Association of Violence With Emergence of Persecutory Delusions in Untreated Schizophrenia

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Objective: Psychosis is considered an important risk factor for violence, but studies show inconsistent results. The mechanism through which psychotic disorders influence violence also remains uncertain. The authors investigated whether psychosis increased the risk of violent behavior among released prisoners and whether treatment reduced this risk. They also explored whether active symptoms of psychosis at the time of violent behavior explained associations between untreated psychosis and violence.

Method: The U.K. Prisoner Cohort Study is a prospective longitudinal study of prisoners followed up in the community after release. Adult male and female offenders serving sentences of 2 or more years for a sexual or violent offense were classified into four groups: no psychosis (N=742), schizophrenia (N=94), delusional disorder (N=29), and drug-induced psychosis (N=102). Symptoms of psychosis, including hallucinations, thought insertion, strange experiences, and delusions of persecution, were measured before and after release. Information on violence between release and follow-up was collected through self-report and police records.

Results: Schizophrenia was associated with violence but only in the absence of treatment (odds ratio=3.76, 95% CI=1.39–10.19). Untreated schizophrenia was associated with the emergence of persecutory delusions at follow-up (odds ratio=3.52, 95% CI=1.18–10.52), which were associated with violence (odds ratio=3.68, 95% CI=2.44–5.55). The mediating effects of persecutory delusions were confirmed in mediation analyses (β=0.02, 95% CI=0.01–0.04).

Conclusions: The results indicate that the emergence of persecutory delusions in untreated schizophrenia explains violent behavior. Maintaining psychiatric treatment after release can substantially reduce violent recidivism among prisoners with schizophrenia. Better screening and treatment of prisoners is therefore essential to prevent violence.

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Findings on associations between major mental illness and violent behavior are controversial. Earlier studies suggested that violence can be driven by symptoms of psychosis, including delusions (1), threat/control-override (2, 3), and command hallucinations (4, 5). However, cross-sectional and case-register studies have found little or no association between psychotic illness and violence (6, 7) and suggest that risk factors for violence are the same among individuals with and without psychosis (8). Nevertheless, there is evidence that violence by patients with psychosis is more common during acute episodes (9–11). Consistent with these findings, more recent studies, which take into account temporal ordering and proximity of symptoms to outcome, have demonstrated an independent association between severe mental illness and violence (10, 12), emphasizing the relevance of persecutory/threat delusions as causal risk factors (11). Patients with psychosis who do not adhere to treatment are both more likely to experience a re-emergence of active symptoms (13, 14) and are at greater risk of violent behavior than their adherent counterparts (15–19). Moreover, first-episode studies suggest that the risk of violence is higher at first presentation than following treatment (9, 20). Despite the high prevalence of mental disorders among prisoners (21, 22), treatment opportunities are less often available in correctional settings than in the community (23). Untreated psychosis may therefore be an important risk factor for violent recidivism in released prisoners and an important target for intervention. The United Kingdom Prisoner Cohort Study is a large, observational longitudinal investigation of risk factors for future violence among released prisoners previously convicted of violent and sexual offenses. Taking into account temporal ordering and proximity, in the present study we aimed to answer the following questions: 1) whether violent offending is more common among prisoners with psychosis after release, 2) which specific symptoms have an effect on their violent behavior, and 3) whether treatment is an important factor in the pathway between symptoms and violence.

This article is featured in this month's AJP Audio, is an article that provides Clinical Guidance (p. 339), and is discussed in an Editorial by Dr. Large (p. 256)

Method

Study Sample

The Prisoner Cohort Study was designed to identify predictors of re-offending among prisoners released into the community from prisons in England and Wales. Study design and sample characteristics have been described previously (24). In brief, the Prison Service Inmate System identified adult male and female offenders serving sentences of ≥2 years for a sexual or violent principle offense and who were expected to be released within 12 months of the study start date (June 2001). The study included two phases of data collection: baseline and follow-up. All 1,717 prisoners who entered the study received a baseline assessment, and 967 (56.3%) were successfully followed up (mean follow-up time=39.2 weeks [SD=33.0]; median=29.6 weeks). The majority, 816 (84.4%), were in the community at follow-up, while 151 (15.6%) had returned to prison. The mean age of the sample was 30.9 (SD=11.6 years) and included 787 (81.4%) men and 180 (18.6%) women.

Measure

A semistructured interview was administered at baseline to collect data on demography and self-reported information on psychiatric treatments received during the current sentence. These included receiving medication for a mental health problem, seeing a psychiatrist or psychologist, or being transferred to a psychiatric hospital.

A lifetime diagnosis of schizophrenia, delusional disorder, or drug-induced psychosis was established at baseline using a module from the Schedule for Affective Disorders and Schizophrenia—Lifetime version (25). Personality disorders were assessed using the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (26), and psychopathy was assessed using the Hare Psychopathy Checklist—Revised (27). All interviews were carried out by research assistants trained in the use of the instruments and after achieving satisfactory interrater reliability (24). All participants completed the Psychosis Screening Questionnaire (28) at baseline by self-report, which measured the occurrence of four symptoms: auditory and visual hallucinations, thought interference, strange experiences, and persecutory delusions.

At follow-up, participants completed a questionnaire administered by lay interviewers using a laptop computer and designed to capture the occurrence of risk factors for violence occurring between release and the interview. Participants were asked again whether they received any psychiatric treatments. Participants also completed the Psychosis Screening Questionnaire to indicate symptoms of psychosis they experienced in the past 3 months. This allowed us to identify symptoms that emerged between baseline and follow-up.

Data on violent behavior occurring in the time between release and follow-up were collected from two sources: 1) self-report and 2) information on convictions obtained from the Police National Computer. For the self-report, participants were asked whether they had been in a physical fight or assaulted or deliberately hit anyone since they were released from prison. The Police National Computer data included offenses committed during the same time span, classified according to the United Kingdom Home Office standard list for "Violence Against the Person." Using both sources of information, 218 (22.9%) participants were identified as violent between release and follow-up.

Statistical Analyses

The demographic and clinical characteristics of prisoners with schizophrenia, delusional disorder, or drug-induced psychosis were compared with those with no psychotic disorder using logistic regressions (29). We also tested for differences in psychopathy scores between those with schizophrenia, delusional disorder, or drug-induced psychosis and those with no psychosis using t tests.

We examined the relationship between baseline psychosis and violent recidivism during the follow-up period, defined as a binary outcome denoted "violence," by fitting logistic regression models. These allowed for comparison of the risk of violence among prisoners with schizophrenia, delusional disorder, or drug-induced psychosis with those with no psychosis. Time at risk was calculated as time (days) between release and follow-up interview minus any time spent in prison. Time at risk and location of follow-up interview (prison or community), as well as potentially confounding clinical and demographic variables, were included as covariates in all adjusted models.

To investigate whether treated or untreated psychotic disorders were associated with increased risk of violent re-offending, we compared the occurrence of violence at follow-up among prisoners with psychosis who did not receive treatment at either time point, who received discontinuous treatment (treatment only during prison), or who received continuous treatment (treatment during prison and after release) with prisoners with no psychosis, using logistic regression models. The observational nature of the study and lack of randomization meant that associations between treated or untreated psychosis and violence may be confounded by differences between treatment groups. To detect potential confounders, we modeled the odds of receiving no treatment, discontinuous treatment, and continuous treatment on numerous demographic, historical, and clinical variables using multinomial logistic regression models (30) (see Table S1 in the online data supplement that accompanies this article). Potential confounders for the effects of treatment (variables that differed significantly between treatment groups) were then added to adjusted models.

Finally, we tested whether increased risk of violence among persons with untreated psychotic disorders was a result of the emergence of active symptoms. Using logistic regression models, we investigated whether emergence of symptoms was related to violence and whether individuals with untreated psychosis were more likely to experience these symptoms at follow-up. To test whether emergence of symptoms significantly mediated the association between untreated psychoses and violent outcome, we standardized regression coefficients as recommended for binary mediators and outcomes (31) and produced bootstrapped standard errors and confidence intervals (using 1,000 repetitions) for the estimated indirect effects to provide statistical evidence of the significance of the mediation by the emergence of symptoms. All analyses were conducted in STATA, version 12 (StataCorp, College Station, Tex.).

Results

Sample Characteristics and Psychopathology

In total, 94 (9.9%) prisoners with follow-up data met the diagnostic criteria for schizophrenia, 29 (3.0%) for delusional disorder, and 102 (10.7%) for drug-induced psychosis. Initially, the demographic and clinical characteristics of individuals in each of the three diagnostic groups were compared with those with no psychosis (N=742). Persons with delusional disorder did not differ from those with no psychosis on any of the tested demographic characteristics. However, those with drug-induced psychosis were significantly younger (odds ratio per year of age=0.96, 95% confidence interval [CI]=0.94–0.98, $p<0.001$), and individuals with

schizophrenia were more likely to be women (odds ratio=2.65, 95% CI=1.75–4.02, p<0.001) and to be unemployed before imprisonment (odds ratio=2.41, 95% CI=1.59–3.64, p<0.001).

Rates of comorbid axis I and axis II disorders varied markedly between each psychotic disorder group and the no psychosis group. Individuals with schizophrenia were significantly more likely to have comorbid major depression (odds ratio=3.08, 95% CI=1.78–5.31, p<0.001), alcohol (odds ratio=1.93, 95% CI=1.14–3.28, p=0.02) and drug (odds ratio=1.81, 95% CI=1.07–3.09, p=0.03) dependence, and schizotypal (odds ratio=12.03, 95% CI=4.42–32.78, p<0.001) and borderline (odds ratio=2.46, 95% CI=1.39–4.37, p=0.002) personality disorders. Those with delusional disorder were more likely to have a diagnosis of major depression (odds ratio=6.35, 95% CI=2.49–16.20, p<0.001) and obsessive-compulsive disorder (odds ratio=3.38, 95% CI=1.12–10.17, p=0.03). Persons with drug-induced psychosis were more likely to be dependent on alcohol (odds ratio=3.02, 95% CI=1.84–4.97, p<0.001) and drugs (odds ratio=5.49, 95% CI=3.26–9.24, p<0.001) but no more likely to have personality disorders or major depression than those with no psychosis.

Individuals with schizophrenia or drug-induced psychosis also had higher psychopathy scores when compared with persons without psychosis (schizophrenia: t=3.53, df=834, p<0.001; drug-induced psychosis: t=2.78, df=842, p<0.006). However, on adjustment for age and gender in a linear regression model, these findings only remained significant for schizophrenia and not drug-induced psychosis (estimated score difference β=0.43, 95% CI=0.22–0.64, p<0.001 and β=0.16, 95% CI=−0.04 to 0.37, not significant, respectively). Delusional disorder was not associated with psychopathy either before or after adjustment for age and gender.

Psychotic Disorders and Violent Re-Offending

We investigated the effects of schizophrenia, delusional disorder, or drug-induced psychosis on the risk of violent re-offending by comparing the occurrence of violence among persons in each of these three groups with persons in the no psychosis group, using a logistic regression model (Table 1). Schizophrenia and delusional disorder were not significantly associated with increased risk of violent re-offending either before or after adjustment for confounders. While drug-induced psychosis was associated with increased violence in univariable analyses, these findings did not remain significant on adjustment for drug and alcohol dependence.

Treated and Untreated Psychotic Disorders and Violence

To explore whether treated or untreated psychotic disorders were associated with increased risk of violence, we compared violence in persons with schizophrenia, delusional disorder, or drug-induced psychosis stratified by treatment type (no treatment, discontinuous treatment, or continuous treatment) with those with no psychosis, using logistic regression models (Table 2). After adjustment, treated and untreated individuals with drug-induced psychosis or delusional disorder were no more likely to be violent at follow-up than those with no psychosis.

Persons with schizophrenia who reported receiving treatment either during prison only or both during prison and after release were also no more likely to violently re-offend than their counterparts with no psychosis. However, when compared with no psychosis, untreated schizophrenia was associated with a significant increased risk of violence (Table 2). We further investigated the effects of treatment on violence among those with schizophrenia by comparing violent re-offending in untreated individuals with those receiving either continuous or discontinuous treatment. In these analyses, individuals with untreated schizophrenia were significantly more likely to be violent at follow-up than their treated counterparts (odds ratio=3.33, 95% CI=1.03–10.75, p=0.04).

Analyses to identify potential confounders on treatment revealed only two significant differences between the three treatment types (see Table S1 in the online data supplement). Those who reported continuous treatment were significantly more likely to be women (odds ratio=7.25, 95% CI=1.51–34.85, p=0.01) and to have comorbid borderline personality disorder (odds ratio=6.22, 95% CI=1.59–24.31, p=0.009) than untreated individuals with schizophrenia. On inclusion of these potential confounders, individuals with untreated schizophrenia remained significantly more likely to be violent at follow-up than those with no psychosis (odds ratio=3.84, 95% CI=1.22–12.08, p=0.02) or those with schizophrenia receiving treatment (odds ratio=3.64, 95% CI=1.06–12.41, p=0.04).

Finally, we examined whether the effects of treatment were specific to psychiatric treatment or whether they extended to treatment for substance abuse. We therefore compared violence among persons with schizophrenia, delusional disorder, or drug-induced psychosis stratified by substance abuse treatment type (no treatment, discontinuous treatment, or continuous treatment) with those with no psychosis, using logistic regression models. These analyses suggested that the risk of violence among individuals with schizophrenia, drug-induced psychosis, or delusional disorder did not differ according to whether they received any treatment for substance abuse disorders.

Symptoms at Follow-Up and Violence

To identify symptoms that may explain the association between untreated schizophrenia and violence, we first investigated whether emergence of specific symptoms of psychosis at follow-up was associated with violence. As

TABLE 1. Comparison of the Occurrence of Violent Re-Offenses Among Prisoners With No Psychosis and Those With Lifetime Schizophrenia, Delusional Disorder, or Drug-Induced Psychosis

	Violent Incident After Release				Logistic Regression					
	No		Yes		Unadjusted			Adjusted[a]		
Group	N	%	N	%	Odds Ratio	95% CI	p	Odds Ratio	95% CI	p
No psychosis (reference)	586	79.4	156	21.6	1.00			1.00		
Schizophrenia	67	71.2	27	28.8	1.52	0.94–2.45	0.089	1.65	0.94–2.90	0.082
Delusional disorder	23	79.3	6	20.7	0.94	0.38–2.34	0.895	0.83	0.31–2.25	0.718
Drug-induced psychosis	69	67.6	33	32.4	1.80	1.15–2.82	0.011	1.29	0.78–2.11	0.320
All groups	745	77.0	222	23.0						

[a] Estimates were obtained by fitting logistic regression models with adjustment for gender, age (years), major depression, drug dependence, alcohol dependence, psychopathy, and time at risk (which accounted for prison sentences occurring between release and violent re-offense).

TABLE 2. Violent Re-Offending Among Prisoners With a Lifetime Diagnosis of Psychotic Disorders Receiving No Treatment, Treatment During Prison, or Continued Treatment Compared With Those With No Psychosis

	Violent Incident After Release				Logistic Regression					
	No		Yes		Unadjusted			Adjusted[a]		
Diagnosis	N	%	N	%	Odds Ratio	95% CI	p	Odds Ratio	95% CI	p
No psychosis (reference)	586	79.4	156	21.6	1.00	—	—	1.00	—	—
Schizophrenia										
No treatment	8	50.0	8	50.0	3.76	1.39–10.19	0.009	3.43	1.10–10.72	0.034
Treatment during prison only	16	72.7	6	27.3	1.41	0.54–3.67	0.480	1.39	0.49–3.96	0.532
Continued treatment	40	75.5	13	24.5	1.22	0.64–2.34	0.544	1.40	0.66–2.97	0.380
Delusional disorder										
No treatment	3	75.0	1	25.0	1.19	0.12–11.50	0.881	0.71	0.07–7.38	0.778
Treatment during prison only	10	77.0	3	23.0	1.07	0.29–3.93	0.919	0.96	0.24–3.89	0.958
Continued treatment	13	92.9	1	7.1	0.27	0.04–2.11	0.214	0.23	0.03–1.81	0.161
Drug-induced psychosis										
No treatment	38	71.7	15	28.3	1.49	0.80–2.77	0.213	1.10	0.57–2.12	0.787
Treatment during prison only	8	53.3	7	46.7	3.29	1.18–9.22	0.023	2.59	0.88–7.61	0.083
Continued treatment	19	79.2	5	20.8	0.99	0.36–2.69	0.985	0.88	0.31–2.56	0.821

[a] Estimates were obtained by fitting logistic regression models with adjustment for gender, age (years), major depression, drug dependence, alcohol dependence, psychopathy, and time at risk (which accounted for prison sentences occurring between release and violent re-offense).

shown in Table 3, the emergence of hallucinations, thought insertion, or strange experiences at follow-up was not significantly associated with increased risk of violence, either before or after adjustment for confounders. However, individuals who developed persecutory delusions at follow-up were significantly more likely to be violent (before and after adjustment).

Given the association between persecutory delusions and violence, we explored whether emergence of these symptoms explained the association between untreated schizophrenia and violence. Individuals with untreated schizophrenia were significantly more likely to experience persecutory delusions at follow-up than those who received either continuous (odds ratio=1.57, 95% CI=1.15–2.98, p=0.03) or discontinuous (odds ratio=2.39, 95% CI=1.12–4.67, p=0.04) treatment or those with no psychosis (odds ratio=1.28, 95% CI=1.18–2.38, p=0.02). Mediation analyses confirmed that the emergence of persecutory delusions significantly mediated the association between untreated schizophrenia and violence (β=0.02, 95% CI=0.01–0.04, p=0.03), accounting for approximately 26% of the total effect of untreated schizophrenia.

Discussion

This study demonstrated that prisoners with schizophrenia who remained untreated during and after imprisonment were more likely to be violent following release than those who received treatment or those without psychosis. The association between untreated schizophrenia was explained, in part, by the emergence of persecutory delusions in these individuals.

Before taking into account whether treatment had been received, there were no differences between prisoners with either schizophrenia or delusional disorder with respect to violence compared with prisoners with no psychotic disorder. These negative findings are in line with previous studies of psychosis and violent recidivism that did not account for the effects of treatment (32). Persons with schizophrenia who did not receive treatment were more than three times as likely to be violent than their treated

TABLE 3. Effects of the Emergence of Symptoms of Psychosis on Violence During the Follow-Up Period

	Logistic Regression					
	Unadjusted			Adjusted[a]		
Emergent Symptom	Odds Ratio	95% CI	p	Odds Ratio	95% CI	p
Hallucinations (N=11)	1.97	0.57–6.79	0.284	3.14	0.81–12.16	0.097
Thought insertion (N=51)	1.42	0.76–2.64	0.270	1.79	0.91–3.52	0.089
Strange experiences (N=76)	0.73	0.40–1.34	0.314	0.78	0.42–1.46	0.441
Persecutory delusions (N=110)	3.68	2.44–5.55	<0.001	3.42	2.19–5.33	<0.001

[a] Estimates were obtained by fitting logistic regression models with adjustment for gender, age (years), major depression, drug dependence, alcohol dependence, psychopathy, and time at risk (which accounted for prison sentences occurring between release and violent re-offense).

counterparts. It was of interest that this effect was not observed for untreated persons with delusional disorder. However, it is possible that persons with this diagnosis responded less well to treatment than those with schizophrenia.

In unadjusted analyses, drug-induced psychosis was associated with a nearly twofold risk for violence following release, which became nonsignificant following adjustments for substance dependence. These effects may therefore be the result of substance-related comorbidity. Indeed, findings did not differ according to treatment, which suggests that subsequent violence had little or no relationship with psychotic symptoms and instead may reflect re-engagement in the drug economy and criminal networks.

We are not aware of any previous study of violent recidivism that has compared risk among treated and untreated prisoners with psychosis. The results of the present study are therefore novel and require replication in independent samples. Nevertheless, our findings are consistent with those in studies of treatment compliance in psychosis that report that nonadherence to medication is associated with increased risk of violence (15–19). They are also in line with findings from studies of first-episode patients that suggest that the risk of violence is higher at first presentation than following treatment (9, 20). Our results confirm the opinion of most clinicians that treatment reduces the risk of violence among persons with schizophrenia and that the risk of future violence is greatly increased among prisoners with schizophrenia if they are not treated. They also indicate that the inconsistent findings reported thus far in studies of psychosis and recidivism may, in part, be explained by the moderating effects of treatment. In line with this hypothesis, a recent meta-analysis (32) suggested that in prison samples, for which the likelihood of treatment is lower than in the community, psychosis is a significant risk factor (33). However, in community or secure hospital samples, with a high likelihood of receiving treatment, studies report no effects or even protective effects on subsequent violence (34).

Untreated Schizophrenia, Emergence of Persecutory Delusions, and Violence

The emergence of persecutory delusions at follow-up significantly mediated the association between untreated schizophrenia and violence. This is in accordance with previous findings that associations between nonadherence to treatment and violence are explained by a lack of overall improvement in symptoms (18). However, our study is the first, to our knowledge, to demonstrate the specificity of these effects for persecutory delusions. We did not find associations with hallucinations, thought insertion, or strange experiences.

There has been considerable debate over the causal pathways between schizophrenia and violence. Some investigators have argued that the association is driven entirely by comorbid conditions, such as drug and alcohol dependence (6). However, others have suggested that active symptoms, in particular delusions (35, 36), play a significant causal role in violent behavior. Our results support this latter hypothesis, suggesting that, if left untreated, schizophrenia is associated with the emergence of persecutory delusions, which in turn increase the likelihood of violence.

Limitations

The prevalence of psychosis in this study (23%) was considerably higher than that reported in a recent meta-analysis (37). This is largely because our study considered lifetime rather than current diagnoses of psychotic disorders. Rates were lower when considering past-year prevalence (11.8% in men and 22.0% in women) but still higher than those found in the largest and most comprehensive survey conducted in the United Kingdom, which reported 1-year prevalences of 8% in men and 14% in women (38). It is probable that the high rates of psychosis in the present study were affected by overselection of serious violent and sexual offenders who received closer attention from prison health care services. Despite the high prevalence of psychosis, sample sizes for individual disorders were small, particularly when stratified by treatment, increasing the likelihood of both type I and type II error. Our findings therefore require replication in larger, more representative samples of the general prison population.

Psychiatric treatment was self-reported, broadly defined, and did not include detailed information on compliance and treatment efficacy. Future investigations should assess the effects of specific treatments and treatment efficacy on violent recidivism.

Patient Perspectives

Case 1

A 21-year-old man with alcohol dependence and a history of cocaine and amphetamine abuse served a sentence of 2 years for attacking a stranger with a 3.5-kg weight during an argument. The victim, a 25-year-old man, required hospital treatment for his injuries. The participant had been diagnosed with schizophrenia, first experiencing symptoms at age 17. He did not receive any treatment for a mental disorder while in prison and remained untreated after release. During his prison stay, the researcher found residual psychotic symptoms, including experiences of bodily influence and delusions of external control. At the follow-up, the participant reported that he was initially supported by his parents after release and that they found employment for him. However, he returned to his former criminal network and confirmed that his friends had encouraged drug misuse. He generally denied using drugs after release but was not willing to confirm or deny questions about cocaine use. He confirmed that a group or organization was plotting to cause him serious harm or injury, indicating the presence of persecutory delusions. He reported that he had become involved in fights with strangers and acquaintances encountered in bars. Police records revealed that he was subsequently convicted of assaulting a police officer who had been called to a bar where he was acting in a strange and threatening manner.

Case 2

A 21-year-old man with antisocial personality disorder served a 4-year prison sentence for the armed robbery of a liquor store in which he threatened staff with a knife and imitation firearm. He initially required alcohol detoxification in prison. He reported physical abuse from age 3 by his father and a family history of alcoholism. He experienced psychotic symptoms for 12 months at age 17 and had been admitted to the hospital and diagnosed with schizophrenia. He did not receive any treatment during or after his imprisonment. At follow-up, he reported that he had returned to his previous criminal network and had been involved in burglaries and thefts. He confirmed that a group or organization was plotting to cause him serious harm or injury, indicating persecutory delusions. These were accompanied by auditory hallucinations, a feeling that strange things were going on around him, severe symptoms of anxiety, and ruminations of different ways of harming other persons on a daily basis. He attended appointments with his parole officer regularly, who was unaware that he had violently assaulted friends on several occasions, one requiring hospital treatment. Because these incidents had not been reported, he had not been charged with a criminal offense.

Case 3

A 52-year-old woman served a 2-year sentence for the robbery of a liquor store to obtain money for her heroin addiction. She had been neglected as a child following her mother's death, and there was a family history of alcohol dependence. She was estranged from her children who were taken into foster care. She first reported psychotic symptoms in childhood and was later diagnosed with schizophrenia. Although previously admitted to a psychiatric hospital, she did not receive assessment or treatment, either during prison or following release. At follow-up, she reported that she had returned to live with her boyfriend. There were repeated moves of accommodation and eviction because of nonpayment of rent and debts. She admitted to heavy misuse of cannabis but denied using other drugs. She reported that a group or an organization was plotting to cause her serious harm or injury, indicating persecutory delusions. She had violently assaulted her boyfriend on one occasion and a female acquaintance in a bar on another, resulting in her arrest and conviction for common assault.

The Prisoner Cohort Study was a naturalistic study. Measured and unmeasured differences between treated and untreated prisoners may therefore have confounded relationships between treatment and violent outcomes. In our study, individuals with untreated schizophrenia did not differ from their treated counterparts in terms of several demographic, historical, clinical, and criminological variables. Borderline personality disorder and female gender were associated with increased odds of treatment. However, these factors were unlikely to confound the relationship between untreated schizophrenia and violence because they were included as covariates in adjusted analyses. Nevertheless, replication of our findings in a randomized design is necessary to safely exclude the effects of any bias.

A recent study (11) demonstrated that angry affect is an important intermediate factor in the pathway between delusions implying threat (including persecutory delusions) and serious violence. Affect as a result of delusions was not measured in the Prisoner Cohort Study. It is therefore possible that the effects of emerging persecutory delusions on violent re-offending in untreated prisoners

were further influenced by anger as a result of delusional beliefs. Future studies are required to investigate this pathway.

Implications

The findings from this study have important implications for the development of risk assessment instruments and risk management to prevent violence. Risk assessment instruments are currently divided according to whether psychosis is a risk (39) or protective factor for violent recidivism (34). Our results suggest that measuring the presence or absence of treatment may reconcile these differences. Failure to treat, or refusal to be treated, should be included as a risk factor.

Our findings emphasize the need for improved screening, ensuring treatment of psychosis among persons in correctional settings and treatment adherence following release if the aim is to manage their risk of violence. A recent study found that only one-quarter of prisoners with severe mental illnesses were successfully identified by mental health in-reach teams and just 13% accepted onto their caseloads (40). Rates of treatment were relatively high among those with psychosis in our study, probably resulting from more careful assessment of our participants because of the seriousness of their offending. Nevertheless, 22% of those with schizophrenia did not report receiving any treatment either during prison or following release. Furthermore, it is estimated that in the United Kingdom, less than one-quarter of prisoners who screen positive for psychosis in the correctional population will subsequently receive an appointment with a mental health professional after release (23). Growing evidence suggests a complex association between delusions and violence (11), and our findings demonstrate that failure to treat schizophrenia results in the emergence of persecutory delusions and violence among released prisoners.

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Clinical Guidance: Violence and Persecutory Delusions

Individuals with schizophrenia who have been imprisoned for violent crimes but not treated are more likely to commit violent acts after release from prison than are those without psychosis or those with schizophrenia who are treated in prison or after release. Keers et al. followed 967 released prisoners in the United Kingdom for a mean of 39 weeks. In the United Kingdom Prisoner Cohort, 22% of those with schizophrenia reported that they had not received any treatment in prison or after release. The higher risk for violence is related to persecutory delusions but not to hallucinations or other psychotic experiences. In an editorial, Large (p. 256) underscores the value of antipsychotic treatment for violent prisoners with schizophrenia to prevent further violent crimes.