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Benzodiazepine use of community-based violent offenders: A preliminary investigation.**Short title: Benzodiazepines and violent crime****Authors:**

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Declarations of interest

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Benzodiazepine use of community-based violent offenders: A preliminary investigation.**Abstract*****Objective:***

To explore the relationship between benzodiazepine use and violent crime in a sample of community-based offenders.

Methods:

Participants were recruited via drug diversion and treatment programs in Melbourne, Australia. Data regarding benzodiazepine and other substance use, mental health, personality characteristics, and crime involvement was collected through semi-structured interviews conducted in 2011. Participants ($n = 82$, 79.3% male) were 21-56 years old, predominantly Australian-born (89%), with 14.6% identifying as Aboriginal or Torres Strait Islanders. Eligibility criteria were having been charged with a criminal offence in the previous six months and at least monthly benzodiazepine use. Group differences between violent ($n = 11$) and non-violent offenders were assessed via independent samples t-tests (two-tailed) and non-parametric tests.

Results:

Individuals charged with violent index offences were significantly more likely to use higher average doses of alprazolam ($p = .040$), and exhibit benzodiazepine dependence ($p = .037$) as well as report high levels of sensation seeking, prior violence, and the diagnoses of depression and personality disorder, than individuals charged with non-violent index offences.

Conclusions:

The findings suggest the existence of a complex dynamic between mental health and violent offending that may be influenced by benzodiazepine use, in particular alprazolam. A core

implication of these preliminary findings includes attending to the interpersonal skills and adaptive coping resources of violent offenders.

Key words: benzodiazepines, alprazolam, violence, impulsive behaviour, mental health

Benzodiazepine use of community-based violent offenders: A preliminary investigation.Introduction

This paper will report on the use of benzodiazepines and their association with violent crime, mental health and other substances in a group of community-based offenders. Forensic samples (i.e., individuals progressing through various stages of the criminal justice system) have been found to misuse benzodiazepines more than the general community (Australian Institute of Health and Welfare, 2011; Ng & Macgregor, 2012). Yet, research investigating the relationship between benzodiazepine use and criminal behaviour is rare (Albrecht et al., 2014). Specifically, no studies have investigated the role of benzodiazepine use and violent crime in an adult community criminal justice sample. This is despite 20% of violent offenders detained by Australian police between 2009 and 2010 tested positive for benzodiazepine use (Sweeney & Payne, 2012). Understanding the association between benzodiazepine use and violent crime is important for the development of prescribing protocols which account for the dynamic and unpredictable nature of community settings, compared to custodial settings. Although not altogether absent from custodial settings, it is argued that factors such as ease of doctor shopping, illicit substances, and black market benzodiazepines, as well as identifying individuals that are not linked in with mental health or substance use services are important factors to consider when developing such protocols.

We argue that the benzodiazepine-violence relationship in this population may vary according to administration and dosing schedules of specific benzodiazepines. Clarity of this issue has been impacted by limitations in the way that previous data has been collected. For example, studies group benzodiazepines together (ignoring concepts such as the half-life or function of specific benzodiazepines) or fail to consider dose, sometimes in the absence of non-violent controls (e.g., Dåderman et al., 2002). Improving our understanding of the relationship between certain benzodiazepines and violent crime may have important medical

and legal implications for prescribing practices, especially when benzodiazepines are commonly used to *manage* agitation (Ashton, 2002).

The Current Study

In order to address the current gaps in our understanding of the relationship between benzodiazepine use and violent crime, the present study aims to examine this relationship within a benzodiazepine-using, community-based criminal justice sample. The current study uses a non-violent offender comparison group, and uniquely explores whether benzodiazepine type or dose level is more closely associated with violent than non-violent criminal behaviour. Alprazolam and diazepam are specifically examined due to their frequent misuse in forensic populations (McGregor et al., 2011; Sweeney & Payne, 2012), and benzodiazepine use during the month and day preceding a recent crime is explored. It is predicted that individuals engaged in violent crime will report greater benzodiazepine use, and higher doses, than non-violent offenders. In order to attend to the complexity of violent behaviour (DeWall et al., 2011), core factors understood to play a role in violent crime are also assessed. Based on prior literature, it is expected that individuals engaged in violence will exhibit a heightened level of impulse control difficulties (Derefinko et al., 2011), increased psychological distress or disorder (Swogger et al., 2010), poly-substance use and prior criminality (Rice et al., 2013).

Method

Participants

Participants were recruited through drug diversion and treatment programs offered within the criminal justice system. Eligibility criteria were (i) 18 years and over, (ii) committed a crime within the last six months, and (iii) used benzodiazepines (prescribed or non-prescribed) at least once per month in previous six months. The term 'index offence' is used to refer to the participants' most recent crime, to which eligibility criteria (ii) relates.

Participants were divided into violent and non-violent groups based on this offence^a. Violent offences included assault, armed robbery, aggravated robbery, sexual offence, and serious threats.

Design and Procedure

The study involved a specifically developed semi-structured interview. Participants provided demographic information, and a mental health and substance use history. Interviews lasted 45-60 minutes and were conducted either face-to-face or over the telephone, and were audio recorded and transcribed verbatim. Information pertaining to mental health diagnoses, past treatment, and substances previously used were then entered into a quantitative data set. Analysis of the de-identified data was approved by the relevant ethics committees.

Measures

Psychological characteristics were assessed via the UPPS Impulsive Behaviour Scale (UPPS; Whiteside & Lynam, 2001)^b, which explores four aspects of impulsive behaviour (urgency, sensation seeking, (lack of) perseverance, and (lack of) premeditation), and the Kessler Psychological Distress Scale (K-10; Kessler et al., 2002), with the cut-off score of 30 or more to indicate a severe mental disorder (Andrews & Slade, 2001).

A 28-day timeline follow back method (TLFB; Sobell et al., 1996; Sobell & Sobell, 1992) was used to measure benzodiazepine and other substance use in the month prior to the index crime. Drug types and combinations, amount/dose, administration route, and withdrawal phases were examined. Benzodiazepine dependence was assessed via the Severity of Dependence Scale (SDS; Gossop & Darke, 1995), with the cut-off score of seven or more (de las Cuevas et al., 2000). Finally, the Criminality Index from the Opiate Treatment Index (OTI; Darke et al., 1992) was used to measure criminal behaviour (property crime, drug dealing, fraud, and violent crime) in the month prior to the index offence.

Statistical Analyses

The data were analysed in SPSS PASW Statistics 18. Preliminary screening indicated that there was a proportion of incomplete data for the dose variables ($n_{range} = 44-60$; 53.70-73.17%). Due to the unique nature of the data, statistical imputation was not conducted, though pairwise case exclusion was applied to analyses. Where normality was violated, variables were recoded, including benzodiazepine dose (within or above the standard dosing range^c (SDR) outlined in the MIMS^d; 'Alprazolam', 2013; 'Diazepam', 2013). The final sample size was 82.

Where possible, group differences were examined using independent samples t-tests (two-tailed). For categorical variables, or when assumptions were violated, non-parametric tests were conducted.

Results

Participant Characteristics

The final sample consisted of 82 individuals, aged between 21-56 years old ($M = 34.6$, $SD = 7.1$; Table 1 for demographics).

[Table-1]

Crime profile

Eleven (13.4%) participants were charged with a violent index offence. In the month prior to the index offence, 64 (78.0%) participants reported engaging in criminal activity, most commonly property crime (69.5%), followed by drug dealing (36.6%), violent crime (22.0%), and fraud (20.7%). Total frequency of crime (OTI total) was positively associated with urgency (responding impulsively in the context of negative emotions), total impulsivity, and the number of substances and benzodiazepines used in the day preceding the index offence (see Table 2).

Benzodiazepine use profile

The three most commonly used benzodiazepines over the lifetime (including prescribed and non-prescribed) were diazepam (98.8%), temazepam (95.1%), and alprazolam (93.9%). More than half (59.8%) of the sample had, over the lifetime, regularly used four or more benzodiazepine types. Nearly half (46.3%) exhibited benzodiazepine dependence, and participants specifically referenced difficulty with diazepam (39.0%) or alprazolam (37.8%) when responding to the SDS. Benzodiazepine dependence was significantly, positively associated with urgency, sensation seeking, psychological distress, and the number of other substances used on a regular basis (see Table 2). Non-medical acquisition methods (i.e., without a prescription) were common (91.5%), though most (70.7%) had used both non-medical and medical sources during their lifetime.

[Table-2]

In the 12-24 hours preceding the index offence, 84.1% of the sample reported using a benzodiazepine, predominantly diazepam (61.0%) and alprazolam (57.3%). More than a third (36.6%) reported using two types of benzodiazepines prior to the index crime. Notably, average alprazolam doses far exceeded national prescribing recommendations (see Table 3).

[Table-3]

Substance use profile

All participants reported lifetime use of cannabis and amphetamines, while other drug use was also high (Table 1). The entire sample had tried at least five drug types ($M = 17.9$, $SD = 3.5$), regularly using an average of 12.8 types ($SD = 3.9$). Substance use treatment had been sought by 96.3% of the sample, predominantly opiate substitution programs (82.9%). Of those who had used benzodiazepines in the 12-24 hours immediately prior to the index offence, 98.8% had done so in combination with another substance.

Mental health profile

The sample was highly distressed, with more than half (52.4%) scoring 30 or above on the K-10 (see Table 1). The majority of the sample reported being diagnosed with a mental illness in their life (82.9%), with 64.6% reporting more than one diagnosis ($M = 2.2$, $SD = 1.7$). The most commonly reported diagnoses were depression and anxiety.

Group differences

Benzodiazepine Use

Individuals who committed a violent index offence reported a significantly greater degree of benzodiazepine dependence than those who committed a non-violent index offence; $t(76) = -2.120$, $p = .037$, 95% C.I.: -5.84 to -.18, Cohen's $d = 0.73$ (Table 4). The use of non-prescribed (i.e., illicit) benzodiazepines did not differ between violent and non-violent offenders ($p = .186$; OR = 0.27, 95% CI: .04-1.71).

[Table 4]

Non-parametric Fisher's exact tests (two-tailed) found that individuals who committed a violent index offence were significantly more likely to use alprazolam at doses above the SDR (90.0%) in the month prior to the index offence, than individuals who committed a non-violent offence (54.0%; $p = .040$; OR = 7.67, 95% CI: .90-65.13). Indeed, violent offenders reported average alprazolam doses substantially higher than the SDR ($M = 26.60$, $SD = 31.13$), compared to the high, though less extreme, average doses reported by non-violent offenders ($M = 9.54$, $SD = 14.92$). However, although a similar trend was observed, alprazolam dose used in the 12-24 hours prior to the index offence did not significantly differ between violent ($M = 14.57$, $SD = 16.56$) and non-violent groups ($M = 9.95$, $SD = 16.54$); $p = .416$; OR = 2.76, 95% CI: .48-15.95. Neither group was significantly more likely to have used alprazolam in the month ($p = .441$, OR = 3.21, 95% CI = .38-26.91) or day ($p = .754$, OR = 1.31, 95% CI: .35-4.90) prior to the index offence.

Non-parametric Fisher's exact tests (two-tailed) failed to find significant group differences relating to diazepam average dose in the month prior to the index offence ($p = .616$; OR = 1.75, 95% CI: .30-10.27) or in the 12-24 hours preceding the offence ($p = .369$; OR = 2.33, 95% CI: .44-12.45). Neither group was significantly more likely to have used diazepam in the month ($p = 1.000$, OR = .84, 95% CI = .16-4.42) or day ($p = 1.000$, OR = 1.06, 95% CI = .28-3.97) prior to the index offence.

Mental Health

Although those who committed a violent index offence ($M = 37.25$, $SD = 9.97$) reported higher distress scores than those who committed a non-violent index offence ($M = 30.81$, $SD = 9.31$), this difference failed to reach statistical significance; $t(75) = -1.839$, $p = .070$ (two-tailed), 95% CI: -13.41 to .53, Cohen's $d = 0.70$. Fisher's exact tests (two-tailed) found that individuals who committed a violent index offence were significantly more likely to be diagnosed with depression (90.9% vs 57.7%; $p = .045$; OR = 7.32, 95% CI: .89-60.29) and personality disorder (36.4% vs 7.0%; $p = .016$; OR = 7.54, 95% CI: 1.64-34.77) than those who committed a non-violent index offence. There were no significant group differences based on anxiety ($p = .210$; OR = 2.39, 95% CI: .64-8.91), panic disorder ($p = .246$; OR = 2.33, 95% CI: .60-9.07), or bipolar ($p = .449$; OR = 2.29, 95% CI: .51-7.57), although the analyses regarding schizophrenia ($p = .068$; OR = 3.94, 95% CI: .96-16.18) and short-term psychosis ($p = .058$; OR = 3.72, 95% CI: .98-14.07) approached significance.

Criminality

Crime involvement (OTI total) in the month prior to the index offence did not differ between groups; $t(79) = -.043$, $p = .966$, 95% CI = -2.19 to 2.10, Cohen's $d = .01$. However, Fisher's exact test (two-tailed) found that individuals who committed a violent index offence were more likely to have engaged in recent violence (54.5%) than those who committed a non-violent index offence (17.1%; $p = .012$, OR = 5.80, 95% CI: 1.52-22.15).

Impulsivity

Individuals who committed a violent index offence displayed significantly higher sensation seeking tendencies than non-violent offenders; $t(72) = -2.157, p = .034$, 95% C.I.: -13.38 to -.53, Cohen's $d = .82$. No further group differences were observed (see Table 5).

[Table-5]

Discussion

The relationship between benzodiazepine use and violent crime was examined in a benzodiazepine-using, community criminal justice sample. Consistent with the literature, our findings demonstrate that violence is multiply-determined, influenced by both unchanging and dynamic factors (Dewall et al., 2011). This study collected data from a hard to reach population and found that individuals who committed a violent index offence were significantly more likely to exhibit benzodiazepine dependence, use high alprazolam doses, display strong sensation seeking tendencies, and report recent violent behaviour and diagnoses of depression and personality disorder, than those who committed a non-violent index offence. A general tendency towards high dose benzodiazepine use is therefore insufficient to indicate violence risk, rather the constellation of risk indicators is important (Jones et al., 2011; Lion et al., 1975).

Individuals who committed a violent index offence exhibited significantly higher levels of benzodiazepine dependence than those who committed a non-violent offence. Violent offenders therefore reported greater difficulty controlling, and greater concern about, their benzodiazepine use. It is reasonable that such difficulties may have disrupted their general coping abilities, increasing the likelihood of emotional, rash responses to other stressors (e.g., violence). Indeed, urgency was positively associated with benzodiazepine dependence, and has been implicated in negative substance use outcomes (Coskunpinar et al.,

2013) and as impacting the link between emotional lability and violence (Dvorak et al., 2013). Found in our study to relate to general offending, it is possible that in the context of problematic benzodiazepine use urgency may heighten the risk of violent behaviour. General sensation seeking tendencies may also impact this response, by impacting activity and environment selection, and level of forethought of actions. Found to be higher in violent offenders in our study, sensation seeking has been associated with violent behaviour in samples of undergraduate students (Derefinko et al., 2011; Dvorak et al., 2013; Miller et al., 2012) and violent prisoners (Shoham et al., 1989), and often observed in substance-using samples (Horvath et al., 2004; Knafo et al., 2013). However, greater disinhibition following benzodiazepine use (Paton, 2002) may also underlie benzodiazepine-related violence. Testing of such mechanisms would improve our understanding of this response, and offer individually tailored treatment approaches (Dvorak et al., 2013).

Individuals who committed a violent index offence were more likely to consume alprazolam at doses above the recognized standard dosing range (i.e., 4mg daily) than non-violent offenders. This finding adds to the growing body of evidence suggesting that alprazolam in particular may play a significant role in violent criminal behavior. Alprazolam is arguably the most concerning benzodiazepine due to its short-acting nature and potential for harm (Nicholas et al., 2011; Rintoul et al., 2013), and is frequently abused in clinical and forensic populations (Horyniak et al., 2012; Sweeney & Payne, 2012). Notably, widespread evidence of alprazolam's harm potential has led to its recent rescheduling to a controlled substance (Schedule 8) in Australia. Specifically pertaining to violence, alprazolam has been associated with instances of increased aggression in clinical studies (Gardner & Cowdry, 1985; O'Sullivan et al., 1994), typically involving high dose regimes. Our data extend these findings, as general use of higher alprazolam doses by non-clinical, criminal-justice involved individuals also appear to be associated with a greater likelihood of violence. It would

appear that, in combination with further efforts to reduce accessibility, understanding the motivations underlying such high alprazolam use may be a pertinent treatment target.

In addition to displaying problematic benzodiazepine use patterns, violent offenders were more likely to report the diagnoses of personality disorder and depression. Personality disorders, especially antisocial (ASPD) and borderline (BPD) types, have been consistently associated with violent behaviour (Yu et al., 2012); a risk increased by comorbid substance abuse (Fountoulakis et al., 2008). Increased violence may stem from traumatic or disrupted attachment histories (Dutton & White, 2012), and/or problematic enduring cognitive and affective characteristics (Gilbert & Daffern, 2011; Howard, 2011). Similarly unclear, the association between depression and aggressive behaviour may reflect common underlying factors (e.g., low serotonin, impaired attachment), violence resulting from depressive sequelae (e.g., reduced social support, increased alcohol use, angry rumination, impaired self-regulation; Dutton & Karakanta, 2013), or depression developing in response to negative rumination following an aggressive act (Graham et al., 2012). The association may also reflect a complex progression over time, influenced by factors such as gender or violence type or severity (Graham et al., 2012). Although our measure of lifetime diagnoses cannot suggest that active symptoms of depression were directly associated with violent offending, our data does suggest that a predisposition towards emotional disturbance, disrupted interpersonal functioning, and reduced executive functioning may be important in the assessment of violence risk, especially in benzodiazepine-using samples.

Limitations and Strengths

The study has a number of limitations. Of note, the small sample size with some variables of interest having missing data, as well as the low base rate of violent offending, greatly precluded the types of analyses that were able to be performed and limited statistical power (e.g., benzodiazepine dose data was available for only seven violent offenders). It is

also unclear whether the sample differs meaningfully from those who may have declined participation. In addition, no correction was made to protect against Type 1 error. Data collection relied on uncorroborated retrospective self-report, a proportion of the sample neglected to provide crime information (i.e., non-specified ‘other’ crime), and the reliability of the TLFB over the six month reporting period was not assessed (Davis et al., 2014; Sacks et al., 2003). Alternative interpretations need also be considered, that dependence to benzodiazepines may develop via attempts to manage pre-existing violent tendencies, and difficulty excluding whether reported aggression occurred during benzodiazepine withdrawal (Votava et al., 2001). It is also important to consider that the identified benzodiazepine dependence-violent crime link may have been influenced by concurrent substance use.

While acknowledging these limitations, the current unique study with a hard to reach population adds to the limited literature regarding the relationship between benzodiazepine use and violence. That is, previous research has focused on community samples, clinical or substance using samples, or forensic samples in custodial settings (Albrecht et al., 2014), greatly reducing the applicability of the findings to community-based offenders. Furthermore, our data permitted specific examination of the roles of diazepam and alprazolam in violent offending.

Implications and Conclusions

Due to the exploratory nature of this investigation, further research is needed to clarify the key factors underlying the benzodiazepine-violent crime relationship. However, the current findings do highlight the importance of adhering to recognized prescribing protocols (such as those outlined by Jones et al., 2011), and addressing reasons for benzodiazepine use (i.e., to manage negative affect). Our findings also promote the use of psychological approaches that target mental health and adaptive coping strategies (e.g., emotion identification and regulation, consequential thinking, impulse control) in violent

offenders. These implications are considered in light of recent data demonstrating that benzodiazepines are frequently sought through illegal, or non-medically prescribed, means (Best et al., 2013; Nielsen et al., 2013). Notably, intervention efforts need to focus on both enhanced control over the prescription of benzodiazepines (i.e., selectivity, size of prescriptions) *and* actively attempt to engage benzodiazepine users who may otherwise fail to come to the attention of prescribing or intervention bodies. Such strategies can hopefully reduce the association between benzodiazepine consumption and being detained for violent offending (Australian Institute of Criminology, 2013).

Notes

^a Offence grouping was considered in line with the World Health Organization's definition of interpersonal violence, and in keeping with recent research in this field (Haggård-Grann et al., 2006).

^b The current study utilised a 5-point Likert scale (0 = not at all, 2 = sometimes, 4 = very much) as opposed to the standard administration of the UPPS, which uses a 4-point Likert scale (1 = strongly agree, 4 = strongly disagree). In order to align the final UPPS scores ($n=76$) with the standardized version of the UPPS (i.e., zero scores are not possible), 7.25% of the data points required re-scoring from zero to one.

^c Alprazolam: 0.5-4.0mg per day; Diazepam: 5-40mg per day.

^d MIMS, originally the Monthly Index of Medical Specialities, is an independent supplier of medicine information in Australia, New Zealand, Asia, and the United Kingdom.

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