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Original article

Serious delinquency and later schizophrenia: A nationwide register-based follow-up study of Finnish pretrial 15- to 19-year-old offenders sent for a forensic psychiatric examination

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ABSTRACT

Background: Aggressive and disruptive behaviors often precede the onset of schizophrenia. In this register-based follow-up study with a case-control design, we wanted to investigate if serious delinquency was associated with future diagnoses of schizophrenia or schizoaffective disorder (here, broadly defined schizophrenia) among a nationwide consecutive sample of 15- to 19-year-old Finnish delinquents sent for a forensic psychiatric examination in 1989–2010.
Methods: The sample comprised 313 delinquents with no past or current psychotic disorder. For each delinquent, four age-, gender- and place of birth -matched controls were randomly selected from the Central Population Register. Five controls (0.4%) had been treated for schizophrenia before their respective index-dates and were thus excluded from further analysis, leaving us with a control population of 1247 individuals. The subjects were followed till death, emigration or the end of 2015, whichever occurred first. Diagnoses were obtained from the Care Register for Health Care.
Results: Forty (12.8%) of the delinquents and 11 (0.9%) of the controls were diagnosed with schizophrenia later in life (HR 16.6, 95% CI 8.53–32.39, $P < 0.001$). Almost half of the pretrial adolescents with later schizophrenia were diagnosed within 5 years of the forensic psychiatric examination, but latency was longer among the other half of the sample, reaching up to 20.5 years.
Conclusions: The study supports the previous research indicating a potential link between serious delinquency and later schizophrenia. Accurate psychiatric assessments should be made in correctional services but also later in life so that any possible psychotic symptoms can be detected in individuals with a history of serious delinquency even if there were no signs of psychosis before or at the time of the crime. Future research should explore which factors influence the delinquent's risk of developing later schizophrenia.

1. Introduction

Schizophrenia is a severe mental disorder, characterized by positive symptoms such as hallucinations and delusions, and negative symptoms such as marked apathy, a paucity of speech, and blunt or incongruent emotional responses. The prevalence of schizophrenia is 0.4–0.7%, depending on the type of prevalence estimate used [1]. In Finland, a lifetime prevalence of 0.9% was presented some years ago [2]. The onset of schizophrenia before the age of 13 is rare [3], as the prevalence of childhood-onset schizophrenia is estimated to be 1 in 10,000 children [4]. There is a substantial increase in schizophrenia frequency in adolescence [4], reaching a peak in early adulthood, and gradually declining until the age of 60, after which the incidence rates level off [5]. Schizoaffective disorder is a psychiatric disorder characterized by both abnormal thought processes and dysregulated emotions [6]. The onset of schizoaffective disorder typically occurs in young adulthood, but the disorder is only about one-third as common as schizophrenia [2]. In research, schizophrenia and schizoaffective

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disorder are often outlined as broadly defined schizophrenia since they resemble each other in many ways (e.g., see Kotov et al. [7] and Amann et al. [8]). Thus, many authors have pooled patients with these two disorders together to form a sample of persons with schizophrenia (see, e.g., Thomson et al. [9]; Barr et al. [10], Seow et al. [11]; Quidé et al. [12]; Yanagida et al. [13]). Before these disorders become clinically manifest and the diagnoses are established, individuals often undergo a prodromal phase, characterized by behavioral abnormalities and cognitive and affective changes [14]. The duration of the prodromal phase varies substantially between individuals, but has been estimated to last for an average of four to five years [14]. It is, however, important to notice that these behavioral, cognitive and affective symptoms may also resolve spontaneously without leading to psychosis [15,16].

It has long been recognized that non-psychotic disorders often occur before the onset of schizophrenia. For example, in a study Lewis et al. [17], 38% of men who developed schizophrenia before the age of 31 had a non-psychotic disorder diagnosed at the age of 18 when screened for entry into the Swedish army. Among these men, personality disorders (OR 8.2), neurosis (OR 4.6) and alcohol abuse (OR 5.5) turned out to be risk factors for future schizophrenia. The authors concluded that personality disorders might represent an underlying vulnerability to schizophrenia, and that other psychiatric disorders that occur before schizophrenia might reflect a prodromal phase of the illness. In a study by Weiser et al. [18] among 16- to 17-year-old men screened by the Israeli draft board, schizophrenia-spectrum personality disorders posed the highest risk (OR 21.5) of later hospitalization for schizophrenia, followed by adjustment disorders (OR 11.8), antisocial personality disorder and impulsive control disorder (OR 8.9), alcohol and drug abuse (OR 6.8), other personality disorders (OR 3.9), and neurosis (OR 3.6). Svirskis et al. [19] concluded that vulnerability to psychosis seems to be associated with a high number of lifetime Axis-I diagnoses including anxiety and mood disorders.

Most individuals with schizophrenia are never violent, but a meta-analysis by Fazel et al. [20] indicated that the rate of violence is 4–5 times greater in persons with schizophrenia than it is among the general population: the estimated proportion of violent people in the general population was 1.6%, whereas among schizophrenia patients, it was 9.9%. The onset of schizophrenia can be preceded by disruptive behaviors [21,22]. In Purcell et al.'s study [23] of treatment-seeking youngsters, the at-risk of psychosis group was significantly more likely to report having been charged by the police and convicted of criminal offences than the not-at-risk group. Accordingly, in a study by Hutton et al. [24], almost every third individual assessed as being at risk of psychosis reported convictions for violence-related crimes, and one in five reported current violent thoughts or plans. A Danish nationwide nine-year follow-up study by Gosden et al. [25] found that among young sentenced criminals, conviction of violence in late adolescence was significantly associated with a future diagnosis of schizophrenia (odds ratio [OR] 4.6, 95% confidence interval [CI] 1.54–13.74). In a study among 15- to 25-year-old pretrial arsonists, who were evaluated in one Finnish forensic psychiatric ward, fire-setting crimes during adolescence or young adulthood were significantly related to schizophrenia or schizoaffective disorder in later life (HR 12.5, 95%CI 4.49–34.65) [9]. Both research groups thus concluded that violent behavior could be seen as part of the pre-schizophrenia phase of young criminals. However, the above-mentioned studies have their limitations including the small sample size [9,24], the highly selected sample [9], the cross-sectional design [23,24], the lack of formal structured assessments of violence risk [24], the self-reported offending [23,24], and the lack of information about alcohol and other substance abuse [25].

The minimum age of criminal liability in Finland is 15. According to Finnish law, when a person is charged of a crime, the court decides whether a forensic psychiatric examination is needed or not. After deciding on an examination, the court requests that arrangements be made by the National Institute for Health and Welfare. The examination is performed either in a state or municipal psychiatric hospital or in a psychiatric hospital for prisoners. These inpatient assessments last approximately two months, and gather data from various sources (family members, relatives, medical records, criminal records, school, child-welfare, and military records). They include psychiatric evaluations, standardized psychological tests, interviews conducted by a multi-professional team, an evaluation of the offender's physical condition, and continuous observation by the hospital staff. The final forensic psychiatric report includes an opinion on the level of criminal responsibility, a possible psychiatric diagnosis, and an assessment as to whether or not the offender fulfils the criteria for involuntary psychiatric care. In Finland, severe offences are often performed under alcohol intoxication, also among adolescents [26]. According to the Finnish criminal law, intentional alcohol intoxication does not diminish an individual's criminal responsibility. Psychotic offenders, on the other hand, are typically regarded as lacking criminal responsibility, and they are referred to involuntary psychiatric treatment instead of correctional services. The above-mentioned procedure concerns both adult and under-aged offenders. In the 1980s and 1990s, 300–400 examinations were performed annually. Nowadays, approximately 100 examinations are performed early. This decrease links to economic factors and factors related to changes in national criminal policy. The overall high quality and reliability of Finnish forensic psychiatric examinations are acknowledged in the courts and among scientists [27].

This register-based nationwide prospective follow-up study, with a case-control design, aimed to shed more light on the potential relationship between serious delinquency and a future diagnosis of schizophrenia, using a sample of Finnish adolescents referred for a forensic psychiatric examination. First, we wanted to find out if severe delinquency was related to risk of later schizophrenia. Secondly, we wanted to compare the delinquents with and without later schizophrenia with respect to gender, primary psychiatric diagnoses received in the forensic psychiatric examination, and comorbid alcohol and other substance-use disorders.

2. Methods

2.1. Sample and procedure

In this study, forensic psychiatric examination reports on all 15- to 19-year-old offenders who were born in Finland and had undergone the examination between 1.1.1989 and 31.12.2010 were collected from the archives of the National Institute of Health and Welfare. The reports were reviewed retrospectively. The study plan was evaluated by the Ethics Committee of the Helsinki and Uusimaa Hospital District, Finland. Permission to conduct the study was granted by the administration of the Helsinki and Uusimaa Hospital District, Finland, and the National Institute of Health and Welfare, Finland. The study was performed in accordance with the Declaration of Helsinki.

2.2. Participants

The study population comprised a nationwide consecutive sample of 348 delinquents. The criminal histories of the delinquents were reviewed, and, according to Fazel and Grann [28], murder, attempted murder, manslaughter, attempted manslaughter, arson, aggravated assault, assault, robbery, kidnapping, rape, attempted rape and child molestation were all regarded as violent offences, and theft, burglary, driving while intoxicated,