Risky business: Deadliest predictors of sex-trade worker sexual victimization

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Conflict of interest

Acknowledgements

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Abstract

Although relatively rare, sexual homicide has stimulated research efforts to better understand and intervene in the prevention of such crime. However, specific high-risk victims such as sex-trade workers have been understudied. To contribute to the limited scientific literature on this topic, the current study examines the characteristics of the sexual victimization of sex-trade workers using a sample of 402 lethal and non-lethal cases. Bivariate and multivariate analyses indicate that the lethal outcome associated with the sexual victimization of sex-trade workers may not be associated with sadism and paraphilic behaviors, but rather by excessive violence and victim's vulnerabilities. Conjunctive analysis further indicated that the combination of excessive violence, victim's intoxication, situational factors, and crime characteristics was associated with lethal sexual victimization of sex-trade workers. Findings suggest strategies in the development of situational prevention and intervention strategies.

Keywords: Lethal outcome, conjunctive analysis, sex-trade workers, sexual victimization, crime escalation

Introduction

Predicting severe forms of sexual violence is a common goal for both researchers and practitioners. Because of its important consequences, lethal sexual victimization has been the object of many studies, despite the relative rarity of this phenomenon (i.e., less than 5% of all homicides; Beauregard & Martineau, 2017; Chopin & Beauregard, 2021; Roberts & Grossman, 1993). The low base rate of this crime has been associated with methodological research limitations, such as the heterogeneity of the samples studied, including offenders and victims with very different characteristics into research designs (see Chopin & Beauregard, 2021). Also, if most of the contemporary knowledge concerned sexual homicide of adult women from the general population,

less is known about more specific types of lethal sexual victimization, such as those committed against marginalized populations, namely women who engage in sex-trade work. As compared to other women, sex-trade workers remain however overrepresented in the homicide rates (Brewer et al., 2006). Also, not only this type of sexual victimization remains particularly understudied, but the laws regulating sex-trade work may lead women who practice it to get isolated due to fear of prosecution, thus enhancing their vulnerability to sexual exploitation.

Many theoretical perspectives can be taken to understand sexual offending and, more specifically, its lethal outcome. In criminology, the rational choice theory (Cornish & Clarke, 1986, 1987) and the routine activity theory (Cohen & Felson, 1979) offer a relevant framework to understand why some individuals engage in lethal and non-lethal sexual victimization as well as why some victims are more vulnerable to such victimization. The rational choice theory postulates that an offender rationally engages in a crime by considering the possible earnings as well as costs incurred associated with his behavior, making crime decisions based on the most profitable calculation (i.e., maximal profit for minimal cost) (Clarke & Cornish, 1985; Piquero & Tibbetts, 2002). Many benefits are thought to be retrieved from sexual offending (e.g., number of sexual acts, intrusive sexual acts) or sexual homicide (e.g., sexual sadism), and such behaviors are associated with various costs (e.g., being caught by police) (see Chopin et al., 2020). In a complementary manner, the routine activity theory provides a contextual view of crime based on the interactions of offenders and victims with their environment. This theory suggests that crimes are committed during everyday activity (e.g., sex-trade work) by a motivated offender upon a vulnerable victim where no gradian are present to intervene (Cohen & Felson, 1979).

In this study, we focused on understanding the sexual victimization of sex-trade workers, with a particular interest in identifying factors associated with lethal outcome. We voluntarily chose to refer to these women as sex-trade workers rather to prostitutes, consistent with studies that promote a less stigmatizing vocabulary (Sawicki et al., 2019), and also moving away from the perspective suggesting that these women are defined only by the activities in which they engage. Getting a better understanding of this specific form of lethal sexual violence could contribute to the refinement of theoretical models explaining the lethal outcome of sexual offending and homicide, including to verify whether they apply adequality for this specific form of lethal sexual victimization. As well, the study of the sexual victimization of sex-trade workers may help to establish tailored prevention measures adapted to such specific contexts.

Violence Committed Against Sex Trade Workers

Women who engage in sex-trade work usually evolve in a risky environment which, combined with a lack of resources to protect them (Salfati et al., 2008; Wenzel et al., 2000), makes them particularly vulnerable to victimization. They are nomadic, widely visible and accessible, and may engage in risky behaviors (e.g., drug use), enhancing their vulnerability (Pagliaro et al., 1993; Ressler & Shachtman, 1997; Salfati et al., 2008; Shannon et al. 2009). From a rational perspective, these characteristics make sex-trade workers victims of

choice for motivated offenders wishing to victimize them. Furthermore, given a general unfavorable public opinion about women who engage in sex-trade activities, these women are also more likely be targeted for sexual violence by men who share this negative opinion, or by men who believe that violence towards sex workers will remain uninvestigated by authorities (Beckham & Prohaska, 2012; Chan; 2021; Fox & Levin, 1994). The idea that women who engage in sex-trade are at the complete disposal of their client is common (Salfati et al., 2008). Thus, the prevalence of victimization (i.e., physical and/or sexual) is important among sex-trade workers, with proportions as large as two-thirds to three-quarters of the samples (Church et al., 2001; Evens et al., 2019; Farley & Barkan, 1998). Not only violence is part of the sex-trade work – even expected from those who practice it (Bisschop et al., 2017; Dalla et al., 2003) – but also characterize the history of women who engage in such activity. A study showed that 24% of adults who experienced a sexual assault reported having engaged in sex-trade behaviors following their victimization (Campbell et al., 2003).

Many factors may contribute to sex-trade workers victimization. The location of activities was found to have an influence on their victimization (Sorochinski & Salfati, 2019). Women who engaged in sex-trade behaviors or solicitation on the street were more likely to be victims of violence as compared to who those who did so indoors (Deering et al., 2014; Raphael & Shapiro, 2004; Shannon et al., 2009). The use of drug was also found to be associated with violence perpetrated by their clients (Shannon et al., 2009; Salfati & Sorochinski, 2021). Past studies found that the use of intoxicative substance increases the level of violence employed during sexual victimization (Beauregard et al., 2005; Brecklin & Ullman, 2010) while impacting the offender's rational cost-benefit analysis associated with his behavior (Assaad & Exum, 2002; Exum, 2002). Moreover, the nature of the relationship with these clients and their characteristics influenced the propension to be victimized. Researchers have highlighted that many women prefer to engage in sex-trade with known and older clients who are perceived as safer (Safalti et al., 2008, Sharpe, 1998). The mobility of sex trader workers with their clients (i.e., moving from a meeting location point to another location for the sexual activities) was also found to be associated with more victimization (Shannon et al., 2009). It was also found that although being maintained by a pimp can contribute to the protection of sex-trade workers against violent clients, these women were often victimized by their pimp (McLeod, 1982; Salfati et al., 2008).

The Lethal Victimization of Sex Trade Workers

Very few studies have looked at the sexual homicide of sex-trade workers and even less have examined factors predicting the lethal outcome. The marginalized lifestyle of these women makes it difficult to estimate the actual prevalence of their homicide as well as to determine offenders' modus operandi (Chan, 2021; Chan & Beauregard, 2019; Potterat et al., 1990; Quinet, 2011; Salfati et al., 2008). Sex-trade workers were more likely to be killed than women from the general population, and women who solicit clients for sexual services on the street were more likely to be killed than those who practice indoor sex-trading (Kinnell, 2001).

In comparing homicides of sex-trade workers to sexual and non-sexual homicides, Salfati et al., (2008) found that offenders with sex-trade worker victims were more likely to be strangers, have prior convictions for

violence, and being employed, but also less likely to have prior convictions for sexual crimes than both comparison groups. Sex-trade workers bodies were also more likely to be transported, found outside, and at a different crime scene than other victims of homicide (Salfati et al., 2008). Looking at marginalized victims (including homeless persons, severe drug users, and a majority of sex-trade workers), Horan and Beauregard (2017) found that among men who engage in sexual homicide of women, those who specifically targeted marginal victims exhibited a variety of offending pathways characterized by deviant fantasies, anger, situational opportunities, and victim characteristics. Also, they noted that the lethal outcome of their sexual victimization was associated with substance abuse, use of coercion and humiliation, as well as a lack of premeditation (i.e., victim was randomly selected and no weapon was brought to the crime scene) and a lack of forensic awareness strategies to avoid detection (e.g., victim's body was left at the crime scene; Horan & Beauregard, 2019). Different motivational patterns were also found among series of sex-trade workers homicides and sexual victimization studied by Salfati and Sorochinski (2019). Chan and his colleagues (2019; 2021) also examined the characteristics of lethal sexual victimization of female sex-trade workers and found distinctive characteristics. Notably, the authors found that this form of victimization was typically committed by white male aged in their early 30s, and in highly populated areas (Chan & Beauregard, 2019). Furthermore, in comparison with the lethal sexual victimization of non-sex workers, Chan (2021) found that sex-trade workers were more likely to be killed by strangers with blunt objects.

Factors Explaining the Lethal Outcome in Sexual Offending

Studies have compared offender, victim, and crime characteristics of non-lethal sexual offending, non-sexual homicide, and sexual homicide in order to identify factors associated with the death of the victims. In general, there are few differences between the non-lethal and lethal outcome of sexual victimization when the level of violence is not considered (Beauregard & Martineau, 2018). However, specific patterns were found across these forms of victimization when the level of violence is taken into consideration (Beauregard & DeLisi, 2018, 2021; Beauregard et al., 2018; Chopin & Beauregard, 2019a). Most cases of sexual homicides involved a stranger victim, targeted randomly (Beauregard & Martineau, 2017b; Chopin & Beauregard, 2019a, 2019b) by an offender characterized by social isolation, paraphilias, and anger (e.g., Milsom et al., 2003; Beauregard & Martineau, 2016; see also Beauregard & Chopin 2020 for a review). Offenders who used weapons and more force than necessary were more likely to kill their victim (Beauregard & Martineau, 2017). Also, men who engage in lethal sexual victimization tend to be more forensically aware than those who engage in non-lethal sexual victimization, coherent with the rational choice theory suggesting that they deploy strategies to reduce the risk of being detect by the authorities (Chopin et al., 2020). Other findings suggest that men who engage in sexual homicide are more likely to resemble men who engage in non-lethal sexual offending; in some cases, the lethal outcome was not necessarily the best discriminant factor to understand these offenders (Stefanska et al., 2016).

Victim's death as the outcome of deviant fantasies

Sexual fantasies in which offenders posit themselves as dominant, superior to others or omnipotent, or in which the act of killing is sexualized may partially explain the lethal sexual victimization (Chan et al., 2011, 2015, 2017; Chopin et al., 2021, 2022; Higgs et al., 2017; Meloy, 2000; Prentky et al., 1989; Stefanska et al., 2017). Comparing lethal sexual offending of women to non-lethal sexual offending, researchers found higher rates of deviant sexual fantasies (e.g., sadism) among men who committed homicides (Proulx et al., 2007). Other sexual motivations including other non-coercive paraphilias (e.g., exhibitionism, fetishism, frotteurism) and hypersexuality were found to characterized lethal sexual victimization (Beauregard & Proulx, 2002; Langevin et al., 1988; Prentky et al., 1989; Stefanska et al., 2015). Men who engage in sadistic sexual homicides were found to have more convictions for violent and sexual offenses (Beech et al., 2005; Kocsis et al., 2002), to engage in an organized crime process characterized by the use of ruse, the identification of vulnerable characteristics among potential victims, and the pre-selection of an isolated crime scene location (Beauregard & Martineau, 2016; Ressler et al., 1988; Beauregard & Proulx, 2002; Chopin & Beauregard, 2020). Such homicides were also characterized by sexualized violence, including humiliation, mutilation, and torture of the victims (e.g., Chopin et al., 2022; Chopin & Beauregard, 2020a; Higgs et al., 2017; Stefanska et al., 2015). If sexual sadism, fantasies or interests are widely recognized as being one of the explanations of lethal sexual victimization, and characteristics of a specific group of offenders (i.e., sadistic/sexualized murderers; see Chai et al., 2021 for a review), the escalation of violence leading to lethal outcome is also an important explanation of such victimization.

Victim's death as the outcome of crime escalation

Sexual offending against adult women is frequently characterized by hostility towards women and excessive anger (see Knight & Prentky, 1989; Malamuth et al., 1991), which sometime escalate and lead to a lethal outcome (Healey et al., 2016). Typically, and in contrast with offenders driven by sadistic motivation for whom violence is used to satisfy deviant fantasies, researchers have identified a subgroup of offenders who kill – sometimes overkill, impulsively and with excessive violence as a result of anger (Beauregard & Proulx, 2002; Chan et al., 2015; Ressler et al., 1988). Lethal sexual victimization in this context is disorganized, characterized by a lack of premeditation and physical restraints, and a randomly selected crime scene location (Beauregard & Proulx, 2002; Chopin & Beauregard, 2019c; 2021). Victims tend to be known by the offenders, and the rape of the victims – not the murder – is the main motivation (Beech et al., 2001). Typically, victims are strangled or asphyxiated, as well as left at the crime scene (Beauregard & Proulx, 2002; Beech et al., 2001, 2005; Chai et al., 2021, Chopin & Beauregard, 2020; Kocsis et al., 2002; Stefanska et al., 2015). Men who engage in sexual homicide driven by anger were likely to exhibit a substance abuse problem, as well as being involved in previous non-violent and non-sexual offenses (Chopin & Beauregard, 2019c).

Victim's death as the outcome of instrumental motivation

Another explanation of lethal sexual victimization relates to cases not characterized by either sexual fantasies or anger, but rather instrumental means (e.g., financial gain, attempt to avoid police detection; Beech et al., 2005; Clarke & Carter, 2000; Chai et al., 2021; Chan et al., 2015; Stefanska et al., 2017). In such cases, offenders killed their victims in order to silence them, eliminate witnesses, or by accident in the context of an altercation during sexual abuse (Chan & Heide, 2009; Fisher & Beech, 2007; Kerr et al., 2013). In such context, offenders had previously targeted their victims – typically an acquaintance – abducted them and used physical restraints, without employing excessive violence (Chai et al., 2021; Chan et al., 2018).

Aim of Study

Given the marginalized lifestyle of sex-trade workers, their death arouses very little interest in the general population (Chan, 2021; Fox & Levin, 1994). Only few studies have examined the characteristics of these crimes. Preliminary findings showed notable differences between the lethal outcome in the sexual victimization of sex-trade workers in comparison to other groups. Of note, these comparative studies were all conducted using data from homicides committed in the United States. To add to the existing literature on this topic, the current study examined the characteristics of the sexual victimization of sex-trader workers using a large sample of lethal and non-lethal cases from France. In France until 2016, sex-trade work was not illegal if not associated with sexually exploitative activities such as pimping or involving children (Darley et al., 2018). Since then, in line with the neo-abolitionist trend in prostitution, the purchase of services of a sex-trade worker is prohibited: the goal being to fight against the harms caused by the criminalization of sex-trade work such as the isolation and the risk of exploitative behaviors. Despite a laudable goal, research has shown that the criminalization of sex-trade work has not been particularly successful (Farley, 2004; Goodyear & Weitzer, 2011; Krüsi et al., 2014, see also De Vries & Farrell, 2019). By examining victim, offender, situational, and crime characteristics, the goal of the present study was to identify factors associated with the lethal outcome of sexual victimization of sex-trader workers.

Methodology

Sample

The sample used in this study comes from a national database operated by the French Ministry of Interior and includes information relating to extrafamilial (i.e., stranger or acquaintance relationship) sexual victimization, which occurred between 1990 and 2018[1] in France. Specifically, these cases are non-serial and concern only one individual involved in the crime against a single victim. Moreover, all of the cases included in this study only involve individuals who were identified and therefore known by the police. This database includes information related to offender, victim, and crime characteristics. Data come from various sources of information. For each case, the information comes from investigative reports, interview reports, medical/autopsy reports provided by pathologists, psychological reports provided by a team of forensic

psychologists, and crime scene forensic reports. To avoid missing data, information is compiled by a team of crime analyst experts in violent crimes. Although it is still possible to have missing values as the information may not always be known, this was not the case with the variables examined in this study.

For this study we used a sample of 402 cases of sexual victimization during which victims were assaulted while engaged in sex-trade work. Specifically, in 304 (75.62%) cases, the sexual assault did not end with the victim's death, whereas 98 cases (24.38%) ended with a lethal outcome. To be included in our sample, non-lethal cases had to be characterized by two features. First, cases needed to be characterized by the presence of at least one of the following sexual behaviors: sexual penetration with a penis (i.e., vaginal and/or anal), fellatio, cunnilingus, penetration with fingers, masturbation, and object insertion. Second, cases had to involve victims that were assaulted while they were engaging in sex-trade work. Also, to be included in our sample, sexual homicide cases must be characterized by at least two criterion of the Ressler et al. (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 sexual homicide subsample were only found naked on the crime scene.

Measures

Dependent variable. In this study we used one dichotomous (0–1) dependent variable. This variable describes the crime outcome, i.e., non-lethal sexual victimization (0) and lethal sexual victimization (1).

Independent variable. We used a total of 26 dichotomous (0–1) independent variables. These variables were divided into four blocks: victim, offender, situational, and crime characteristics.

Victim characteristics. Previous studies found that lethal outcome in sexual assaults may be associated with victim characteristics and vulnerabilities (Beauregard et al., 2020; Beauregard & Mieczkowski, 2012; Chan, 2021; Chopin et al., 2021). Based on these previous findings, we selected the following six dichotomous variables: (1) victim is a female (yes = 1, no = 0), (2) victim is a juvenile (i.e., victim was less than 18 years old at the time of the assault; yes = 1, no = 0), (3) victim is elderly (i.e., victim was 65 years old or more at the time of the assault; yes = 1, no = 0), (4) victim abuses alcohol (i.e., the medical/autopsy reports provided by pathologists suggest that the victim was under the influence of alcohol at the time of the crime; yes = 1, no = 0), (5) victim abuses drugs (i.e., the medical/autopsy reports provided by pathologists suggest that the victim was under the influence of drugs at the time of the crime; yes = 1, no = 0), (6) victim is vulnerable (i.e., homeless, itinerant; yes = 1, no = 0).

Offender characteristics. Studies suggested that offender characteristics were associated with the lethal outcome of sexual assaults (Chopin & Beauregard, 2019c; Chopin et al., 2021; Chopin et al., 2022; Mieczkowski & Beauregard, 2010). To examine this with victims involved in sex-trade work, we used six dichotomous variables: (7) offender abuses alcohol (i.e., identification of alcohol intoxication was made on the

basis of offenders' testimony as well as coroner toxicology analysis; yes = 1, no = 0), (8) offender abuses drugs (i.e., identification of alcohol intoxication was made on the basis of offenders' testimony as well as coroner toxicology analysis; yes = 1, no = 0), (9) offender is socially isolated (i.e., avoid social contact with other, as determined by the police investigation; yes = 1, no = 0), (10) offender has previous criminal convictions, (11) offender meets criteria of sexual sadism (i.e., assessed using the Severe Sexual Sadism Scale, see Nitschke et al., 2009; yes = 1, no = 0), (12) offender presents paraphilic behaviors other than sadism (i.e., types of behavior associated to any paraphilias but without having to meet the diagnostic criteria; e.g., exhibitionism, fetishism; yes = 1, no = 0).

Situational characteristics. Previous studies identified that situational factors were associated with the lethal outcome of sexual assaults (Chopin & Beauregard, 2019c; Mieczkowski & Beauregard, 2010). In order to test this possibility with our sample, we used seven dichotomous variables: (13) crime location is a deserted place (i.e., location where witnesses cannot hear, see, or interrupt the crime; yes = 1, no = 0), (14) crime location is the victim's residence/brothel (yes = 1, no = 0), (15) crime location is the offender's residence (yes = 1, no = 0), (16) crime location is the victim's vehicle (yes = 1, no = 0), (17) crime location is the offender's vehicle (yes = 1, no = 0), (18) crime location is an outdoor place (e.g., street, woods, alley, public park; yes = 1, no = 0), (19) crime occurs during the night (i.e., 6 pm-6 am; yes = 1, no = 0).

Finally, several studies found that crime characteristics were important factors explaining lethal outcomes of sexual assaults (Beauregard & Mieczkowski, 2012; Chopin & Beauregard, 2019c; Mieczkowski & Beauregard, 2010). Based on this body of work we used seven dichotomous variables: (20) offender is a known client of the victim (yes = 1, no = 0), (21) offender beats the victim (yes = 1, no = 0), (22) offender uses a con approach (yes = 1, no = 0), (23) offender brings a weapon (i.e., does not imply that the offender used the weapon; yes = 1, no = 0), (24) victim physically resists (yes = 1, no = 0), (25) victim is penetrated (i.e., vaginal and/or anal penetration with a penis; yes = 1, no = 0), (26) offender uses strategies to destroy forensic evidence (yes = 1, no = 0).

Analytical Strategy

Data analysis followed a three-step process. First, we examined at the bivariate level (i.e., chi-square) the differences between non-lethal and lethal sexual victimization for the entire set of independent variables. Second, using only the significant variables (p < 0.05) from the bivariate analyses, we looked at which factors were associated with lethal sexual victimization at the multivariate level. As suggested by many (e.g., Hosmer & Lemeshow, 2013; Tabachnick & Fidell, 2019), performing multivariate analyses is not recommended when bivariate analyses indicate that there is no relationship between two variables. If a significant relationship is observed at the multivariate level despite the absence of a significant relationship at the bivariate level, it is likely due to interaction effects with other variables. Specifically, we used a sequential logistic binomial regression to identify the specific characteristics associated with the outcome of sexual assaults and determine the weight of each block of independent variables. Each block of variables was tested individually. Then, a

nested binomial logistic regression analysis was conducted using only the significant variables from all the previous models. This analysis represented the final and best model. Multicollinearity was checked for the variables included in the multivariate analyses and no VIFs were above 1.27 and tolerance not below 0.79 (Appendix 1). Third, using only significant variables (p < .05) from the nested binomial logistic regression analysis we computed a conjunctive analysis of case configurations (CACC) to explore patterns in our data. As such, CACC is an analysis technique used to "aggregate individual characteristics into groups of unique case configurations" (p.44) (Hart, 2021). This technique allows to analyze all possible interaction terms and determine odds or probabilities associated with each particular interaction complex (Miethe et al., 2008). Conjunctive analysis of case configurations has been previously used for the analysis of crime escalation (see e.g., Beauregard & Mieczkowski, 2012; Chopin & Beauregard, 2019c; Chopin et al., 2021; Mieczkowski & Beauregard, 2010) as it allows 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 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 four or five binary variables quickly becomes unwieldy.

Results

Table 1 presented the bivariate analyses between the victim, offender, situational, and crime characteristics and the outcome of the crime (non-lethal vs. lethal sexual victimization). Findings showed that two victim characteristics were significantly associated with the crime outcome. Sex-trade workers who were elderly (χ^2 = 4.15, φ = 0.10, p = .042) or who abused alcohol (χ^2 = 10.25, φ = 0.16, p = .001) were more often killed during a sexual assault event. As to the situational characteristics, two variables were significant. Sexual assaults occurring in the victim's residence or brothel (χ^2 = 15.97, φ = 0.20, p < .001) were more likely to end with a lethal outcome whereas sexual aggression occurring in the offender's vehicle (χ^2 = 5.81, φ = -0.12, p = .016) were less likely to end with the victim's death. Finally, results indicated that six crime characteristic variables were significantly associated with the crime outcome. Sexual assaults where the offender was a known client (χ^2 = 22.92, φ = 0.22, p < .001), where the offender have beaten the victim (χ^2 = 13.35, φ = 0.18, p < .001), in which a weapon was brought (χ^2 = 7.85, φ = 0.14, p = .005), and where the victim physically resisted (χ^2 = 4.08, φ = 0.10, p = .044) were more likely to end with a lethal outcome. However,

cases where the offender used a con approach (χ^2 = 6.62, φ = -0.13, p = .010) and penetrated the victim (χ^2 = 37.27, φ = -0.30, p < .001) were less likely to end with the victim's death.

[Insert Table 1 here]

Table 2 and Appendix 2 presented findings of the binomial sequential logistic regression. Model 1 included only the variables related to the victim characteristics. This model presented a Nagelkerke R^2 of 0.06 and an area under the curve (AUC) of 0.60. Results showed that sex-trade workers who were elderly (OR = 5.19, p = .034), and who abused alcohol (OR = 2.89, p = .002), were respectively 5.19 and 2.89 times more likely to be killed during a sexual assault. Model 2 included only the variables related to the situational characteristics. This model presented a Nagelkerke R^2 of 0.06 and an AUC of 0.60. Results showed that sexual assaults that occurred at the victim's residence or brothel (OR = 2.26, p = .001) were 2.26 times more likely to end with a lethal outcome. Model 3 included only the variables related to the crime characteristics. This model presented a Nagelkerke R^2 of 0.24 and an AUC of 0.75. Results indicated that offenders who knew their victims as a client (OR = 2.92, p = .001) and who used physical violence with them (OR = 2.40, p = .001) were respectively 2.92 and 2.40 times more likely to kill their victims. On the opposite, offenders who vaginally/anally penetrated their victims (OR = 1/0.26, p < .001) were 3.85 less likely to kill them. The best model included only the significant variables of the three previous models. This model presented a Nagelkerke R^2 of 0.82 and an AUC of 0.80. Results showed that sex-trade workers who abused alcohol (OR = 3.80, p = .001), who were assaulted in their residence/brothel (OR = 2.64, p < .001), by a client they knew (OR = 3.10, p < .001), who have beaten them (OR = 2.50, p = .001), were respectively 3.80, 2.64, 3.10, 2.50 times more likely to be killed during a sexual assault. However, sexual assaults where victims were penetrated vaginally/anally were (OR = 1/0.25, p < .001) four times less likely to end with a lethal outcome.

[Insert Table 2 here]

Table 3 presented the matrix produced by the conjunctive analysis of the victim, situational, and crime characteristics and the crime outcome. A total of 32 combinations were computed and eight combinations (#6, 8, 12, 13, 15, 22, 26, 30) presented a significant p-value (< .05). Among these combinations, six were associated with the lethal outcome of sexual assaults involving sex-trade workers (#6, 8, 12, 22, 26, 30) and two were associated with the non-lethal outcome (#13, 15). Findings suggested that the most lethal combination was #6 (OR = 64.64, p = .004). This combination showed that when victims did not abuse alcohol, the crime occurred in the victim's residence/brothel, the offender beat the victim but did not vaginally/anally penetrate her, the crime was approximately 65 times more likely to end with a lethal outcome. The second most dangerous combination was #30 (OR = 29.00, p = .024) showing that when the victim abused alcohol, was not assaulted in her residence/brothel, by a client she knew, was beaten and did not experience vaginal/anal penetration, the crime was 29 times more likely to end with a lethal outcome. Finally, the third most dangerous combination was #30 (OR = 22.32, p = .041) showing that when the victim abused alcohol,

was not assaulted in her residence/brothel, the offender was a known client, who has beaten her but did not penetrate vaginally/anally the victim, the crime was approximately 22 times more likely to end with a lethal outcome. Moreover, of the six significant combinations presenting odds ratio higher than 1 (#6, 8, 12, 22, 26, 30), four involved the beating of the victim, three the victim alcohol abuse as well as the crime occurring at the victim's residence/brothel. However, no combination was associated with the lethal outcome involved the vaginal/anal penetration of the victim.

[Insert Table 3 here]

Discussion

The aim of this study was to identify factors associated with a lethal outcome in the sexual victimization of sex-trade workers. Looking at various variables associated with this severe form of sexual violence, bivariate and multivariate analyses highlighted victim, situational, and crime characteristics associated with the lethal outcome. Offender characteristics did not permit to distinguish the lethal from the non-lethal outcome. Rather, situational and victim characteristics were better indicators associated with the lethal outcome of sexual victimization. Rational choice theory and routine activity theories suggest that a crime occur in a suitable environment towards a vulnerable victim. Our results show that older and intoxicated victims were more likely to be killed during the sexual assault compared to younger and non-intoxicated victims, supporting the idea that most vulnerable persons are more likely to be victimize.

The lethal sexual victimization of sex-trade workers was also more likely to be committed in an indoor residence/brothel by a known client, against supporting the idea that rational offenders chose a suitable environment without guardian to maximize the benefit of his crime while decreasing the risk of being caught. Our results appear however to counter the usual myths associated with sex-trade. On the one hand, we believe that the increase in the Internet use for sexual solicitation may result in an increase in the overall occurrence of indoor encounters (see Bernier et al., 2021 for an application of the impact of Internet on this aspect) – including with sex-trade workers – and may contribute to a perceived sense of security. On the other hand, it is possible that indoor crimes are less visible and may provide a sense of impunity for perpetrators (see Leclerc et al., 2015). The fact that victims are more at risk of dying when the client is known may reflect the victim's false sense of security. Sex-trade workers may have learned to be careful with complete strangers and may let down their guard with known clients. These hypotheses, however, needed to be further investigated. These results have implications on prevention programs that should reinforce the need to be careful in every situation.

Congruent with previous studies (Horan & Beauregard, 2017, 2018) and confirming our research hypotheses, our results show that lethal sexual victimization of sex-trade workers is characterized by high levels of violence. Moreover, congruent with specific studies on sex-trade workers' homicides, our results suggest that, although sexual sadism and other paraphilias are characteristics of some offenders who engage in sexual

victimization of sex-trade workers (15% to 40%), they are not associated with the lethal outcome of this offense (see also Chopin et al., 2022).

In contrast with studies showing a lack of premeditation in the sexual homicides of sex-trader workers (Horan & Beauregard, 2018), in our study offenders who killed their victims were more likely to bring a weapon at the crime scene, suggesting some sort of premeditation. This characteristic was not associated with the lethal outcome in sexual victimization when considering other situational and crime characteristics. Of note also is the fact that Horan & Beauregard (2018) examined different proxy measures of premeditation (i.e., victim as randomly selected and no weapon was brought to the crime scene). Thus, future research will be needed to clarify whether lethal sexual victimization of sex-trade workers is characterized by premeditation behaviors. Finally, congruent with findings from Horan & Beauregard's (2018) study, men who sexually assault sex-trade workers tend not to be forensically aware, as evidenced by a low prevalence strategies used to destroy evidence at the crime scene. This result could mean that, as previously suggested, these men believe that violence towards sex-trade workers will remain uninvestigated by authorities (Beckham & Prohaska, 2012; Chan; 2021; Fox & Levin, 1994), that they made a rational choice leave quickly the crime scene with evidence but to avoid being seen, or simply that they are not aware of police detection or even that the death of victims was a result of an accident. All of these hypotheses will need to be further examined in future research.

Excessive violence and substance abuse in conjunction with situational and crime characteristics in association with lethal sexual victimization of sex-trade workers

An excessive level of violence was found associated with the lethal sexual victimization of sex-trade workers. Our findings show that the most associated combination of factors characterizes stranger offenders who engage in excessive violent behaviors but not in sexual penetration against their victims. Inversely, the two less associated combinations leading to lethal victimization involve no beating but sexual penetration. As noted by some researchers, many men who engage in sexual assault exhibit sexual dysfunction (e.g., Brody et al., 2005; Chan, 2017; 2021). For men turning to sex-trade workers and failing to achieve sexual acts, sexual dysfunction can generate feelings of humiliation and rage that will be unleashed on the victim (Brody et al., 2005). This explanation echoes with our results showing a high level of violence among men who did not achieve sexual penetration with their victims. As stated previously, in our study, we did not have access to measures of offenders' feelings, nor did we have insight on potential sexual dysfunction. Thus, to further test these hypotheses, future research conducted directly with men who sexually victimized sex-trade workers is needed.

Interacting with these factors is also the presence of alcohol in the victims' body. Intoxication characterized three of the most associated combinations leading to lethal outcome, all of those involving violence from the offenders. It did not characterize many offenders, nor does it distinguish lethal from non-lethal outcome of sexual victimization. Given their lifestyle characterized by risky behaviors, including the use of intoxicating substance (Salfati et al., 2008), our findings suggest that this condition among victims may amplify the sex-trade worker vulnerabilities to be assaulted. In our sample, victims who offered less resistance – perhaps due to

a state of intoxication – were more likely to be killed by offenders. From a theoretical perspective, engaging in sexual victimization against a victim who does not resist may be considered as rational, reducing the risk of leaving evidence on the crime scene or on the victim, and thus potentially avoid police detection.

Finally, the conjunctive analysis reveals the importance of two other situational factors interacting in association with the lethal outcome of sexual victimization, namely the crime scene location (i.e., within an indoor residence or not), and the relationship between victim and offender (i.e., a known client or not). These variables and their respective outcome (i.e., present or not) are fairly equally represented among the six combinations of factors associated with the lethal outcome, making it difficult to interpret their associations with other risk factors. Sexual homicides committed in an indoor residence tend to be much more characterized by violence and, inversely, both combinations of non-lethal sexual victimization of sex-trade workers were not committed in such location. This suggests that crimes committed out of sight were more likely to escalate in lethal violence, in coherence with previous studies showing that lethal sexual offenses are more frequently committed in indoor locations (Beauregard et al., 2021). Furthermore, while victim-offender relationship was equally represented in combinations associated with the lethal outcome, both combinations of non-lethal victimization were committed by strangers. To our knowledge, this result has never been examined in previous studies. In light of our results, we argue that known clients are much more emotionally involved which, when experiencing a sense of humiliation and anger, may engage in more violence against their victim. This hypothesis obviously needs more examination to be confirmed or infirmed.

Implications, limitations, and conclusive notes

 This study contributes to a better understanding of the lethal sexual victimization of sex-trade workers by identifying factors associated with its lethal outcome. Among others, we found that excessive violence, indoor crime location, substance abuse, and offender-victim relationship characterize such homicides. As to the theoretical implications, findings from this study allow considering that the lethal sexual victimization of sex-trade workers is more likely to be associated with the violence escalation theory than the presence of sadistic fantasies or instrumental motivations. Our results support the rational choice theory and routine activity theory as a framework to understand the specific sexual victimization of sex-trade workers. Indeed, lethal sexual victimizations were committed against vulnerable (i.e., intoxicated) victims in closed environment where guardian could not intervene. Attacking victims who do not resist may also reflect a rational choice to reduce the risk of leaving traces leading to a possible crime in order to increase the profits sought by the crime. Findings from our study also add to the existing literature on sexual victimization of sex-trade workers, thus contributing to a general and more refine understanding of the phenomenon and factors related.

In terms of practical implications, these findings should be considered for situational prevention with women who engage in sex-trade work. Most policies relating to sex-trade activities focus on preventing individuals from engaging in such activity rather than implementing measures to improve the protection of those who do. As previous studies have shown, sex-trade workers present an increased risk of being victimized and killed.

Findings from our study suggest that factors associated with the lethal outcome of sexual victimization are more likely to be situational rather than individual offender characteristics. By understanding the way lethal outcome occurs, it will be easier for authorities to anticipate and implement situational measures that will make the aggression less likely to be committed. Situational crime prevention can be defined as the concrete measures and techniques used to reduce criminal opportunities by increasing risks of arrest and /or decrease expected benefits (see e.g., Clarke & Eck, 2005). Identifying and understanding indicators of severe crimes committed against sex-trade workers should thus be helpful to implement specific prevention policies tailored to the specific contexts of this activity. Specifically, it would be important for these women to be aware of the danger to which they are exposed with some clients, sometimes armed, and in a private residence. If some women may be tempted to let their guard down with regular clients, they should be aware of the dangers they face even in the appearance of safety. Furthermore, facing of a generalized movement for the use of Internet and social networks for solicitation of any kind, prevention and education strategies could be deployed on websites dedicated to the solicitation of sexual services to inform Internet users of the dangers and consequences associated with such practices, including in indoor residence/brothel. Sex trade workers as a marginalized population should have easy access to helping resources when needed. As for offenders who exhibit violent behaviors and may endorse dehumanizing cognitions towards these women (Fox & Levin, 1994), cognitive and anger management therapy would be important to be considered.

 Limitations associated with this study must be acknowledged. First, the data used in this study come from police investigative cases, offering an in-dept understanding of crime and situational factors. However, while offering many details on crime through reports (i.e., investigative reports, interview reports, medical/autopsy reports provided by pathologists, and crime scene forensic reports), details obtained by psychological reports provided by a team of forensic psychologists with limited access to offender characteristics offer less insight on psychological factors involved in those cases. While excessive violence could be objectively measured (e.g., by victim's injuries), we were not able to measure offenders' emotions that could be associated with these behaviors, such as a feeling of humiliation or anger. All these psychological markers may be involved in the lethal sexual victimization of sex-trade workers and should be considered for investigation in future research.

Second, findings from this study should only be generalized to solved cases of sexual homicides of sex-trade workers. Researchers have noted the difficulty of estimating the accurate prevalence of lethal sexual victimization of sex-trade workers (Chan, 2021; Chan & Beauregard, 2019; Potterat et al., 1990), highlighting the fact that the inter-jurisdictional mobility of these women and the general lack of interest towards them may largely contribute to an underestimation and under-investigation of these cases. In this context, it is possible that unsolved cases of lethal sexual assault of sex-trade workers, not considered in this study, present distinctive characteristics.

Third, while offering some insight on the importance of premeditating behaviors and forensic awareness strategies, and adding to previous literature on these topics, we must note that we were limited in terms of the

variable used to measure premeditation and forensic awareness. To get a better understanding of offenders' crime process when engaging in lethal sexual victimization of sex-trade workers, future research should be conducted using the same variables used in this study, but additional ones to.

Lastly, while the rational choice and routine activities theories provide a relevant framework to make sense of situational factors and individuals' temporary states (e.g., intoxication) associated with the lethal outcome of sexual victimization, they allow less to explain the psychological mechanisms such as deviant sexual interests or fantasies which may drive those who engage in such sexual offending behaviors. Other theoretical frameworks particularly issuing from the field of forensic psychology (see for example Chopin et al., 2022 for a review) could thus be considered in future studies to broaden our understanding of not only the lethal purpose of sexual victimization, but also the behaviors of offenders.

 As conclusive notes, this study adds to the existing and specific literature of the sexual victimization of marginalized victims. Examining victim, offender, situational, and crime characteristics of this severe form of sexual violence, we identified factors associated with its lethal outcome. Conjunctive analysis highlighted the importance of the excessive use of violence, lack of sexual penetration, the characteristic of the crime scene location, as well as the relationship between offender and its victim as important factors to understand the phenomenon. Findings should be considered in the development of situational prevention and intervention strategies. Future research replicating this study, but also investigating additional individual and situational factors are needed.

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Tables

Table 1. Bivariate analyses of victim, offender, situational, and crime characteristics on the crime outcome (N = 402)

	Non-lethal outcome		Lethal outcome		χ^2	φ
	n=	%	n=	%		

Victim characteristics						
Victim is a female	288	94.74	87	88.78	4.20	0.10
Victim is a juvenile	5	1.64	2	2.04	0.07	0.01
Victim is elderly	3	0.99	4	4.08	4.15*	0.10
Victim abuse alcohol	22	7.24	18	18.37	10.25**	0.16
Victim abuse drugs	22	7.24	8	8.16	0.09	0.02
Victim was vulnerable	28	9.21	12	12.24	0.76	0.04
Offender characteristics						
Offender abuse alcohol	60	19.74	18	18.37	0.09	-0.15
Offender abuse drugs	28	9.21	12	12.24	0.76	0.04
Offender is socially isolated	9	2.96	6	6.12	2.06	0.15
Offender has previous criminal convictions	41	13.49	14	14.29	0.04	0.01
Offender has a diagnosis of sadism (SeSaS)	108	35.53	39	39.80	0.58	0.04

Offender presents paraphilic behaviors (other than sadism)	44	14.47	20	20.41	1.95	0.07
Situational characteristics						
Crime location is a deserted place	163	53.62	53	54.08	0.01	0.00
Crime location is the victim's residence/brothel	99	32.57	54	55.10	15.97***	0.20
Crime location is the offender's residence	30	9.87	6	6.12	1.28	-0.06
Crime location is the victim's vehicle	9	2.96	0	0.00	2.97	-0.09
Crime location is the offender's vehicle	64	21.05	10	10.20	5.81*	-0.12
Crime location is an outdoor place	102	33.55	28	28.57	0.84	-0.05
Crime occurs during the night	192	63.16	56	57.14	1.14	-0.53
Crime characteristics						
Offender is a known client	32	10.53	30	30.61	22.92***	0.24

Offender beats the victim	116	38.16	58	59.18	13.35***	0.18
Offender use a con approach	263	86.51	74	75.51	6.62**	-0.13
Offender bring a weapon	162	53.29	68	69.39	7.85**	0.14
Victim resists physically	63	20.72	30	30.61	4.08*	0.10
Victim sustains a sexual penetration	238	78.29	45	45.92	37.27***	-0.30
Offender use strategies to destroy forensic evidence	26	8.55	12	12.24	1.18	0.05

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

Table 2. Sequential logistic binomial regression of factors predicting the lethal outcome (N = 402)

	Model 1			Model 2			Model 3			Best Model		
	β	S.E.	Exp(β)	β	S.E.	Exp(β)	β	S.E.	Exp(β)	β	S.E.	Exp(β)
Victim characteristics												
Victim is a female	-0.78	0.42	0.46									
Victim is elderly	1.65	0.78	5.19*							1.05	1.06	2.85

Victim abuse alcohol	1.06	0.35	2.89**							1.33	0.41	3.80**
Situational characteristics												
Crime location is the victim's residence/brothel				0.82	0.26	2.26**				0.97	0.27	2.64***
Crime location is the offender's vehicle				-0.43	0.39	0.65						
Crime characteristics												
Offender is a known client							1.07	0.32	2.92**	1.13	0.33	3.10***
Offender beats the victim							0.87	0.26	2.40**	0.92	0.27	2.50**

Offender use a con approach						-0.59	0.33	0.56			
Offender brings a weapon						0.46	0.28	1.58			
Victim resists physically						0.39	0.29	1.48			
Victim sustains a sexual penetration						-1.35	0.26	0.26***	-1.38	0.27	0.25***
Constant	-0.58	0.41	0.56	-1.42	0.19	0.24	-0.81	0.42	0.45	-1.48	0.30	0.23
-2 log likelihood	430.06			428.79			375.62			360.86		
Cox & Snell R^2	0.04			0.04			0.16			0.19		
Nagelkerke R^2	0.06			0.06			0.24			0.29		

% classification	0.75			75.60			80.30			83.10		
AUC	0.60			0.63			0.76			0.80		

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

*Table 3. Conjunctive analysis of factors predicting the crime outcome (non-lethal versus lethal) (N = 402)*

Victim abuses alcohol	Crime occurs in the victim's residence/ brothel	Offender is a known client	Offender beats the victim	Victim sustains sexual penetration	Non-lethal outcome n=304	Lethal outcome n=98	Odds ratio Lethal / Non-lethal	95% CI	p	#
No	Yes	Yes	Yes	Yes	0	0	3.09	0.06 - 156.83	.573	1
				No	2	0	0.61	0.02 - 12.90	.754	2
			No	Yes	2	0	0.61	0.02 - 12.90	.754	3
				No	0	0	3.09	0.06 - 156.83	.573	4
		No	Yes	Yes	9	2	0.68	0.14 - 3.21	.629	5
				No	0	9	64.64	3.72 - 121.57	.004	6
			No	Yes	14	3	0.66	0.18 - 2.35	.526	7
				No	4	5	4.03	1.06 - 15.32	.041	8
	No	Yes	Yes	Yes	11	7	2.05	0.77 - 5.43	.150	9
				No	7	2	0.88	0.18 - 4.32	.879	10
			No	Yes	10	2	0.61	0.13 - 2.84	.532	11
				No	3	7	7.72	1.95 - 30.45	.004	12
		No	Yes	Yes	69	12	0.48	0.245 - 0.92	.027	13
				No	16	9	1.82	0.77 - 4.26	.168	14
			No	Yes	99	13	0.32	0.16 - 0.59	<.001	15
				No	37	8	0.64	0.28 - 1.42	.277	16
Yes	Yes	Yes	Yes	Yes	0	0	3.09	0.06 - 156.83	.573	17
				No	0	0	3.09	0.06 - 156.83	.573	18
			No	Yes	0	0	3.09	0.06 - 156.83	.573	19
				No	0	1	9.27	0.37 - 229.51	.174	20
		No	Yes	Yes	0	0	3.09	0.06 - 156.83	.573	21
				No	0	3	21.64	1.10 - 422.61	.043	22
			No	Yes	1	0	1.03	0.04 - 25.50	.985	23
				No	0	0	3.09	0.06 - 156.83	.573	24
	No	Yes	Yes	Yes	1	2	1.56	0.13 - 17.35	.719	25
				No	0	3	22.32	1.14 - 45.98	.041	26
			No	Yes	0	2	15.78	0.75 - 331.49	.076	27
				No	0	0	3.09	0.06 - 156.83	.573	28
		No	Yes	Yes	7	0	0.20	0.01 - 3.55	.274	29
				No	0	4	29.00	1.54 - 54.58	.024	30
			No	Yes	11	4	1.13	0.35 - 3.64	.834	31
				No	1	0	1.03	0.04 - 25.41	.987	32

Appendix

Appendix 1. Multicollinearity diagnosis

	Tolerance	VIF
Victim is a female	0.95	1.05
Victim is elderly	0.98	1.02
Victim abuse alcohol	0.97	1.03
Crime location is the victim's residence/brothel	0.79	1.27
Crime location is the offender's vehicle	0.82	1.22
Offender is a known client	0.94	1.07
Offender beats the victim	0.95	1.05
Offender uses a con approach	0.94	1.06
Offender brings a weapon	0.92	1.09
Victim resists physically	0.95	1.06
Victim sustains a sexual penetration	0.92	1.09

Appendix 2. ROC curve analysis of the sequential logistic binomial regression models
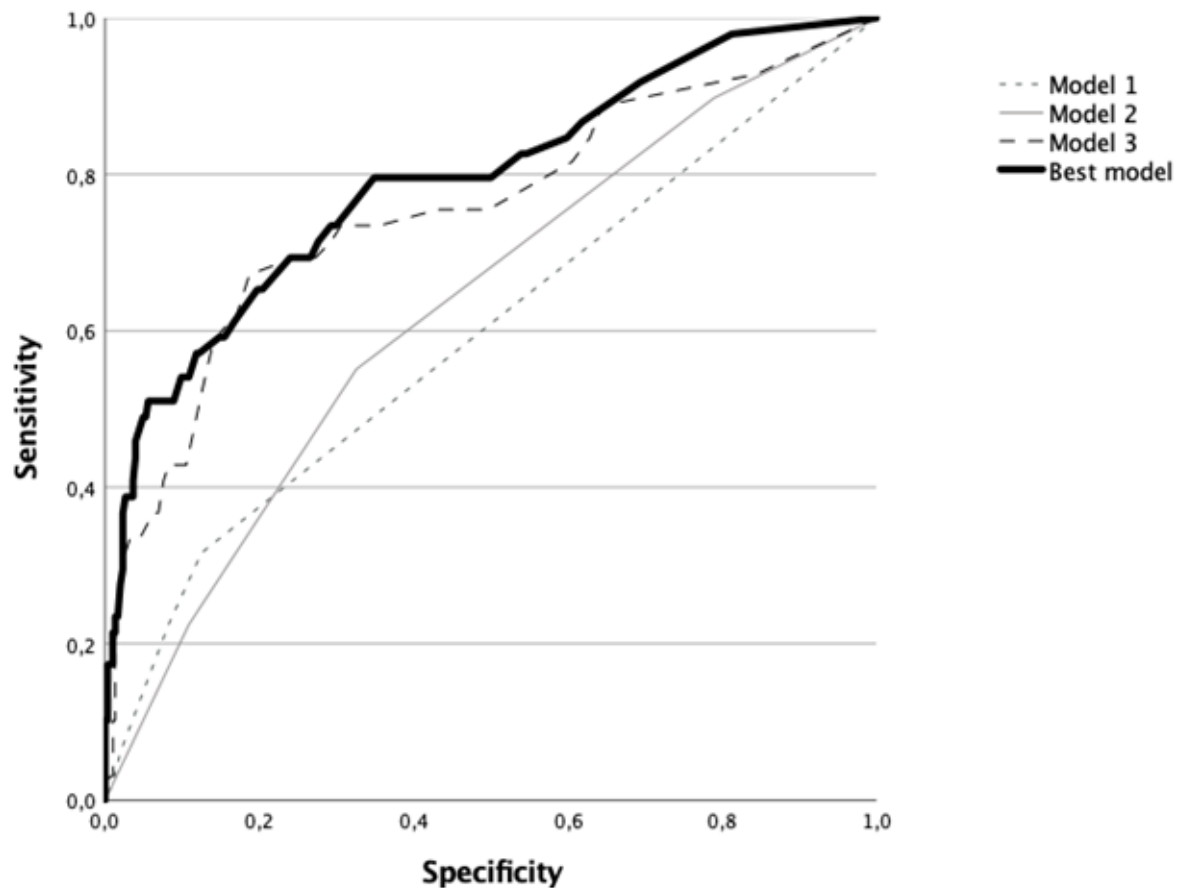
Footnotes

1.   Between 1990 and 1999, 77.39% of cases did not end with a lethal outcome while in 22.81%, victims were killed. Between 2000 and 2009, in 75.66% of cases the sexual aggression did not lead to the victim's death while 24.34% of cases ended with a lethal outcome. Finally, between 2010 and 2018, in 74.07% of cases victims were not killed while in 25.93% of cases, the sexual offending led to the victim's death. We tested whether there were differences in the distribution of cases across these three periods and the results indicate that this was not the case ($\chi 2 = 0.370$, p = .83) ↵