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The triggering effect of alcohol and illicit drugs on violent crime in a remand prison population: A case crossover study

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ABSTRACT

Background: The association between substance abuse, particularly alcohol abuse, and violence has been well established. However, since substance abuse co-occurs with several other risk factors for violence, the causal link between substance abuse and violence and the extent to which the acute influence of alcohol, illicit drugs, benzodiazepines, and anabolic androgenic steroids have a triggering effect on violent behavior are more uncertain.

Methods: Case-crossover design was used based on data from structured face to face interviews with remand prisoners ($n = 194$; 172 men, 22 women) suspected of violent crimes. Main outcome measure: odds ratio (OR 95% CI) for a violent crime, 24 h after exposure to different substances, compared to periods of no exposure was calculated using conditional logistic regression and a Mantel–Haenszel estimator with confidence intervals for sparse data.

Results: Intake of alcohol (OR 6.41 CI 4.24–9.67) and large doses of benzodiazepines (OR 36.32 CI 7.14–183.65) triggered interpersonal violence. Stratified analyses of possible effect modifiers were sex, conduct/behavioral problems, trauma experiences; psychiatric vulnerability did not reveal any substantial differences.

Conclusion: Influences of alcohol and unusually high doses of benzodiazepines are proximal risk factors for violent crime. Improved knowledge of short-term (and dose-related) risk factors may contribute to treatment planning and risk assessment of violence.

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1. Introduction

Interpersonal violence is a major public health problem in several aspects, including sexual and domestic violence, robbery, threat, and infringement of individual integrity. Interpersonal violence accounts for a large proportion of fatal or serious physical injuries, as well as psychological trauma and a severe loss of quality of life for the victims (Krug et al., 2002). Substance abuse in general and alcohol abuse in particular are associated with an increased risk of interpersonal violent behavior (Boles and Miotto, 2003; Grann and Fazel, 2004; Hoaken and Stewart, 2003). The relation is complex, addressing issues of proximal and distal risk factors, pharmacological effects, social context, and personal expectancy, as well as biological and psychological vulnerability (Boles and Miotto, 2003; Chermack and Giancola, 1997; Hoaken and Stewart, 2003). Additionally, the propensity for aggressive behavior enhances the risk of being aggressive when under the influence of alcohol or illicit drugs (Taylor and Chermack, 1993). The effect of alcohol on aggression and violent behavior has been studied from the perspective of several disciplines (Chermack and Giancola, 1997; Parker, 2004) and in relation to a variety of violent offenses, e.g., assault, homicide, domestic violence, and sexual assault (Connor et al., 2011; Darke, 2010; Murdoch et al., 1990). Intake of alcohol can dampen fear, distort cognition, and reduce impulse control, which may lead to enhanced aggression (Taylor and Chermack, 1993).

Other suggested substances that would increase the risk for violent behavior are benzodiazepines and anabolic androgenic steroids. The empirical literature is ambiguous regarding the relationship between benzodiazepines and aggression (Hoaken and Stewart, 2003). Benzodiazepines are prescribed for anxiety, insomnia, and severe alcohol withdrawal. Case reports of violent offenders assessed in forensic psychiatry suggest that benzodiazepines in combination with alcohol or illicit drugs are associated with impulsivity and anterograde amnesia (Dåderman et al., 2002). Further, benzodiazepine intake may cause a paradoxical reaction in some individuals, e.g., hostility, aggression and agitation (Bramness

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et al., 2006). The use of anabolic androgenic steroids (AAS) has been correlated with aggressiveness in animal models, case reports and surveys (McGinnis, 2004; Pope and Katz, 1994; Thiblin et al., 1997). The androgen testosterone and its synthetic analogues may induce irritability and aggression (Pope et al., 2000; Quaglio et al., 2009) and an association with violence has been demonstrated in one study that controlled for substance use (Beaver et al., 2008). However, it has been more difficult to prove a temporal relation between testosterone and violent behavior (Lundholm et al., 2010) or study results have been confounded by premorbid personality traits that increase both AAS use and violent behavior (Perry, 2003). AAS use is prevalent among criminals and as part of patterns of poly-substance abuse (Gårevik and Rane, 2010; Skårberg et al., 2009). For other common drugs of abuse the relation is also unclear; the impact of central stimulants, i.e., amphetamine and cocaine, on violent behavior is uncertain (Hoaken and Stewart, 2003), but they appear to affect executive functioning, and heavy use may lead to paranoia, irritability, and aggressiveness (Dawe et al., 2009). Cannabis and opioids have sedative effects, albeit, withdrawal, drug seeking or drug induced psychosis (for cannabis) may enhance the risk of violent behavior (Boles and Miotto, 2003; Hoaken and Stewart, 2003).

A substantial collection of literature confirms the association between substance abuse and violence, however, much less is known about possible causal links because of methodological limitations related to the common co-occurrence of multiple risk factors. We use the case crossover design that allows us to control for unmeasured static within individual confounding (such as sociodemographic factors, childhood experience, personality, cognitive ability). To our knowledge, only one previous study investigated the triggering or acute effect of alcohol, illicit drugs, and major classes of prescribed psychotropic drugs in violent offenders. Haggård-Grann et al. (2006) studied 133 violent male offenders at a forensic psychiatric evaluation unit and a national prison evaluation unit; a thirteen-fold increased risk of a violent offence within 24 h after alcohol consumption was demonstrated, while the influence of regular doses of benzodiazepines was related to a decreased risk of violence. Further apprehension of the triggering effect of substances on violence may be of central importance for risk assessment and treatment.

The aim of this study is to investigate if alcohol and psycho active drugs, including benzodiazepines and anabolic androgenic steroids, have a triggering effect on violent crime and if the effect varies between individuals with conduct/behavioral problems, psychological vulnerability and trauma experiences.

2. Methods

2.1. Study design

The case-crossover design is an epidemiologic design for the purpose of investigating what triggering exposures with an acute and transient effect of an acute outcome. The case-crossover design applies best if the exposure is intermittent, the effect on risk is transient and immediate, and the outcome is abrupt (Maclure and Mittleman, 2000).

One challenge in most research is to avoid control selection bias, therefore, the case-crossover design involves only cases that serve as their own controls. The comparison is made within the individual, comparing exposure at the case period (e.g., the time at the index crime) with exposures at personal control periods. The design resembles that of either a matched case–control study (the matched-pair approach), in which the control information is collected from a certain control period matched to the case period, or a retrospective cohort study in which the control information is from the person-time of the exposure (the usual frequency approach). The argument is that if there are triggering exposures, they should occur much more frequently during a period immediately prior to the onset of the outcome (e.g., disease, violence) than during a comparable period when outcome has not occurred. When examining the possible causal linkage between alcohol and drug consumption and the commission of violent criminal offenses, it would be challenging to select a comparison group that was correctly matched with respect to all other present individual risk factors. Therefore, the case-crossover design appears to be an appropriate choice.

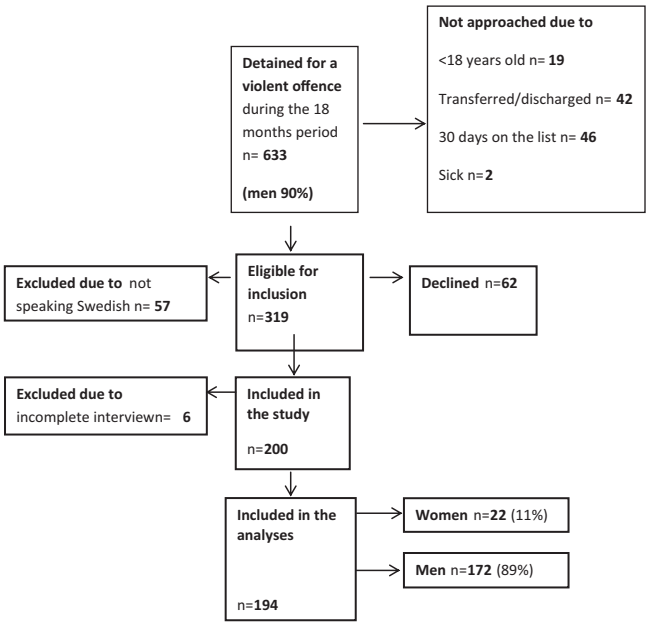

Fig. 1. Flow chart of recruitment.

2.2. Procedure

The study was approved by the Uppsala ethical committee (2008/380). Data was collected, with some interruptions due to administrative routines, during a 20-month period (May 2009–December 2010) at the largest remand prison in Sweden. A flow chart that describes recruitment is depicted in Fig. 1.

A licensed psychologist (LL) received a list of new clients upon arrival at the setting once a week. Inclusion criteria were: older than 18 years of age, Swedish speaking and detained for a violent crime. In accordance with previous studies, violent crime was defined as homicide, manslaughter, assault, unlawful threat, robbery, arson, illegal threat, illegal coercion, intimidation, violation of a person's or a woman's integrity, and sexual offences (Fazel et al., 2009; Frisell et al., 2010). If an individual had been listed for 30 days and had not yet been interviewed, he or she was excluded to minimize the effect of recall bias. The mean time between the suspected violent crime and the interview was 60 days (median 18 days, range 2–1463 days).

During the study period, 633 persons suspected of committing a violent crime were detained at the remand prison (according to the Prison and Probation Administrative System). Of these, 319 were eligible for study inclusion and 200 agreed to participate. Six interviews were excluded because they were of insufficient quality. Therefore, 194 persons were included in the analysis, with assault as the most commonly suspected crime for both men and women. A demographic description of the participants and the index violent crimes are presented in Table 1.

2.3. Data collection

Clients were approached in their cells and if a client agreed to participate, he or she signed an informed written consent form and the face-to-face interview was conducted in an interrogation room. Personnel from the remand prison were not present during the interview. The interview included demographic questions, a subjective description of the violent crime for which the participant had been remanded, and questions regarding potential triggers (i.e., last intake of alcohol or drugs in relation to the index crime, one week previously, and during the past year). For alcohol, a question of amount of alcohol at last intake was added and the usual frequency for that amount. For benzodiazepines, the questions of whether they had used a high dose (that is, a high dose compared to usual use) and for what reason they used (the expected effect) were added. For AAS, there was an additional question about lifetime use. To facilitate the memory of the requested information, a calendar was used to identify the date of the index crime and control periods. In order to carry out stratified analyses and further describe the population, the participants were also assessed regarding conduct disorder, antisocial personality disorder, and risk of suicide (not analyzed in this study) using the Mini-International Neuropsychiatric Interview (Sheehan et al., 1998). They completed five self-reporting questionnaires; (1) The Childhood Trauma Questionnaire (CTQ; Gerdner and Allgulander, 2009), a 28-item questionnaire with five sub-scales measuring emotional, physical, and sexual abuse and emotional and physical neglect; (2) The Alcohol Use Disorders

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