

Homicide of Strangers by People with a Psychotic Illness

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Background: The homicide of strangers by people with psychosis, referred to here as “stranger homicides,” are rare and tragic events that generate adverse publicity for mental health services and have resulted in significant changes in mental health policy and law. **Aim:** To estimate the incidence of stranger homicides, using data from previously published studies, and to compare the characteristics of psychotic offenders who killed strangers with the characteristics of those who killed a close relative. **Method:** Meta-analysis of the population-based studies of homicide by persons suffering from a psychosis in which the number of subjects who killed strangers was also reported. **Characteristics of stranger homicide and family homicide offenders were examined in a multicenter case-control study of homicide during psychotic illness in four high-income countries. Results:** A pooled estimate of 1 stranger homicide per 14.3 million people per year (95% confidence interval, 1 in 18.9 million to 1 in 11.5 million people per year) was calculated by meta-analysis of 7 studies. The characteristics of the 42 stranger homicide offenders from New South Wales

[NSW], Quebec and Eastern Ontario, Finland, and the Netherlands were identified. Twenty seven (64%) of these had never previously received treatment with antipsychotic medication. The stranger homicide offenders were more likely to be homeless, have exhibited antisocial conduct, and had fewer negative symptoms than those who killed family members. The victims of stranger homicide were mostly adult males and the homicides rarely occurred in the victim's home or workplace. **Conclusions:** Stranger homicide in psychosis is extremely rare and is even rarer for a patient who has received treatment with antipsychotic medication. A lack of distinguishing characteristics of stranger homicide offenders and an extremely low base rate of stranger-homicide suggests that risk assessment of patients known to have a psychotic illness will be of little assistance in the prevention of stranger homicides.

Key words: schizophrenia/psychosis/violence/homicide/
risk assessment

Introduction

The community perception that the mentally ill are dangerous contributes to the stigma experienced by those with schizophrenia,^{1,2} and the risk of homicide by the mentally ill has been used as an argument against deinstitutionalization.³ Publicity arising from homicides of complete strangers by psychotic individuals appears to have been a catalyst for changes in mental health policy and for laws governing compulsory psychiatric treatment.^{4,5} In Canada, the killing of Brian Smith, a former professional ice hockey player and sports broadcaster, by a mentally ill patient led to an amendment to the Mental Health Act and the Health Care Consent Act that became known as “Brian's Law.”⁶ The law introduced community treatment orders and new criteria for involuntary commitment to psychiatric facilities. Similar changes were introduced in New York after the killing of a young woman, Kendra Webdale, by a recently discharged psychotic patient.⁷ In the United Kingdom, the Clunis enquiry into the killing of Jonathan Zito at a London railway station recommended that every patient about to be discharged from a psychiatric hospital be subjected to a formal risk assessment.⁸

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Health and policy measures that aim to protect the public from violence by the mentally ill might be justified if the threat of violence was greater than that of the nonmentally ill. There is a modest but consistent association between mental illness and serious violence,⁹ including homicide.¹⁰ However, measures aimed at the care and control of current patients would have a limited effect on the number of stranger homicides if many of these events occur during the first episode of psychosis, after the emergence of psychotic symptoms, but before diagnosis and treatment. Recent studies, including a systematic review and meta-analysis, show that the rate of homicide during first-episode psychosis is as much as 15 times greater than the annual rate after treatment.^{11,12} These studies also suggest that the rate of homicide committed by previously treated psychotic patients is lower than the widely accepted estimate of 1 in 3000 schizophrenic males per year.¹³ The same might be true for rates of stranger homicide, although few studies have considered the association between serious mental illness and stranger homicide, or the phase of mental illness in which a stranger homicide is more likely to occur. If a significant proportion of those who kill strangers in the course of psychotic illness have never received treatment with antipsychotic medication, then measures to reduce the risk of future harm by known patients can have a limited effect, and measures that improve early detection and treatment of psychosis might be a more successful way to reduce the incidence of stranger homicide.

Studies that have reported the relationship between mentally ill homicide offenders and their victims show that the proportion of victims who are strangers is low.^{11,14,15} A study of stranger homicide in England and Wales over a 3-year period from 1996 to 1999 found that people with a diagnosis of schizophrenia were responsible for 7.8% of all homicides and 4.3% of the stranger homicides.¹⁶ Although stranger homicides increased in England and Wales between 1967 and 1997, the increase was mainly due to lethal assaults by young men intoxicated with alcohol.

A study of stranger homicide in Canada reported that 1.7% of stranger homicide offenders were mentally retarded or mentally ill. None were found to have a clearly psychotic motive for the homicide, but about one-quarter of the patients were reported to have paranoia or a sense of “impending doom.”¹⁷ The authors concluded that those who killed strangers were similar in most respects to those who killed acquaintances.

One of the few studies reporting the characteristics of a group of mentally ill offenders who attempted to kill strangers described 20 people who had pushed subway passengers in front of oncoming trains.¹⁸ Three were charged with murder. The offenders had a mean age in the mid-30s, three-quarters were men and two-thirds were homeless. Nineteen of the 20

offenders had an established diagnosis of schizophrenia and all but one of those were thought to have positive symptoms of psychotic illness at the time of the offence.

In the first part of the study, we aimed to estimate, using a meta-analysis of published data, the proportion of homicides committed during psychotic illness in which the victim was a stranger and the incidence of stranger homicide. In the second part of the study, we examined a separate sample of homicide offenders with psychosis who had killed strangers, with particular reference to the proportion of those offenders who had previously received treatment with antipsychotic medication. Finally, we aimed to compare the characteristics of stranger homicide offenders with psychosis with a case-control group who killed a family member.

Method

Meta-analysis of the Proportion of Stranger-Homicides During Psychotic Illness and Rate of Stranger-Homicides by People with Psychosis

Studies which included all the homicides during psychotic illness in a defined population over a specified period and which also reported the number of subjects who killed strangers were located from examination of the papers located in the course of 3 earlier systematic reviews of homicide associated with psychotic illness.^{10,12,19} The search methods used to locate studies of homicide offenders in psychosis from defined populations employed a comprehensive set of search terms in Medline, PsychINFO, Cinahl and Embase (1960–2008), hand searching of the references of other papers, a systematic examination of official homicide statistics in English language jurisdictions and email contact with authors for further information including the number of victims who were strangers (see Large *et al.*¹⁰ and Nielssen and Large¹² for details).

Seven studies were included.^{11,14,15,20–23} We performed a meta-analysis of the proportion of stranger homicides among homicide offenders with psychotic illness and a second meta-analysis of the population-based rates of stranger homicide.

Inter-rater reliability testing found no differences between data independently extracted by M.M.L. and O.N. Meta-analyses were performed using Comprehensive Meta Analysis (CMA) version 2.2.²⁴ CMA software allows the meta-analysis of proportions and rates in a single group using the number of events, the total number of events, and total number of person-years. The number of person-years was calculated by multiplying the population provided in the study with the duration of the sample period. CMA employs the same computational algorithms used by the Cochrane Collaborators to weight studies by the inverse variance method and to assess effect size. CMA was also used to assess heterogeneity using Q value and I square statistics and the choice of

random or fixed effects models was made on the basis of heterogeneity considerations.²⁵

Description of Psychotic Homicide Offenders Who Kill Strangers and a Case–Control Study Comparing Stranger-Homicide and Family-Homicide With Psychosis

There were 18 cases of stranger homicide by patients with a psychotic illness in NSW, Australia between 1991 and 2005.¹¹ To examine the characteristics of a larger number of cases, M.M.L. and O.N. sought the assistance of the authors of recent studies of homicide in psychosis from Canada, Finland, and the Netherlands, who had data about cases of stranger homicide during psychotic illness and controls of family homicides. The controls were taken from the next patient in the series who had killed a close family member, including a spouse, child, parent, grandparent, sibling, or other cohabiting relative. Family-homicide was chosen as the comparison group because of the close familiarity of the perpetrators with the victim. People who had killed a friend or acquaintance were excluded. Hence, the controls were matched for the presence of psychosis at the time of the offence, the time frame, and the region in which the homicide occurred.

Cases and controls were drawn from series of psychotic homicide offenders in the state of NSW in Australia, East Ontario and Quebec in Canada, the Netherlands, and Finland. The NSW series included known cases between 1991 and 2005,^{11,26} the Quebec and East Ontario series included psychotic homicide offenders who had killed either a stranger or a family member between 1990–2005,^{27–30} the Finnish series included all known cases between 1987 and 2004,²⁰ and the Dutch series was taken from between 2002 and 2008.^{31–33}

We defined a stranger homicide as any case in which the victim had no knowledge of the offender 24 h before the homicide. This definition theoretically included cases in which a mentally ill offender pursued an unknowing victim over a period of time, although no cases of this nature were found. Patients in psychiatric hospitals and prison inmates who had killed fellow inmates after knowing them for less than 24 h were included in the case-control study, but were excluded from the meta-analysis of rates and proportions of stranger homicide because we were interested in the risk of homicide faced by members of the general public from unknown persons with psychotic illness.

The following data were collected from cases and controls:

1. Demographic data, including age, sex, marital and employment status, and whether the offenders were homeless at the time of the homicide.
2. Developmental history, including any history of childhood trauma, conduct disorder, the nature of any previous criminal convictions, details of prior substance

abuse, the number of years of education and whether or not there was any documented history of head injury. The data regarding personality dysfunction was limited to objective features of antisocial personality.

3. Offence characteristics, including the number of victims, the age and sex of the youngest victim in cases of multiple homicide, the location of the offence, the method used and whether or not the homicide was committed with greater violence than was necessary to ensure the death of the victim.^{20,34}
4. The offender's psychiatric diagnosis, reported symptoms at the time of the homicide, and whether or not the offender had been affected by substances. We also recorded if the patient had reported any degree of amnesia for the event and if legal proceedings had led to a finding of reduced criminal responsibility.
5. Details of past psychiatric treatment, if any, including previous admissions to psychiatric hospitals, a history of previous treatment with antipsychotic medication, and a history of any contact with mental health services in the month before the homicide. Data regarding adherence to prescribed antipsychotic medication at the time of the offence were generally limited to the history provided by the patient, apart from a few cases of patients receiving medication by long-acting injection.

Details of individual cases, and often the offenders themselves, were known to the researchers in the different locations. M.M.L. and O.N. rated cases and controls from NSW by an examination of psychiatric reports and published court judgments. D.B. extracted data from court documents, H.H. and T.L. rated the Finnish cases based on the data collected from detailed forensic psychiatric reports and data from the Netherlands were retrieved from forensic psychiatric reports located by M.L.

Differences between groups of previously treated and never-treated stranger homicide offenders were examined with Pearson's chi-squared, or, if any cell had a count of less than 5, with Fisher's exact test. Student's *t* test was used to compare continuous variables and all tests were applied in the 2-tailed form. Differences between cases and controls were examined with odds ratios and 95% confidence intervals (CI) for categorical variables. Statistical analysis was performed using SPSS 17.0. No Bonferroni correction was applied because of the exploratory nature of the study. A continuity corrected estimate of the sample size indicated that 107 cases were required to have an 80% chance of finding a significant difference at $P = 0.05$ between cases and controls of a variable that was present in 40% of one group and 60% of the other. A study with a smaller number of cases and controls might be expected to detect larger differences between stranger and family homicides.

Permission to conduct the study was obtained from the Human Research and Ethics Committee of St Vincent's Hospital in Sydney and from The National Authority of

Table 1. Studies Reporting Stranger-Homicides by Psychotic Patients in Defined Populations

Study	Location	Diagnosis	Homicides by People With a Psychosis, <i>n</i>	Stranger-Homicides by People With a Psychosis, <i>n</i>	% Homicides in Psychosis With Stranger Victims	Estimated Annual Population Rate of Stranger-Homicides by People With a Psychosis
Appleby and Shaw ¹⁵	England and Wales	Schizophrenia	141	13	9.2	1 in 18 million
Erb <i>et al.</i> ²¹	Hessen, Germany	Schizophrenia	29	2	6.9	1 in 12 million
Hafner and Boker ²³	FDR, Germany	Schizophrenia	284	24	8.4	1 in 15 million
Meehan <i>et al.</i> ¹⁴	England and Wales	Schizophrenia	85	12	14.1	1 in 13 million
Gottlieb ²²	Copenhagen, Denmark	Psychosis	58	2	3.4	1 in 7 million
Nielssen <i>et al.</i> ¹¹	NSW, Australia	Psychosis	126	18 ^a	14.3	1 in 7 million
Laajasalo and Häkkänen ^{20,34}	Finland	Schizophrenia	125	7	5.6	1 in 12 million

Note: NSW, New South Wales; FDR, Federal Democratic Republic of Germany.

^aIncludes 3 fellow patients and 2 fellow prisoners.

Medicolegal Affairs in Helsinki. Information from the Canadian cases was obtained from coroner's files and court documents that are on the public record, and family homicide data were extracted from a study that had received ethical approval from the University of Ottawa Institute of Mental Health Research. Data from the Netherlands were taken from forensic psychiatric documents in a way that conformed with ethical and judicial guidelines for research.

Results

The Proportion of Stranger-Homicides by People With Psychosis

Seven studies from Australia, Denmark, Finland, Germany, and the United Kingdom were included in the meta-analysis (table 1). The proportion of stranger-homicides among homicide offenders suffering from either schizophrenia or psychosis was homogeneous (Q value = 6.9, df of Q = 6, P = 0.328, I square = 13.4). Therefore, a fixed effects model was used to calculate a pooled proportion of stranger homicides of 9.0% of all homicides by people with psychosis (95% CI = 7.2–11.2%, Z = -18.862, P < 0.001).

The Rate of Stranger-Homicides by People With Psychosis

The population rate of stranger homicides committed by people diagnosed as having either schizophrenia or psychosis in studies from Australia, Denmark, Finland, Germany, and the United Kingdom were also statistically homogeneous (Q value = 4.47, df of Q = 6, P = 0.61, I square = 0.000). A fixed effects model was therefore used to calculate a pooled rate of stranger homicides

committed by offenders with psychosis of 1 in 14.3 million people per year (95% CI = 1 in 18.9 million per year to 1 in 11.5 million per year, Z = 8.278, P < 0.001). If it is assumed that 0.5% of the population have schizophrenia, the annual risk of a stranger homicide by a person with schizophrenia can be estimated to be about 1 in 70 000 patients per annum. If the prevalence of schizophrenia-related psychosis is assumed to be 1%, the estimated risk of stranger homicide is lower, about 1 in 140 000 patients per annum.

Case-Control Study of Stranger-Homicide in Psychosis

This multicenter study from Australia, Canada, Finland, and the Netherlands located a total of 42 people with a psychotic illness who killed a stranger comprising 40 males and 2 females. The average age of the 42 stranger homicide offenders was 31.7. Schizophrenia-related psychosis (schizophrenia, schizophreniform psychosis, schizo-affective disorder, delusional disorder, and psychosis not otherwise specified) was diagnosed in 39 patients (93%). Eight stranger homicide offenders killed more than 1 person, including 1 offender in Canada who killed 14 people, resulting in a total of 66 victims. Two-thirds of the victims were men, with a mean age of 36.7. None of the victims of stranger homicide were children (table 3).

The average age of the 42 patients who killed a family member was 32.9 and 9 of the family-homicide offenders were women. Eleven offenders killed more than 1 family member, resulting in a total of 55 victims. One-third of victims were men and 8 were children.

There were no significant differences between the age, education, marital status, or employment status of the people who killed strangers when compared with

Table 2. Demographic and Developmental Characteristics of Stranger-Homicide Offenders with Psychosis

	Stranger-Homicides, <i>n</i> (%)	Family-Homicides, <i>n</i> (%)	Odds Ratio or <i>t</i> Statistic	95% Confidence Interval of the Odds Ratio, <i>P</i> Value
Total	42	42		
Male	40 (95)	33 (79)	5.46	1.10–27.0 ^a
Mean age (SD)	31.7 (SD 11.1)	32.9 (SD 10.2)	<i>T</i> = 0.52	0.56
Ever married	12 (29)	18 (43)	0.53	0.22–1.32
Employed	9 (21)	9 (21)	1.0	0.35–2.84
Homeless ^b	7 (17)	0 (0)	—	—
Low intelligence	6 (14)	5 (12)	1.23	0.35–4.40
History of child abuse	8 (19)	7 (17)	1.17	0.38–3.60
Mean years of education (SD)	10.7 (3.0)	10.5 (2.3)	<i>T</i> = –0.54	<i>P</i> = 0.59
History consistent with conduct disorder	16 (38)	6 (14)	3.69	1.27–10.7 ^a
Repeated antisocial conduct as an adult	17 (40)	7 (17)	3.40	1.27–9.42 ^a
Prior violent offence	19 (45)	14 (33)	1.65	0.68–4.00
Prior nonviolent offence	16 (38)	12 (29)	1.54	0.62–3.84

^aSignificant at <0.05.

^bSignificant at *P* = 0.01 using Fisher's exact test.

those who killed family members. Those who killed strangers were more likely to be homeless, to have a history of childhood conduct disorder, and to have repeated antisocial conduct as an adult but not criminal convictions.

The stranger homicides were more likely to have been committed in a public place (24 of 42 or 57%) than were the family homicides (4 of 42 or 10%). The stranger homicides not committed in public settings included 5 in prisons and psychiatric hospitals, all of which occurred within hours of reception or admission. Eight of the stranger homicides were committed in the victim's home or place of work (table 3).

Stranger-homicides were reported to have fewer negative symptoms, although this finding could be a type I error due in the absence of a Bonferroni correction for multiple comparisons. There were no other notable differences in the diagnoses, patterns of substance abuse, symptoms, or histories of treatment between the groups (tables 2–4).

Previous Treatment of Psychotic Stranger-Homicide Offenders

Most of the people in both groups were in their first episode of psychosis as less than half of the people in both groups had ever been prescribed antipsychotic medication or admitted to a psychiatric hospital. Of the 16 who had previously been admitted, 11 were in contact

with mental health services and 5 (12% of the total) were reported to be taking antipsychotic medication at the time of the homicide (table 4).

Of the 42 stranger homicide offenders from 4 countries, 27 (64%) had not previously received treatment with antipsychotic medication. This was a nonsignificantly larger proportion of never-treated patients than was found among the family homicide offenders, of whom 22 (52%) had never been treated. Never-treated patients were reported to have experienced symptoms of psychosis for an average of 3.6 (SD 3.2) years before the homicide, whereas the treated patients had symptoms for 5.8 (SD 4.4) years, a difference that did not reach statistical significance. Never-treated stranger homicide offenders were more likely to hold delusional beliefs about the victim (20/27 vs 6/15, two-tailed Fisher's exact, *P* = 0.047). No other differences were found in the demographic, illness, or offense variables.

Discussion

The homicide of another person due to symptoms of illness is the most significant complication of psychotic illness. Stranger homicides are particularly serious, in part because of the fear that is often generated in the wider community and the repercussions that sometimes flow to other patients and service providers. However, an important finding of this study is that stranger homicide by patients with psychosis is exceptionally rare, with an

Table 3. Details of the Stranger-Homicide Offences Committed by People With Psychosis

	Stranger-Homicides, <i>n</i> (%)	Family-Homicides, <i>n</i> (%)	Odds Ratio or <i>t</i> Statistic	95% Confidence Interval of the Odds Ratio, <i>P</i> Value
Total	42	42		
Homicide at victims home or workplace	8 (19)	20 (48)	0.26	0.10–0.67 ^a
Multiple victims	8 (19)	11 (26)	0.66	0.24–1.86
Knife or firearm use	23 (55)	18 (43)	1.61	0.68–3.82
Excessive force used	12 (29)	19 (45)	0.48	0.20–1.20
Intoxicated with drugs or alcohol	7 (17)	5 (12)	1.48	0.43–5.10
Age of victim (SD)	36.7 (19.1)	42.6 (23.9)	<i>T</i> = 1.13	<i>P</i> = 0.10
Male victim	27 (64)	15 (36)	3.60	1.46–8.85 ^a
Legal finding of full criminal responsibility	3 (7)	2 (5)	0.65	0.10–4.10

^aSignificant at <0.05.

incidence of approximately 1 case per 14 million population per year.

A limitation of this study is that we were not able to locate studies from regions with higher rates of total homicide, eg, parts of the United States, where there are also likely to be more homicides by patients with psychosis, and hence more stranger homicides.¹⁰ Furthermore, because never-treated patients appear to carry a particular risk for stranger homicide, it is likely that regions in which there is a longer duration of untreated psychosis might also have higher rates of stranger homicide by those with schizophrenia.¹⁹

The main limitation of our case–control study stems from the rarity of stranger homicides, as the small sample size resulted in a lack of statistical power to detect differences in the characteristics of stranger and family homicide offenders with a psychosis. With 42 cases, we estimated that the study had an 80% chance of detecting a significant difference (*P* = 0.05) if a factor was present in 70% of one group and 30% of the other. The small sample size placed a further limitation on the statistical power of the comparison of treated and untreated patients and potentially large differences between the groups might have been concealed by a type II error. Conversely, differences between the groups that appeared significant might have resulted from a type I error because of the number of comparisons.

This study found that stranger homicides during psychotic illness were more likely to be committed by homeless people, people with a history of conduct disorder, and with adult antisocial behavior, a finding similar to that of Martell and Dietz.¹⁸ However, in contrast to their findings, the majority of the stranger homicide offenders in our study had never had treatment with antipsychotic medication or been admitted to hospital, despite often having been unwell for many years.

While stranger homicide is extremely rare, homicides of strangers by treated patients is rarer still, as 5 of the 42 stranger homicide offenders were reported to be receiving treatment with antipsychotic medication at the time of the offence and the true number of those who were reliably adherent to an adequate dose of medication might have been even lower. Most of the stranger homicide offenders in our sample were not known to mental health services and hence there were no opportunities to assess risk in those patients. Moreover, the extreme rarity of stranger homicides among untreated patients who are in contact with health services and by previously treated patients means that there is little prospect of developing a risk assessment instrument that is sufficiently sensitive or specific to be of any use in predicting which patient might commit this kind of offence. The very low incidence of these events also means that any measure designed simply to prevent stranger homicide is likely to be disproportionate to the actual number of deaths. For example, in NSW, the region in this study with the highest rate of stranger homicides, deaths in motor vehicle accidents and by suicide were 500 times more common than stranger homicide by the mentally ill.

In contrast to inevitably futile attempts to reduce stranger homicide by predicting which patient might commit one, there are grounds for believing that earlier treatment of first-episode patients and improved clinical care in general can reduce the incidence of homicides and other adverse outcomes in schizophrenia. A fall in rates of homicide by the mentally ill in the United Kingdom coincided with the widespread availability of community psychiatric services.³⁵ Inquiries that have followed homicides by known patients have often highlighted failings in routine care rather than a failure to predict the

Table 4. Details of the Illness and Treatment of Stranger-Homicide Offenders With Psychosis

	Stranger-Homicides, <i>n</i> (%)	Family-Homicides, <i>N</i> (%)	Odds Ratio or <i>t</i> Statistic	95% Confidence Interval of the Odds Ratio, <i>P</i> Value
Total	42	42		
Schizophrenia spectrum	39 (93)	37 (88)	1.76	0.39–7.87
Alcohol misuse	8 (19)	8 (19)	1.0	0.34–2.97
Cannabis misuse	14 (33)	15 (36)	0.90	0.37–2.21
Stimulant misuse	6 (14)	1 (2)	6.83	0.78–59.5
Prior head injury	11 (26)	7 (17)	1.77	0.61–5.14
Thought disorder	27 (64)	31 (74)	0.64	0.25–1.62
Delusions of a threat	18 (43)	14 (33)	1.50	0.62–3.64
Command auditory hallucinations	5 (12)	6 (14)	0.81	0.23–2.89
Prominent negative symptoms	13 (31)	22 (52)	0.41	0.17–0.99 ^a
Impaired recollection of the homicide	10 (24)	18 (43)	0.42	0.16–1.06
Duration of illness in years (SD)	4.5 (3.8)	4.0 (4.75)	<i>T</i> = −0.53	<i>P</i> = 0.59
No prior antipsychotic treatment	27 (64)	22 (52)	1.63	0.68–3.20
Ever admitted to a psychiatric hospital	16 (38)	19 (45)	0.76	0.31–1.78
Antipsychotic treatment at the time of homicide	5 (12)	8 (19)	0.57	0.17–1.93
In contact with mental health services in the month before the homicide	11 (26)	13 (31)	0.79	0.31–2.0

^aSignificant at <0.05.

event.^{36,37} Furthermore, the finding that patients with untreated psychosis carry a particularly high risk of harm to themselves,^{38,39} to family members¹¹ including children,²⁶ as well as occasionally to complete strangers supports the conclusion that earlier treatment of psychotic illness can save lives.^{40,41}

Conclusion

Although the killing of a complete stranger by a psychiatric patient is a catastrophic event, this study demonstrates that these events are extraordinarily rare. Inquiries conducted after stranger homicides sometimes highlight deficiencies in service provision, such as the failure to ensure community treatment. Measures that ensure earlier treatment of psychosis and continued treatment in the community would be likely to prevent homicides of both strangers and family members. However, the extreme rarity of these events means that

identification of individual patients who might kill a stranger is not possible.

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References

1. Corrigan PW, Rowan D, Green A, et al. Challenging two mental illness stigmas: personal responsibility and dangerousness. *Schizophr Bull.* 2002;28:293–309.
2. Marie D, Miles B. Social distance and perceived dangerousness across four diagnostic categories of mental disorder. *Aust N Z J Psychiatry.* 2008;42:126–133.
3. Grunberg F, Klinger BI, Grumet B. Homicide and deinstitutionalization of the mentally ill. *Am J Psychiatry.* 1977;134:685–687.

4. Paterson B. Newspaper representations of mental illness and the impact of the reporting of “events” on social policy: the “framing” of Isabel Schwarz and Jonathan Zito. *J Psychiatr Ment Health Nurs.* 2006;13:294–300.
5. Coid J. The Christopher Clunis Enquiry. *Psychiatric Bull.* 1994;18:449–452.
6. Legislative Assembly of Ontario. Bill 68, 2000 An Act, in memory of Brian Smith, to amend the Mental Health Act and the Health Care Consent Act, 1996. http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&BillID=576&isCurrent=false&ParlSessionID=37%3A1. Accessed June 16, 2009.
7. Appelbaum PS. Assessing Kendra’s Law: five years of outpatient commitment in New York. *Psychiatr Serv.* 2005;56:791–792.
8. The Report of the Inquiry into the Care and Treatment of Christopher Clunis. London: Her Majesty’s Stationery Office; 1994. http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&BillID=576. Accessed September 22, 2009.
9. Fazel S, Långström N, Hjern A, Grann M, Lichtenstein P. Schizophrenia, substance abuse, and violent crime. *JAMA.* 2009;301:2016–2023.
10. Large M, Smith G, Nielssen O. The relationship between the rate of homicide by those with schizophrenia and the overall homicide rate: a systematic review and meta-analysis. *Schizophr Res.* 2009;112:123–129.
11. Nielssen OB, Westmore BD, Large MM, Hayes RA. Homicide during psychotic illness in New South Wales between 1993 and 2002. *Med J Aust.* 2007;186:301–304.
12. Nielssen O, Large M. Rates of homicide during the first episode of psychosis and after treatment: a systematic review and meta-analysis. *Schizophr Bull.* November 5, 2008; doi:10.1093/schbul/sbn144.
13. Wallace C, Mullen P, Burgess P, Palmer S, Ruschena D, Browne C. Serious criminal offending and mental disorder. Case linkage study. *Br J Psychiatry.* 1998;172:477–484.
14. Meehan J, Flynn S, Hunt IM, et al. Perpetrators of homicide with schizophrenia: a national clinical survey in England and Wales. *Psychiatric Serv.* 2006;57:1648–1651.
15. Appleby L, Shaw J. *Avoidable Deaths: Five Year Report of the National Confidential Inquiry into Suicide and Homicide by People with Mental Illness.* Manchester: University of Manchester. http://www.medicine.manchester.ac.uk/suicideprevention/nci/Useful/avoidable_deaths_full_report.pdf. Accessed December 22, 2006.
16. Shaw J, Amos T, Hunt I, et al. Mental illness in people who kill strangers: longitudinal study and national clinical survey. *Br Med J.* 2004;328:734–737.
17. Langevin R, Handy L. Stranger-homicide in Canada: a national sample and a psychiatric Sample. *J Crim Law Criminol.* 1987;78:398–429.
18. Martell DA, Dietz PE. Mentally disordered offenders who push or attempt to push victims onto subway tracks in New York City. *Arch Gen Psychiatry.* 1992;49:472–475.
19. Large M, Nielssen O. Evidence for a relationship between the duration of untreated psychosis and the proportion of psychotic homicides prior to treatment. *Soc Psychiatry Psychiatr Epidemiol.* 2008;43:37–44.
20. Laajasalo T, Hakkanen H. Offence and offender characteristics among two Finnish homicide offenders with schizophrenia: comparison of early- and late-start offenders. *J Forensic Psychiatr Psychol.* 2005;16:41–59.
21. Erb M, Hodgins S, Freese R, Muller-Isberner R, Jockel D. Homicide and schizophrenia: maybe treatment does have a preventative effect. *Crim Behav Ment Health.* 2001;11:6–26.
22. Gottlieb P, Gabrielsen G, Kramp P. Psychotic homicides in Copenhagen from 1959 to 1983. *Acta Psychiatr Scand.* 1987;76:285–292.
23. Hafner H, Boker W. *Crimes of Violence by Mentally Abnormal Offenders: Psychiatric Epidemiological Study in the German Federal Republic.* Cambridge, UK: Cambridge University Press; 1982.
24. Borenstein M, Hedges L, Higgins J, Rothstein H. *Comprehensive Meta-analysis Version 2.* Englewood, NJ: Biostat; 2005.
25. Thompson SG, Sharp SJ. Explaining heterogeneity in meta-analysis: a comparison of methods. *Stat Med.* 1999;18:2693–2708.
26. Nielssen OB, Large MM, Westmore BD, Lackersteen SM. Child homicide in New South Wales from 1991 to 2005. *Med J Aust.* 2009;190:7–11.
27. Bourget D, Gagné P, Labelle ME. Parricide: a comparative study of matricide versus patricide. *J Am Acad Psychiatry Law.* 2007;35:306–312.
28. Bourget D, Grace J, Whitehurst L. A review of maternal and paternal filicide. *J Am Acad Psychiatry Law.* 2007;35:74–82.
29. Bourget D, Gagné P. Fratricide: a forensic psychiatric perspective.. *J Am Acad Psychiatry Law.* 2006;34:529–533.
30. Bourget D, Labelle A, Gagné P, Tessier P. First episode psychosis and homicide. *Bull Canad Psychiatr Assoc.* 2004;36:6–9.
31. Liem M, Koenraadt F. Filicide—a comparative study of maternal versus paternal child homicide. *Crim Behav Ment Health.* 2008;18:166–176.
32. Liem M, Koenraadt F. Familicide: a comparison with spousal and child homicide by mentally disordered perpetrators. *Crim Behav Ment Health.* 2008;18:306–318.
33. Liem M, Hengeveld M, Koenraadt F. Domestic Homicide Followed by Parasuicide: A Comparison with Homicide and Parasuicide. *Int J Offender Ther Comp Criminol.* 2009; 53:497–516.
34. Laajasalo T, Haakanen H. Excessive violence and psychotic symptomatology among homicide offenders with schizophrenia. *Crim Behav Ment Health.* 2006;16:242–253.
35. Large M, Smith G, Swinson N, Shaw J, Nielssen O. Homicide due to mental disorder in England and Wales over 50 years. *Br J Psychiatry.* 2008;193:130–133.
36. Munro E, Runggay J. Role of risk assessment in reducing homicides by people with mental illness. *Br J Psychiatry.* 2000;176:116–120.
37. Dyer C. Better care for Michael Stone might still not have prevented the killings. *BMJ.* 2006;333:670.
38. Large M, Babidge N, Andrews D, Storey P, Nielssen O. Major self-mutilation in the first episode of psychosis. *Schizophr Bull.* 2009;35:1012–1021.
39. Nielssen O, Large M. Untreated psychotic illness in the survivors of serious suicide attempts. *Early Interv Psychiatry.* 2009;3:116–122.
40. Melle I, Johannesen JO, Friis S, et al. Early detection of the first episode of schizophrenia and suicidal behavior. *Am J Psychiatry.* 2006;163:800–804.
41. Large M, Nielssen O. Treating the first episode of schizophrenia earlier will save lives. *Schizophr Res.* 2007;92:276–277.