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# An application of *CRAVED* to the choice of victim in sexual homicide: a routine activity approach

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## Abstract

*CRAVED*—*Concealable, Removable, Available, Valuable, Enjoyable, and Disposable*—has proven to be a useful model to explain various forms of theft. No attempt has been made to apply this model to interpersonal crimes. The current study proposes that the *CRAVED* model may be used not only to explain theft but also patterns of sexual homicide. Therefore, the aim of the study is to attempt to use the *CRAVED* model in order to explain the differences between sexual homicide of children and sexual homicide of adult. Logistic regression models on a sample of 350 Canadian sexual homicide cases showed that indicators associated to the Removable and Available components of *CRAVED* were the most useful in predicting the type of victim targeted by sexual murderers. Implications for situational crime prevention are discussed.

**Keywords:** Sexual crime, Sexual homicide, *CRAVED*, Routine activity theory, Victim selection, Target selection

## Background

In contrast to high volume crimes such as theft, burglary, or robbery, sexual homicide is a crime of rare occurrence and its rate in North America has been slowly declining for several years (James and Proulx 2014). Despite its infrequency, this type of crime attracts a great deal of attention from the public due to the seemingly randomness of the crime. According to Felson (1986), “people make choices, but they cannot choose the choices available to them. Nor they can be sure what chain of events will follow from their choices, including choices made by others” (p. 119). This illustrates perfectly the difficulty in understanding the process of target selection for various crimes and how the choice of target will have an influence on the actions or behaviours of the offender. Although most victims of sexual homicide are adult women, some offenders specifically target children. The selected target/victim will have an influence on the behaviour exhibited by the offender during the criminal event.

Some researchers have hypothesized that sexual murderers who target children are behaviourally different from those who target adults. A study by Spehr et al. (2010) compared a group of 35 sexual murderers who targeted children to a group of 100 sexual murderers who targeted adult victims. Findings revealed that sexual murderers of children were less likely to report alcohol abuse and drug dependency, as well as to present sexual dysfunctions or narcissistic personality disorders. Although no significant differences were observed with respect to the risk assessment scores, Psychopathy Checklist-Revised (PCL-R) scores, and rates of release and reconvictions, sexual murderers of children were more likely to have committed sexual abuse prior to the crime. They were less likely, however, to have committed rape or have caused bodily injury, than sexual murderers of adults. Unlike sexual murderers of adult victims, those who murdered children were more likely to have purposefully carried out the crime without any provocation from the victim (Spehr et al. 2010).

Beauregard et al. (2008) compared a group of 11 sexual murderers of children to a group of 66 sexual murderers of adults. Contrary to the study by Spehr et al. (2010), these authors did not find many differences between the

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groups of offenders; rather their findings suggested that both types of offenders were similar. They did, however, find differences in the pre-offense behaviour and intent to commit the offense. For instance, sexual murderers of children were more likely to report deviant sexual fantasies, use of pornography prior to the crime, and premeditation of the crime, than sexual murderers of adults. Moreover, sexual murderers of children were less likely to target a victim under the influence of drugs/alcohol than sexual murderers of adults. Perhaps more interesting is the fact that sexual murderers of children were more likely to establish contact with the victim prior to the crime, to commit the crime during the day, to use strangulation to kill the victim, and to dismember and hide the victim's body, as compared to sexual murderers of adults. According to Beauregard et al. 2008 (see also Beauregard and Field 2008), most of the differences observed between sexual murderers of children and adults could be explained through a routine activity perspective (see Cohen and Felson 1979).

#### **Routine activity theory and the *CRAVED* model**

Crime, as explained by routine activities theorists, results from the convergence in time and space of three essential elements: (1) a motivated offender; (2) a suitable target; and, (3) the absence of a capable guardian (Cohen and Felson 1979). However, because offenders exercise some degree of reasoning in their selection of a particular target over another, within a socio-spatial context, this choice will be determined by the subjective value of the target. Empirical studies have shown that the suitability of a particular target can be explained by numerous factors, such as the anticipated success rate, potential "pay-off" or perceived higher gain (Clarke and Cornish 1985), ease of entry or physical accessibility (e.g., Bernasco and Nieubeerta 2005), and level of guardianship (e.g., Miethe and Meier 1990; Tewksbury and Mustaine 2003). As such, it is possible for an offender to find a suitable target (e.g. desired by the offender) that is too well guarded to merit an attempt.

Following Cohen and Felson's (1979) *VIVA* (i.e., value, inertia, visibility, and accessibility) model for suitable targets, Clarke (1999) proposed a revised model specifically designed for theft of hot products. This model encompasses six properties that make targets especially attractive to criminals. For instance, in the case of theft, "hot products" are usually more *Concealable*, *Removable*, *Available*, *Valuable*, *Enjoyable*, and *Disposable* (*CRAVED*; Petrossian and Clarke 2014). *CRAVED* was designed to overcome some of the limitations of the *VIVA* model, such as taking into account the motivation, as well as the characteristics that are important to consider when contemplating theft (e.g., concealing and disposing of the

goods; Clarke 1999). Although Clarke (1999) criticized the *VIVA* model for being too broad and being applicable to both human and inanimate object targets, Felson (2002) explained that *CRAVED* could also be applied to human targets of predatory crimes, even sexual crimes. "A violent offender generally needs to conceal the violent act, as well as steps before and after it. He must remove himself safely from the scene; avail himself of a convenient human target for violent attack; find a target of value in his own mind; enjoy the criminal act, or at least avoid pain to himself, and dispose of incriminating evidence, even the victim" (p. 32). While Clarke (1999) criticized the *VIVA* model for not putting enough emphasis on the concealable, enjoyable, and disposable properties of the target, he failed to recognize the fact that these properties were important not only in property offenses but for predatory crimes as well.

#### **Routine activities and sex offending**

Routine activity theory assumes that criminal victimization does not occur through a process of random distribution within society, and that crime-commission is a function of the convergence of lifestyles and criminal opportunity. Hence, daily activities and lifestyles nurture a criminal opportunity structure by enhancing the exposure and proximity of crime targets to motivated offenders (Felson and Cohen 1980; Miethe and Meier 1990). When looking at victimization, studies have shown time and again that one's activities and lifestyle contribute to their likelihood of being victimized (Miethe and Meier 1990; Tewksbury and Mustaine 2003). Certain lifestyles, for instance, drug addiction and association with the criminal element, result in a greater risk for victimization. Most studies that have looked at the influence of routine activities in sexual crimes have done so using demographic data to represent specific aspects of victims' lifestyles (e.g., Tewksbury et al. 2008). Although interesting, these studies fall short with respect to explaining just how offenders' and victims' routine activities actually influence the crime-commission process. Deslauriers-Varin and Beauregard (2010) examined how the routine activities of the victims of sexual crimes (i.e., where they were and what they were doing prior to the crime) influence the target selection scripts of repeat sex offenders. Scripts should be viewed as the routinization of the complete sequence of the criminal decision-making process. The notion of crime scripts thus helps in the understanding of behavioral routines (i.e., criminal events) and their identifiable stages and decision-making processes; crime scripts also aid in investigations of the complete crime-commission sequence (Cornish 1994, 1999). Deslauriers-Varin and Beauregard (2010) identified three scripts, namely: home, outdoors, and social. The authors also

found that target selection is highly influenced by the victim's routine activities and the physical environment in which the crime takes place. Similar to what Beauregard et al. (2007a, b) found, location type strongly influences the strategies an offender will use to commit the crime. Where the victim is and what the victim is doing will then influence the course of the crime.

Shifting the focus from victim to offender, only two studies have specifically examined sex offenders' routine activities and the impact of routine on *modus operandi*. Blanchette et al. (2009) identified three lifestyle profiles for rapists and child molesters: the festive, the orderly, and the isolated. Building upon this study, Pedneault and Beauregard (2014) used latent profile analysis to examine the offenders' routine activities based on three important centers of individual activity: the home, leisure, and transportation. Findings of this study lead to the establishment of five offender types. The "inactive loners" are characterized by a lack of involvement in social activities. These offenders spend the least amount of time with a romantic partner, and they report having few friends. They are unlikely to frequent bars or other venues for social interaction, be involved in sports, and spend the least amount of time engaged in watching television. They generally have limited mobility spending little time walking and/or driving. In contrast, the "social travelers" have a large social network and are more mobile, spending a significant amount of their time driving. The "single walkers" spend little time with romantic partners but spend a lot of time in drinking establishments or walking around. The "familial homebodies" spend most of their time engaged in domestic activities, such as being with a romantic partner and/or watching television. They tend to have a limited social network and do not frequent bars. Finally, the "partyers" are characterized by their engagement in a high volume of social activity. These offenders spend a considerable amount of time in bars and/or taverns every week. They tend to engage in drug use, and have a considerable social network. These five profiles illustrate that sex offenders spend many hours per week engaging in non-criminal activities. In fact, among the five profiles identified, only one is compatible with the typical image of the "antisocial" criminal—i.e., the partyer. These results do not support the use of a traditional distinction between offending environments of "being at home" or "being out" to understand opportunities for sexual offending. Such categorization ignores the dynamics involved in many sexual offenses. Similar to the study by Blanchette et al. (2009), and congruent with routine activity theory, the findings by Pedneault and Beauregard (2014) showed that the crime-commission process is influenced by lifestyle characteristics. As such, sex offenders from the partyer profile were more likely to

offend at night, when both offender and victim(s) were intoxicated. The partyer is more likely to use coercion to approach victims before sexually assaulting them in a single sexual event. The lifestyle profiles failed to distinguish victim characteristics (i.e., sex, age, and relationship). According to Pedneault and Beauregard (2014), the reason for an absence of significant differences based on victim characteristics was unknown and should be subject to further investigation.

#### Aim of the study

*CRAVED* has proven to be a useful model to explain various forms of theft (e.g., cellphones, Whitehead et al. 2008; bags, Smith et al. 2006; parrots, Pires and Clarke 2012; fish, Petrossian and Clarke 2014). The current study proposes that the *CRAVED* model may be effectively applied to sexual homicide in order to explain differential patterns of offending. More specifically, the aim of the study is to examine the indicators related to the *CRAVED* model in order to explain the differences between sexual homicide of children and sexual homicide of adults. In addition to the sexual preference hypothesis suggested by Abel et al. (1987), we propose that similar to property offenders, it is possible to explain—at least in part—the selection of particular targets/victims of sexual murderers based on indicators related to *CRAVED* but adapted to sexual crimes. Moreover, one of the overarching goals of this study is to build upon the growing research suggesting that sex offenders are capable of reasoning similar to other types of offenders.

#### Method

##### Sample and procedure

The sample includes a total of 350 cases of sexual homicide committed between 1948 and 2010 in Canada. Of the 350 cases, 79 offenders killed a child (71 female and 8 male; mean age = 12.8 years old; age range = 2–16) and 271 offenders killed an adult (246 female and 25 male; mean age = 31.9 years old; age range = 17–95). 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). More specifically, the case had to meet the definition of sexual homicide provided by the FBI, that means it had to include at least one of the following: (a) victim's attire or lack of attire, which refers to the victim state of dress at the time the body was discovered (e.g., victim completely naked upon discovery or partially undressed); (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). In the current sample, 25.1 % ( $n = 88$ ) of the cases presented evidence of sexual activities at the crime scene, other than vaginal and anal intercourse, while it was established that in 10.6 % of cases ( $n = 37$ ) post-mortem sexual activities occurred. Biological evidence suggesting sexual activities between the offender and the victim was also present in 24.0 % of the cases ( $n = 84$ ). In 85.4 % ( $n = 299$ ) of cases, the victims were found completely or partially naked, and evidence of foreign object insertion was found in 8.0 % of cases ( $n = 28$ ). Finally, unusual or bizarre acts (5.7 %,  $n = 20$ ) and biting the victim (7.4 %,  $n = 26$ ) were also evident in the sample. Information on all cases of sexual homicide was collected from a national database operated by the Royal Canadian Mounted Police (RCMP). The data contained within this database are provided by investigators assigned to the individual cases, and are submitted approximately 45 days into the investigation. Data related to the victim(s), the potential or suspected offender, offender behaviour during and after the crime, and any forensic information that may be available, were utilized in this study.

### Measuring *CRAVED*

As suggested by Petrossian and Clarke (2014), measures of *CRAVED* must be appropriate to the form of crime and the specific context examined. This is why the indicators have been uniquely conceptualized below for this study. In order to identify these indicators, we have reviewed carefully the information related to the crime that was available to the police and consider each item of *CRAVED*. What follows is the list of potential indicators for each item of *CRAVED* relevant to the crime of sexual homicide.

**Concealable** As explained by Clarke (1999), targets that are easy to identify or that cannot be concealed afterwards are less desirable and thus less likely to be selected by offenders. In the specific case of sexual homicide, we identified six indicators related to the Concealable component. Five of the six indicators are dichotomous (1 = yes, 0 = no): (1) forensic awareness, (2) used restraints/gags, (3) body moved, (4) concealed body, and (5) the case is unsolved.<sup>1</sup> The sixth indicator is the number of days to body recovery. It may be argued that victim selection (i.e., child versus adult), may influence concealment strategies or choices. Offenders may be more or less likely to use forensic awareness strategies (e.g., wearing gloves, wiping semen, destroying evidence), use restraints

to better control the victim and prevent an escape, and move the victim and conceal the body in order to avoid being associated with the crime. Moreover, victim type is likely to influence whether an offender is able to successfully avoid detection (i.e., case remaining unsolved after a certain time) and how long it will take to recover the body.

**Removable** It is suggested that targets that can be easily moved are more likely to be selected by offenders. This applies to victim selection in sexual homicide as well. Four dichotomous (1 = yes, 0 = no) indicators were identified: (1) victim build is thin, (2) victim abused alcohol/drugs, (3) body left in a residence, and (4) weapon used. It can be hypothesized that a victim who is small, frail, or even under the influence of a substance is more vulnerable and more likely to be targeted by an offender. Moreover, an offender is more likely to extract himself from a crime scene if he leaves the body in a residence, and as research has shown (e.g., Chan and Beauregard 2014), the use of a weapon may facilitate the removal of a victim from a certain location.

**Available** As with inanimate objects, in order to be targeted by an offender, a victim has to be visible and accessible (Clarke 1999). A total of seven dichotomous (1 = yes, 0 = no) indicators were identified to measure this component: (1) victim at home, (2) victim living with an adult, (3) victim outside on the street, (4) victim at recreational activities, (5) con approach, which refers to using a ruse to get in contact with the victim such as a false pretense (e.g., the offender pretends that he needs help with his car so that he can get access to the victim in her home), (6) contact with victim in a residence, and (7) offense in a residence. In a predatory crime such as sexual homicide, a victim is more likely to be targeted if the person is easily accessible, such as being out on the street or simply outside the home alone, or if the offender can approach the victim. The variable "victim at home" is very important to measure the availability of the victim as in most stranger crimes, victims are less accessible if they are inside their home. Moreover, victims in their home are arguably less visible than victims out on the street. However, in some cases the offender and the victim know each other. This may cause the crime event to move from a public space (e.g., the street) to a more private space (e.g., a residence). For instance, with the variable "contact with victim in a residence", it is important to consider this aspect as it may facilitate the commission of the crime as the victim is readily available in a place that protects the offender from discovery by by-standers. This could be the case of an offender meeting the victim at a party or an offender responsible of babysitting a child while parents are away from the home. Then, the variable "offense in a residence" is simply that after the

<sup>1</sup> Solved cases are those where the offender has been identified but may or may not have been charged with the offense. If there is more than one offender responsible, and at least one of them has not been identified, the case is considered unsolved.

encounter between the offender and the victim, the crime takes place in a residence, which could be the victim's, the offender's or neither.

*Valuable* Clarke (1999) suggested that the most valuable goods are more likely to be targeted by thieves, and this also holds true for sex offenders. It can be difficult to operationalize the concept of value in terms of human targets. What makes a victim valuable will differ from one offender to the next. However, research has suggested that for many offenders, younger victims are a desired target (Felson 2002; Tedeschi and Felson 1994). Thus, victim age has been chosen to represent the valuable indicator of *CRAVED* in the current study. The age of the victim was dichotomized (1 = adult—17 or older; 0 = child—16 or younger) to measure this component of *CRAVED*. The distinction between childhood and adulthood was defined in terms of the age 16 as this is the age of consent in Canada. Sixteen has been the age of consent in Canada since 2008 when the age was increased from 14 (Government of Canada 2014). The current study used this indicator as the dependent variable for the bivariate and multivariate analyses.

*Enjoyable* Thieves will select products that can bring them pleasure (e.g., DVD player, television) over other goods of a similar value (e.g., microwave, espresso machine). Although less obvious in sexual crimes, it can be argued that offenders will target victims who will allow them to obtain sexual gratification. For the purpose of this study, three dichotomous (1 = yes, 0 = no) indicators were used: (1) vaginal sex, (2) anal sex, and (3) beating. Arguably, if an offender is seeking sexual gratification, they are more likely to target a victim whom they will be able to control and therefore commit the sexual acts of their choosing (with penetration offenses being desired). In some cases this includes selecting a victim whom they will be able to physically assault as well in order to fulfill deviant sexual fantasies (see Beauregard and Proulx 2002).

*Disposable* Similar to the thief who is likely to select products that are easy to sell or fence, offenders involved in predatory crimes are likely to target victims and engage in behaviours that will make it easier to control and/or dispose of the victim during and after the offense. For our purpose, three dichotomous (1 = yes, 0 = no) indicators were identified: (1) victim is a stranger, (2) stabbing the victim, and (3) use of strangulation to kill the victim. The reason why strangulation is the only method of killing used in the study is because it is the main one. In sexual homicide, contrary to most homicide, strangulation is the usual method used to cause death (see Chan and Beauregard 2014). It is easier for an offender to avoid detection if he has no connection to the victim or if the victim can no longer resist. Victims are easier to control

when certain injuries (stabbed) are inflicted or when no longer alive (strangled) (Table 1).

### Analytical strategy

First, we assessed the relationship between each independent variable against the dependent variable at the bivariate level, and we chose only the significant predictors for multivariate analyses to increase statistical power with our relatively small sample. Second, logistic regression was used to assess the impact of all the indicators of each component of *CRAVED* on the choice of victim in cases of sexual homicide.

### Results

When examining the bivariate relationships between the type of victim and each of the indicators of the *CRAVED* components, Table 2 shows that among the 23 variables investigated, eleven are not significantly related to the type of sexual murderer: victim is a stranger, con approach, forensic awareness, using restraints/gags, using a weapon, vaginal sex, anal sex, moving the body, concealing the body, contact and offense locations are a residence. As to the significant variables, two Concealable indicators were significant or approaching significance. Thus, offenders who target adults are more likely to remain undetected, but the police recover the victim's body quicker, than those who target a child victim<sup>2</sup> (approaching significance). Three out of the four indicators of Removable were significant. Offenders who target an adult are more likely to choose a victim of thin build, who has abused alcohol and/or drugs, and they are more likely to leave the victim in a residence after the crime. In terms of the Available component of *CRAVED*, four indicators were significantly related (or approaching significance) to the choice of victim. Offenders who target adult victims are less likely to attack at home, if the victim is living with another adult, and if the victim is outside on the street. However, offenders are more likely to attack the adult victim when the person is participating in recreational activities. The only indicator of Enjoyable that was significant indicates that offenders who target adults are less likely to physically beat their victim. Finally, results of the Disposable indicators showed that offenders who target adults are less likely to strangle but more likely to stab their victim to inflict fatal injury.

Table 3 presents the findings from the sequential logistic regression analyses on the type of victim targeted using the *CRAVED* indicators that were significant (or approaching significance) at the bivariate level. Model 1 examines only the effect of Concealable on the type of victim targeted. Results show that the model is significant

<sup>2</sup> It should be noted that only 8 victims were male.

**Table 1** Frequencies *CRAVED* indicators for all cases of sexual homicide (N = 350)

| Indicators for <i>CRAVED</i>                | %     | <i>n</i> |
|---|-------|----------|
| <i>Concealable</i>                          |       |          |
| Forensic awareness                          | 45.7  | 160      |
| Used restraints/gags                        | 14.9  | 52       |
| Body moved                                  | 34.0  | 119      |
| Concealed body                              | 36.0  | 126      |
| Unsolved                                    | 27.7  | 97       |
| Number of days to recover body <sup>a</sup> | 71.09 | 384.22   |
| <i>Removable</i>                            |       |          |
| Victim build is thin                        | 34.3  | 120      |
| Victim abuses alcohol/drugs                 | 45.1  | 158      |
| Body recovery—residence                     | 23.1  | 81       |
| Weapon used                                 | 54.0  | 189      |
| <i>Available</i>                            |       |          |
| Victim at home                              | 27.7  | 97       |
| Victim living with adult                    | 65.1  | 228      |
| Victim outside on the street                | 33.1  | 116      |
| Victim at recreational activities           | 25.1  | 88       |
| Con approach                                | 40.6  | 142      |
| Contact location—residence                  | 27.4  | 96       |
| Offense location—residence                  | 27.4  | 96       |
| <i>Valuable</i>                             |       |          |
| Victim is a child                           | 22.6  | 79       |
| <i>Enjoyable</i>                            |       |          |
| Vaginal sex                                 | 46.3  | 162      |
| Anal sex                                    | 16.3  | 57       |
| Beating                                     | 47.1  | 165      |
| <i>Disposable</i>                           |       |          |
| Victim is stranger                          | 25.7  | 90       |
| Stabbing                                    | 21.1  | 74       |
| COD is strangulation                        | 26.6  | 93       |

<sup>a</sup> Mean is reported in the % column and the standard deviation in the *n* column

( $\chi^2 = 10.63, p < 0.001$ ), with a Cox and Snell  $R^2$  of 0.03. Sexual murderers who target an adult are more likely to avoid detection and see the case remain unsolved ( $\beta = 0.80, p < 0.05$ ). Model 2 looks at the effect of the Removable indicators while taking into account the Concealable indicators. Results show that the model is significant ( $\chi^2 = 51.41, p < 0.001$ ), with a Cox and Snell  $R^2$  of 0.15. Offenders who target adults are still more likely to avoid detection ( $\beta = 1.03, p < 0.01$ ). Moreover, offenders who target adults are more likely to choose a victim of thin build ( $\beta = 0.76, p < 0.001$ ), who abused alcohol/drugs ( $\beta = 1.01, p < 0.001$ ), and they are more likely to leave the body in a residence ( $\beta = 1.55, p < 0.001$ ). The third model examines the effect of the Available indicators while also taking into account the Concealable and

Removable indicators. Results show that the model is significant ( $\chi^2 = 89.53, p < 0.001$ ), with a Cox and Snell  $R^2$  of 0.24. Similar to Model 2, offenders targeting adults are more likely to avoid detection ( $\beta = 0.96, p < 0.01$ ), choose a victim of thin build ( $\beta = 0.67, p < 0.01$ ), and leave the victim in a residence after the murder ( $\beta = 1.31, p < 0.01$ ). However, choosing a victim who abused alcohol/drugs is no longer significant ( $\beta = 0.55, p > 0.10$ ). Results show that offenders who target adults are also less likely to attack the victim when the person is at home ( $\beta = -0.94, p < 0.05$ ), living with another adult ( $\beta = -2.34, p < 0.001$ ), or outside on the street ( $\beta = -0.75, p < 0.05$ ). The fourth model examines the effect of the Enjoyable indicators while also considering the Concealable, Removable, and Available indicators. Results show that the model is significant ( $\chi^2 = 92.58, p < 0.001$ ), with a Cox and Snell  $R^2$  of 0.25. The findings of Model 4 are very similar to those of the previous model, with the exception of beating the victim, which is less likely to happen when offenders target adults ( $\beta = -0.54, p < 0.10$ ). Finally, Model 5 looks at all the indicators of *CRAVED* (except for Valuable, which is used as the dependent variable here). Results show that the model is significant ( $\chi^2 = 93.37, p < 0.001$ ), with an unchanged Cox and Snell  $R^2$  of 0.25. Offenders who target adults are more likely to avoid detection ( $\beta = 0.93, p < 0.05$ ), to choose victims of thin build ( $\beta = 0.65, p < 0.01$ ), and to leave them at a residence after the crime ( $\beta = 1.27, p < 0.01$ ). Moreover, offenders who target adults are less likely to attack the victims at home ( $\beta = -0.92, p < 0.05$ ), if they are living with at least one other adult ( $\beta = -2.28, p < 0.001$ ), and if they are outside on the street ( $\beta = -0.76, p < 0.05$ ). In addition, offenders who target adults are less likely to beat their victim ( $\beta = -0.52, p < 0.10$ ). None of the indicators for Disposable were significantly related to the type of victim.

### Supplementary analyses

To further investigate the factors that could explain why offenders target one victim type over another, we examined different offender characteristics.<sup>3</sup> We looked at the offender's build (i.e., whether the offender was thin or not), his abuse of alcohol and/or drugs at the time of the crime, whether he was single, frequently engaged in social and/or criminal activities, and whether he presented any prior violent, sexual, or property convictions. Moreover, we looked at whether the offender possessed a sexual collection and whether he exhibited evidence of paraphilic behavior. Interestingly, of all these variables, only the last two proved to be significant. Hence,

<sup>3</sup> These analyses were conducted on a subsample of 229 offenders as the original sample included unsolved cases for which no information about the offender was available for obvious reasons. These bivariate analyses are available upon request from the first author.

**Table 2 Bivariate analyses between guardianship, modus operandi, locations, and the type of sexual murderer**

| Variables                                   | Sexual murderers of children<br>(n = 79) | Sexual murderers of adults<br>(n = 271) | Phi, Cramer's V, F |
|---|--|---|--------------------|
| <i>Concealable</i>                          |  |   |                    |
| Forensic awareness                          | 44.3 (35)                                | 46.1 (125)                              | 0.02               |
| Used restraints/gags                        | 11.4 (9)                                 | 15.9 (43)                               | 0.05               |
| Body moved                                  | 34.2 (27)                                | 33.9 (92)                               | -0.002             |
| Concealed body                              | 31.6 (25)                                | 37.3 (101)                              | 0.05               |
| Unsolved                                    | 19.0 (15)                                | 33.2 (82)                               | 0.13**             |
| Number of days to recover body <sup>a</sup> | 140.53 (754.55)                          | 50.85 (156.60)                          | 3.36 <sup>†</sup>  |
| <i>Removable</i>                            |  |   |                    |
| Victim build is thin                        | 49.4 (39)                                | 29.9 (81)                               | 0.20***            |
| Victim abuses alcohol/drugs                 | 31.6 (25)                                | 49.1 (133)                              | 0.15**             |
| Body recovery—residence                     | 11.4 (9)                                 | 26.6 (72)                               | 0.15**             |
| Weapon used                                 | 58.2 (46)                                | 52.8 (143)                              | -0.05              |
| <i>Available</i>                            |  |   |                    |
| Victim at home                              | 35.4 (28)                                | 25.5 (69)                               | -0.09*             |
| Victim living with adult                    | 96.2 (76)                                | 56.1 (152)                              | -0.35***           |
| Victim outside on the street                | 55.7 (44)                                | 26.6 (72)                               | -0.26***           |
| Victim at recreational activities           | 19.0 (15)                                | 26.9 (73)                               | 0.07 <sup>†</sup>  |
| Con approach                                | 44.3 (35)                                | 39.5 (107)                              | -0.04              |
| Contact location—residence                  | 31.6 (25)                                | 26.2 (71)                               | -0.05              |
| Offense location—residence                  | 21.5 (17)                                | 29.2 (79)                               | 0.07               |
| <i>Valuable</i>                             |  |   |                    |
| Victim is a child                           | -  | -                                       | -                  |
| <i>Enjoyable</i>                            |  |   |                    |
| Vaginal sex                                 | 44.3 (35)                                | 46.9 (127)                              | 0.02               |
| Anal sex                                    | 20.3 (16)                                | 15.1 (41)                               | -0.06              |
| Beating                                     | 59.5 (47)                                | 43.5 (118)                              | -0.13**            |
| <i>Disposable</i>                           |  |   |                    |
| Victim is stranger                          | 24.1 (19)                                | 26.2 (71)                               | 0.02               |
| Stabbing                                    | 15.2 (12)                                | 22.9 (62)                               | 0.08 <sup>†</sup>  |
| COD is strangulation                        | 35.4 (28)                                | 24.0 (65)                               | -0.11*             |

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ <sup>†</sup>  $p < 0.10$ <sup>a</sup> Means are reported with the standard deviation in parentheses

offenders who possess a sexual collection ( $\chi^2 = 4.14$ ,  $p < 0.05$ ,  $\phi = -0.13$ ) and exhibit paraphilic behaviors ( $\chi^2 = 8.18$ ,  $p < 0.01$ ,  $\phi = -0.19$ ) are more likely to target children.

### Discussion and conclusion

Using indicators from *CRAVED*, this study identified several differences between the sexual homicide of children and the sexual homicide of adults. When considering all of the indicators at once, the study found that sexual murderers who specifically target adults (mainly women) are more likely to attack a victim of thin build, leave the body in a residence, and remain undetected by the police. However, offenders who target children are more likely to find the victim at home or outside on the street, be living with

another adult, and they are more likely to physically beat the victim during the criminal event. In line with the findings from Beauregard et al. (2008), it appears that sexual murderers adapt their modus operandi to the type of victim they target, or, that the type of victim encountered will necessitate an adaptation of their modus operandi to suit the situation. This adaptation of the modus operandi seems to be related to the victims' routine activities. For instance, children are more likely to be encountered at home or close to home outside on the street. Because of their age, they are also likely to live with at least one adult. As suggested by Felson and Cohen (1980), the daily activities nurture a criminal opportunity structure by enhancing the exposure and proximity of crime targets to motivated offenders. On the other hand, when offenders target an adult, the

**Table 3 Sequential logistic regression models of guardianship, modus operandi, and location on the type of sexual murderer**

| Variables                         | Model 1<br>$\beta$ (SD) | Model 2<br>$\beta$ (SD) | Model 3<br>$\beta$ (SD) | Model 4<br>$\beta$ (SD)   | Model 5<br>$\beta$ (SD)   |
|-----------------------------------|-------------------------|-------------------------|-------------------------|---------------------------|---------------------------|
| <i>Concealable</i>                |                         |                         |                         |                           |                           |
| Unsolved                          | 0.80 (0.32)*            | 1.03 (0.34)**           | 0.96 (0.37)**           | 0.94 (0.38)*              | 0.93 (0.38)*              |
| Number of days to recover body    | -0.001 (0.001)          | -0.001 (0.001)          | -0.001 (0.001)          | -0.001 (0.001)            | -0.001 (0.001)            |
| <i>Removable</i>                  |                         |                         |                         |                           |                           |
| Victim build is thin              | -                       | 0.76 (0.23)***          | 0.67 (0.25)**           | 0.65 (0.25)**             | 0.65 (0.25)**             |
| Victim abuses alcohol/drugs       | -                       | 1.01 (0.30)***          | 0.55 (0.34)             | 0.51 (0.34)               | 0.52 (0.35)               |
| Body recovery—residence           | -                       | 1.55 (0.42)***          | 1.31 (0.51)**           | 1.30 (0.51)**             | 1.27 (0.51)**             |
| <i>Available</i>                  |                         |                         |                         |                           |                           |
| Victim at home                    | -                       | -                       | -0.94 (0.40)*           | -0.90 (0.41)*             | -0.92 (0.41)*             |
| Victim living with adult          | -                       | -                       | -2.34 (0.62)***         | -2.31 (0.62)***           | -2.28 (0.62)***           |
| Victim outside on the street      | -                       | -                       | -0.75 (0.34)*           | -0.79 (0.35)*             | -0.76 (0.35)*             |
| Victim at recreational activities | -                       | -                       | 0.36 (0.41)             | 0.31 (0.41)               | 0.31 (0.41)               |
| <i>Valuable</i>                   |                         |                         |                         |                           |                           |
| -                                 | -                       | -                       | -                       | -                         | -                         |
| <i>Enjoyable</i>                  |                         |                         |                         |                           |                           |
| Beating                           | -                       | -                       | -                       | -0.54 (0.31) <sup>†</sup> | -0.52 (0.31) <sup>†</sup> |
| <i>Disposable</i>                 |                         |                         |                         |                           |                           |
| Stabbing                          | -                       | -                       | -                       | -                         | 0.27 (0.43)               |
| COD is strangulation              | -                       | -                       | -                       | -                         | -0.15 (0.34)              |
| Constant                          | 0.19 (0.42)             | -2.07***                | 0.88 (0.93)             | 1.23 (0.95)               | 1.17 (0.95)               |
| $\chi^2$                          | 10.63**                 | 51.41***                | 89.53***                | 92.58***                  | 93.37***                  |
| Cox and Snell R <sup>2</sup>      | 0.03                    | 0.15                    | 0.24                    | 0.25                      | 0.25                      |

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ <sup>†</sup>  $p < 0.10$ 

size of the potential victim may become important. Thus, these offenders will prefer a victim of thin build in order to facilitate the commission of the crime. Such a factor is not important when the victim is a child as they are typically considerably smaller than the offender. For instance, Beauregard and Field (2008) found that young victims are more readily transportable from the crime scene to the disposal sites and are easier to hide because they are smaller and easier to control. This illustrates the importance of the inertia of target as proposed in the routine activity theory (Felson 2002) or the removable component of *CRAVED*. These findings are also congruent with the scripts identified by Deslauriers-Varin and Beauregard (2010). As shown in their study, it appears that target selection is highly influenced by the victim's routine activities and the physical environment in which the crime takes place.

However, the current findings also lend some credibility to the hypothesis that sexual murderers of children may actually exhibit important behavioural/trait differences from sexual murderers of adults. In addition to the components of *CRAVED*, we analyzed at the bivariate level the possible differences that exist among offender characteristics between sexual murderers of children and adults.

Although the two groups of offenders presented more similarities, two significant differences emerged. Sexual murderers of children are more likely to present evidence of paraphilic behaviors as well as possess a sexual collection. Despite being in line with the findings from Spehr et al. (2010) who found that sexual murderers of children were more likely to have committed sexual abuse prior to the crime, we believe that the two differences observed in the current study can actually represent differences in the offenders' routine activities. As suggested by Pedneault and Beauregard (2014), the crime-commission process is influenced by the lifestyle characteristics of the offender, which is congruent with the routine activity theory. Hence, offenders' routine activities (the collection of child pornography and engagement in paraphilic behaviours) will be useful indicators in turns of predicting their interest in committing a hands on offense against a child victim. Even if this could very well be attributed to a difference in sexual preference, the fact is that, on some level, the lifestyle of these offenders impacts their target selection.

Despite *CRAVED* having been suggested to specifically explain theft and hot products, we believe it can also be applied to violent crimes, such as sexual crimes and



sexual homicide. Following the demonstration by Felson (2002), it is possible to identify indicators relevant to each component of *CRAVED*, even in sexual crimes. Offenders seek to procure a specific type of victim or commodity in the commission of their crime. This argument may be made in the case of property offenses, such as theft, where specific valuable commodities are sought which will have financial benefits for the offender. The argument may also be made in the case of interpersonal crime where in the place of a valuable commodity a desired victim is sought to provide personal benefits (for example, sexual gratification) for the offender. Although interpersonal crimes often appear opportunistic, whether or not an offender attacks a specific victim is a choice, albeit sometimes one made with haste. The choice of victim is dependent upon a number of factors. *CRAVED* identified some of these factors. Our bivariate analyses showed that each component of *CRAVED* was useful to explain the choice of a child or an adult victim in sexual homicide. However, when looking at *CRAVED* from a multivariate analysis, the findings revealed that surprisingly one component of *CRAVED* did not add to one's understanding of victim selection, namely disposable. We do not believe this suggests that the disposable component is not important in sexual homicide. Instead, the absence of significant differences could be attributed to the present conceptualization of disposal (i.e., the specific indicators used) and the lack of availability of other information that would allow for a different conceptualization.

*CRAVED* constitutes a novel way to examine victim selection in sexual crimes. Traditionally, the selection of a child over an adult in sexual crimes has been explained by different sexual preferences (e.g., Abel et al. 1987). Although the sexual preference hypothesis can explain why some offenders prefer children, this does not provide a comprehensive understanding, particularly when considering offenders who target both adult and child victims. Victim-choice polymorpha (Guay et al. 2001) refers to the offender's choice of different victims over time. Although it appears that offenders show relative stability across offenses for such characteristics as victim age, victim gender, and offender–victim relationship (e.g., Guay et al. 2001), Weinrott and Saylor (1991) noted that the type of data being analyzed must be taken into account when examining crime-switching patterns, as versatility is often greater in studies using self-report, rather than official data. For instance, Heil et al. (2003) found that 70 % of their sample sexually offended against both children and adult victims. In such cases, preference cannot adequately explain the selection process. *CRAVED* allows for an examination of an even broader range of factors that can explain why an offender would choose a child over an adult in some circumstances and not in others.

Moreover, when using *CRAVED* to examine the choice of victim in sexual homicide, it also becomes possible to identify situational crime prevention strategies. For instance, *CRAVED* clearly indicated that factors related to being removable and available were important in explaining the choice of victim in sexual homicide. Therefore, it becomes important to act on the availability and removability of the victim. As proposed by Wortley and Smallbone (2006), one possible way to act on the availability of the victim is through public education programs that can be put in place to sensitize parents or caregivers to the need for effective supervision of children in their care. Moreover, as child victims may be easily targeted because they are outside on the street, it is possible to design or restructure public places, extend guardianship, or increase the natural surveillance of outdoor public places (e.g., removing blind spots and natural obstacles, trimming bushes in parks or public spaces; Wortley and Smallbone 2006). In addition, implementing or increasing the frequency of police routine patrol or other types of surveillance teams (e.g., neighborhood watch), are other methods of extending guardianship and creating the illusion of surveillance and increase the risk of apprehension.

Despite the interesting findings and the practical implications, this study is not without limitations. The most obvious limitation is the nature of the data. The data are limited to what is observed by the police at the crime scene or revealed through investigation. Moreover, despite police databases being a useful source of data, that provide a significant amount of detail relating to the offense, they unfortunately offer very little information about the offenders themselves. In addition, as the study includes cases that were unsolved at the time of data entry, it was not possible to examine a wide range of offender characteristics and how they relate to the choice of victim. Finally, we realize that the different indicators used to measure the different items of *CRAVED* are not necessarily exclusive and that one indicator could be used for more than one item. Although this did not constitute a major obstacle in the current study, it nonetheless points toward the need to identify several indicators for each item of *CRAVED* to make sure that each item is well-measured.

Future studies will be needed to replicate the present findings. It would be interesting to see *CRAVED* being used to explain other forms of sexual crimes. Considering that the current study is the first to apply *CRAVED* to sexual crimes, there is a need to develop a list of indicators that measure the different components of the model. In doing so, it will allow us to improve our understanding of sexual crimes, as well as develop more effective prevention strategies.

### Authors' contributions

EB and MM have equally participated to the conception and design of the study, data collection, analysis, and interpretation. EB and MM have equally been involved in drafting the manuscript and revising it for important intellectual content. Both EB and MM have given final approval of the version to be published and have agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors read and approved the final manuscript.

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### Compliance with ethical guidelines

### Competing interests

The authors declare that they have no competing interests.

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