# Reduction of Crime in First-Onset Psychosis: A Secondary Analysis of the OPUS Randomized Trial

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**ABSTRACT**

***Objective:*** Violence and criminality are adverse outcomes for some persons who develop psychotic illnesses. The extent to which treatment can reduce offending has rarely been studied. The aim of this study was to evaluate whether assertive specialized treatment would reduce the rate of crime in patients with a first episode of psychotic illness.

***Method:*** From January 1998 to December 2000, a total of 547 patients aged 18–45 years with a first episode of schizophrenia spectrum disorder (*ICD-10* diagnostic code within F2) were randomized to assertive specialized treatment or standard treatment in an outpatient setting. In the current secondary analysis of the data, levels of criminality during the 2-year treatment period and the 3 years following were assessed using official records from Danish registers. Main outcome measures were any offending and violent offending.

***Results:*** No significant reduction in violent offending or any offending was found in the assertive specialized treatment group (adjusted hazard ratio = 1.06; 95% CI, 0.72–1.56) compared with the control group. Prevalence of offending was low and had often commenced prior to inclusion in the trial.

***Conclusions:*** While assertive specialized treatment has shown good treatment effects, it had no impact on rates of offending, thereby calling into question the potential efficacy of universally applied improvements in outpatient services with respect to reducing crime and violence. More specific interventions that address criminogenic needs in a more narrowly defined group of high-risk patients may be considered.

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Those who suffer from psychotic illnesses have been consistently shown to display elevated rates of violence and criminality,[1,2] particularly around the time of illness onset.[3] Some researchers[4] have argued that the excess risk in this group can be explained by co-occurring antisocial traits and problems with substance misuse, while others[5] maintain that the risk is driven by the psychotic symptoms per se, whereby adequate treatment is thought to prevent offending. Whether criminality is driven by direct effects of illness or whether known criminogenic risk factors are occurring at a higher rate, the reduction of such criminality is important both in terms of avoiding the adverse impact on the perpetrator and the victims and in terms of potentially reducing the stigma of those with psychosis.[5,6] However, violence and criminality have rarely been considered an outcome of interest for interventions in this group.

Using data from the OPUS trial,[7] a randomized controlled trial comparing assertive specialized treatment and standard treatment of first-episode psychosis, the aim of this secondary analysis was to compare rates of offending in the 2 treatment groups and to assess whether assertive specialized treatment prevented offending in the 2-year treatment period and the subsequent 3-year follow-up period. Since the treatment under consideration was not directed at reducing antisocial behavior, the question addressed in this study was whether improved clinical management was sufficient to reduce offending.

The main outcome measures were guilty verdicts in general (any offending) and more specifically for violent offending. Additionally, we utilized the high-quality information on duration of untreated psychosis in the OPUS data to assess whether the risk of offending increased after illness onset, but before treatment.

## METHOD

### Participants

During the period from January 1998 to December 2000, a total of 547 patients with a diagnosis in the schizophrenia spectrum (*ICD-10* code within F2) were included in the OPUS trial and were randomized to either assertive specialized treatment or treatment as usual. They were recruited from both inpatient and outpatient mental health services in the 2 largest Danish cities, Copenhagen and Aarhus; were 18–45 years old; and had not received antipsychotic drugs for more than 12 weeks of continuous treatment at the time of inclusion. Exclusion criteria included presence of mental retardation, organic mental disorder, or psychotic condition due to acute intoxication or withdrawal state, although comorbid substance misuse in itself was not grounds for exclusion. Additionally, familiarity with the Danish language was required. Around 5% of the referred patients refused to participate in the trial[8]; however, they did not differ from those who did participate with regard to duration of psychosis, severity of psychopathology, or diagnosis.[9] Comparisons with national registers revealed that, in Aarhus, 90% of those who had a first diagnosis within *ICD-10* diagnostic code F2 in the inclusion period participated in the trial. In Copenhagen, the corresponding number was 63%.

**Clinical Points**

- Assertive specialized treatment alone, when applied universally in first-episode psychosis, did not reduce the risk *or* volume of violence and other criminality, despite the proven effectiveness of this treatment in reducing levels of symptoms and problems with comorbid substance misuse.
- Almost three-quarters of those who committed offenses after commencing treatment for first-episode psychosis had already begun doing so before inclusion in the treatment trial.

### Ethics

All participants gave informed consent. The randomized controlled trial was approved by the Danish Ethics Committee (KF 01–387/97) prior to its initiation and was registered at ClinicalTrials.gov (identifier: NCT00157313).

### Treatment Groups

The experimental treatment consisted of assertive community treatment, family involvement, and social skills training and had a duration of 2 years, during which time patients saw their primary staff member usually on a weekly basis, often in their own home. The caseload ratio was 1:10. After 2 years, the patients were transferred to standard treatment. The fidelity to the standard assertive community treatment model, as measured by the Index of Fidelity of Assertive Community Treatment, was 70%.[10] The standard treatment offered contact with a community mental health center, with an average caseload ratio of 1:25, less frequent meetings, and no systematic offers of additional treatment elements. In both treatment groups, antipsychotic medication was administered as indicated by and in accordance with Danish guidelines, which recommend a low dose strategy and second-generation antipsychotics as the first drug choice. For a full description of randomization, treatment content, and assessments, see Petersen et al.[7] After a 2-year treatment period, patients receiving the assertive specialized treatment were found to have significantly better clinical outcomes with regard to psychotic and negative symptoms, secondary substance misuse, treatment adherence, and success with lower doses of antipsychotic medication.[7] At the 5-year follow-up, these differences had equalized between the treatment groups; however, the patients who had received assertive specialized treatment fared better on secondary outcome measures such as living in supported housing and number of days spent in hospital.[10]

### Sources of Data

From the OPUS trial, we obtained baseline information on gender and age at inclusion, primary diagnosis according to *ICD-10*,[11] level of psychotic and negative symptoms (Scale for Assessment of Positive Symptoms[12] and Scale for Assessment of Negative Symptoms[12]), duration of untreated psychosis (Interview for the Retrospective Assessment of the Onset of Schizophrenia[13]), and presence of substance misuse (Schedule for Clinical Assessment in Neuropsychiatry[14]), all of which was combined with information from Danish national registers. The Psychiatric Central Research Register[15] contains information on all admissions since 1969 and on all outpatient contacts since 1995. From this register, we obtained information for each patient on any periods of admission after inclusion in the trial. The Danish Civil Registration System[16] contains data on gender and date of birth and maintains continuously updated information on vital status; from this register, we obtained information on the date of death or emigration, when applicable. Data were linked using the unique personal identification number.

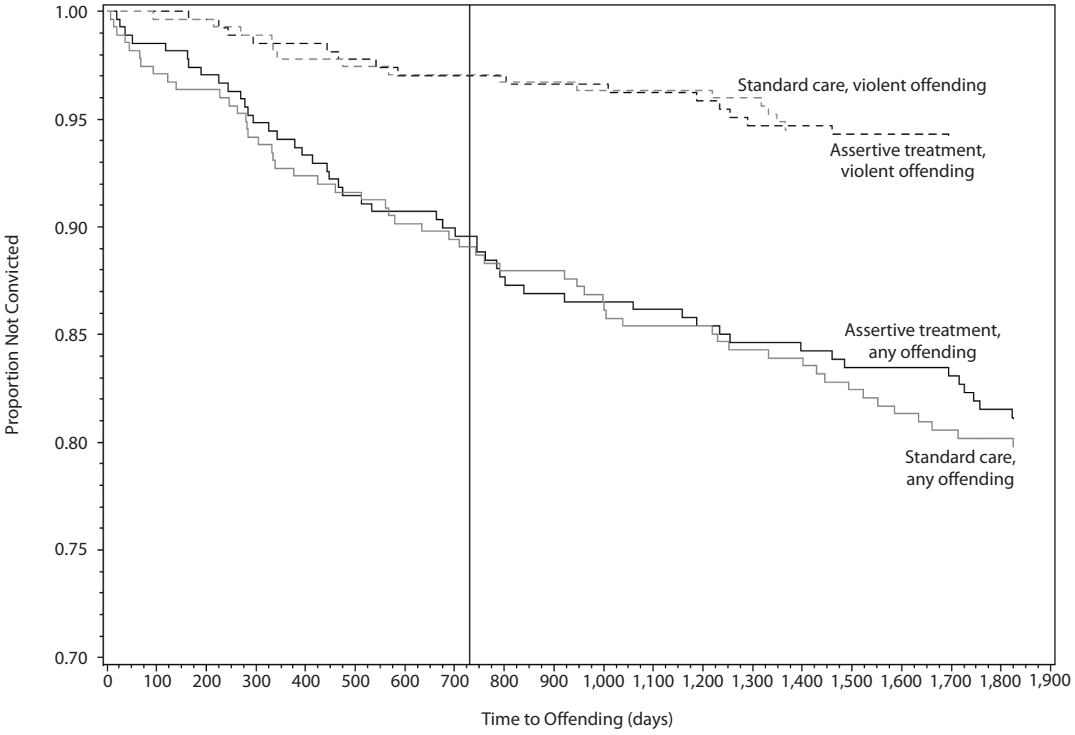
### Main Outcome Measure

From the Danish National Crime Register,[17] which is essentially 100% complete, we obtained information on all offenses that led to a guilty verdict. This register became electronic in 1978, and, through Statistics Denmark (http://www.dst.dk/en/Statistik/dokumentation/Declarations/convictions-for-criminal-offences.aspx), we had access to all criminal charges from 1980 to 2007. Guilty verdicts include custodial sentences, suspended sentences, conditional withdrawal of charges, fines, and sentences to psychiatric treatment; Danish courts do not use diversion programs for mentally disordered offenders. Offenses against the penal code, special legislation regarding drugs and weapons, or sections of the traffic act dealing with impaired driving were included as "any" offending, while violent offending included all violent and sexual offenses. We used the date of the offense as the time point for the survival analyses, and, in cases for which this date was missing (16 of 904; 1.8%), we used the date of the conviction instead. We also calculated the number and type of offenses and convictions within the 5-year follow-up period. For this analysis, we considered the following types of offending: violent (including sexual), acquisitive (theft, fraud, breaking and entering, and related), substance related (possession, trafficking, and driving under the influence), and other.

### Statistical Analysis and Power Calculation

The participants were followed from the time of inclusion in the trial until the time of violent offending or any offending, death, emigration, or the end of follow-up (2 years and 5 years), whichever came first. Attrition from the study was around 45% in both treatment groups after 5 years,[10] but, since we used official records to assess offending status, we were able to obtain full follow-up information on all participants in the trial. For generating Kaplan-Meier plots,[18] we used the LIFETEST procedure in SAS statistical software, version 9.1.3 (SAS Institute Inc; Cary, North Carolina). Hazard ratios, 95% CIs, Wald statistics, and associated *P* values were based on the Cox proportional hazards model,[18] using the PHREG procedure in SAS. Adjusted models considered the potential confounding effects of age at baseline, gender, offending history (prior to recruitment into the study), level of negative and psychotic dimension symptoms, duration of untreated psychosis, and presence of substance misuse at baseline. Periods during follow-up that were spent as an

**Figure 1. Kaplan-Meier Plot of Any Offending and Violent Offending Since Inclusion in the OPUS Trial, by Treatment Group**




inpatient in a psychiatric hospital were included as a time-varying covariate. All analyses were performed as intention to treat.

With 270 patients randomized to each group, we would be able to detect a difference equivalent to a hazard ratio of 0.7 for any offending statistically significant at the 5% level with a high probability (power > 80%).[19]

### Analysis of Offending Prior to Treatment

Looking at the period prior to inclusion in the trial, we used information on duration of untreated psychosis to estimate the time of onset of psychosis and analyzed whether the first offense occurred before or after this time. This analysis was restricted to those patients who had experienced psychotic symptoms (excluding 93 patients with a diagnosis of schizophrenia simplex or schizotypal disorder) and to those whose complete criminal record was available (excluding a further 75 patients born in 1964 or earlier). Using a Cox regression model, we followed individuals from their 15th birthday until their first offense or their inclusion in OPUS, whichever came first. Onset of psychosis was entered as a time-varying variable, and the model was adjusted for gender. Note that this analysis involved conditioning on the future, as all participants were later enrolled in the OPUS study.

## RESULTS

Of the total OPUS sample, 275 (50.3%) were randomized to the assertive specialized treatment group and 272 (49.7%) to the treatment-as-usual group. There were no significant differences between the groups with respect to sociodemographic and clinical factors. Characteristics of the groups have been described in full elsewhere.[20] Offending prior to inclusion in the trial was prevalent in both groups, with 88 (32.0%) of the assertive specialized treatment group and 90 (33.1%) of the standard care group having engaged in such behavior. In both treatment groups, 23 (about 8%) had a conviction for violent offending prior to inclusion in the trial.

### Main Outcome: Effect of Treatment on Crime

Figure 1 shows a Kaplan-Meier plot of the 2 treatment groups with respect to their first offense following inclusion in the program. Contrary to what was hypothesized, there did not appear to be any difference between the 2 treatment groups ($P = .69$). By the end of the 2-year treatment period, 12% in both groups had offended, and, at 5 years after inclusion, 20% of the assertive specialized treatment group and 19% of the standard treatment group had offended. Of those who offended after inclusion, almost 75% had also done so before inclusion (41 of 55 in the assertive specialized treatment group and 35 of 50 in the standard treatment group).

Violent offending was less prevalent but was of similar magnitude in both treatment groups, with 3% in both groups having committed a violent crime after 2 years, and with 5% in the assertive specialized treatment group and 6% in the standard treatment group having committed a violent crime after 5 years. Hypothesizing that treatment could have differential effects depending on the person's prior offending

**Table 1. Cox Regression Analysis for Any Offending**

| Variable | Cases Per Person-Years | Adjusted Hazard Ratio[a] (95% CI) |
|---|---|---|
| Treatment group | | |
| Standard | 50/1,167 | 1 |
| Assertive specialized | 55/1,193 | 1.06 (0.72–1.56) |
| Hospitalization[b] | | |
| Not hospitalized | 94/2,146 | 1 |
| Hospitalized | 11/215 | 0.70 (0.36–1.35) |
| Gender | | |
| Male | 87/1,304 | 1 |
| Female | 18/1,056 | 0.48 (0.28–0.82) |
| Substance misuse | | |
| Not present | 50/1,835 | 1 |
| Present | 55/525 | 1.77 (1.16–2.68) |
| Negative dimension | | |
| None or low | 25/542 | 1 |
| Medium | 61/1,326 | 1.08 (0.67–1.73) |
| High | 19/492 | 0.77 (0.42–1.42) |
| Psychotic dimension | | |
| None or low | 18/482 | 1 |
| Medium | 43/1,006 | 1.29 (0.68–2.46) |
| High | 44/872 | 1.28 (0.64–2.54) |
| Duration of untreated psychosis | | |
| Short | 40/702 | 1 |
| Long | 45/1,137 | 0.68 (0.44–1.05) |
| Missing | 8/98 | 1.98 (0.86–4.55) |
| Not applicable | 12/424 | 0.56 (0.26–1.20) |
| Prior offending | | |
| No | 29/1,736 | 1 |
| Yes | 76/624 | 5.28 (3.27–8.52) |
| Age at inclusion[c] | NA | 0.68 (0.49–0.95) |

[a]A value of 1 indicates reference group.
[b]Time-dependent variable.
[c]Age was modeled as [(age−27)/10], thus the hazard ratio reflects the risk decrease per 10 years.
Abbreviation: NA = not applicable.

**Table 2. Type and Frequency of Offending, by Treatment Group (N = 547)**

| Variable | Assertive Specialized Treatment (n = 275) | Standard Treatment (n = 272) |
|---|---|---|
| Offending within 5 years of inclusion in the OPUS trial | | |
| Type of conviction, n (%) | | |
| Custodial sentence | 4 (1) | 2 (1) |
| Suspended sentence | 9 (3) | 9 (3) |
| Fine | 45 (16) | 38 (14) |
| Conditional withdrawal of charges | 10 (4) | 11 (4) |
| Sentence to psychiatric treatment | 12 (4) | 11 (4) |
| Type of offense, n (%) | | |
| Violent offense | 15 (5) | 16 (6) |
| Acquisitive offense | 42 (15) | 31 (11) |
| Substance-related offense | 14 (5) | 20 (7) |
| Other offense | 16 (6) | 11 (4) |
| First conviction after inclusion in the OPUS trial | | |
| Type of conviction, n (%) | | |
| Custodial sentence | 1 (0) | 0 (0) |
| Suspended sentence | 3 (1) | 5 (2) |
| Fine | 39 (14) | 34 (13) |
| Conditional withdrawal of charges | 6 (2) | 4 (1) |
| Sentence to psychiatric treatment | 6 (2) | 6 (2) |
| Type of offense, n (%) | | |
| Violent offense | 7 (3) | 10 (4) |
| Acquisitive offense | 36 (13) | 26 (10) |
| Substance-related offense | 7 (3) | 10 (4) |
| Other offense | 5 (2) | 3 (1) |
| Number of convictions after inclusion in the OPUS trial, n (%) | | |
| 1 | 30 (11) | 31 (11) |
| 2 | 9 (3) | 6 (2) |
| 3–5 | 10 (4) | 11 (4) |
| 6+ | 6 (2) | 1 (0) |

history, we tested for equality over strata in restricted models that contained only those with or those without a history of offending. With *P* values for the log-rank test in the range of .31–.73 for any offending and .65–.97 for violent offending, we found no evidence to support this hypothesis.

In a Cox regression, we found an insignificant hazard ratio of 1.08 (95% CI, 0.74–1.58) for assertive specialized treatment compared to standard treatment. In a fully adjusted model (Table 1), the association remained insignificant, but male gender, younger age, substance misuse at baseline, and a history of offending were identified as risk factors for offending. Although the result was not significant, there was some indication ($P = .11$) that those who were unwilling or unable to give information on duration of untreated psychosis were at increased risk for offending, while our data did not indicate that those with a long duration of untreated psychosis should be at increased risk for offending. For violent offending, the unadjusted hazard ratio was 0.91 (95% CI, 0.45–1.84). Given the very low prevalence of this outcome, we lacked sufficient data to fit an adjusted model.

### Frequency of Offending

Although we found no evidence that assertive specialized treatment reduced the occurrence of offending relative to standard treatment, we considered the possibility that assertive specialized treatment could reduce the volume of offending, such that those who offend do so less frequently. Table 2 shows the cumulative number of offenses for both treatment groups during the first 5 years after inclusion, along with frequencies of different types of verdicts and offenses and the total number of convictions within the 5-year follow-up. Again, there were no significant differences between the 2 treatment groups; however, the level of criminality was modest. Most of those who offended did so only once, and many received only a fine.

### Relative Time of Onset—Psychosis Versus Offending

Looking to the period preceding inclusion in the trial, we found a hazard ratio of 1.29 (95% CI, 0.82–2.02) for committing the first offense after the onset of psychosis relative to before. Although the result was not significant, this finding does give some indication that the risk of offending may increase after onset of a psychotic disorder.

## DISCUSSION

In our analysis of data from a controlled trial of 547 patients with a first episode of psychosis who were randomized to assertive specialized treatment or standard care, we found no significant reductions in violent offending or any offending, both in terms of the number of people who engaged in such behaviors and with respect to frequency of offending. While the sample size may have limited our ability to detect small

differences, no trends for differences between the treatment groups were found.

Our finding of no difference is in line with 1 previous study[21] of the effect of intensive case management on violent behavior. Utilizing data from the UK700 study, Walsh et al[21] found no reduction in violence in an inner city sample of persons with chronic psychosis. In comparison to the UK study, our patients were younger, they were in an earlier stage of illness, and the difference between treatments was larger since our specialized treatment consisted of assertive community treatment, psychoeducational family involvement, and social skills training and not simply a lighter caseload. For these reasons, along with OPUS patients' having been shown to have significantly better clinical outcomes (psychotic and negative symptoms, secondary substance misuse, treatment adherence, and success with lower doses of antipsychotic medication) and secondary outcomes (living in supported housing and days spent in hospital),[7,10] one would have expected better results. Explanations for a lack of effect include the possibility that the intervention was still not intensive enough or that it should have specifically targeted risk of criminal behavior, eg, proviolence attitudes, anger experience, and social problem solving. It is also the case that the prevalence of offending after inclusion in the OPUS study was relatively low, and it might be argued that benefits would more likely be found in interventions that target higher-risk patients, such as those with dual diagnoses.

Periods spent in psychiatric hospitals can be regarded as more intensive interventions, and, for the analyses, we considered whether these times were best conceptualized as time not at liberty to offend or as time with reduced opportunities to offend. On the basis of Danish practice, in which it is not uncommon for violent episodes in inpatient settings to be reported to the police and dealt with by the courts,[22] and on the basis of the empirical observation that some patients did in fact offend while hospitalized, we entered time in hospital as a time-varying variable in the Cox regression rather than censoring out those periods.[23] As this variable was not significant in multivariate regression, we found no indication that hospitalization reduced offending. Of course, those who are at increased risk of violence would more likely be admitted, which would confound the results; however, we have no reason to believe that increased risk of nonviolent offending, which is by far the most prevalent in our study, should have any association with likelihood of admission.

A key point is that almost three-quarters of those who offended after commencing treatment had already begun doing so before inclusion in the program. Numerically, most of the preinclusion offending took place before illness onset, indicating that non–mental illness factors may be important for offending. Taking time at risk into account, however, we found some indication, although not statistically significant, that the risk of offending increases after onset of psychotic symptoms, which makes programs targeting early detection and early treatment potentially of interest for study. In other words, the timing of treatment may be important; however, this issue remains to be explored. Our failure to find any association between offending and duration of untreated psychosis is consistent with the results of a recent meta-analysis and systematic review by Large and Nielssen,[3] in which more serious violence was associated with a longer duration of untreated psychosis, while less serious violence was not.

### Strengths and Limitations

Even though the OPUS trial is one of the larger randomized controlled trials comparing assertive specialized treatment with standard care, our analysis still suffers from the possibility of type II error in the Cox regression, although we did not see any indication of trend in our data. A great strength of the present study is the use of national registers for follow-up information, particularly since those with antisocial traits are more likely to be lost to follow-up under usual study conditions. Linking the OPUS dataset to the national registers means that differential attrition was avoided and that we were able to obtain follow-up information on all participants regardless of whether, or for how long, they participated in the trial. Loss to follow-up occurred only in cases of death or emigration, and, in these cases, we had access to the exact dates of loss so as to make relevant adjustments to the analyses.

Using official records caused underestimation of the rates of offending and aggression, which becomes quite apparent when our results are compared to the meta-analysis of Large and Nielssen,[3] who reported that 35% of first-episode patients had any degree of violence and that 17% had at least 1 episode of more severe violence (any degree of injury, use of weapon, or sexual assault) prior to treatment contact. Only 8% of patients in our study had a previous conviction for violence. While part of the difference can possibly be related to differences in levels of criminality or demographic compositions in the various studies, our measurement was less sensitive than using self-report or case notes. Apart from avoiding differential attrition, the reliance on official records protects against information bias in a study in which the intervention group had more frequent contact with carers than controls and also ensures standardized definitions.

## CONCLUSIONS

While assertive specialized treatment has been shown to improve clinical outcomes in first-episode psychosis, in the current study we found no indication of an effect on offending. The prevalence of offending was low in the study group, and the majority of those who offended after inclusion in the trial had commenced doing so prior to that time, indicating that earlier intervention may be warranted.

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***Author contributions:*** Ms Stevens analyzed and interpreted the data and drafted the manuscript. Drs Nordentoft, Agerbo, Dean, and Mortensen

interpreted the data and critically revised the manuscript. All authors have read and approved the final version for submission.

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***Additional information:*** The OPUS database is owned by Merete Nordentoft, DrMed; for information on accessing the OPUS data, contact Dr Nordentoft at d198080@dadlnet.dk. Data from the Danish National Crime Register and the Central Person Register (Danish Civil Registration System) are available through Statistics Denmark at http://www.dst.dk/en/TilSalg/Forskningsservice.aspx. The Psychiatric Central Research Register is located at Statens Serum Institut, Copenhagen, Denmark; for information on gaining access, contact serum@ssi.dk.

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