample, SH must be characterized by at least one criterion of the Ressler, Burgess, and Douglas (1988) definition (i.e., Victim’s attire or lack of attire; exposure of the sexual parts of the victim’s body; sexual positioning of the victim’s body; insertion of foreign objects into the victim’s body cavities; evidence of sexual intercourse; evidence of substitute sexual activity, interest, or sadistic fantasy). None of the victims included in the SH sample were only characterized by being found naked.

**Measure**

*Dependent variable.* In this study we used one dependent variable describing the crime outcome. It was a dichotomous variable with 0 used for violent rape cases and 1 used for extrafamilial sexual homicides.

*Independent variables.* A total of nine dichotomous (0–1) independent variables were used in this study. Four variables were used to describe offender behavior whereas five variables described modus operandi characteristics.

*Offender behavior.* Variables describing offenders’ behaviors are all dichotomous. The first variable described social isolation. This variable described offenders that voluntarily avoid social contact with other people. It is completed on the basis of police investigations and the expertise of psychologists. The second variable described offenders that have consumed psychoactive substances at the time of the offense. This variable combined offenders that have consumed alcohol and/or drug(s) at the time of the offense. The third variable described offenders with a criminal history. It characterized cases where offenders have previous convictions. These convictions were not necessarily for sexual offense but for all types of crime. Unfortunately, we do not have details on the type of crime.
Modus operandi characteristics. The five variables describing modus operandi characteristics were all dichotomous (0-1). The first variable described the relationship between offenders and victims at the time of the offense. If offenders and victims were in a stranger relationship (e.g., not known prior to offense), the variable was coded with 1. Conversely, offenders and victims that were in an acquaintance relationship (e.g., friend, family friend, employer, teacher, neighbor, internet contact, etc.) were coded with 0. The second variable described the approach strategy used by offenders. When the variable was coded with 1, offenders used a coercive ‘blitz’ approach (e.g., offender grabbed and immediately choked the victim, offender immediately overpowered the victim, offender immediately hit the victim, offender immediately stabbed or shot the victim, etc.). On the opposite, offenders used non-coercive approach (i.e., con, surprise). The third variable described cases where the offender had beaten the victim. The fourth variables described cases where victims opposed physical resistance. Finally, the fifth variable described cases where offenders brought a weapon with them.

Statistical Analyses

We have analyzed the data in two phases. First, we identified a series of variables associated with the escalation from rape to SH based on the established literature and previous research. We then present a bivariate analysis (Chi-square, including Cramer’s V/Phi coefficients), presented in Table 1, to confirm that the variables in the two domains – modus operandi and offender characteristics – each have significant main effects with the outcome variable. This is done to verify that these variables are significant predictors and suitable for further multivariate analyses.

While the presentation of these bivariate analyses is interesting, the limitations which are present when simple bivariate relationships are considered in a complex system are self-
evident. Although previous studies have used logistic regression in order to examine the relationship of these variables to a specific outcome, Ragin (1994) points out a shortcoming often unconsidered with the logistic regression approach. When one considers that different precursor conditions may produce the same or indistinguishable outcomes for a single outcome variable or condition, this presents a challenge.

Our interest is in the ways in which subset combinations of these variables and the possible interaction effects of the discrete variables influence the outcome state. Miethe, Hart, and Regoezzi (2008) have recently proposed a technique for exploring multivariate relationships among categorical variables. They have labelled this technique conjunctive analysis of case configurations. The technique is an extension of tabular contingency analysis and Qualitative Comparative Analysis (QCA) and consists of compiling a matrix of all possible interactive combinations for a given series of binary categorical variables. The list of all possible combinations is then organized along an analytic dimension, and interactive relationships among variables are assessed in relation to some qualitative premise of interest. Conjunctive analyses have been performed to investigate different outcomes related to violent crime and policing issues such as the decision to confess for sex offenders, the bystander presence and intervention in nonfatal violent victimization, as well as the violent outcome in hostage and barricade incidents (e.g., Beauregard & Michaud, 2015; Beauregard & Mieczkowski, 2012; Hart & Miethe, 2008; Mieczkowski & Beauregard, 2010).

The appeal of conjunctive analysis resides in its presentation of all possible interaction terms and the assignment of odds or probabilities associated with each particular interaction complex. Another important element, and one particularly relevant to the outcome of the escalation from rape to SH, is that the technique permits an exploration of interactions among categorical variables – that is, that the same outcome can be created by more than one multivariate configuration of the antecedent conditions that the analysis is exploring. By using
this approach and considering all possible combinations of variables – a saturated model – one can target three different aspects of the cause-effect relationship: (1) the determination of the smallest number of all factors which appear to be related to the outcome state; (2) the potential identification of some set of necessary conditions (i.e., elements which appear in every case of the outcome state); or (3) the potential identification of some set of sufficient conditions (i.e., elements, which if present, result in the outcome state).

The limitation of conjunctive analysis is that the matrix of interaction terms can quickly grow very large since, for a binary variable, for example, the number of theoretical combinations is \(2^n\), where \(n\) is the number of variables included in the matrix. Thus, a matrix with more than five or six binary variables quickly becomes unwieldy. Therefore, we chose to limit our analyses to five variables. The conjunctive matrix allows for the calculation of the odds of the occurrence of any particular \(n\)-way interaction term. Overall, the dynamics of the conjunctive analysis approach suggests a technique that identifies important variables that themselves appear to be associated with the dependent or predicted state, linked to a method that can consider all the interaction of those variables.

In the current study, we focus on eight dichotomized variables relevant to two contexts (the modus operandi and the offender characteristics) that have been empirically associated with the escalation from rape to SH. We calculated odds ratios as an index of the relative dangerousness of each particular combination. For instance, an odds ratio greater than 1 indicates this particular combination increases the risk of an escalation from rape to SH. While an odds ratio of less than 1 means it reduces the risk that the offender end up to kill his victim during a rape. In order to assess the impact of the offender characteristics, we have first calculated a baseline model including only the modus operandi characteristics. Then, four other matrices were calculated adding one offender characteristic to the baseline model.

**Results**
Table 1 presents the bivariate analyses between the modus operandi, offender characteristics and the outcome of the crime (rape versus SH). Findings showed that two offender characteristics were significantly associated with the outcome of the crime. Thus, offenders who have consumed psychoactive substances before the crime ($\chi^2 = .21, p < .001$), are considered as socially isolated ($\chi^2 = .31, p < .001$), and frequently engaged in criminal activities ($\chi^2 = .17, p < .001$) are more likely to have escalated to SH during a rape event. As to the modus operandi, findings show that the only variable that was not significantly related to the outcome of the crime was the offender bringing a weapon ($\chi^2 = .03, p > .05$). However, results have shown that when the offender has beaten the victim ($\chi^2 = .40, p < .001$), had a relationship with the victim ($\chi^2 = .11, p < .001$), used a blitz approach ($\chi^2 = .07, p < .01$), and the victim resisted the attack ($\chi^2 = .11, p < .001$), the rape is more likely to have escalated to SH.

Table 2 presents the matrix produced by the conjunctive analysis of the modus operandi characteristics on the escalation from rape to SH. Insofar as considering the odds of a rape escalating to SH, it appears that the most dangerous combination is #13 (OR = 11.28), suggesting that when the offender and victim were not strangers, the offender did not use a coercive approach, the victim was beaten, and the victim resisted the attack, the rape is more than 11 times more likely to have escalated to a SH. It is noteworthy that the second most dangerous combination is #1 (OR = 10.38) and includes a crime where the offender and the victim were stranger, the offender used a blitz approach, the victim was beaten, and the victim resisted. When a rape presents these characteristics, it is 10 times more likely to have escalated to SH. Moreover, of the seven combinations presenting an odds ratio higher than 1 (#1, 2, 5, 6, 12, 13, and 14), six present a crime involving the beating of the victim (#1, 2, 5, 6, 13, and 14) but four present no resistance from the victim (#2, 6, 12, and 14). The results
also show that certain combinations are less likely to have led to an escalation from rape to SH (#4, 8, and 16). Of these three combinations, two of them present a sequence where the offender did not use a blitz approach, did not beat the victim, and the victim did not resist.

[INSERT TABLE 2 HERE]

Table 3 presents the matrix produced by the conjunctive analysis of the modus operandi characteristics and the offender characteristic of having consumed psychoactive substances before the crime on the escalation from rape to SH. In terms of the odds of a rape escalating to SH, it appears that the most dangerous combination is #1 (OR = 29.43), showing that a rape is almost 30 times more likely to have escalated to SH when the offender and victim were stranger, the offender used a blitz approach, the victim was beaten, the victim resisted the attack, and the offender had consumed psychoactive substances. By adding the variable of the offender using psychoactive substances, the likelihood of a rape escalating to SH increased from 10 times (see Table 2) to almost 30 times more likely. Moreover, of the 13 combinations presenting an odds ratio higher than 1 (#1, 2, 4, 9, 10, 11, 12, 13, 24, 26, 27, 28, and 31), nine present a crime not involving a blitz approach (#9, 10, 11, 12, 13, 26, 27, 28, and 31) and ten present the beating of the victim (#1, 2, 4, 9, 10, 11, 12, 26, 27, and 28). In only six of the 13 lethal combinations the use of psychoactive substances from the offender led to a greater likelihood of the rape escalating to SH. The results also show that four combinations are less likely to have led to an escalation from rape to SH (#8, 14, 16, and 32). In all four combinations the offender did not use psychoactive substances before the crime.

[INSERT TABLE 3 HERE]

Table 4 presents the matrix produced by the conjunctive analysis of the modus operandi characteristics - including the offender characteristic of being socially isolated - on the escalation from rape to SH. Insofar as considering the odds of a rape escalating to SH, it appears that the most dangerous combination is #9 (OR = 77.69), showing that when a rape is
characterized by the offender and victim being strangers, the offender did not use a blitz approach, the victim was beaten, the victim resisted, and the offender was socially isolated, it is 77 times more likely to have escalated to a SH. Interestingly, the second most dangerous combination (#3; OR = 46.56) presents a similar sequence, except that the victim has not resisted during the attack. Moreover, of the 15 combinations presenting an odds ratio higher than 1 (#1, 2, 3, 4, 9, 10, 11, 13, 15, 20, 23, 24, 26, 28, and 31), ten present a crime involving the beating of the victim (#1, 2, 3, 4, 9, 10, 11, 20, 26, and 28) and nine present a stranger offender-victim relationship (#1, 2, 3, 4, 9, 10, 11, 13, and 15) as well the absence of resistance from the victim (#3, 4, 11, 15, 20, 23, 24, 28, and 31). In slightly more than half of the most lethal combinations (eight out of 15), being socially isolated was associated with a greater likelihood of a rape escalating to a SH (#1, 3, 9, 11, 13, 15, 23, and 31). The results also show that four combinations are less likely to have led to an escalation from rape to SH (#8, 12, 14, and 32). In all four combinations the offender was not considered socially isolated.

[INSERT TABLE 4 HERE]

Finally, Table 5 presents the matrix produced by the conjunctive analysis of the modus operandi characteristics and the offender characteristic of being involved in criminal activities, on the escalation from rape to SH. In terms of the odds of a rape escalating to SH, it appears that the most dangerous combination is #1 (OR = 29.43), showing that a rape is almost 30 times more likely to have escalated to SH when the offender and victim were stranger, the offender used a blitz approach, the victim was beaten, the victim resisted the attack, and the offender was involved in criminal activities. Moreover, of the 13 combinations presenting an odds ratio higher than 1 (#1, 2, 4, 9, 10, 11, 12, 13, 24, 26, 27, 28, and 31), ten present a crime involving the beating of the victim (#1, 2, 4, 9, 10, 11, 12, 26, 27, and 28) and nine present a crime not involving a blitz approach (#9, 10, 11, 12, 13, 26, 27, 28, and 31). In
slightly more than half of the combinations (seven out of 13) is the fact of not being involved in criminal activities associated with a greater likelihood of a rape escalating to a SH (#2, 4, 10, 12, 24, 26, and 28). The results also show that four combinations are less likely have led to an escalation from rape to SH (#8, 14, 16, and 32). In all four combinations the offender was not involved in criminal activities.

[INSERT TABLE 5 HERE]

**Discussion**

We investigated a set of factors that can help to explain the differences between violent rapes and SHs in terms of offender and offense characteristics. Four factors are related to the modus operandi (i.e., stranger relationship, blitz approach, offender beat the victim, the victim physically resist) and three factors are related to the offenders’ characteristics (i.e., psychoactive substance consumption, loner behavior, and previous criminal history). In order to explore the various interactions between these factors and what the most lethal combinations are, we used a series of conjunctive analyses.

**Weapon: Unnecessary Condition to the Lethal Outcome**

Bivariate findings of our study suggested that the presence of weapon during a sexual crime does not play a specific role in the lethal outcome, contrary to previous studies (Chan & Heide, 2009; Felson & Messner, 1996; Mieczkowski & Beauregard, 2010). Various reasons may explain this discrepancy. First, the fact that a weapon does not contribute to the lethal outcome in a sexual crime is coherent with another study from France, showing that in most cases, offenders killed their victims by beating them and, to a lesser extent, by using asphyxiation or strangulation (Chopin & Beauregard, 2018). Therefore, it is possible that the use of a weapon in committing a sexual crime is largely influenced by cultural factors (Beauregard, 2019)). Second, it is possible that despite sex offenders bringing a weapon with them at the crime scene – or even taking one from the crime scene – to control or threaten the
victim, the majority of offenders who end up killing the victim do so using their own hands, either by beating them or using strangulation.

**Intentional and Non-Intentional SHs?**

Results of the first conjunctive analysis showed that of the ten combinations with significant odds ratios, seven lead to an increased risk of a lethal outcome. Interestingly, the most lethal combination occurred when offenders and victims are acquainted, offenders used a non-coercive approach (i.e., con or surprise), the victim physically resisted and were beaten. The second most lethal combination involved a stranger relationship between offenders and victims, the use of coercive (blitz) approach, and victims that both physically resisted and were beaten by the offenders. These two combinations with quite different modus operandi lead to a similar outcome: the victims’ death. This finding suggests that offender-victim relationship as well as the type of approach are not especially important to explain the lethal outcome. Rather, the most important variables are the victim’s resistance and the blows given by the offenders. This finding may suggest that among the events leading to the death of the victim, there could be two distinct types of SH: non-intentional and intentional.

In three combinations (#1,5,13), victims were beaten by the offender and they physically resisted during the attack. The rational choice approach (Cornish & Clarke, 1986) suggests that offenders make decisions following a cost-benefit analysis. On that basis, we can hypothesize that situations including this specific combination (i.e., physical resistance and blows) can be considered as non-intentional. We can speculate that in these cases, the offenders were motivated to commit a rape but encountered victim resistance. Such situations may increase the risks for the offender (e.g., third-party intervention) and may potentially lead to their identification and arrest by the police. To reduce this risk (costs) associated to the victim’s behavior, one alternative for the offender is to overcome the victim’s resistance by beating her. In some instances, the force used to beat the victim was more than necessary to
overcome the resistance and may lead to the death of the victim, especially for vulnerable victims (e.g., elderly victims; see Chopin & Beauregard, 2018; Chopin & Beauregard, 2019a). This course of action follows a crime escalation pattern from rape to SH, as suggested in previous studies. (Beauregard & Mieczkowski, 2012; Beech, Fisher, and colleagues, 2005; Beech, Oliver, and colleagues, 2005; Mieczkowski & Beauregard, 2010).

In three other combinations (#2,6,14), victims were beaten without physically resisting and in one combination (#12), victims were not beaten and did not physically resist during the attack. For these combinations, it seems that the expressive violence is not reactive to the victim’s behavior but instead is part of their offending process (e.g., sadistic sexual murderer; see Beauregard & Proulx, 2002). In these combinations, pain was inflicted intentionally to cause suffering and death of the victim (Healey and colleagues, 2013; Higgs and colleagues, 2015). This hypothesis of intentionality is strengthened by three specific combinations (#4,8,16) where the absence of resistance and blows to the victim is characterized by odds ratio decreasing the risk of lethal outcome. It is possible that rape cases follow the same modus operandi, as these intentional SHs may be in situations where the initial intent was both to sexually assault and kill the victim but failed for internal (e.g., offender renunciation) or external (e.g., victims absconding) reasons. It is important to mention here that with victim resistance, it is difficult to precisely identify whether it is the actual resistance of the victim that increased the risk of lethal outcome or if other behaviors such as the use of a blitz approach or the beating of the victim increased the victim resistance, which in turn increased the risk of a lethal outcome.

The Influence of Offender’s Characteristics

The study aimed to test whether some offender characteristics, when combined with a certain modus operandi, could influence the likelihood of a lethal outcome. Interestingly, the findings were mixed. For instance, when the offender has used psychoactive substances, the
lethal outcome can be partially explained by the disinhibitory effect of drugs and/or alcohol. Moreover, research has shown that alcohol and drug consumption generally increases the level of violence used during a sexual assault (see Beauregard, Lussier, & Proulx, 2005; Brecklin & Ullman, 2010; Ouimet, Guay, & Proulx, 2000) and decreases the ability of offenders to make rational decisions (Assaad & Exum, 2002). On one hand, our findings showed that in all four combinations negatively associated with a lethal outcome (#8,14,16,32), the offenders did not consume alcohol and/or drugs prior to the assault. On the other hand, of the 13 combinations positively associated with a lethal outcome, six involved offenders that consumed psychoactive substances prior to offense (#1,9,11,13,27,31) whereas in seven combinations (#2,4,10,12,24,26,28) psychoactive substances consumption was not involved. If we interpret these findings in light of the possibility of intentional/non-intentional SH discussed above, we can hypothesize that in cases where the lethal outcome was non-intentional, the use of alcohol and/or drugs by rapists probably led to a loss of control while dealing with the victim’s resistance. For offenders involved in an intentional SH, the consumption of psychoactive substances may have contributed to disinhibit their homicidal fantasies and downplay the consequences of their actions, as well as the risks involved in the commission of the crime.

A similar pattern is observed with regards to offenders being lonely. Social isolation has been reported as being an important factor associated with SH (Grubin, 1994; Higgs and colleagues, 2015; Milsom and colleagues, 2003; Nicole & Proulx, 2007). In our findings, all three combinations negatively associated with a lethal outcome were characterized by the absence of social isolation in the offenders (#8,16,32). However, of the 15 combinations positively associated with a lethal outcome, social isolation was present in 8 of them (#1,3,9,11,13,15,23,31). It is possible that in intentional SHs, offenders characterized with social isolation are unable develop intimate relationships (Grubin, 1994; Marshall, 1989) and
instead invested their time and energy in deviant sexual fantasies, leading to antisocial and destructive behaviors against other people (Beauregard & Martineau, 2017; Palermo, 2008). In cases of non-intentional SHs, offenders characterized with social isolation may resort to expressive violence more easily due to their inability to approach a female without using coercion, which may lead to quick escalation to SH. It is noteworthy that social isolation is more often associated with intentional (#3,11,15,23,31) than non-intentional (#1,9,13) SH.

These mixed findings related to the impact of the offender characteristics also suggest that what really matters to understand SH are the behaviors adopted by the offender during the crime. We are not implying that offender characteristics may not influence the choice of certain behaviors during the crime but what our findings show is that this influence is only visible in certain specific situations. This reinforces the need to continue exploring the interactions between factors related to a lethal outcome in sexual crime to fully understand which combinations are more likely to have been lethal. What happens between the offender and the victim during the crime is a complex event requiring special tools to investigate the impact of each behavior. The use of conjunctive analysis is an appropriate method that allows for the exploration of all possible combinations of factors in order to identify which combinations are more likely to have led to a lethal outcome.

Lastly it is important to discuss the limitations of this study. First, we used police data which carry a certain number of limitations (see Aebi, 2006, 2010; Chopin & Aebi, 2017; Chopin & Aebi, 2018). Police data only include reported crimes and our findings concern only crimes reported to police authorities. Cases used in this research concern only solved non-serial crimes and we cannot exclude the possibility that unsolved and serial crimes present different patterns. Secondly, the nature of the conjunctive analysis limits the number of variables that it is possible to test. Third, our study is based on cases that occurred between 1979 and 2018. We cannot exclude the possibility that modus operandi has changed over
time. Fourth, our findings are based on a French sample and we cannot conclude that they are
generalizable to crimes occurring in other countries. Despite Chopin and Beauregard (2019b)
found that findings concerning SHs can be generalizable, it is not the case concerning rape
cases. Moreover, findings of this study concerned exclusively violent rape cases and cannot
be applied to rape cases where physical violence against victims were limited or lacking.

Finally, our conclusions are based on hypotheses and we cannot establish a causal
relationship between the victim resistance and force used by offenders. We suggested that
victim resistance lead to the use of force by the offender according to the rational choice
approach (Cornish & Clarke, 1986) but we cannot exclude that in some situations victims
resist when the violence becomes more severe and death seems likely.

Further research could replicate this methodology by testing other theoretically or
practically relevant modus operandi and offender characteristics to improve the understanding
of SH. Additional analyses could also test combinations of offenders’ and victims’
characteristics (e.g., alcohol consumption of both offender and victim) to examine how these
interactions may influence the likelihood of a lethal outcome in sexual crimes. Finally, future
studies could attempt to classify SH according to the intentionality of the lethal outcome and
provide a more comprehensive analysis of the modus operandi, victim, and offender
characteristics.

Conclusion

The current study used conjunctive analysis to explore all potential interactions
between four crime scene behaviors and three offender characteristics in order to better
understand which of these combinations were the most likely to have been lethal in sexual
crimes. We found that modus operandi behaviors and especially the violence used by
offenders during the assault, was fundamental to predict the lethal outcome. Moreover, our
findings showed that victim resistance was very important to distinguish the type of SH (i.e., intentional and non-intentional). Also, despite the fact that offenders’ characteristics are associated with a lethal outcome, their contribution is only partial as these characteristics only have an impact in certain situations. Finally, the use of conjunctive analysis allowed for the demonstration of the heterogeneity of situations in which SHs may arise. From a theoretical perspective, this confirms the existence of both intentional and non-intentional SHs, improving our knowledge on the various offending processes involved in this particular form of sexual crime.
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Table 1. Bivariate analysis of offenders and modus operandi characteristics (N=1566)

|                          | Rape (n=1263) | Sexual Homicide (n=303) | Cramer's V/φ |
|--------------------------|----------------|-------------------------|--------------|
| **Offender characteristics** |                |                         |              |
| Offender has consumed psychoactive substances | 315 24.94% | 148 48.84% | .207*** |
| Offender is socially isolated | 61 4.83%    | 84 27.72% | .312*** |
| Frequently engage in criminal activities | 143 11.32% | 79 26.07% | .167*** |
| **Modus operandi Characteristics** |                |                         |              |
| Offender have beaten the victim | 110 8.71% | 137 45.21% | .396*** |
| Stranger relationship | 882 69.83% | 172 56.77% | .110*** |
| Coercive (Blitz) approach | 203 16.07% | 69 22.77% | 0.07** |
| Physical resistance of the victim | 235 18.61% | 92 30.36% | .114*** |
| Offender brought a weapon | 224 17.74% | 62 20.46% | .028 |

Notes. *p ⩽ .05. **p ⩽ .01. ***p ⩽ .001.
Table 2. Conjunctive Analysis of the Modus Operandi Characteristics and the crime outcome (Rape Vs Sexual Homicide) (N=1566)

| Offender and victim were strangers | Offender used a coercive (blitz) approach | Victim was beaten during the assault | Victim has physically resisted | Rape (n=1263) | SH (n=303) | Odds Ratio | Combo # |
|-----------------------------------|-------------------------------------------|-------------------------------------|-------------------------------|--------------|------------|------------|---------|
| Yes                               | Yes                                       | Yes                                 | Yes                           | 5            | 12         | 10.38***   | 1       |
|                                   | No                                        | Yes                                 | Yes                           | 13           | 12         | 3.97**     | 2       |
| No                                | Yes                                       | No                                  | Yes                           | 22           | 6          | 1.14       | 3       |
|                                   | No                                        | No                                  | Yes                           | 122          | 12         | 0.39**     | 4       |
| Yes                               | Yes                                       | Yes                                 | No                            | 11           | 20         | 8.04***    | 5       |
|                                   | No                                        | No                                  | Yes                           | 33           | 20         | 4.56***    | 6       |
|                                   | No                                        | No                                  | Yes                           | 123          | 20         | 0.66       | 7       |
|                                   | No                                        | No                                  | Yes                           | 553          | 57         | 0.31***    | 8       |
| No                                | Yes                                       | Yes                                 | No                            | 2            | 2          | 4.19       | 9       |
|                                   | No                                        | Yes                                 | No                            | 8            | 5          | 2.63       | 10      |
|                                   | No                                        | No                                  | Yes                           | 6            | 3          | 2.10       | 11      |
|                                   | No                                        | No                                  | No                            | 25           | 17         | 2.94**     | 12      |
| Yes                               | Yes                                       | Yes                                 | No                            | 5            | 13         | 11.28***   | 13      |
|                                   | No                                        | Yes                                 | No                            | 33           | 40         | 5.67***    | 14      |
|                                   | No                                        | No                                  | Yes                           | 61           | 16         | 1.10       | 15      |
|                                   | No                                        | No                                  | No                            | 241          | 35         | 0.55**     | 16      |

Notes. *p \leq .05. **p \leq .01. ***p \leq .001.
Table 3. Conjunctive Analysis of the Modus Operandi and Offender (Psychoactive substances) Characteristics and the crime outcome (Rape Vs Sexual Homicide) (N=1566)

| Offender and victim were stranger | Offender used a coercive (blitz) approach | Victim was beaten during the assault | Victim has physically resisted | Offender have consumed Psychoactive substances prior to assault | Rape (n=1263) | SH (n=303) | Odds Ratio | Combo # |
|---------------------------------|----------------------------------------|-----------------------------------|-------------------------------|-------------------------------------------------|--------------|-----------|-----------|--------|
| Yes                             | Yes                                    | Yes                               | No                            | Yes                                             | 0            | 3         | 29.43**  | 1      |
|                                 |                                        |                                   |                               | Yes                                             | 5            | 9         | 7.70**   | 2      |
|                                 |                                        |                                   |                               | No                                              | 3            | 3         | 4.20     | 3      |
|                                 |                                        |                                   |                               | Yes                                             | 10           | 9         | 3.84**   | 4      |
|                                 |                                        |                                   |                               | No                                              | 3            | 1         | 1.39     | 5      |
|                                 |                                        |                                   |                               | Yes                                             | 19           | 5         | 1.10     | 6      |
|                                 |                                        |                                   |                               | No                                              | 16           | 1         | 0.26     | 7      |
|                                 |                                        |                                   |                               | Yes                                             | No           | 11        | 0.41**   | 8      |
|                                 |                                        |                                   |                               | No                                              | Yes          | 2         | 0.16%    | 8      |
|                                 |                                        |                                   |                               | No                                              | No           | 9         | 0.71%    | 9      |
|                                 |                                        |                                   |                               | Yes                                             | Yes          | 5         | 1.27%    | 7      |
|                                 |                                        |                                   |                               | No                                              | Yes          | 106       | 3.63%    | 11     |
|                                 |                                        |                                   |                               | No                                              | No           | 28        | 8.58%    | 11     |
|                                 |                                        |                                   |                               | Yes                                             | Yes          | 17        | 1.35%    | 13     |
|                                 |                                        |                                   |                               | No                                              | Yes          | 106       | 3.30%    | 14     |
|                                 |                                        |                                   |                               | Yes                                             | No           | 67        | 6.27%    | 15     |
|                                 |                                        |                                   |                               | No                                              | Yes          | 486       | 6.60%    | 16     |
|                                 |                                        |                                   |                               | Yes                                             | Yes          | 1         | 0.33%    | 17     |
|                                 |                                        |                                   |                               | No                                              | No           | 1         | 0.08%    | 18     |
|                                 |                                        |                                   |                               | Yes                                             | Yes          | 1         | 0.33%    | 18     |
|                                 |                                        |                                   |                               | No                                              | No           | 7         | 1.32%    | 19     |
|                                 |                                        |                                   |                               | Yes                                             | Yes          | 0         | 0.00%    | ---    |
|                                 |                                        |                                   |                               | No                                              | Yes          | 6         | 0.48%    | 21     |
|                                 |                                        |                                   |                               | No                                              | Yes          | 3         | 0.33%    | 22     |
|                                 |                                        |                                   |                               | Yes                                             | No           | 22        | 1.74%    | 23     |
|                                 |                                        |                                   |                               | No                                              | Yes          | 1         | 0.32%    | 24     |
|                                 |                                        |                                   |                               | No                                              | No           | 4         | 3.96%    | 25     |
|                                 |                                        |                                   |                               | Yes                                             | Yes          | 3         | 0.24%    | 26     |
|                                 |                                        |                                   |                               | No                                              | No           | 30        | 11.88%   | 27     |
|                                 |                                        |                                   |                               | Yes                                             | Yes          | 4         | 0.32%    | 28     |
|                                 |                                        |                                   |                               | No                                              | No           | 57        | 3.96%    | 29     |
|                                 |                                        |                                   |                               | Yes                                             | Yes          | 17        | 2.97%    | 30     |
|                                 |                                        |                                   |                               | No                                              | No           | 224       | 8.58%    | 31     |

Notes. *p <= .05. **p <= .01. ***p <= .001.
Table 4. Conjunctive Analysis of the Modus Operandi and Offender (Loner) Characteristics and the crime outcome (Rape Vs SH) (N=1566)

| Offender and victim were stranger | Offender used a coercive (blitz) approach | Victim was beaten during the assault | Victim has physically resisted | Offender is socially isolated | Rape (n=1263) | SH (n=303) | Odds Ratio | Combo # |
|----------------------------------|------------------------------------------|-------------------------------------|--------------------------------|-------------------------------|---------------|------------|------------|--------|
| Yes                              | Yes                                      | Yes                                 | Yes                            | 0                             | 0.00%         | 4          | 1.32%      | 37.97*  | 1      |
| No                               | Yes                                      | Yes                                 | Yes                            | 5                             | 0.40%         | 8          | 2.64%      | 6.82**  | 2      |
| No                               | Yes                                      | Yes                                 | Yes                            | 2                             | 0.16%         | 2          | 0.66%      | 4.19    | 5      |
| No                               | Yes                                      | Yes                                 | Yes                            | 12                            | 0.95%         | 3          | 0.99%      | 1.04    | 7      |
| No                               | Yes                                      | Yes                                 | Yes                            | 10                            | 0.87%         | 12         | 3.96%      | 4.69*** | 10     |
| No                               | Yes                                      | Yes                                 | Yes                            | 2                             | 0.16%         | 17         | 5.61%      | 37.47***| 11     |
| No                               | Yes                                      | Yes                                 | Yes                            | 4                             | 0.32%         | 5          | 1.65%      | 5.28*   | 13     |
| No                               | Yes                                      | Yes                                 | Yes                            | 119                           | 9.42%         | 16         | 5.28%      | 0.54*   | 14     |
| No                               | Yes                                      | Yes                                 | Yes                            | 22                            | 1.74%         | 20         | 6.60%      | 3.99*** | 15     |
| No                               | Yes                                      | Yes                                 | Yes                            | 529                           | 41.88%        | 39         | 12.87%     | 0.20*** | 16     |
| Yes                              | Yes                                      | Yes                                 | Yes                            | 1                             | 0.08%         | 0          | 0.00%      | 1.38    | 17     |
| No                               | Yes                                      | Yes                                 | Yes                            | 1                             | 0.08%         | 2          | 0.66%      | 8.39    | 18     |
| No                               | Yes                                      | Yes                                 | Yes                            | 1                             | 0.08%         | 1          | 0.33%      | 4.18    | 19     |
| No                               | Yes                                      | Yes                                 | Yes                            | 4                             | 0.32%         | 7          | 2.31%      | 7.44**  | 20     |
| No                               | Yes                                      | Yes                                 | Yes                            | 1                             | 0.08%         | 1          | 0.33%      | 4.18    | 21     |
| No                               | Yes                                      | Yes                                 | Yes                            | 7                             | 0.55%         | 4          | 1.32%      | 2.40    | 22     |
| No                               | Yes                                      | Yes                                 | Yes                            | 1                             | 0.08%         | 3          | 0.99%      | 12.62*  | 23     |
| No                               | Yes                                      | Yes                                 | Yes                            | 24                            | 1.90%         | 15         | 4.95%      | 2.68**  | 24     |
| Yes                              | Yes                                      | Yes                                 | Yes                            | 0                             | 0.00%         | 0          | 0.00%      | ---     | 25     |
| No                               | Yes                                      | Yes                                 | Yes                            | 5                             | 0.40%         | 14         | 4.62%      | 12.19***| 26     |
| No                               | Yes                                      | Yes                                 | Yes                            | 6                             | 0.48%         | 3          | 0.99%      | 2.10    | 27     |
| No                               | Yes                                      | Yes                                 | Yes                            | 30                            | 2.38%         | 34         | 11.22%     | 5.19*** | 28     |
| No                               | Yes                                      | Yes                                 | Yes                            | 3                             | 0.24%         | 2          | 0.66%      | 2.79    | 29     |
| No                               | Yes                                      | Yes                                 | Yes                            | 58                            | 4.59%         | 17         | 5.61%      | 1.23    | 30     |
| No                               | Yes                                      | Yes                                 | Yes                            | 10                            | 0.79%         | 10         | 3.30%      | 4.27**  | 31     |
| No                               | Yes                                      | Yes                                 | Yes                            | 231                           | 18.29%        | 29         | 9.57%      | 0.47*** | 32     |

Notes. *p ≤ .05. **p ≤ .01. ***p ≤ .001.
Table 5. Conjunctive Analysis of the Modus Operandi and Offender (Offender involved in criminal activities) characteristics and the crime outcome (Rape Vs Sexual Homicide) (N=1566)

| Offender and victim were stranger | Offender used a coercive (blitz) approach | Victim was beaten during the assault | Victim has physically resisted | Offender have been previously involved in criminal activities | Rape (n=1263) | SH (n=303) | Odds Ratio | Combo # |
|---------------------------------|------------------------------------------|-------------------------------------|--------------------------------|---------------------------------------------------------------|--------------|------------|------------|--------|
| Yes                             | Yes                                      | Yes                                 | Yes                            | 0                                                             | 0.00%        | 3         | 0.99%      | 29.43** |
| No                              | Yes                                      | Yes                                 | No                             | 5                                                             | 0.40%        | 9         | 2.97%      | 7.70**  |
| No                              | No                                       | Yes                                 | Yes                            | 3                                                             | 0.24%        | 5         | 0.99%      | 4.20    |
| No                              | No                                       | Yes                                 | No                             | 10                                                            | 0.79%        | 9         | 2.97%      | 3.84**  |
| No                              | No                                       | Yes                                 | No                             | 19                                                            | 1.50%        | 5         | 1.65%      | 1.10    |
| No                              | Yes                                      | Yes                                 | Yes                            | 16                                                            | 1.27%        | 1         | 0.33%      | 0.26    |
| No                              | Yes                                      | Yes                                 | No                             | 106                                                           | 8.39%        | 11        | 3.63%      | 0.41**  |
| No                              | Yes                                      | Yes                                 | No                             | 9                                                             | 0.71%        | 15        | 4.95%      | 6.96*** |
| No                              | Yes                                      | Yes                                 | No                             | 5                                                             | 0.40%        | 7         | 2.31%      | 5.95**  |
| No                              | No                                       | Yes                                 | No                             | 28                                                            | 2.22%        | 26        | 8.58%      | 4.14*** |
| No                              | No                                       | Yes                                 | Yes                            | 17                                                            | 1.35%        | 10        | 3.30%      | 2.50*   |
| No                              | No                                       | Yes                                 | No                             | 106                                                           | 8.39%        | 10        | 3.30%      | 0.37**  |
| No                              | No                                       | Yes                                 | No                             | 67                                                            | 5.30%        | 19        | 6.27%      | 1.19    |
| No                              | No                                       | Yes                                 | No                             | 486                                                           | 38.48%       | 20        | 6.60%      | 0.11*** |
| No                              | Yes                                      | Yes                                 | Yes                            | 1                                                             | 0.08%        | 1         | 0.33%      | 4.18    |
| No                              | No                                       | Yes                                 | No                             | 1                                                             | 0.08%        | 1         | 0.33%      | 4.18    |
| No                              | No                                       | Yes                                 | No                             | 7                                                             | 0.55%        | 4         | 1.32%      | 2.40    |
| No                              | No                                       | Yes                                 | No                             | 0                                                             | 0.00%        | 0         | 0.00%      | --     |
| No                              | No                                       | Yes                                 | No                             | 6                                                             | 0.48%        | 3         | 0.99%      | 2.10    |
| No                              | No                                       | Yes                                 | No                             | 22                                                            | 1.74%        | 36        | 11.88%     | 7.61*** |
| No                              | No                                       | Yes                                 | No                             | 4                                                             | 0.32%        | 12        | 3.96%      | 12.98***|
| No                              | No                                       | Yes                                 | No                             | 3                                                             | 0.24%        | 4         | 1.32%      | 5.62*   |
| No                              | No                                       | Yes                                 | No                             | 30                                                            | 2.38%        | 36        | 11.88%     | 5.54*** |
| No                              | No                                       | Yes                                 | No                             | 4                                                             | 0.32%        | 2         | 0.66%      | 2.09    |
| No                              | No                                       | Yes                                 | No                             | 57                                                            | 4.51%        | 12        | 3.96%      | 0.87    |
| No                              | No                                       | Yes                                 | No                             | 17                                                            | 1.35%        | 9         | 2.97%      | 2.24*   |
| No                              | No                                       | Yes                                 | No                             | 224                                                           | 17.74%       | 26        | 8.58%      | 0.44*** |

Notes. *p < .05. **p < .01. ***p < .001.