

Comparing violence in schizophrenia patients with and without comorbid substance-use disorders to community controls

Short T, Thomas S, Mullen P, Ogloff JRP. Comparing violence in schizophrenia patients with and without comorbid substance-use disorders to community controls.

Objective: This study examined crime and violence in patients with schizophrenia with and without comorbid substance-use disorders.

Method: A case-linkage design was used to compare patterns of violence and offending between 4168 schizophrenia patients drawn from a state-wide public mental health register, both with and without comorbid substance-use disorders, and a randomly selected community control group who had never been diagnosed with schizophrenia.

Results: Schizophrenia patients were significantly more likely than controls to be guilty of violent and non-violent offences, and to have been involved in family violence. Even schizophrenia patients without comorbid substance-use disorders had a significantly elevated risk of violence; this group were more than twice as likely as controls to have a violent conviction. The elevation of violence risk in schizophrenia patients was higher in females (OR = 8.59) than males (OR = 2.25).

Conclusion: The increased risk of violent offending in schizophrenia cannot be solely attributed to the effects of comorbid substance misuse, although comorbidity certainly heightens the likelihood of criminality. In addition to offending, people with schizophrenia are more likely than community controls to come to the attention of police via their involvement in family violence incidents. Schizophrenia is a particularly strong risk factor for violence in females.

T. Short^{1,2}, S. Thomas^{1,2}, P. Mullen^{1,2}, J. R. P. Ogloff^{1,2}

¹The Centre for Forensic Behavioural Science, Monash University and ²Victorian Institute of Forensic Mental Health, Melbourne, Vic., Australia

Key words: schizophrenia; psychoses; criminality; aggression

Tamsin Short, 505 Hoddle Street, Clifton Hill, Vic., 3068 Australia.

E-mail: tamsin.short@monash.edu

Accepted for publication November 14, 2012

Significant outcomes

- The majority of schizophrenia patients do not engage in criminal violence, but a diagnosis of schizophrenia is significantly associated with the risk of criminal and family violence in comparison to the general community.
- Even schizophrenia patients without comorbid substance-use disorders were significantly more likely than controls to have been found guilty of violent offences.
- The association between violence and having schizophrenia is stronger for women than for men (OR 8.59 vs. 2.25)

Limitations

- Variables such as socioeconomic status and employment were not routinely recorded so were not able to be considered.
- The rates of crime and substance-use diagnoses reported here will underestimate the true prevalence rates in the community, given only some criminality leads to charges or convictions and only a small proportion of substance abuse is recognized and recorded.
- The small number of schizophrenia patients who are assessed and treated exclusively within the private mental health system will be excluded from this study.

Introduction

There is now evidence to show that people with schizophrenia are significantly more likely than other community members to engage in criminality, violence and homicide (1–4). However, it has been argued that any increase in offending by psychiatric patients can be attributed largely, if not entirely, to comorbid substance abuse and social disadvantage, rather than psychotic illness *per se* (5–9). In a recent reflection on their classic *MacArthur Violence Risk Assessment Study*, Monahan and Steadman maintained that ‘our views have not changed over the succeeding decade: patients who were not substance abusers were no more likely to be violent than were their neighbours’ (pg. 149) (7). Similarly, in 2009, Fazel and colleagues reported that ‘the association between schizophrenia and violent crime is minimal unless the patient is diagnosed as having substance abuse comorbidity’ (p. 2021) (10). The debate about the causes of violence in schizophrenia continues in both clinical and academic circles, despite an extensive literature examining mental illness and violence. Ascertaining the risk of violent offending among persons with schizophrenic disorders, both with and without comorbid substance misuse, has important clinical and policy implications (11). To employ effective risk management strategies, there is a need to ascertain not only whether schizophrenia patients are generally at an increased risk of violence, but in what situations, and under what conditions, this risk applies. If it is indeed substance abuse, rather than psychosis, which drives the increased risk of violence, then attempts to prevent and treat violent behaviours should focus primarily on reducing the prevalence of substance misuse. Mental illness could then be disregarded as an independent risk factor. On the other hand, if schizophrenia alone is shown to be a valid and robust risk factor for violence, then its inclusion in structured risk assessment tools and clinical assessments is certainly warranted and its management should become part of any risk reduction strategy.

The majority of existing studies on mental illness have focussed either on criminal charges or convictions or on violence during psychiatric admission. Less research has compared rates of family violence and the use of protection/restraining orders between patients with severe mental illness and others in the community. Given that it is family members, rather than strangers, who are typically affected by violence by the mentally ill (12), this study will additionally examine incidents of family violence perpetrated by schizophrenia patients

which do not lead to criminal charges (including the use of restraining orders and police attendance at domestic disputes).

Aims of the study

This study aims to add to the literature on mental disorder and violence by determining the likelihood of violent offending, family violence and restraining orders in schizophrenia patients, both with and without substance comorbidity, and to compare this to a randomly selected control group without schizophrenia.

Material and methods

The current study employed a case-linkage design, using identical ascertainment methods to link information from the state-wide mental health and police records databases in Victoria, Australia (population 5.5 million) (13). Offending and family violence patterns were then compared between a sample of persons with schizophrenic disorders (the ‘schizophrenia sample’) and a randomly selected community sample drawn from the state electoral roll who had never been diagnosed with schizophrenia (the ‘community sample’). In recognition of the heterogeneity of schizophrenia syndromes and the recording of provisional diagnoses on psychiatric registers, the present research employed a broad definition of ‘schizophrenia disorder’ which included all subtypes of the disorder, plus schizoaffective disorder, unspecified psychosis and delusional disorders.

Sample selection

The community sample comprised 5000 cases (50% male) randomly selected from the Victorian electoral roll. Since electoral registration is compulsory in Australia, and the roll is updated monthly to add and remove cases, it provides an excellent representation of the state’s population (14). Full name, gender and age (within 2-year age band) were extracted for each of the 5000 names selected. All cases were aged between 17 and 65 years.

The schizophrenia sample comprised all persons first diagnosed with a schizophrenia disorder in the cohort years 1975, 1980, 1985, 1990, 1995, 2000 and 2005 in the public mental health system, as recorded on the Victorian Psychiatric Case Register (VPCR). All diagnoses on the VPCR are made by the psychiatrist within 1 month of admission, according to the ICD 9/ICD 10 diagnostic system (15, 16). While the VPCR does not record contacts with the private mental health sector, it is recog-

nized as being a good representation of schizophrenia patients in Victoria (virtually all of whom obtain services in the public mental health system at some point during their illness) (17, 18).

For the purposes of this research, 'schizophrenia disorder' was defined as a chronic primary psychosis, and included diagnoses of schizophrenia, schizoaffective disorder, paraphrenia, shared psychotic disorder, delusional disorders and unspecified non-organic psychosis (ICD-9 codes 295 and 297, plus ICD-10 codes F20, F22, F24, F25 and F29). Psychotic disorders caused by transient or organic factors (such as substance-induced psychosis) were excluded. As multiple provisional diagnoses are recorded on the VPCR, a case was only included if at least 75% of diagnoses after the initial contact were of a schizophrenic disorder, or if there was a recognized clinical progression to a schizophrenia diagnosis (for example, from a substance-induced psychosis). Using these eligibility criteria, the schizophrenia sample was reduced from the initial 7177 cases to 4168 cases (1263 excluded on diagnostic criteria and 1746 excluded due to being outside the 17–65 age band).

Linkage procedure to obtain psychiatric history

The full psychiatric history for each individual in both the schizophrenia and control samples was extracted from the VPCR, which details all psychiatric diagnoses, admissions and service contacts within the public mental health system in Victoria. The Victorian Births, Deaths and Marriages Registry was also searched (using full name and date of birth) to obtain the date of death for the 4168 cases in the schizophrenia sample.

All cases in the community sample were linked manually with the VPCR by full name, gender and 2-year age band. Cases which were outside the 17–65-year age band ($n = 114$), had inaccessible archived psychiatric records ($n = 84$), or inaccurate date of birth matches ($n = 4$), were permanently deleted from the sample. Of the 4712 controls, 521 individuals were identified on the VPCR; 71 (1.5%) of these were identified as having a schizophrenia-spectrum diagnosis and consequently removed from the sample, leaving 4641 cases.

Linkage procedure to obtain criminal and family violence history

The Victoria Police Law Enforcement Assistance Program (LEAP) details all criminal charges and victimization incidents known to police, in addition to details of all restraining orders and police

attendance at domestic disputes. Each of the 4168 schizophrenia cases and the 4641 community control cases were linked manually with the LEAP database, using full name, gender and date of birth (or age category if not identified on the VPCR). Deterministic, then probabilistic matching procedures using 'SOUNDEX' were used to maximize accurate matching. SOUNDEX is a phonetic algorithm used to match names by their phonetic pronunciation, so that same-sounding names are matched despite minor differences in spelling. For the 2818 community controls and 2276 schizophrenia cases who had records on the LEAP database, their full criminal history (charges, convictions, sentence outcomes, family violence reports, restraining orders and victimization reports) were extracted.

Outcomes: Coding violence, crime and mental disorder

Criminal offences were coded as either 'violent' or 'non-violent'. Violent offences included all contact sex offences (such as rape or indecent assault) and any physical assaults involving force or causing harm to the victim (such as assault, armed robbery or homicide). All other offences, including theft, stalking, driving, and drug-related offences, were coded as 'non-violent'. Sub-criminal family violence incidents and restraining orders were coded separately.

Information was extracted from the LEAP database regarding the number of charges, guilty outcomes, and recorded convictions recorded per person. Guilty outcome was selected as the primary measure of offending, as it represents offences which the court has determined to have actually occurred. Only limited information on the date of offences was available for incidents occurring before the system upgrade in 1993, therefore this variable was not able to be coded.

In terms of psychiatric history, each case and control were coded according to the presence of Axis I, Axis II and substance-use disorders. A substance-use disorder was defined as any form of substance dependence, abuse or substance-induced disorder (excluding nicotine- and caffeine-related disorders) coded using the ICD-9/ICD-10 (15, 16).

Ethics and data analysis

The study received ethics approval from Monash University, the Victorian Department of Human Services and Victoria Police, in accordance with the *Australian National Health and Medical Research Centre Guidelines* (19). Binary logistic regression was used to compare the chances of

offending in the schizophrenia and community samples, with age, gender and the presence of substance-use disorders controlled for statistically in multivariate models. Interaction terms were fitted, with the likelihood ratio test being used to specifically assess the role of substance use as an effect modifier. In instances where the likelihood ratio test was significant at $P < 0.05$, the adjusted odds ratio (AOR) based on the model with the interaction term fitted was reported. Finally, the population-attributable risk percentage (PAR%) was calculated, using the method set out in Hennekens and Buring (20) to indicate how much violent crime in the community could theoretically be attributed to schizophrenia.

Results

Descriptive statistics of the samples are presented in Table 1. Compared to the community group, the schizophrenia group were older ($t(8869.9) = -24.3$, $P < 0.001$) and contained a significantly greater proportion of males ($\chi^2 = 181.5$, $df = 1$, $P < 0.001$). In both the schizophrenia ($\chi^2 = 135.06$, $df = 1$, $P < 0.001$) and community ($\chi^2 = 23.42$, $df = 1$, $P < 0.001$) samples, there was a significantly greater proportion of males among those diagnosed with a substance-use disorder. The schizophrenia and community samples were combined for further analysis ($N = 8809$), and age and gender were controlled for statistically. To explore further the impact of comorbid substance-use disorders on violent offending, the schizophrenia sample was subdivided into those patients with a diagnosed comorbid substance-use disorder ($n = 913$, 21.9%) and those without ($n = 3255$, 78.1%).

Criminal and violent offending

In the community sample, 8.6% of people ($n = 398$) had been charged with a criminal offence, 7.7% ($n = 357$) were found guilty of an offence and 4.9% ($n = 227$) had a recorded criminal conviction. Thus, 90% of community controls charged with a criminal offence were found

guilty of at least one offence, and 64% of these guilty outcomes led to a conviction. In the schizophrenia group, 24.6% ($n = 1024$) of the sample had been charged with a criminal offence, 22.9% ($n = 953$) had been found guilty and 15.4% ($n = 642$) had a recorded criminal conviction. Thus, 93% of persons charged were found guilty of at least one offence, and 67% of these guilty outcomes led to a conviction. There were no significant differences between the two groups in the mean number of charges (20.34, $SD = 57.33$, vs. 21.46, $SD = 48.22$, $t(1420) = -0.37$, $P = 0.71$) or guilty outcomes (12.04, $SD = 28.16$, vs. 16.03, $SD = 38.48$, $t(1308) = -1.78$, $P = 0.08$) per person.

Almost one quarter of the schizophrenia sample had been charged with a criminal offence during their lifetime, compared to less than 10 per cent of the community sample. As shown in Table 2, people in the schizophrenia sample were significantly more likely to be charged with, found guilty, and convicted of a criminal offence than the community sample, even after controlling for the potentially confounding effects of gender, age and substance-use disorders ($P < 0.001$). Individuals in the schizophrenia sample were also significantly more likely than the community sample to have made contact with the police via restraining order applications and attendance at family violence incidents ($P \leq 0.001$).

Overall, the schizophrenia group was 4.57 times more likely than the community group to have been found guilty of a violent offence ($P < 0.001$). This odds ratio reduced to 3.11 (95% CI 2.39–4.03), but remained statistically significant, after age, gender and substance-use disorders were controlled for statistically. The schizophrenia group were also 2.51 (95% CI 2.14–2.95) times more likely than the community sample to have been found guilty of a non-violent offence, after controlling for the same covariates. Furthermore, using the same multivariate model, the schizophrenia group were three times more likely to be found guilty of family violence offences as compared to the community sample (AOR = 3.00, 95% CI 2.43–3.71). Consistent with these findings, and more generally speaking, the schizophrenia group were more than two times more likely than the community sample to have been found guilty of any criminal offence after controlling for gender, age and substance use (AOR = 2.16, 95% CI 1.78–2.61). Of note, there were significant interactions between all of the offending types and substance use. The population-attributable risk percentage for violent offending by the schizophrenia sample was 6.99%.

Table 1. Descriptive statistics for the schizophrenia and community samples

	<i>N</i>	Mean age (SD)	Males (%)	Females (%)
Schizophrenia sample	4168	45.2 (11.2)	63.7	36.3
Schizophrenia only	3255	46.8 (11.0)	59.1	40.9
With substance-use disorder	913	39.8 (9.6)	80.1	19.9
Community sample	4641	39.2 (12.1)	49.5	50.5
No substance-use disorder	4586	39.1 (12.2)	49.0	51.0
With substance-use disorder	55	42.3 (11.1)	81.8	18.2

Table 2. Prevalence and odds ratios for criminal offences, family violence and restraining orders in the schizophrenia and community samples

	Schizophrenia sample (<i>N</i> = 4168)	Community sample (<i>N</i> = 4641)	Odds ratio (95% CI)	Adjusted odds ratio* (95% CI)	Sig. level
Charged with any offence	24.6% (<i>n</i> = 1024)	8.6% (<i>n</i> = 398)	3.47 (3.07–3.93)	2.32 (2.00–2.70)	<i>P</i> ≤ 0.001
Guilty of any offence	22.9% (<i>n</i> = 953)	7.7% (<i>n</i> = 357)	3.56 (3.12–4.05)	2.35 (2.02–2.72)	<i>P</i> ≤ 0.001
Convicted of any offence	15.4% (<i>n</i> = 642)	4.9% (<i>n</i> = 227)	3.54 (3.02–4.15)	1.95 (1.62–2.34)	<i>P</i> ≤ 0.001
Guilty of a violent offence	10.0% (<i>n</i> = 416)	2.4% (<i>n</i> = 110)	4.57 (3.69–5.66)	2.56 (2.01–3.28)	<i>P</i> ≤ 0.001
Guilty of a non-violent offence	21.7% (<i>n</i> = 904)	7.2% (<i>n</i> = 332)	3.60 (3.15–4.11)	2.35 (2.01–2.74)	<i>P</i> ≤ 0.001
Perpetrator of family violence incident	12.1% (<i>n</i> = 505)	3.7% (<i>n</i> = 172)	3.58 (3.00–4.28)	2.72 (2.22–3.33)	<i>P</i> ≤ 0.001
Subject to restraining order	10.3% (<i>n</i> = 429)	3.0% (<i>n</i> = 140)	3.69 (3.03–4.49)	2.37 (1.90–2.96)	<i>P</i> ≤ 0.001

*Controlling for the effects of gender, age and substance-use disorders.

Comorbid substance-use disorders

Table 3 shows the rates of general and violent offending in the comorbid, schizophrenia only and community samples. Compared to the community sample, the comorbid group was 8.60 times more likely to have been found guilty of a violent offence ($P \leq 0.001$), after controlling for age and gender. They were also significantly more likely than schizophrenia patients with no known substance-use disorder to be found guilty of a violent crime ($P \leq 0.001$). When compared to the community sample, schizophrenia patients without a comorbid substance-use disorder were still 2.65 times more likely to be found guilty of a violent crime (95% CI = 2.07–3.41, $P \leq 0.001$), after controlling for age and gender. Substance misuse also increased the risk of violent offending in the community sample; controls with a diagnosed substance-use disorder were 14.62 times more likely than those without a substance-use disorder to have been found guilty of a violent offence (95% CI = 7.75 – 27.57, $P \leq 0.001$), controlling for age and gender.

Risk of violence between genders

Controlling for age and substance-use disorders, females with schizophrenia ($n = 778$) were 8.59 times more likely than females without schizophrenia ($n = 1963$) to be convicted of a violent offence (OR = 8.59, 95% CI = 3.43 – 21.54). Controlling for the same covariates, males with schizophrenia ($n = 2656$) were 2.25 times more likely than males without schizophrenia ($n = 2292$) to be

convicted of a violent offence (OR = 2.25, 95% CI = 1.75–2.90).

Discussion

This study employed a robust case-linkage methodology to compare rates of criminality and family violence in schizophrenia patients with a randomly selected community sample who had not been diagnosed with schizophrenia. Schizophrenia patients were not only more likely than controls to have a record of offending and criminal violence, but were also significantly more likely to have been subject to a restraining order and to have been involved in family violence incidents which came to the attention of police. These results provide further evidence that partners and family members (rather than strangers) may be particularly likely to experience violence by schizophrenia patients, and indicates that violence and conflict in schizophrenia extends beyond behaviour which results in a criminal conviction (12, 21). Furthermore, this study discredits the notion that the increased prevalence of violence in schizophrenia can be solely attributed to substance misuse, as even patients without a known substance-use disorder were significantly more likely than the community to behave violently. This supports recent data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), which found that respondents with major mental illness were significantly more likely than those without to report violent behaviours, irrespective of substance misuse (4).

Table 3. Comparison of offending between the comorbid sample, schizophrenia-only sample and community sample (prevalence and odds ratios)

	% Guilty of any offence	% Guilty of a violent offence	Odds ratio of violent offending compared to schizophrenia-only sample*	Odds ratio of violent offending compared to community sample*
Co-morbid sample (<i>N</i> = 913)	46.8% (<i>n</i> = 427)	22.8% (<i>n</i> = 208)	3.32 (95% CI 2.66–4.14) $P \leq 0.001$	8.60 (95% CI 6.70–11.04) $P \leq 0.001$
Schizophrenia-only sample (<i>N</i> = 3255)	16.2% (<i>n</i> = 526)	6.4% (<i>n</i> = 208)	–	2.65 (95% CI 2.07–3.40) $P \leq 0.001$
Community sample (<i>N</i> = 4641)	7.7% (<i>n</i> = 357)	2.4% (<i>n</i> = 110)	–	–

*Controlling for the effects of gender and age.

Strengths and limitations

A key strength of this study is the large sample size and robust case-linkage methodology, which provides greater statistical power and confidence in the results (22). However, as with all case-linkage studies, data analysis was limited by the depth and completeness of the information that has been recorded in the source databases over time (i.e. the police contacts database and psychiatric case register). As it is not possible to guarantee the accuracy of either the original data entry or the current matching procedures, a small degree of error will inevitably be incurred (22). However, the impact of such error on the overall results is countered by the use of robust matching methodology and a significant sample size, and it is expected that the overall margin of error will be minimal. A further limitation of the psychiatric case register is that it does not provide reliable information about demographic variables such as employment, housing or socioeconomic status, all of which would arguably be useful covariates given their potential association with criminality. It was also not possible to access individual formulations or case notes on the VPCR because of the historical nature of the register. Furthermore, while the inclusion criteria we adopted to classify as a schizophrenia case were derived from a number of ICD codes and categories, the case was ultimately coded on the basis of the person having any of these in combination in 75% or more of the diagnoses recorded on the VPCR. As such, it was not possible to conduct further potentially clinically pertinent analyses, for example, comparing paranoid vs. non-paranoid disorders.

Similar quality and depth limitations are inherent with the Victoria Police LEAP database because of its historical nature. For example, LEAP does not provide reliable information about offence dates, which precluded a temporal analysis of offending and psychiatric diagnosis in this study. In addition, the rates of violent crime and substance-use disorders reported here are likely to underestimate the true prevalence of violence and substance misuse within the community, as both are underrepresented in officially recorded databases (17, 23). It must also be noted that the rate of substance-use disorders in the community was notably lower than that generally reported in epidemiological surveys in Australia and elsewhere (24, 25). This is likely because in Victoria, most persons with primary substance-use disorders are treated in the private sector or by specialized drug and alcohol services, and thus (in the absence of a major mental illness) are not typically recorded on

the VPCR as having a substance-use disorder (25, 26). Thus, it seems probable that the community sample actually have a higher number of substance-use disorders than was reported here.

It should be noted that the current study excluded any schizophrenia patients treated exclusively in the private sector. However, as all crisis services and involuntary admissions in Victoria must occur within the public system, the majority of schizophrenia patients will come into contact with the public system at some point during the course of their illness and thus be included in the study (17). We further note that no correction was applied for periods when opportunities for offending were reduced (such as during hospitalization or incarceration). However, we point out that this would lead to an underestimation of the true difference between rates of offending in the schizophrenia and community samples. Therefore, any elevation in offending risk in the schizophrenia sample can be interpreted with some confidence.

Finally, the study used official records of violent crime, which are known to underestimate the true prevalence of violence within the community. Ideally, it would be useful to supplement official criminal records with other collateral data. However, owing to the large sample size of the current study, and the historical nature of the sample selection, it was neither feasible nor possible to conduct interviews with individual participants. Furthermore, the use of officially recorded psychiatric diagnoses and court outcomes for criminal charges arguably provides a more conservative measure of both 'schizophrenia' and 'violent crime' than would be obtained by a self-report methodology.

Crime and violence in schizophrenia

The vast majority of schizophrenia patients in this sample had not engaged in violent or criminal behaviour. However, one in four schizophrenia patients had been charged with a criminal offence, and one in 10 had been found guilty of a violent crime. These rates were significantly higher than those reported in the community sample, where less than 10% of persons had been charged with any crime and only 2.4% had been found guilty of criminal violence. Even after controlling for age, gender and substance-use disorders, people with schizophrenia disorders were more than twice as likely as others in the community to have been found guilty of a criminal offence. These differences were significant for both violent and non-violent crimes, although the odds of offending in the schizophrenia group were particularly high for violent offences. This indicates that schizophrenia

patients have a higher likelihood of general criminality than the general community, and that when they do offend, may be particularly prone to committing violent offences. These results are generally consistent with other robust case linkage and birth cohort studies, which indicate that schizophrenia patients are somewhere between two to five times more likely than other community members to engage in criminal violence (17, 27–30).

In considering the present findings, it is important to note that the population-attributable risk for violent offending in schizophrenia was 6.99%, which indicates that only 7% of all violent crimes committed could be theoretically attributed to the effects of schizophrenia. In other words, if all schizophrenia patients were removed from the community (and if schizophrenia was indeed causally related to violence), the amount of violent crime would drop by only 7%. This further emphasizes that schizophrenia disorders are only one of many potential causative factors for violence, and that the majority of violent incidents are, indeed, not related to psychotic disorders (1, 31, 32). The current data do *not* provide evidence for schizophrenia as a causal factor for violence. Rather, schizophrenia should be considered a risk factor which, if present, increases the statistical likelihood of an individual committing violent crime when compared to others in the community. It should be noted that there are other risk factors (such as psychopathy, history of violence and male gender) which are more closely associated with violence than schizophrenia (5, 33).

Finally, this research also supports the notion that people with severe mental illness experience significantly more problems in interpersonal relationships, and that family members may often be the targets of violent behaviour (12, 21). As such, providing care and support to families and carers of people with psychotic disorders may be an effective means of ameliorating interpersonal conflict and therefore reducing the incidence and impact of violence in this population.

The role of comorbid substance abuse

This study confirms that substance-use disorders greatly heighten the risk for criminal violence in both schizophrenia patients and other community members. However, contrary to some recent assertions, (7, 9, 10) this study indicates that schizophrenia is independently related to criminal violence, irrespective of comorbid substance misuse. In other words, the increased likelihood of violent crime in people with schizophrenia cannot be solely attributed to the effects of substance abuse, and

there may be something else associated with, or inherent to, the illness itself that increases the likelihood of violent behaviour. Indeed, even schizophrenia patients without a substance-use disorder were 2.5 times more likely than our community sample to have been found guilty a violent crime.

Nevertheless, it is worth noting the marked increase in the likelihood of criminal violence among those patients with a known substance-use disorder. Patients with a history of offending and comorbid substance misuse present with a particularly elevated risk of violence, and specialized services and management strategies are warranted for this population. This group were far more likely to commit violent crime, with the likelihood of offending nearly 14 times greater than that of the general community. In our study, this equated to roughly one in five patients who would be considered at significantly elevated risk of violence. Thus, even if we were only to consider the elevated risk posed by those patients with comorbid substance misuse, the relatively high prevalence of substance misuse in this population dictates that a significant proportion of patients has a greatly augmented chance of offending. Dismissing the association between violence and mental illness as simply an association with substance misuse risks overshadowing the important point that many schizophrenia patients *do* abuse substances, and that even if they do not, these patients are statistically more likely to be violent than the general community.

Risk of violence in females with schizophrenia

This study also examined the relative influence of schizophrenia on violence in males and females. While schizophrenia disorders significantly increased the risk of violence in both genders, they had a relatively greater impact on violence in women than in men. In comparison to men with schizophrenia, who experienced a two-fold increase in risk of violence compared with other men, women with schizophrenia were almost nine times more likely than women without this disorder to commit a violent offence. This finding may be partly owing to the relatively lower base rates of violence in females; as women are typically less violent than men, the impact of schizophrenia may therefore be more apparent in their offending behaviour. Similar conclusions were put forward by Taylor and Bragado-Jimenez, who reviewed the literature on violence in females with psychosis and surmised that ‘psychosis confers a disproportionate risk of violence on women than men’ (34) (p. 56). This suggests that schizophrenia disorders may be a particularly useful risk factor when considering violence in women.

Acknowledgements

This study was supported by a grant from the Australian Research Council; a collaboration between Monash University, Victorian Institute of Forensic Mental Health and Victoria Police. The research team comprised James Ogloff, Stuart Thomas, Paul Mullen, Trish Martin, Jonathan Clough, Christine Tye, Ashley Dickinson and Ken Lay.

Declaration of interest

None of the authors have any conflict of interest or financial investment in this research, or in general. The results formed part of Dr. Short's doctoral research, which was conducted at Monash University.

References

1. ANGERMEYER MC. Schizophrenia and violence. *Acta Psychiatr Scand* 2000;**102**:63–67.
2. BENNETT DJ, OGLOFF JRP, MULLEN PE, THOMAS SDM, WALLACE C, SHORT T. Schizophrenia disorders, substance abuse and prior offending in a sequential series of 435 homicides. *Acta Psychiatr Scand* 2011;**124**:226–233.
3. DOUGLAS KS, GUY LS, HART SD. Psychosis as a risk factor for violence to others: a meta-analysis. *Psychol Bull* 2009;**135**:679–706.
4. VAN DORN R, VOLAVKA J, JOHNSON N. Mental disorder and violence: is there a relationship beyond substance use? *Soc Psychiatry Psychiatr Epidemiol* 2012;**47**:487–503.
5. ELBOGEN EB, JOHNSON SC. The intricate link between violence and mental disorder: results from the national epidemiologic survey on alcohol and related conditions. *Arch Gen Psychiatry* 2009;**66**:152–161.
6. FAZEL S, LICHTENSTEIN P, GRANN MC, GOODWIN GM, LANGSTROM N. Bipolar disorder and violent crime: new evidence from population-based longitudinal studies and systematic review. *Arch Gen Psychiatry* 2010;**67**:931–938.
7. TORREY EF, STANLEY J, MONAHAN J, STEADMAN HJ. The MacArthur violence risk assessment study revisited: two views ten years after its initial publication. *Psychiatr Serv [Debate]* 2008;**59**:147–152.
8. VOLAVKA J, SWANSON J. Violent behavior in mental illness: the role of substance abuse. *J Am Med Assoc* 2010;**304**:563–564.
9. LEVIN A. Violence and mental illness: media keep myths alive. *Psychiatr News* 2001;**36**:10.
10. FAZEL S, LANGSTROM N, HJERN A, GRANN M, LICHTENSTEIN P. Schizophrenia, substance abuse, and violent crime. *J Am Med Assoc* 2009;**301**:2016–2023.
11. MULLEN P, OGLOFF J. Providing mental health services to adult offenders in Victoria, Australia: overcoming barriers. *Euro Psychiatry* 2009;**24**:395–400.
12. STRAZNICKAS KA, MCNIEL DE, BINDER RL. Violence towards family caregivers by mentally ill relatives. *Hosp Community Psychiatry* 1993;**44**:385–387.
13. Australian Bureau of Statistics. Australian demographic statistics. Canberra, Australia: Australian Bureau of Statistics, 2010.
14. Victorian Electoral Roll act. Victoria, Australia: 2002.
15. World Health Organization. The International Classification of Diseases, 9th revision. Geneva, Switzerland: World Health Organisation, 1977.
16. World Health Organization. The International Classification of Diseases, 10th revision. Geneva, Switzerland: World Health Organisation, 1992.
17. WALLACE C, MULLEN PE, BURGESS P. Criminal offending in schizophrenia over a 25-year period marked by deinstitutionalization and increasing prevalence of comorbid substance use disorders. *Am J Psychiatry* 2004;**161**:716–727.
18. CUTAJAR MC, MULLEN PE, OGLOFF JR, THOMAS SD, WELLS DL, SPATARO J. Schizophrenia and other psychotic disorders in a cohort of sexually abused children. *Arch Gen Psychiatry* 2010;**67**:1114–1119.
19. National Health and Medical Research Council. National Statement on Ethical Conduct in Human Research. Canberra, Australia: National Health and Medical Research Council, 2007.
20. HENNEKENS CH, BURING JE. Measures of disease frequency. In: MAYRENT SL, ed. *Epidemiology in medicine*. Philadelphia, PA: Lippincott, Williams & Wilkins, 1987:54–100.
21. SILVER E. Mental disorder and violent victimisation: the mediating role of involvement in conflicted social relationships. *Criminology* 2002;**40**:191–212.
22. MORTENSEN PB. The untapped potential of case registers and record-linkage studies in psychiatric epidemiology. *Epidemiol Rev* 1995;**17**:205–209.
23. CARCACH C. Reporting crime to the police. *Trends Issues Criminal Justice* 1997;**68**:1–6.
24. GRANT BF, STINSON FS, DAWSON DA et al. Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the national epidemiologic survey on alcohol and related conditions. *Arch Gen Psychiatry* 2004;**61**:807–816.
25. Australian Bureau of Statistics. National Survey of Mental Health and Wellbeing: summary of results. Canberra, Australia: Australian Bureau of Statistics, 2007.
26. SHORT TB, THOMAS S, LUEBBERS S, OGLOFF JRP, MULLEN PE. Utilization of public mental health services in a random community sample. *Aust N Z J Psychiatry* 2010;**44**:475–481.
27. RASANEN P, TIIHONEN J, ISOHANNI M, RANTA-KALLIO P, LEHTONEN J, MORING J. Schizophrenia, alcohol abuse, and violent behavior: a 26-year followup study of an unselected birth cohort. *Schizophr Bull* 1998;**24**:437.
28. HODGINS S. Mental disorder, intellectual deficiency and crime: evidence from a birth cohort. *Arch Gen Psychiatry* 1992;**49**:476–483.
29. HODGINS S, MEDNICK SA, BRENNAN PA, SCHULSINGER F, ENGBERG M. Mental disorder and crime: evidence from a Danish birth cohort. *Arch Gen Psychiatry* 1996;**53**:489–496.
30. ARSENEAULT L, MOFFITT TE, CASPI A, TAYLOR PJ, SILVA PA. Mental disorders and violence in a total birth cohort: results from the Dunedin study. *Arch Gen Psychiatry* 2000;**57**:979–986.
31. FAZEL S, GULATI G, LINSSELL L, GEDDES JR, GRANN MC. Schizophrenia and violence: systematic review and meta-analysis. *PLoS Med* 2009;**6**:e1000120.
32. SWANSON JW, VAN DORN RA, SWARTZ MS, SMITH A, ELBOGEN EB, MONAHAN J. Alternative pathways to violence in persons with schizophrenia: the role of childhood antisocial behavior problems. *Law Hum Behav* 2008;**32**:228–240.
33. HART SD. The role of psychopathy in assessing risk for violence: Conceptual and methodological issues. *Legal Criminol Psychol* 1998;**3**:121–137.
34. TAYLOR PJ, BRAGADO-JIMENEZ MD. Women, psychosis and violence. *Int J Law Psychiatry* 2009;**32**:56–64.