Background
The extent to which rates of homicide by people with or without schizophrenia vary over time has theoretical and practical implications in understanding homicide by people with mental illness.

Aims
The aim was to report on the rates of homicide by people diagnosed with schizophrenia over time in a region in which there were dramatic changes in the overall rates of homicide.

Methods
An examination of homicide by people diagnosed with schizophrenia in the course of judicial psychiatric examination, and the rate of other homicide in the Chuvash Republic of the Russian Federation between 1981 and 2020 was undertaken.

Results
During the 40 years of the study a total of 5741 people faced legal proceedings for a homicide offence, of whom 179 (3.1%) were diagnosed with schizophrenia. During the study period the average annual total homicide rate rose from about 9 per 100 000 in the 1980s, peaked at 17 per 100 000 in the 1990s before falling to 13 per 100 000 in the 2000s and 6 per 100 000 in the 2010s.

Conclusions
The rise and fall in rates of homicide by people diagnosed with schizophrenia in parallel to total homicide suggests that homicidal behaviour might not be intrinsic to the clinical manifestations of the illness, and might instead reflect a heightened vulnerability to social factors that are associated with homicide by people without schizophrenia.

Keywords
Homicide; schizophrenia; alcohol; criminal responsibility; Russia (Chuvashia).

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schizophrenia, manic depression and morbid jealousy) rose more quickly than rapidly rising rates of other intentional homicides in the period 1970 to 1984. More recently, a study from Ontario, Canada found a non-significant fall in homicide offending by people who were mentally ill during a period when the rate of other homicide fell more. To date the only study that focused on changes in rates of homicide by people with schizophrenia found a rise in the absolute number of homicide offenders with schizophrenia during a period in which other homicide rates fell in England and Wales. The major limitation in interpreting this group of studies as an indicator of the association between homicide offending by people who are mentally ill compared with those who are not mentally ill is the differences between studies in the way mental illness is diagnosed and defined in law between jurisdictions and over time.

Aims
We have previously reported on the characteristics of offenders with schizophrenia and other mental disorders from The Chuvash Republic of the Russian Federation, a region with both a high total homicide rate and a high rate of homicide by people with schizophrenia. Previously we found that almost half of all homicide offenders had at least one mental disorder, including alcohol dependence experienced by 16% of offenders and schizophrenia experienced by over 4% of offenders. In this paper we report on the trends in rates of homicide by people with schizophrenia and without schizophrenia (other homicides) during a period of 40 years when the rate of total homicide rose and fell dramatically. We hypothesised that if rates of homicide by people with schizophrenia were fixed over time that they would not be correlated with the rates of homicide by people without schizophrenia and that the proportion of homicides by people with schizophrenia would fall while other homicide rates were rising and would rise when other homicide rates were falling. In other words, the rate of homicide by people with schizophrenia did not change when the overall rate of homicide changed.

Method

Sample
The study examined a data-set of all homicides in Chuvash Republic of the Russian Federation between January 1981 and December 2020. The Chuvash Republic has a population of over 1.2 million living in an area of around 18 000 km², centred in the city of Cheboksary on the Volga River about 650 km east of Moscow. A third of the population live in Cheboksary and 40% are considered to be rural. During the period of the study, and as in the rest of Russia, people in the Chuvash Republic who are charged with a homicide offence are referred for psychiatric evaluation under Section 21 of the Russian Penal Code. Referral for judicial psychiatric examinations. For the purpose of this study the psychiatric diagnoses were made using the version of the ICD that was current at the time of the judicial examinations. For the purpose of this study the psychiatric diagnoses in each individual was made by retrospective chart review using ICD-10 criteria.

Statistical analysis
Non-age-adjusted homicide rates were calculated using the number of annual homicide incidents and the annual population of Chuvashia, as measured by the census or imputed using linear assumptions in the intervening years. The association between rates of homicide by people with schizophrenia and other homicide and the association between the rates of other homicide and the proportion of all homicides committed by people with schizophrenia were examined with a Pearson correlation coefficient using untransformed homicide rates.

The changes in homicide rates by people with and without schizophrenia and changes in the proportion of homicides (homicides by people with schizophrenia/total homicides) committed by people with schizophrenia over time were examined using Kendall’s Tau rank correlation coefficient over the whole period of the study and over two equal periods (1981–2000 and 2001–2020) in which the homicide rates were, respectively, rising and falling. In order to illustrate the association between homicide in schizophrenia and other homicide, rates were displayed as Log10 (1 + homicide rate per million population per annum) so as to avoid the scale minimisation effects that can arise because of the low base rate of homicide offending by people with mental illness. Possible differences in the characteristics of male and female homicide offenders with schizophrenia were examined using r-test and chi-square (χ²). When one or several cells contained five individuals or less, a Fisher’s Exact test was used. All tests were performed in a two-tailed form. The data were analysed using SPSS Version 27 (SPSS Inc. Chicago, IL, USA).

Ethical approval
Approval for the research was obtained from the Ethics Committee of the Medical Faculty of Chuvash State University, and the Chuvash Association of Psychiatrists, Narcologists, Psychotherapists and Medical Psychologists (a branch of the Russian Society of Psychiatrists). As the study only uses statistical information, no oral or written consent was taken from the individuals of the study.

Results

Rates of homicide
In the 40 years from the beginning of 1981 and the end of 2020, 5741 people faced legal proceedings for a homicide offence, and 3410 homicide offenders were referred for psychiatric evaluation. Over this period there were more homicide victims than offenders because the police did not solve every case, some offenders had multiple victims, and some offenders died by suicide or died prior to being examined. A small number of offenders from other parts of Russia were examined elsewhere. The homicide clearance rates, defined as an offender being identified by the
police, were more than 90% in the period of the study. Of those subjected to judicial examination, 46.7% were found to have at least one mental disorder, and 7.7% were found to be not responsible for their actions because of mental disorder according to the Russian Criminal Code.18

During the study period 179 homicide offenders were identified as having schizophrenia, including 14 recidivist offenders who committed both homicides between 1981 and 2020 (Table 1). The population of Chuvashia rose slightly from 1.304 million in 1981 to 1.347 million in 1993, and subsequently fell by about 10% to 1.224 million in 2020.

During the four decades of the study the rates of homicide by people without schizophrenia rose and fell:

(a) 1981–1990: average 8.9 per 100 000 person-years;
(b) 1991–2000: average 16.4 per 100 000 person-years;
(c) 2001–2010: average 12.5 per 100 000 person-years;
(d) 2011–2020: average 6.1 per 100 000 person-years.

Rates of homicide by people with schizophrenia also rose and fell in the same periods:

(a) 1981–1990: average 0.28 per 100 000 person-years;
(b) 1991–2000: average 0.41 per 100 000 person-years;
(c) 2001–2010: average 0.47 per 100 000 person-years;
(d) 2011–2020: average 0.21 per 100 000 person-years.

The annual rate of homicide by people with schizophrenia was strongly correlated with the rate of other homicide (Pearson’s $r = 0.503$, $r^2 = 0.253$, $F = 12.9$, d.f. = 38, $P = 0.001$) (Fig. 1). There was no significant association between the rates of other homicide and the proportion of all homicides committed by people with schizophrenia (Pearson’s $r = –0.21$, $r^2 = 0.045$, $P = 0.19$).

In the period 1981–2000 rates of homicide by people with schizophrenia rose significantly (tau $(\tau) = 0.33$ $P = 0.04$) as did those without schizophrenia $(\tau = 0.67$ $P = 0.0001)$. In the period 2001–2020 rates of homicide by people with schizophrenia fell
significantly ($\tau = -0.35$, $P = 0.03$) as did those by people without schizophrenia ($\tau = -0.86$, $P < 0.0001$) (Fig. 1).

The proportion of homicides by people with schizophrenia did not change over the 40 years of the study ($\tau = 0.15$, $P = 0.18$), during the period 1981–2000 when rates of homicide were rising ($\tau = -0.05$, $P = 0.75$) or in the period 2001–2020 when rates of homicide were falling ($\tau = 0.06$, $P = 0.7$).

Characteristics of homicides by people with schizophrenia

In total 160 homicide incidents were committed by men with schizophrenia and 19 (10.7%) by women with schizophrenia. Adolescents (defined as individuals aged between 12 and 19 years) with schizophrenia committed 11 (6.2%) homicide offences (Table 1). There were 18 recidivist homicides by people with schizophrenia, 17 of which took place in rural areas, including 14 who committed their first and second homicide in the period of the study and 4 whose initial homicide was before 1981. There were 15 homicides with multiple victims, including 3 by women, and 2 homicides followed by suicide by people who were known to have schizophrenia. Thirty-one offenders were sentenced to indefinite hospital care, and the remainder received fixed terms (Table 2).

![Fig. 1 Homicide rates by people with schizophrenia and other homicide in Chuvashia 1981 to 2020.](https://www.cambridge.org/core)

Discussion

Main findings

This study examines the rates of homicide by people with schizophrenia over a period of 40 years in a region that had a dramatic rise and equally dramatic decline in the rate of homicide. The results confirm the well-recognised over-representation of people with schizophrenia among homicide offenders, but also suggest that the rate of homicide by those with schizophrenia is correlated with changes in the rate of other homicide and that the proportion of homicides committed by people with schizophrenia might not fall when other homicide rates are higher and might not rise as other homicides become less common.

Interpretation of our findings

Although the reasons for the five- to tenfold increase in homicide risk associated with schizophrenia remains uncertain, the findings of this study suggest that the increased rate is at least partly because of a greater exposure or greater sensitivity of people with schizophrenia to more general risk factors for homicide, including factors such as substance use and social disadvantage, rather than an intrinsic or inevitable propensity to lethal violence associated with the illness.

In this study the $r^2$ statistic indicated that about one-quarter of the variance in the rate of homicide associated with schizophrenia was explained by the changes in the overall rate of homicide. This can be compared with the results of a 2009 meta-analysis that found that three-quarters of the variance in rates of homicide in schizophrenia between jurisdictions was explained by the rates of other homicide. Hence both cross-sectional and longitudinal studies suggest that homicide rates by people with schizophrenia are not fixed over time and between regions and that social factors that influence homicide by people without schizophrenia, for example, alcohol and other drug use, levels of violence in the community, and the efficiency of the police in preventing crimes influence the likelihood of a person with schizophrenia committing a homicide offence. However, the moderate $R^2$ value in the association between rates of homicide in people with schizophrenia and
other homicide does suggest that there are other factors that influence the rate homicide in schizophrenia that operate independently to those associated with total homicide. These might include the availability and quality of psychiatric care, variation in the prevalence of schizophrenia, and the specific impact of substance use which has been proposed as a possible reason for changes in rates of other homicide by people who are mentally ill in the USA, along with the quality of services.19

A decline in the consumption of alcohol in Chuvashia might also have been important. During the period of the study alcohol consumption in Chuvashia fell from being above the Russian national average to well below the national average during a period in which the national personal capita alcohol consumption fell by more than 40%.21 About half of the offenders with schizophrenia (83/179, 46%) were reported to be intoxicated with alcohol at the time of the offence, a pattern that had not changed in the decade since an earlier report.21

## Strengths and limitations

Strengths of this study are the complete nature of the sample and related statistical information, consistency in the way the psychiatric

### Table 2: Characteristics of homicide offenders with schizophrenia 1981–2020

| Total offenders | Female offenders | Male offenders | χ² (d.f.) | P   | Total, n | Female, n | Male, n |
|----------------|-----------------|---------------|----------|-----|----------|-----------|--------|
| Age, years: mean (s.d.), range | 36.84 (12.43) | 37.73 (12.33) | 24–70 | 36.84 (12.64) | 12–63 | 5.675 | 0.018 | 165 | 19 | 146 |
| Comorbid traumatic brain injury, n (%) | 41 (24.85) | 1 (5.26) | 40 (27.39) | 5.675 | 0.018 | 165 | 19 | 146 |
| Marital status, n (%) | 9.737 (3) | 0.020 |
| Single | 99 (60.00) | 9 (47.37) | 90 (61.64) | 165 | 19 | 146 |
| Divorced | 24 (14.50) | 2 (10.53) | 22 (15.07) | 165 | 19 | 146 |
| Widow | 1 (0.60) | 1 (5.26) | – | – | 165 | 19 | 146 |
| Married (civil marriage) | 41 (24.85) | 7 (36.85) | 34 (23.29) | 165 | 19 | 146 |
| Location, rural, n (%) | 93 (56.36) | 10 (52.6) | 83 (56.85) | 0.353 | 165 | 19 | 146 |
| Education, n (%) | 21.1 (0.75) | 0.075 |
| No formal education | 2 (1.21) | 1 (5.26) | 1 (0.68) | 165 | 19 | 146 |
| Attended school | 56 (33.94) | 2 (10.53) | 54 (37.00) | 165 | 19 | 146 |
| Completed school | 78 (47.27) | 13 (68.42) | 65 (44.52) | 165 | 19 | 146 |
| College education | 21 (12.73) | 2 (10.53) | 19 (13.01) | 165 | 19 | 146 |
| University education | 8 (4.85) | 1 (5.26) | 7 (4.79) | 165 | 19 | 146 |
| Age at onset of schizophrenia, mean (s.d.) | 14.7 (10.8) | 13.00 (11.25) | 0.5–36 | 14.28 (10.71) | 0.5–36 | 165 | 19 | 146 |
| Legal outcomes, n (%) | 31 (18.79) | - | - | 31 (21.23) | 6.456 | 0.010 | 165 | 19 | 146 |
| Conviction | 46 (27.88) | 1 (5.26) | 45 (30.82) | 6.807 | 0.009 | 165 | 19 | 146 |
| Treatment in a psychiatric hospital by court order | 34 (20.61) | 8 (42.11) | 26 (15.00) | 6.067 | 0.013 | 165 | 19 | 146 |
| Suicidal behaviour | 12.713 (6) | 0.047 |
| Previous criminal conviction | 46 (27.88) | 4 (21.10) | 42 (26.77) | 0.955 | 165 | 19 | 146 |
| Method of homicide, n (%) | 179 | 19 | 160 |
| Beaten | 39 (21.79) | 7 (36.85) | 32 (20.00) | 179 | 19 | 160 |
| Stab–cut | 93 (51.96) | 9 (47.37) | 84 (52.50) | 179 | 19 | 160 |
| Strangled | 25 (13.97) | 1 (5.26) | 24 (15.00) | 179 | 19 | 160 |
| Firearm | 2 (1.12) | - | 2 (1.25) | 179 | 19 | 160 |
| Set fire | 1 (0.55) | - | 1 (0.63) | 179 | 19 | 160 |
| Threw from a height | 1 (0.55) | - | 1 (0.63) | 179 | 19 | 160 |
| Several ways | 18 (10.06) | 1 (5.26) | 17 (10.62) | 179 | 19 | 160 |
| Victims and circumstances | 35.990 (4) | <0.001 |
| n = 200, p = 0.033 as amended by Yeats. | 20.50 | 179 | 19 | 160 |
| Children | 17 (8.50) | 9 (47.37) | 8 (45.2) | 179 | 19 | 160 |
| Spouses (couple) | 19 (9.50) | 2 (10.53) | 17 (9.60) | 179 | 19 | 160 |
| Relatives | 78 (40.00) | 10 (47.37) | 68 (44.52) | 179 | 19 | 160 |
| Acquaintances (neighbours) | 79 (39.00) | 5 (26.32) | 74 (47.73) | 179 | 19 | 160 |
| Strangers | 7 (3.50) | - | 7 (3.98) | 179 | 19 | 160 |
| Two or more rates or, n (%) | 15 (7.50) | 3 (15.79) | 12 (7.50) | 0.632 | 179 | 19 | 160 |
| Alcohol intoxication, n (%) | 35 (17.50) | 2 (10.53) | 33 (20.63) | 1.836 | 179 | 19 | 160 |
| On the street, n (%) | 21 (11.73) | 1 (5.26) | 20 (12.50) | 1.699 | 165 | 19 | 146 |
| Attempts to conceal, n (%) | 21 (11.73) | 1 (5.26) | 20 (12.50) | 1.699 | 165 | 19 | 146 |

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a. Victims were children (39.13%) or males (d.f. = 1, χ² = 31.251; P < 0.001).
b. Victims were acquaintances (neighbours) (43.50%) or females (d.f. = 1, χ² = 8.914; P = 0.0028 as amended by Yeats).
examinations were recorded and an absence of changes to relevant sections of the legal code. Limitations of the study include that some homicide offenders did not receive a judicial examination, not all homicides were solved by the police, and the absence of information about the mental state of some of the homicide offenders who died by suicide before they could be examined.

**Implications**

A more reliable estimate of the extent to which rates of homicide by people with schizophrenia vary from other homicide rates might be obtained by meta-analysis once further longitudinal studies have been conducted in other jurisdictions. The extent of this correlation has implications for our understanding of the reasons for homicide by people with schizophrenia, and the degree to which systems of treatment for psychosis, and more general measures to reduce violence and homicide in the community might play a role in the prevention of homicide by people with emerging and established mental illness.

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