TECHNICAL COMMENTARY

Criminal offending, aggression and violence

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Introduction

Criminal offending covers a wide range of behaviours from destructive acts, stealing, sexual assaults, to physical assaults causing injury or death. The majority of patients with schizophrenia will never commit a crime, however, the few who do may help perpetuate a negative public stereotype that schizophrenia is associated with violent behaviour.

It is difficult to determine whether the violent acts of an individual with schizophrenia are a consequence of the illness, or are traits of that particular individual. This ambiguity is confounded by the fact that people with schizophrenia may be at particularly high risk for exposure to the social factors that contribute to violent or homicidal tendencies in the general population, including social disadvantage and substance abuse. Furthermore, any increase in violent behaviour seen in an individual with schizophrenia could be the result of a co-morbid psychiatric disorder such as antisocial personality disorder.

Violent behaviour interferes with continuity of treatment, and increases the burden for patients, their caregivers and society. Identifying the factors associated with risk of violence may lead to early identification of those most at risk and preventative interventions.

Method

We have included only systematic reviews (systematic literature search, detailed methodology with inclusion/exclusion criteria) published in full text, in English, from the year 2000 that report results for people with a diagnosis of schizophrenia, schizoaffective disorder, schizophreniform disorder or first episode schizophrenia. We have prioritised reviews with pooled data for inclusion. Reviews were identified by searching the databases MEDLINE, EMBASE, CINAHL, Current Contents, PsycINFO and the Cochrane library. Hand searching reference lists of identified reviews was also conducted. When multiple copies of reviews were found, only the most recent version was included.

Review reporting assessment was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist a meta-analysis[1]. Reviews with less than 50% of items checked have been excluded from the library. The PRISMA flow diagram is a suggested way of providing information about studies included and excluded with reasons for exclusion. Where no flow diagram has been presented by individual reviews, but identified studies have been described in the text, reviews have been checked for this item. Note that early reviews may have been guided by less stringent reporting checklists than the PRISMA, and that some reviews may have been limited by journal guidelines.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach where high quality evidence such as that gained from randomised controlled trials (RCT) may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention or other matter under review are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large, there is a dose dependent response or if results are reasonably consistent, precise and direct with low associated risks (see end of table for an explanation of these terms)[2]. The resulting table represents an objective summary of the available evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

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Results

We found 20 systematic reviews that met our inclusion criteria[3-22]. These are presented below the results, in alphabetical order.

Arrest rates

- Moderate to low quality evidence suggests arrest rates in people with schizophrenia or bipolar disorder are around 40%, which is similar to arrest rates in people with other mental disorders. There is a small increased risk of repeat offending in people with schizophrenia compared to people with depression and compared to the population in general. People with schizophrenia have similar rates of repeat offending as people with substance use disorders, mental retardation, or learning disabilities.

Aggression

- Moderate quality evidence suggests a large effect of having previous admissions, small to medium-sized effects of having a history of illicit substance abuse or involuntary admissions, and small effects of being male, having schizophrenia, having a history of self-destructive behavior, and not being married. Moderate to low quality evidence suggests small effects of having a history of violence or being young.
- Moderate quality evidence suggests aggression rates in people with schizophrenia are around 33%, with verbal aggression being more common than physical aggression, or aggression towards property or self. Moderate to low quality evidence finds the prevalence of any aggression in people during a first episode of psychosis is around 31%, and the prevalence of serious aggression is around 16%.
- Moderate to high quality evidence suggests a small, decreased risk of aggression with better cognitive functioning.

Violence

- Moderate quality evidence suggests a small increased risk of violence in people with schizophrenia compared to the population in general. The risk of violence was lower in people with schizophrenia than in people with personality disorders.
- The factors associated with a large increased risk of violence in people with schizophrenia are; previous violent victimisation, high verbal aggression, poly-substance misuse, non-adherence to psychological therapies, and previous hospital admissions. The factors associated with a medium-sized increased risk of violence are; homelessness, childhood maltreatment, aggression and hostility, any substance misuse, poor impulse control, psychopathy, antisocial personality disorder, a history of conviction, imprisonment, assault or involuntary hospital admission, and a lack of insight. The factors associated with a small increased risk of violence are; parental criminal involvement, parental alcohol misuse, previous suicide attempts, higher symptom scores, excitement and angry affect scores, non-white ethnicity, low socio-economic status, non-adherence to antipsychotic medication, and a history of self-destructive behaviour.
- For people with first-episode psychosis, violence is associated with medium-sized effects of involuntary treatment, hostility, having a forensic history, manic symptoms, illegal drug use, being male, being younger, and having a longer duration of untreated psychosis.
- In psychiatric inpatients, the overall prevalence of violence is 17%. High quality evidence suggests a strong association between inpatient violence and having a history of violence. Weaker associations were found between inpatient violence and being male or having an alcohol abuse disorder.

Homicide

- Moderate to high quality evidence suggests a large increased risk of homicide in people

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with first-episode psychosis prior to treatment compared to after treatment. Prior to treatment, the rate of homicide in first-episode patients is around 0.16%, and after treatment it is around 0.01%.

- Moderate to high quality evidence suggests the proportion of stranger homicide is significantly lower than the proportion of other homicides in people with psychotic disorders.

Dack C, Ross J, Papadopoulos C, Stewart D, Bowers L

A review and meta-analysis of the patient factors associated with psychiatric inpatient aggression

Acta Psychiatrica Scandinavica 2013; 127: 255-268

View review abstract online

Comparison	**Assessment of factors associated with psychiatric inpatient aggression.** **The sample included people with schizophrenia, depression, mania, personality disorders, or organic brain syndrome.**
Summary of evidence	**Moderate quality evidence (large samples, inconsistent, imprecise or indirect) suggests a large effect of having previous admissions, small to medium-sized effects of having a history of illicit substance abuse or involuntary admissions, and small effects of being male, having schizophrenia, having a history of self-destructive behavior, and not being married. Moderate to low quality evidence (large samples, inconsistent, imprecise and indirect) suggests small effects of having a history of violence, or being young.**

Factors associated with inpatient aggression

A small effect of increased inpatient aggression in patients with a schizophrenia diagnosis vs. other diagnoses;

13 studies, N = 13,173, RR = 1.16, 95%CI 1.10 to 1.22, $p < 0.001$, $I^2 = 92.50\%$

For all patients, regardless of diagnosis

A large effect of increased inpatient aggression in patients with more previous admissions vs. fewer previous admissions;

2 studies, N = 2,300, SMD = 1.20, 95%CI 1.05 to 1.35, $p < 0.001$, $I^2 = 98.50\%$

A small effect of increased inpatient aggression with younger age vs. older age;

18 studies, N = 9,584, SMD = -0.32, 95%CI -0.39 to 0.25, $p < 0.001$, $I^2 = 51.10\%$

A small to medium-sized effect of increased inpatient aggression in patients with a history of any violence vs. no history of violence;

5 studies, N = 1,013, RR = 2.27, 95%CI 1.90 to 2.69, $p < 0.001$, $I^2 = 75.80\%$

A small to medium-sized effect of increased inpatient aggression in patients with involuntary admissions vs. patients with voluntary admissions;

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8 studies, N = 6,520, RR = 2.17, 95%CI 2.01 to 2.34, $p < 0.001$, $I^2 = 98.50\%$ *A small to medium-sized effect of increased inpatient aggression in patients with a history of illicit substance abuse vs. patients with no history of illicit substance abuse;* 3 studies, N = 296, RR = 2.09, 95%CI 1.46 to 3.00, $p < 0.01$, $I^2 = 7.80\%$ *A small effect of increased inpatient aggression in patients with a history of any substance abuse vs. patients without a history of any substance abuse;* 6 studies, N = 1,113, RR = 1.15, 95%CI 1.00 to 1.31, $p < 0.05$, $I^2 = 76.40\%$ *A small effect of increased inpatient aggression in male patients vs. female patients;* 21 studies, N = 16,309, RR = 1.10, 95%CI 1.03 to 1.17, $p < 0.01$, $I^2 = 48\%$ *A small effect of increased inpatient aggression in patients who are single vs. patients who are married or in a de facto relationship;* 6 studies, N = 6,570, RR = 0.72, 95%CI 0.63 to 0.83, $p < 0.001$, $I^2 = 2.3\%$ *A small effect of increased inpatient aggression in patients with a history of self-destructive behavior vs. patients without a history of self-destructive behavior;* 3 studies, N = 567, RR = 1.24, 95%CI 1.03 to 1.50, $p < 0.05$, $I^2 = 95.30\%$ *A small effect of increased inpatient aggression in patients with a history of violent convictions vs. patients without a history of violent convictions;* 4 studies, N = 362, RR = 0.80, 95%CI 0.65 to 0.98, $p < 0.05$, $I^2 = 87.90$ The following factors were not associated with a risk of inpatient aggression: ethnicity, education, and having an affective disorder.	
Factors associated with repetitive inpatient aggression	
<u>For all patients, regardless of diagnosis</u> *A small effect of increased repetitive inpatient aggression in patients with a history of any violence vs. patients without a history of any violence;* 2 studies, N = 703, RR = 1.58, 95%CI 1.45 to 1.73, $p < 0.01$, $I^2 = 99.1\%$ *A small effect of increased repetitive inpatient aggression in male patients vs. female patients;* 9 studies, N = 1,694, RR = 0.83, 95%CI 0.75 to 0.93, $p < 0.01$, $I^2 = 56.7\%$ *A small effect of increased repetitive inpatient aggression in patients with a history of any substance abuse vs. patients without a history of any substance abuse;* 3 studies, N = 702, RR = 1.28, 95%CI 1.04 to 1.59, $p < 0.05$, $I^2 = 11.3\%$ The following factors were not associated with a risk of repetitive inpatient aggression: age, ethnicity, diagnosis, and having a history of violent convictions.	
Consistency in results‡	Consistent for illicit substance abuse (aggression and repetitive aggression), male sex (aggression only), and marital status

	(aggression only).
Precision in results§	Precise apart from history of violence, illicit substance abuse, and age.
Directness of results‖	Direct for schizophrenia vs. other diagnoses only (mixed diagnoses otherwise).

Douglas KS, Guy LS, Hart SD

Psychosis as a risk factor for violence to others: a meta-analysis

Psychological Bulletin 2009; 35(5): 679-706

View review abstract online

Comparison	**Assessment of violence in people with psychosis vs. violence in people without psychosis.** **Psychotic disorders included schizophrenia, affective psychosis, unspecified psychosis and psychotic symptoms.** **Acts of violence included homicide, attempted homicide, sexual violence, assaults and threats of violence.**
Summary of evidence	**Moderate quality evidence (unclear sample size, consistent, imprecise, direct) suggests a small effect size of increased risk of violence in people with psychosis compared to people without psychosis.**

Association between psychosis and violence

Authors state that the reported mean ORs are highly skewed, so the median is a better measure of central tendency.

The overall analysis suggests a small, significant effect of increased violence in people with psychosis compared to people without psychosis;

204 studies, N = unclear, 166 independent data sets

Raw median OR = 1.66, IQR 0.79 to 3.09

Raw mean OR = 2.17, 95%CI = 1.85 to 2.50, Q_W = 169.17, $p > 0.05$

Subgroup analyses suggest a significant, small effect size of increased violence in people diagnosed with schizophrenia, and a medium effect size for people with psychotic symptoms in general. However, there was no significant effect for people with affective psychoses or unspecified psychoses;

Schizophrenia: 68 studies, median OR = 1.71, IQR 0.61 to 3.83, $p < 0.001$ Psychotic symptoms: 77 studies, median OR = 2.07, IQR 1.29 to 3.17, $p < 0.001$ Affective psychoses: 22 studies, median OR = 1.36, IQR 0.66 to 3.27, $p > 0.05$ Mixed/unspecified psychoses: 62 studies, median OR = 1.25, IQR 0.62 to 2.85, $p > 0.05$ $Q_B = 9.28$, $p = 0.026$ *Subgroup analysis suggests all symptom clusters show a significant, small to medium effect size of increased violence;* Positive symptoms: 62 studies, median OR = 2.32, IQR 1.23 to 3.46, $p < 0.001$ Negative symptoms: 22 studies, median OR = 1.32, IQR 0.87 to 2.05, $p < 0.05$ Disorganized symptoms: 20 studies, median OR = 1.85, IQR 1.20 to 3.06, $p < 0.05$ Other/unspecified symptoms: 22 studies, median OR = 1.78, IQR 1.23 to 3.42, $p < 0.01$ $Q_B = 6.88$, $p = 0.076$ *Subgroup analysis for specific symptoms showed all positive symptoms were significantly related to higher levels of violence, apart for paranoia which showed a trend-level effect;* Hallucinations and/or delusions: 37 studies, median OR = 2.31, $p < 0.0001$ Other positive symptoms (bizarre behaviour, excitement, suspiciousness, non-delusional or non-hallucinatory paranoia): 25 studies, median OR = 2.37, $p < 0.0001$ Threat/control-override symptoms: 18 studies, median OR = 1.92, $p = 0.002$ Paranoid symptom: 16 studies, median OR = 1.11, $p = 0.07$ Note: authors report that overall, the risk of violence was higher among general population (community) samples with psychosis than among samples from psychiatric hospitals, correctional settings or forensic psychiatric settings. Risk was higher in studies that compared people with psychosis to people without any mental disorder than in studies that compared people with psychosis to people with other mental disorders. Psychosis had a greater effect than non-psychotic mood and anxiety disorders, however psychosis was associated with significantly lower risk for violence than antisocial and borderline personality disorders. Risk was higher in people with psychosis and comorbid substance use than in people with psychosis without comorbid substance use.	
Consistency in results	Consistent for overall psychosis analysis, heterogeneity measure is not reported for subgroup analyses.
Precision in results	Imprecise
Directness of results	Direct

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Fazel S, Gulati, G, Linsell, L, Geddes, J.R, Grann, M

Schizophrenia and violence: systematic review and meta-analysis

PLoS Med 2009; 6(8): e1000120. doi:10.1371/journal.pmed.1000120

View review abstract online

Comparison	**Violent crimes in people with schizophrenia and related psychoses vs. the general population.**
Summary of evidence	**Moderate quality evidence (large samples, mostly inconsistent, imprecise, direct) suggests a large increase in the risk of any violent crime in people with schizophrenia compared to the general population. This risk may be partly explained by comorbid substance abuse, as the rates of violence are similar to those of people with substance abuse disorders who do not have a psychotic disorder.**

Violent crimes

A large increased risk of violent crimes in people with schizophrenia vs. general population;

7 studies N = 3,786, OR = 5.02, 95%CI 3.41 to 7.39, I^2 = 80%, $p < 0.001$

Men: 13 studies N = 9,379, OR = 3.98, 95%CI 2.98 to 5.31, I^2 = 86.3%, $p < 0.001$

Women: 6 studies, N = 5,002, OR = 7.85, 95%CI 4.00 to 15.4, I^2 = 86.4%, $p < 0.001$

A large increased risk of violent crimes in people with schizophrenia and comorbid substance abuse vs. general population;

11 studies, N = 2,891, OR = 8.93, 95%CI 5.43 to 14.68, I^2 = 93%, $p < 0.001$

A large increased risk of violent crimes in people without schizophrenia with substance abuse vs. general population;

13 studies, N = unclear, OR = 7.43, 95%CI 4.33 to 12.73, I^2 = 99.2%, $p < 0.001$

A small increased risk of violent crimes in people with schizophrenia without comorbid substance abuse vs. general population;

11 studies, N = 2,891, OR = 2.14, 95%CI 1.73 to 2.66, I^2 = 59%, $p = 0.007$

Homicide

A large increased risk of homicide in people with schizophrenia vs. general population;

5 studies, N = 3,260, OR = 19.47, 95%CI 14.70 to 25.78, I^2 = 59.7%, $p = 0.042$

Subgroup analyses of choice of outcome measure, diagnosis of schizophrenia or other psychosis,

study location, and study period were not significantly associated with this risk estimate. *A large increased risk of homicide in people without schizophrenia with substance abuse vs. general population;* 2 studies, N = unclear, OR = 10.90, 95%CI 3.41 to 34.87, I^2 = 90.5%, *p* = 0.001

Consistency in results	Inconsistent
Precision in results	Imprecise
Directness of results	Direct

Fazel S, Yu R

Psychotic disorders and repeat offending: systematic review and meta-Analysis

Schizophrenia Bulletin 2011; 37(4): 800-810

View review abstract online

Comparison	**Assessment of repeat offending (criminal recidivism) in people with schizophrenia and related psychoses vs. the general population.**
Summary of evidence	**Moderate quality evidence (large samples, mostly inconsistent, imprecise, direct) suggests a small increased risk of criminal recidivism in people with schizophrenia or psychosis compared to the general population. People with schizophrenia also show a small increased risk of criminal recidivism compared to people with depression, and show similar rates to people with substance use disorders, mental retardation or learning disabilities. The risk of criminal recidivism is lower in people with schizophrenia than in to people with personality disorders. Increased risk of criminal recidivism may be most apparent in females, in people from the United States and in people released from prison rather than a psychiatric hospital.**

Criminal recidivism

A small increased risk of criminal recidivism in people with schizophrenia vs. the general population;

4 studies, N = 72,673, OR = 1.60, 95%CI 1.40 to 1.80, I^2 = 9%, *p* = 0.35

A small increased risk of criminal recidivism in people with schizophrenia vs. people with

	depression; 4 studies, N = unclear, OR = 1.90, 95%CI 0.90 to 4.00, I^2 = 85.3%, p < 0.001 *A small to medium-sized reduced risk of criminal recidivism in people with schizophrenia vs. people with personality disorders;* 20 studies, N = unclear, OR = 0.50, 95%CI 0.40 to 0.70, I^2 = 63.0%, p < 0.001 *No differences in criminal recidivism between people with schizophrenia and people with mental retardation or learning disability;* 3 studies, N = unclear, OR = 1.20, 95%CI 0.30 to 4.40, I^2 = 77.9%, p = 0.01 *No differences in criminal recidivism between people with schizophrenia and people with substance use disorders;* 9 studies, N = unclear, OR = 0.90, 95%CI 0.50 to 1.40, I^2 = 72.0%, p < 0.001 *A medium-sized increased risk of criminal recidivism in females, but not males, with schizophrenia than in people with any other psychiatric disorder;* Males: 11 studies, N = unclear, OR = 0.73, 95%CI 0.45 to 1.19, I^2 = 80.4%, p < 0.001 Females: 3 studies, N = unclear, OR = 2.06, 95%CI 1.22 to 3.47, I^2 = 0%, p = 0.555 Mixed: 13 studies, N unclear, OR = 1.24, 95%CI 0.93 to 1.66, I^2 = 67.2%, p < 0.001 *Studies from the United States reported a small increased risk of criminal recidivism in people with schizophrenia compared to the general population, which was not found in studies from the rest of the world;* USA: OR = 1.60, 95%CI 1.20 to 2.10, I^2 = not reported The rest of the world: OR = 0.80, 95%CI 0.60 to 1.20, I^2 = not reported *A small increased risk of criminal recidivism in people with schizophrenia released from prison compared to the general population, which was no found in people with schizophrenia released from hospital settings;* Prison: OR = 1.50, 95%CI 1.30 to 2.10, I^2 = 40.5%, p = 0.16 Psychiatric hospital: OR = 0.90, 95%CI 0.60 to 1.50, I^2 = 80.8%, p < 0.001 There were no differences in risk estimates according to study period, sample size, diagnostic criteria, age, definition of diagnosis, study location, outcome measure, study type, and duration of follow-up.
Consistency in results	Mostly inconsistent
Precision in results	Imprecise
Directness of results	Direct

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Golenkov A, Nielssen O, Large M

Systematic review and meta-analysis of homicide recidivism and Schizophrenia

BMC Psychiatry 2014; 14: 46

View review abstract online

Comparison	**Rate of homicide recidivism in people with schizophrenia.**
Summary of evidence	**Moderate quality evidence (medium to large samples, inconsistent, unable to assess precision, direct) suggests the rate of homicide recidivism in people with schizophrenia is around 2%, with estimates higher in published than unpublished data.**
Homicide recidivism	
The rate of homicide recidivism in people with schizophrenia is around 2%; 6 samples from 12 countries, N = 801, recidivism = 2.3%, 95%CI 0.07% to 7.2%, I^2 = 79%, $p < 0.001$ *The rate was significantly higher in published reports than in unpublished data;* Published: recidivism = 8.6%, 95%CI 5.7% to 12.9% Unpublished: recidivism = 0.06%, 95%CI 0.02% to 1.8% Q_B = 19.5, $p < 0.0005$	
Consistency in results	Inconsistent
Precision in results	Unable to assess; no measure of precision is reported.
Directness of results	Direct

Green K, Browne K, Chou S

The relationship between childhood maltreatment and violence to others in individuals with psychosis: a systematic review and meta-analysis

Trauma, Violence and Abuse 2017; May: 1524838017708786

View review abstract online

Comparison	**Rates of violence in people with a psychotic disorder and a history of childhood maltreatment compared to people with schizophrenia or psychotic disorder (including substance-induced psychosis) and no history of childhood maltreatment.**
Summary of evidence	**Moderate quality evidence (consistent, imprecise, direct, large sample) suggests a medium-sized increased history of violence in people with a psychotic disorder and a history of childhood maltreatment.**
Childhood maltreatment and violence	
People with a psychotic disorder and a history of childhood maltreatment were approximately twice as likely to have a history of violence than people with a psychotic disorder and no history of childhood maltreatment; 11 studies, N = 2,215, OR = 2.46, 95%CI 1.91 to 3.16, $p < 0.05$, $I^2 = 8.87$, $p > 0.05$ There were no significant differences in the effect size when studies with transformed data was excluded, small samples (< 50) were excluded, or in adult vs. child/adolescent samples. Authors report a possibility of publication bias.	
Consistency in results	Consistent
Precision in results	Imprecise
Directness of results	Direct

Iozzino L, Ferrari C, Large M, Nielssen O, De Girolamo G

Prevalence and risk factors of violence by psychiatric acute inpatients: A systematic review and meta-analysis

PLoS ONE 2015; 10 (6): e0128536

View review abstract online

Comparison	**Prevalence and risk factors for violence in psychiatric inpatients.** **The sample predominately included people with schizophrenia, but also included people with bipolar disorder or personality disorders.**

Summary of evidence	**Moderate to high quality evidence (large sample, inconsistent, precise, direct) suggests the overall prevalence of violence in psychiatric inpatients is 17%.** **High quality evidence (also consistent) suggests a strong association between inpatient violence and having a history of violence. Weaker associations were found between inpatient violence and being male or having an alcohol abuse disorder.**
Prevalence and risk factors	
The pooled prevalence of inpatients who committed at least one act of violence was 17%; 35 studies, N = 23,972 patients, prevalence = 17%, 95%CI 14% to 20%, I^2 = 98%, $p < 0.001$ Univariate analyses showed the factors associated with increased inpatient violence are; being male (β = 0.48), having an alcohol abuse disorder (β = 0.32), having a history of violence (β = 0.27), having a diagnosis of schizophrenia (β = 0.26), and involuntary admission (β = 0.11). A multivariate analyses, which explained 68% of study heterogeneity, included having male gender, diagnosis of schizophrenia, having an alcohol abuse disorder, and involuntary admission, showed only male gender (β = 0.28) and having an alcohol abuse disorder (β = 0.21) were significant predictors. A multivariate analyses, which explained 100% of study heterogeneity, included having a history of violence, male gender, diagnosis of schizophrenia, and having an alcohol abuse disorder, showed only having a history of violence was a significant predictor (β = 0.42). Authors report no evidence of publication bias.	
Consistency in results	Inconsistent for overall prevalence rates, consistent for the multivariate models.
Precision in results	Precise
Directness of results	Direct

Large M, Nielssen O

Evidence for a relationship between the duration of untreated psychosis and the proportion of psychotic homicides prior to treatment

Social Psychiatry and Psychiatric Epidemiology 2008; 43(1): 37-42

View review abstract online

Comparison	**Relationship between the average duration of untreated psychosis (DUP; the period between the onset of definite psychotic symptoms and a period of adequate treatment with antipsychotic medication, usually judged to be about a month of treatment) and the proportion of homicides committed during the first episode of psychosis in the same region/country.**
Summary of evidence	**Moderate to low quality evidence (unclear sample size, unable to assess consistency or precision, direct) finds a large association between increased DUP and the proportion of homicides.**
Proportion of homicides committed during the first episode of psychosis	
A large association was found between mean DUP and the proportion of homicides in first episode psychosis, with previous treatment versus contact with mental health services as a covariate; 13 studies, N = not reported, R = 0.822, R^2 = 0.676, *p* = 0.003 No significant relationship was found between average Log^{10} median DUP and the proportion of homicides.	
Consistency in results	Unable to assess; no measure of heterogeneity is provided.
Precision in results	Unable to assess; no confidence intervals are provided.
Directness of results	Direct

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

Schizophrenia Research 2009; 112: 123-129

View review abstract online

Comparison	**Rate of schizophrenia diagnosis in people who commit homicide.**
Summary of evidence	**Moderate quality evidence (large sample, inconsistent, unable to assess precision, direct) finds the rate of schizophrenia diagnosis in people who commit homicide is around 6.5%. As this rate was correlated with the rates of all homicides, it suggests shared causal factors (such as substance abuse, having access to weapons and social disadvantage) may explain part of this**

	association.
Homicide rates in schizophrenia and the general population	
The rate of schizophrenia diagnosis in homicide offenders is around 6.5%; 18 studies, N = 16,460, schizophrenia = 6.48%, 95%CI 5.56% to 7.54%, $p < 0.001$, $I^2 = 82.2\%$, $p < 0.0001$ Authors state that this is higher than would be expected from estimates of the overall prevalence of schizophrenia, and therefore confirms an association between schizophrenia and homicide. The rates of homicide by people with schizophrenia were correlated with the rates of all homicides (R = 0.868, $p < 0.001$). Authors state that this suggests the reasons for homicide committed by people with schizophrenia may be similar to the reasons for homicide in the general population, and not just due to the disorder itself. Shared factors may include, substance abuse, having access to weapons and being disadvantaged.	
Consistency in results	Inconsistent
Precision in results	Unable to assess; no measure of precision is reported.
Directness of results	Direct

Large M, Nielssen O

Violence in first-episode psychosis: a systematic review and meta-analysis

Schizophrenia Research 2011; 125: 209-220

View review abstract online

Comparison	**Rates and characteristics of violence in people with first-episode psychosis vs. non-violent psychiatric controls.** **Any violence was used when the severity of the violence was not specified.** **Less serious violence was defined as physical violence against objects and assault not causing physical injury.** **Serious violence was defined as assault causing any degree of injury, any use of a weapon, or any sexual assault.** **Severe violence was defined as violence resulting in serious injury that required treatment in hospital or resulted in permanent**

	physical harm to the victim.
Summary of evidence	**Moderate quality evidence (large samples, mostly inconsistent, imprecise, direct) suggests rates of any form of violence in people prior to or during first-episode psychosis are around 35%, but rates of severe violence are around 0.6%.** **The factors most commonly associated with violence, showing a medium effect sizes, are involuntary treatment, hostility, having a forensic history, manic symptoms, illegal drug use, being male, younger, and having a longer duration of untreated psychosis.**
Violence	
The proportion of patients with any degree of violence prior to contact with mental health services or during a first-episode of psychosis is around 35%; 6 studies, N = 1,187, 35.4%, 95%CI 26.8 to 45.1%, I^2 = 89.2% $p \leq 0.001$ *The proportion of patients with a history of more serious or severe violence is around 17%;* 8 studies, N = 2,427, 16.6%, 95%CI 12.9 to 21.3%, I^2 = 81.5%, $p \leq 0.001$ *The proportion of patients with a history of severe violence is around 0.6%;* 4 studies, N = 603, 0.6%, 95%CI 0.2 to 1.7%, I^2 = 0%, p = 0.99	
Characteristics associated with violence	
Small to medium-sized effects suggest the following factors are associated with violence in first-episode psychosis; 8 studies, N = 2,427 Involuntary treatment: OR = 3.84, 95%CI 2.19 to 6.73, $p < 0.0001$, I^2 = 0%, p = 0.90 Hostility: OR = 3.52, 95%CI 2.09 to 5.92, $p < 0.0001$, I^2 = 51.25%, p = 0.10 Forensic history: OR = 3.28, 95%CI 1.75 to 6.14, p = 0.0002, I^2 = 61.37%, p = 0.08 Manic symptoms: OR = 2.86, 95%CI 1.87 to 4.38, $p < 0.0001$, I^2 = 0%, p = 0.62 Illegal drug use: OR = 2.33, 95%CI 1.49 to 3.63, p = 0.0002, I^2 = 61.64%, p = 0.03 Less education: OR = 1.99, 95%CI 1.06 to 3.70, p = 0.03, I^2 = 0%, p = 0.66 Younger age: OR = 1.85, 95%CI 1.28 to 2.69, p = 0.001, I^2 = 0%, p = 0.51 Male: OR = 1.61, 95%CI 1.15 to 2.26, p = 0.01, I^2 = 0%, p = 0.48 Longer duration of untreated psychosis: OR = 1.56, 95%CI 1.05 to 2.31 p = 0.03, I^2 = 80.21%, $p < 0.0001$ No associations were reported for alcohol use, depressed mood, ethnic minority groups, general psychopathology, insidious onset of psychosis, less insight, living alone, low socioeconomic status, positive or negative symptoms, a diagnosis of schizophrenia, self-harm, being single, or being	

unemployed. *Medium-sized effects suggests the following factors were associated with more serious violence in first-episode psychosis;* 3 studies, N = 397 Forensic History: OR = 4.42, 95%CI 1.67 to 11.71, p = 0.003, I^2 = 89.14%, p < 0.001 Duration of untreated psychosis: OR = 2.76, 95%CI 1.38 to 5.54, p = 0.004, I^2 = 17.67%, p = 0.30 Total symptom severity: OR = 2.05, 95%CI 1.03 to 4.10, p = 0.04, I^2 = 0%, p = 0.87 No associations were reported for specific positive, negative, or manic symptoms, a diagnosis of schizophrenia, male sex, or younger age. *A Large effect suggests the following factor was associated with more serious violence in first-episode psychosis;* Involuntary treatment: 3 studies, N = 441, OR = 5.71, 95%CI 1.57 to 20.74, p = 0.01, I^2 = 77.86%, p = 0.03 No associations were reported for; substance and alcohol use, male sex, manic and total symptoms, a diagnosis of schizophrenia, or being unemployed.	
Consistency in results	Consistent for all reported outcomes except drug use, DUP and forensic history during FEP, and involuntary treatment after FEP.
Precision in results	Mostly imprecise
Directness of results	Direct

Li W, Yang Y, Hong L, An FR, Ungvari GS, Ng CH, Xiang, Y. T.

Prevalence of aggression in patients with schizophrenia: A systematic review and meta-analysis of observational studies

Asian Journal of Psychiatry 2020; 47: 101846

View review abstract online

Comparison	**Aggression rates in people with schizophrenia.**
Summary of evidence	**Moderate quality evidence (large samples, inconsistent, imprecise, direct) suggests aggression rates in people with schizophrenia are around 33%, with verbal aggression being more common than physical aggression, or aggression towards property or self.**

Aggression rates Measured on the Modified Overt Aggression Scale	
Around one third of people with schizophrenia report aggression; Any aggression: 10 studies, N = 3,749, 33.3%, 95%CI 21.5% to 47.7%, I^2 = 98% *Verbal aggression was the most common type of aggression;* Verbal aggression: 4 studies, N = 702, 42.6%, 95%CI 17.0% to 72.9%, I^2 = 85% Physical aggression: 4 studies, N = 796, 23.7%, 95%CI 10.4% to 45.3%, I^2 = 83% Aggression towards property: 4 studies, N = 796, 23.8%, 95%CI 10.1% to 46.4%, I^2 = 84% Aggression towards self: 4 studies, N = 796, 23.5%, 95%CI 6.5% to 57.7%, I^2 = 94% Modified Overt Aggression Scale cut-off 'total score ≥5′ values and inpatients reported the highest rates of any aggression. Meta-regression analyses found that studies published recently reported higher aggression rates, while higher quality studies reported lower aggression rates. There were no moderating effects of study region, gender, or assessment time.	
Consistency in results	Inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Livingstone JD

Contact between police and people with mental disorders: A review of rates

Psychiatric Services 2016; 67: 850-857

View review abstract online

Comparison	**Arrest rates in people with schizophrenia or bipolar disorder and other mental disorders.**
Summary of evidence	**Moderate to low quality evidence (large samples, unable to assess consistency or precision, indirect) suggests arrest rates in people with schizophrenia or bipolar disorder are around 40%, which is similar to people with other mental disorders.**

Arrest rates	
Arrest rate: 12 studies, N = 121,467, average rate = 40% Other mental disorders: 10 studies, N = 5,385, average rate = 41%	
Consistency in results	Unable to assess; no measure of consistency is reported.
Precision in results	Unable to assess; no measure of precision is reported.
Directness of results	Indirect; mixed diagnosis samples

Nielssen O, Large M

Rates of homicide during the first episode of psychosis and after treatment: a systematic review and meta-analysis

Schizophrenia Bulletin 2008; doi:10.1093/schbul/sbn144

View review abstract online

Comparison	**Homicide rates in people with first-episode psychosis before and after treatment.**
Summary of evidence	**Moderate to high quality evidence (large samples, consistent for untreated first-episode psychosis group, precise, direct) suggests a large effect of increased rates of homicide in people with first-episode psychosis prior to treatment compared to after treatment.**
Homicide	
The rate of homicide during the first-episode of psychosis is around 0.16%; 1.59 homicides per 1000 first-episode presentations (equivalent to 1 in 629 presentations), 95%CI 1.06 to 2.40, $p < 0.001$, $I^2 = 92.3\%$, $p < 0.001$ *The annual rate of homicide after treatment is around 0.01%;* 0.11 homicides per 1000 per annum (equivalent to 1 every 9090 previously treated patients), 95%CI 0.07 to 0.16, $p < 0.001$, $I^2 = 95.32\%$, $p < 0.001$ *A large effect of increased rate of homicide prior to treatment vs. after treatment;* 10 studies, N = 894, RR = 15.5, 95%CI 11.0 to 21.7, $p < 0.001$	
Consistency in results	Consistent for all except rates of homicide in previously treated

	patients.
Precision in results	Precise
Directness of results	Direct

Nielssen O, Bourget D, Laajasalo T, Liem M, Labelle A, Hakkanen-Nyholm H, Koenraadt F, Large M

Homicide of strangers by people with a psychotic illness

Schizophrenia Bulletin 2011; 37(3): 572-579

View review abstract online

Comparison	**The proportion of stranger homicides vs. other homicides (family members, friends etc) by people with a psychotic disorder, predominately schizophrenia.**
Summary of evidence	**Moderate to high quality evidence (large samples, consistent, appears precise, direct) suggests the proportion of stranger homicide is significantly lower than the proportion of other homicide (family members, friends, etc.) in offenders with schizophrenia or psychosis.**

Stranger homicide

The proportion of stranger homicide was significantly lower than the proportion of other homicide in offenders with schizophrenia or psychosis;

7 studies, N = 848, 9.0%, 95%CI 7.2 to 11.2%, $p < 0.001$, $I^2 = 13.4\%$, $p = 0.328$

Pooled rate of stranger homicides committed by offenders with psychosis is 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, $p < 0.001$). If it is assumed that the prevalence of schizophrenia-related psychosis is assumed to be 1%, the estimated risk of stranger homicide is about 1 in 140 000 patients per annum.

Consistency in results	Consistent
Precision in results	Appears precise
Directness of results	Direct

Reagu S, Jones R, Kumari V, Taylor PJ

Angry affect and violence in the context of a psychotic illness: A systematic review and meta-analysis of the literature

Schizophrenia Research 2013; 146: 46-52

View review abstract online

Comparison	**Angry affect in people with schizophrenia or related psychoses who exhibit violent behaviour compared to people with schizophrenia who do not exhibit violent behaviour.**
Summary of evidence	**High quality evidence (large samples, consistent, precise, direct) suggests higher angry affect scores in patients with schizophrenia who exhibit violent behavior.**
Angry affect	
A small effect of higher anger scores in the violent group compared to the non-violent group; 5 studies, N = 510, SMD = 0.74, 95%CI 0.53 to 0.94, $p < 0.00001$, $I^2 = 0\%$, $p = 0.67$	
Consistency in results	Consistent
Precision in results	Precise
Directness of results	Direct

Reinharth J, Reynolds G, Dill C, Serper M

Cognitive predictors of violence in schizophrenia: a meta-analytic review

Schizophrenia Research, Cognition 2014; 1: 1101-111

View review abstract online

Comparison	**Association between aggression and cognition in people with a psychotic disorder (inpatients or outpatients).** **85.9% of the sample had a diagnosis of a psychotic disorder; ~70% had schizophrenia or schizoaffective disorder.**
Summary of evidence	**Moderate to quality evidence (large samples, inconsistent,**

	precise, direct) suggests a small decreased risk of aggression with better cognitive performance. High quality evidence (consistent) suggests this effect is apparent for any diagnosis, post-discharge and behavioural measures of aggression, and for global cognition and insight. There was a small, increased risk of aggression with better motor functioning, and no significant relationships with memory, attention, executive functioning, or visual-spatial reasoning (trend effect).
Aggression	
Small, decreased risk of aggression with better cognitive performance; 29 studies, N = 4,764, OR = 0.59, 95%CI 0.51 to 0.67, $p < 0.05$, $I^2 = 63.72$, $p < 0.05$ *Subgroup analyses showed similar effect sizes according to;* All diagnoses: 19 studies, N = 3,822, OR = 0.64, 95%CI 0.56 to 0.72, $p < 0.05$, $I^2 < 50\%$, $p > 0.05$ Schizophrenia only: 9 studies, N = 2,128, OR = 0.75, 95%CI 0.62 to 0.89, $p < 0.05$, $I^2 < 25\%$, $p > 0.05$ Post-discharge aggression: 3 studies, N = 1,999, OR = 0.71, 95%CI 0.59 to 0.85, $p < 0.05$, $I^2 < 25\%$, $p > 0.05$ Behavioural assessment of aggression: 14 studies, N = 981, OR = 0.76, 95%CI 0.60 to 0.97, $p < 0.05$, $I^2 < 25\%$, $p > 0.05$ Combined measures of insight, general cognition, attention, visual-spatial reasoning, memory, motor functioning and processing speed: 19 studies, N = 3,507, OR = 0.72, 95%CI 0.63 to 0.82, $p < 0.05$, $I^2 < 25\%$, $p > 0.05$ Global cognition: 11 studies, N = 732, OR = 0.61, 95%CI 0.47 to 0.80, $p < 0.05$, $I^2 < 25\%$, $p > 0.05$ Insight: 5 studies, N = 2,422, OR = 0.72, 95%CI 0.61 to 0.86, $p < 0.05$, $I^2 < 50\%$, $p > 0.05$ *Small, increased risk of aggression with better motor functioning;* Motor functioning: 4 studies, N = 370, OR = 1.52, 95%CI 1.03 to 2.24, $p < 0.05$, $I^2 < 25\%$, $p > 0.05$ Authors report no significant relationships between aggression and executive functioning ($r = 0.01$, $p > 0.05$) visual-spatial reasoning ($r = -0.13$, $p = 0.06$), memory ($r = -0.09$, $p > 0.05$) or attention ($r = -0.08$, $p > 0.05$). Authors report no publication bias.	
Consistency in results	Consistent for subgroup analyses only
Precision in results	Precise, apart from motor functioning
Directness of results	Direct

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Winsper C, Ganapathy R, Marwaha S, Large M, Birchwood M, Singh SP

A systematic review and meta-regression analysis of aggression during the first episode of psychosis

Acta Psychiatrica Scandinavica 2013; 128: 413-421

View review abstract online

Comparison	**Rates of aggression before and after contact with services during first-episode psychosis.** **Note: 'serious aggression' is physical violence/assault against another person or committing a violent crime. 'Any aggression' included physical aggression against people, property, self or animals.**
Summary of evidence	**Moderate to low quality evidence (medium-sized samples, inconsistent, imprecise, direct,) suggests the prevalence of any aggression in patients during a first episode of psychosis is around 31%, and the prevalence of serious aggression is around 16%. There were no differences in rates of aggression before compared to after first contact with mental health services.**

Overall rates of aggression

11 studies, prevalence of any aggression = 31%, 95%CI 26 to 37%, I^2 = 86.3%, $p < 0.0001$

12 studies, prevalence of serious aggression = 16%, 95%CI 12 to 20%, I^2 = 90.3%, $p < 0.0001$

Rates before and after treatment

There were no differences in risk of aggression before vs. after contact with services in cohorts assessed at both times;

Any aggression: 3 studies, N = 395, OR = 1.18, 95%CI 0.46 to 2.99, $p > 0.05$, I^2 = 88.3%, $p < 0.0001$

Serious aggression: 2 studies, N = 242, OR = 0.61, 95%CI 0.31 to 1.21, $p > 0.05$, I^2 = 38.2%, $p = 0.203$

There were also no differences in prevalence of aggression before vs. after contact with services in cohorts assessed at either times;

15 studies, N = 3,294

Prevalence of any aggression before service contact: 28%, 95%CI 22 to 34%

Prevalence of any aggression after service contact: 31%, 95%CI 20 to 42%

Prevalence of serious aggression before service contact: 16%, 95%CI 11 to 20% Prevalence of serious aggression after service contact: 13%, 95%CI 6 to 20% Note: authors report that prevalence rates of any aggression (but not serious aggression) were higher in studies using structured vs. unstructured questionnaires (35% vs. 26%). Any aggression rates were higher in studies using self-report measures than in studies using case notes or criminal records (34% vs.31% vs. 17%) Serious aggression was higher for case notes than for self-report and criminal records (20% vs. 16% vs. 10%). Rates of any and serious aggression were higher for shorter time frames (any aggression: 1 year or less: 35%, 2 to 3 years: 30%, over 3 years: 26%, serious aggression: 1 year or less: 22%, 2 to 3 years: 15%, over 3 years: 13%). The pooled prevalence of any aggression (but not serious aggression) was higher for countries outside of Europe compared to inside of Europe (35% vs. 30%). However, meta-regression analyses revealed no significant effects on the overall prevalence rates according to these study factors.

Consistency in results	Inconsistent
Precision in results	Imprecise
Directness of results	Direct

Witt K, van Dorn R, Fazel S

Risk factors for violence in psychosis: systematic review and meta-regression analysis of 110 Studies

PLoS ONE 2013; 8(2): e55942. doi:10.1371/journal.pone.0055942

View review abstract online

Comparison	**Factors associated with violence in people with psychosis.** **The vast majority of sample were diagnosed with a schizophrenia spectrum disorder.**
Summary of evidence	**High quality evidence (large sample, consistent, precise, direct,) suggests a small increased risk of violence in patients with psychosis who have non-white ethnicity.** **Moderate to high quality evidence (large samples, inconsistent or imprecise, direct) suggests a large increased risk of violence in patients who have been violently victimised, who have high verbal aggression, or who have a history of poly-substance misuse. There is a medium-sized increased risk with homelessness, childhood physical abuse, psychopathy, aggression and hostility,**

	substance misuse, poor impulse control, and antisocial personality disorder. There is a small increased risk with childhood sexual abuse, parental criminal involvement, parental alcohol misuse, previous suicide attempts, higher general/total symptom scores, higher excitement, and higher positive symptom scores. **Moderate to low quality evidence (small sample, inconsistent or imprecise, direct) suggests a large increased risk of violence in patients who are non-adherent to psychological therapies.** **Moderate to low quality evidence (large samples, inconsistent and imprecise, direct) suggests a medium effect of having a history of conviction or imprisonment, a history of assault, or a lack of insight into the disorder. There is a small increased risk of violence in patients who are male, who have low socio-economic status in adulthood, or who are non-adherent with antipsychotic medication.**
Demographic and premorbid risk factors	
A large effect of increased risk of violence with; Being violently victimised: 4 studies, N = 3,034, OR = 6.1, 95%CI 4.0 to 9.1, $p < 0.001$, $I^2 = 0\%$ *Medium-sized effects of increased risk of violence with;* Recent homelessness: 8 studies, N = 3,546, OR = 2.3, 95%CI 1.5 to 3.5, $p < 0.001$, $I^2 = 47\%$ History of homelessness: 9 studies, N = 4,253, OR = 2.3, 95%CI 1.5 to 3.4, $p < 0.001$, $I^2 = 40\%$ Childhood physical abuse: 4 studies, N = 2,177, OR = 2.2, 95%CI 1.5 to 3.1, $p < 0.001$, $I^2 = 39\%$ *Small effects of increased risk of violence with;* Childhood sexual abuse: 3 studies, N = 1,924, OR = 1.9, 95%CI 1.5 to 2.4, $p < 0.001$, $I^2 = 0\%$ Parental history of criminal involvement: 4 studies, N = 14,191, OR = 1.8, 95%CI 1.5 to 2.2, $p < 0.001$, $I^2 = 0\%$ Male sex: 37 studies, N = 30,713, OR = 1.6, 95%CI 1.2 to 2.1, $p < 0.001$, $I^2 = 84\%$ Parental history of alcohol misuse: 5 studies, N = 14,209, OR = 1.6, 95%CI 1.4 to 1.8, $p < 0.001$, $I^2 = 0\%$ Non-white ethnicity: 16 studies, N = 5,270, OR = 1.4, 95%CI 1.2 to 1.6, $p < 0.001$, $I^2 = 0\%$ Lower socio-economic status in adulthood: 12 studies, N = 17,325, OR = 1.4, 95%CI 1.1 to 1.9, $p < 0.01$, $I^2 = 62\%$ *There were no associations with;* Education, socio-economic status in childhood, urbanicity, living alone, marital status, employment, age, and parental status.	

Criminal history
Large effects of increased risk of violence with;
A history of assault: 4 studies, N = 1,808, OR = 21.4, 95%CI 5.2 to 86.6, $p < 0.001$, $I^2 = 91\%$
Higher aggression scores: 7 studies, N = 396, OR = 17.4, 95%CI 2.6 to 117.0, $p < 0.01$, $I^2 = 65\%$
Higher psychopathy factor 2 scores: 3 studies, N = 168, OR = 8.8, 95%CI 1.6 to 46.7, $p < 0.05$, $I^2 = 0\%$
Higher psychopathy factor 1 scores: 3 studies, N = 168, OR = 7.2, 95%CI 1.4 to 35.9, $p < 0.05$, $I^2 = 0\%$
Higher verbal aggression scores: 5 studies, N = 465, OR 5.5, 95%CI 1.6 to 18.9, $p < 0.01$, $I^2 = 12\%$
Medium-sized effects of increased risk of violence with;
History of imprisonment for any offence: 6 studies, N = 2,990, OR = 4.5, 95%CI 2.7 to 7.7, $p < 0.001$, $I^2 = 62\%$
Higher psychopathy total scores: 7 studies, N = 486, OR = 4.4, 95%CI 1.2 to 15.6, $p < 0.05$, $I^2 = 58\%$
A recent arrest for any offence: 3 studies, N = 2,326, OR = 4.3, 95%CI 2.7 to 6.7, $p < 0.001$, $I^2 = 55\%$
Aggressive behavior during the study period: 4 studies, N = 1282, OR = 4.3, 95%CI 1.2 to 15.1, $p < 0.05$, I^2 88%
A history of conviction for a violent offence: 6 studies, N = 16 409, OR = 4.2, 95%CI 2.2 to 9.1, $p < 0.001$, $I^2 = 86\%$
Meets criteria for psychopathy: 4 studies, N = 358, OR = 3.6, 95%CI 1.0 to 12.4, $p < 0.05$, $I^2 = 8\%$
History of conviction for any offence: 5 studies, N = 856, OR = 3.5, 95%CI 1.2 to 10.6, $p < 0.05$, $I^2 = 67\%$
History of arrest for any offence: 4 studies, N = 2,781, OR = 3.5, 95%CI 2.1 to 5.8, $p < 0.001$, $I^2 = 72\%$
History of violent behavior: 11 studies, N = 2,626, OR = 3.1, 95%CI 2.2 to 4.4, $p < 0.001$, $I^2 = 0\%$
Hostility during the study period: 3 studies, N = 2,724, OR = 2.8, 95%CI 1.8 to 4.2, $p < 0.001$, $I^2 = 0\%$
A small effect of increased risk of violence with;
Higher hostility scores: 16 studies, N = 3,290, OR = 1.5, 95%CI 1.0 to 2.1, $p < 0.001$, $I^2 = 1\%$
There were no associations with;
Greater number of previous arrests for any offence, higher scores on the Aggression Against Others subscale, higher scores on the Aggression Against Objects subscale, recent violent behavior, higher poor hostile and/or aggressive impulse control scores, history of conviction for a non-violent offence, or age at first criminal offence.

Substance misuse
A large effect of increased risk of violence with; A history of polysubstance misuse: 3 studies, N = 338, OR = 10.3, 95%CI 2.5 to 41.5, $p < 0.01$, $I^2 = 0\%$ *Medium-sized effects of increased risk of violence with;* Substance use disorder: 9 studies, N = 5333, OR = 3.1, 95%CI 1.9 to 5.0, $p < 0.001$, $I^2 = 50\%$ Recent substance misuse: 5 studies, N = 476, OR = 2.9, 95%CI 1.3 to 6.3, $p < 0.01$, $I^2 = 54\%$ A history of alcohol misuse: 19 studies, N = 18 549, OR = 2.3, 95%CI 1.7 to 3.3, $p < 0.001$, $I^2 = 63\%$ A history of substance misuse: 16 studies, N = 5365, OR = 2.2, 95%CI 1.6 to 2.9, $p < 0.001$, $I^2 = 46\%$ Recent alcohol misuse: 7 studies, N = 2139, OR = 2.2, 95%CI 1.3 to 4.0, $p < 0.01$, $I^2 = 52\%$ Recent drug misuse: 7 studies, N = 3604, OR = 2.2 95%CI 1.6 to 3.1, $p < 0.001$, $I^2 = 38\%$ A history of drug misuse: 14 studies, N = 18 561, OR = 2.1, 95%CI 1.3 to 3.5, $p < 0.01$, $I^2 = 93\%$ *There were no associations with;* A history of cannabis misuse
Suicidality
A small effect of increased risk of violence with; Previous suicide attempts: 12 studies, N = 4037, OR = 1.6, 95%CI 1.1 to 2.3, $p < 0.05$, $I^2 = 42\%$ *No associations with;* History of self-harm, suicidal ideations, or scores on the Aggression Against Self scale
Treatment-related factors
A large effect of increased risk of violence with; Non-adherence with psychological therapies: 3 studies, N = 118, OR = 6.7, 95%CI 2.4 to 19.2, $p < 0.001$, $I^2 = 31\%$ *A small effect of increased risk of violence with;* Non-adherence with medication: 9 studies, N = 1472, OR = 2.0, 95%CI 1.0 to 3.7, $p < 0.05$, $I^2 = 63\%$ *There were no associations with;* Prescribed antipsychotic medication, duration of current inpatient admission, duration of current outpatient treatment, age at first psychiatric inpatient admission, medication dosage, number of previous psychiatric admissions, longer duration of untreated illness, duration of illness, duration of

antipsychotic treatment, and extrapyramidal side effect scores.
Psychopathological, positive and negative symptoms
Medium-sized effects of increased risk of violence with; Poor impulse control: 11 studies, N = 2451, OR = 3.3, 95%CI 1.5 to 7.2, $p < 0.01$, $I^2 = 31\%$ Lack of insight: 6 studies, N = 2402, OR = 2.7, 95%CI 1.4 to 5.2, $p < 0.01$, $I^2 = 61\%$ Antisocial personality disorder: 4 studies, N = 405, OR = 2.1, 95%CI 1.0 to 4.3, $p < 0.05$, $I^2 = 15\%$ *Small effects of increased risk of violence with;* Higher general symptom scores: 21 studies, N = 4233, OR = 1.7, 95%CI 1.1 to 2.6, $p < 0.05$, $I^2 = 13\%$ Higher total PANSS scores: 15 studies, N = 3226, OR = 1.5, 95%CI 1.0 to 2.2, $p < 0.05$, $I^2 = 10\%$ Higher excitement scores: 9 studies, N = 1685, OR = 1.6, 95% CI 1.0 to 2.6, $p < 0.05$, $I^2 = 0\%$ Higher positive symptoms scores: 28 studies, N = 5342, OR = 1.2, 95% CI 1.0 to1.5, $p < 0.05$, $I^2 = 0\%$ *There were no associations with;* Negative symptoms or IQ

Consistency in results	Inconsistent ($I^2 > 50\%$) for; male sex, low SES in adulthood, a history of assault, high hostility scores, history of imprisonment, high psychopathy scores, recent arrest, aggressive behaviour, previous convictions, previous arrests, recent and previous alcohol misuse, recent and previous drug misuse, non-adherence with medication, lack of insight. All other factors had consistent results. Note; authors report that four study characteristics were associated with heterogeneity between study results: the proportion of the sample with prior violence histories, the proportion of the sample detained in forensic psychiatric settings, the study being conducted in the USA vs. rest of the world, and use of a register-based rather than self-report measure of violence.
Precision in results	All data are imprecise apart from non-white ethnicity.
Directness of results	Direct

Woodward, M, Nursten, J, Williams, P, Badger, D

Mental disorder and homicide: a review of epidemiological research

Epidemiologia e Psichiatria Sociale 2000; 9(3): 171-189

View review abstract online

Comparison	**Reasons for homicide in patients with mental disorders, mostly schizophrenia related disorders.**
Summary of evidence	**Low quality evidence (unable to assess consistency or precision, unclear conclusions for schizophrenia samples) is unsure as to the factors contributing to homicide in schizophrenia.**
Homicide	
Authors conclude that the most common characteristics of homicide offenders tend to include young men who are often diagnosed with schizophrenia, who misuse drugs and alcohol, and who have a comorbid antisocial personality disorder.	
Consistency in results	Unable to assess; no measure of consistency is reported.
Precision in results	Unable to assess; no measure of precision is reported.
Directness of results	Direct

Zhou J, Zhong B, Xiang Y, Chen Q, Cao X, Correll CU, Ungvari GS, Chiu HFK, Lai KCY, Wang X

Prevalence of aggression in hospitalized patients with schizophrenia in China: a meta-analysis

Asia-Pacific Psychiatry 2016; 60(8): 60-69

View review abstract online

Comparison	**Prevalence of aggression in Chinese inpatients with schizophrenia.**
Summary of evidence	**Moderate quality evidence (large samples, inconsistent, unable to assess precision, direct) suggests the overall prevalence of aggression in Chinese inpatients with schizophrenia is around 35%. Factors associated with increased aggression were more severe positive or disorganised symptoms, past history of**

	aggression and involuntary admission.
Aggression **Measured using the Modified Overt Aggression Scale (MOAS)**	
The overall prevalence of aggression in Chinese inpatients with schizophrenia is ~35%; 19 studies, N = 3,941, prevalence = 35.4%, 95%CI 29.7% to 41.4%, $p < 0.0001$ Significant risk factors for aggression were more severe positive symptoms including hostility or suspiciousness (78.9%, 15 studies), delusions (63.2%, 12 studies), past history of aggression (42.1%, 8 studies), disorganised behaviour (26.3%, 5 studies), auditory hallucinations (10.5%, 2 studies), and involuntary admission (10.5% 2 studies). Studies with sample size < 156 reported higher prevalence rates of aggression than studies with sample size ≥ 156. No differences in prevalence rates were found according to; year of publication, diagnostic tool, sex, age, or aggression cut-off MOAS score (≤ 4 or 5). Authors report no publication bias.	
Consistency in results	Authors report data are inconsistent.
Precision in results	Unable to assess; no measure of precision is reported.
Directness of results	Direct

Explanation of acronyms

β = coefficient, CI = confidence interval, I^2 = the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance), IQR = interquartile range, N = number of participants, OR = odds ratio, *p* = statistical probability of obtaining that result ($p < 0.05$ generally regarded as significant), Q = Q statistic (chi-square) for the test of heterogeneity, RR = risk ratio, SMD = standardised mean difference, vs. = versus

Explanation of technical terms

* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small.

† Different effect measures are reported by different reviews.

Prevalence refers to how many existing cases there are at a particular point in time. Incidence refers to how many new cases there are per population in a specified time period. Incidence is usually reported as the number of new cases per 100,000 people per year. Alternatively some studies present the number of new cases that have accumulated over several years against a person-years denominator. This denominator is the sum of individual units of time that the persons in the population are at risk of becoming a case. It takes into account the size of the underlying population sample and its age structure over the duration of observation.

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion of actual positives that are correctly identified (100% sensitivity = correct identification of all actual positives) and specificity is the proportion of negatives that are correctly identified (100% specificity = not identifying anyone as positive if they are truly not).

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomized trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) that allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. 0.2 represents a small effect, 0.5 a medium effect, and 0.8 and over represents a large treatment effect[23].

Odds ratio (OR) or relative risk (RR) refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in a treatment group, or a group exposed to a risk factor, relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment or not exposed to the risk factor. Conversely, an RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a risk factor. An RR or OR of 1.00 means there is no difference between groups. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[24]. lnOR stands for logarithmic OR where an lnOR of 0 shows no difference between groups. Hazard ratios measure the effect of an explanatory variable on the hazard or risk of an event.

Correlation coefficients indicate the strength of association or relationship between

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variables. They are an indication of prediction, but do not confirm causality due to possible and often unforseen confounding variables. An r^2 of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardized (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the dependent variable, statistically controlling for the other independent variables. Standardized regression coefficients represent the change being in units of standard deviations to allow comparison across different scales.

‡ Inconsistency refers to differing estimates of treatment effect across studies (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. I^2 is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent substantial heterogeneity and 75% to 100%: considerable heterogeneity. I^2 can be calculated from Q (chi-square) for the test of heterogeneity with the following formula;

$$I^2 = \left(\frac{Q - df}{Q}\right) \times 100\%$$

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, this criteria should be relaxed[25].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available so is inferred from available evidence. These inferred treatment effect sized are of lower quality than those gained from head-to-head comparisons of A and B.

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