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Police-registered offenses and psychiatric disorders among young males

The Finnish "From a boy to a man" birth cohort study

■ **Abstract** *Objective* To study associations between crime and psychiatric disorders among adolescent males in a representative population-based cohort study. *Method* The sample includes 2,712 Finnish boys born in 1981. Information on criminality consists of offenses registered in the Finnish National Police Register 1998–2001. Crime was classified according to frequency and type (drug, violent, property, traffic, and drunk driving offenses). Information on psychiatric diagnoses between 1999 and 2004 was collected from the Finnish National Military Register. *Results* Of the 2,712 boys, 22% had a crime registration during the 4-year period, and 10% had at least one psychiatric disorder according to the Military Register. Those with psychiatric disorders accounted for 49% of all crimes. Of those with more than five crimes ($n = 98$), 59% had psychiatric diagnoses. After adjusting for other crime types and childhood socio-economic status, property crime was independently associated with several diagnoses: antisocial personality (APD), substance use (SUD), psychotic, anxiety, and adjustment disorders. Drug offending was independently associated with APD, SUD, and psychotic disorder, and traffic offenses with APD. *Conclusions* Youth crime is predominantly associated with antisocial personality and substance use disorders. Crime prevention efforts should focus on boys showing a risk for antisocial and substance use problems. In particular, property, drug, and repeat offenders need mental health and substance use assessment. There is a need to develop integrated mental health and substance use treatment services for young offenders within or alongside the criminal justice system.

■ **Key words** crime – psychiatric disorder – youth – birth cohort

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Introduction

The prevalence of criminal behavior peaks in late adolescence, then declining with age [8]. The occurrence of psychiatric disorders generally coincides with offending at the same stage of life [2], emphasizing the need to study the links between these two phenomena. Although crime committed by the young and the mentally disturbed is a matter of public concern, empirical knowledge of the link between youth crime and mental health has been scarce and largely based

on unrepresentative institutionalized samples [9, 37, 38] Most people with psychiatric disorders are not hospitalized, and most offenders are not convicted [2]. Since the 1990's, access to comprehensive central registers has enabled population-based studies on criminality and mental health. Studies have shown psychiatric comorbidity, substance use, and psychotic illness to increase the risk of crime [6]. Unfortunately, research sampling of hospitalized patients and convicted offenders selectively underestimates rates of mental illness and crime in the general population, potentially biasing the findings [2]. This undermines especially studies on young populations since mental health service use in late adolescence is known to be uncommon [36].

Furthermore, previous population-based studies have mainly focused on the associations between major psychiatric disorders, such as schizophrenia, and violent crime or crime in general, ignoring associations between various specific psychiatric disorders and crime categories, such as drug, violent, property, traffic, and drunk driving offenses. Although recognizing the need to study serious crime such as violence, the lack of evidence between different crime types and psychiatric disorders is unexpected. The bulk of offending consists of property and traffic offenses, while the rate of violence is substantially lower [3]. In order to cut the crime rates, it would be useful to understand the connection between various crime types, repeated crime, and psychiatric disorders.

Our aim is to investigate how offending type and frequency are associated with specific psychiatric diagnoses in a Military Register in a representative birth cohort study among adolescent males. On the basis of previous studies, we hypothesize that especially repeated crime is associated with psychiatric disorders. More specifically, crime is likely to be linked to antisocial personality (APD), substance use (SUD), and psychotic disorders [2], whereas the role of anxiety and depressive disorders is less clear [26, 27]. To our knowledge, this is the first population-based study reporting associations between different psychiatric disorders, levels of criminal activity, and several crime categories (i.e. drug, violent, property, traffic, and drunk driving offenses) based on inclusive police reports, not only convicted crime.

Method

■ Subjects

This study is part of a nation-wide follow-up study called "From a Boy to a Man" included in the Epidemiological Multicenter Child Psychiatric Study in Finland [1, 34, 35]. The original sample was drawn from the total Finnish population born in 1981 ($n = 60,007$). The original sample consisted of 6,017 children, which was 10% of the age group. Of the selected 6,017 children, 5,813 (96.6%) took part in the study in 1989, and 2,946 of them were boys. A sample of

the age cohort was drawn by selecting a representative sample of communities according to their degree of urbanization: urban, suburban, and rural. In small communities, all children born in 1981 belonged to the sample, while in larger cities, a representative sub-sample of the area based on school districts was drawn from all the school districts. A child registered in the district belonged to the sample even if he attended school outside the district due to a need or desire for special education (e.g. special language classes or classes for behaviorally disturbed or disabled children [1].

The 10-year follow-up sample included the same boys as had taken part in the study in 1989. The follow-up information was based on two national registers: the Finnish National Police Register including information on criminal offenses, and the Finnish Military Register including information on psychiatric diagnoses. Because the identification number was missing or the identification numbers between baseline and register data could not be matched, information about psychiatric disorders from the Finnish Military Register and information about criminal offenses from the Finnish National Police Register were obtained for 2,712 males (92.1% of the baseline sample). Register and questionnaire data were matched on the basis of individual social security numbers.

The research plan was approved by the Joint Commission on Ethics of Turku University and Turku University Central Hospital. Access to the registers was granted by the Ministry of the Interior and the Finnish Defense Forces. The Office of the Data Protection Ombudsman in Finland approved the register linkage. The combined information from the registers was analyzed in such a way that the subjects could not be identified.

■ Register information on psychiatric disorders

Finnish men born in 1981 received their obligatory call-up in 1999. The call-up provided an opportunity to reach nearly all the boys in the age group. Military service lasting from 6 to 12 months is obligatory for Finnish males, and they have a medical examination during the spring of the year they turn 18. The purpose of the examination is to obtain a preliminary assessment of their fitness class for military service. After the examination, they must attend the call-up between September and November of the same year. At the military call-up, there is a medical examination to assess whether any health changes have occurred that would affect the preliminary fitness class. By March 2004, 80.4% of the men had completed military service, i.e. 6, 9, or 12 months, while 9.5% had been permanently exempted from the service, and 6.8% had completed non-military service. Thus, 96.4% of the men had completed their obligatory service. The cumulative information on psychiatric diagnoses in the present study was based on the Military Register information including all psychiatric diagnoses from the call-up health examination in autumn 1999, and the Military Register information at two time-points, in October 2002 and March 2004. During that time period the subjects were 18–23 year old. The diagnoses were made at the mental health examination at call-up, during the military service, or at the health examination evaluating the subjects' fitness for the military. The register information about psychiatric diagnoses is based on the most recent assessment. Information about possible psychiatric diagnoses is not necessarily the same at the different time-points. The more severe and chronic psychiatric diagnoses are usually based on consultation with specialized psychiatric services, while a less severe diagnosis may be based only on an assessment by a general practitioner. The general practitioner also obtains information from the school and health care system, which can be considered to increase the accuracy of the diagnoses. Thus, information is collected widely, and also those individuals are reached who have not been in contact with psychiatric services in the health care sector.

As reported previously [35], the case histories of the men belonging to the Turku military province (Finland is divided into 12 military provinces) were checked (13% of those who had psychiatric diagnosis). In about 40% of the cases in that sample, the psychiatric diagnoses were based on consultation with a specialist in psychiatry, whereas in the remaining cases, they were based on

an assessment by a general practitioner. Also in the latter cases, information from examinations by psychologists and previous documents from health and school services were available. Thus, the diagnostic procedures can be regarded as accurate enough for the purposes of the present study.

The subject was classified into "any psychiatric disorder" group if he had at least one psychiatric diagnosis according either to the ICD-10 classification system at the military call-up examination in 1999 or information obtained from the Finnish National Military Register in October 2002 or March 2004. According to data pooled from the three different time-points, subjects were classified into six disorder groups: antisocial personality, substance use, psychotic (including e.g. schizophrenia and schizophreniformic psychosis), anxiety, depressive, and adjustment disorders. If the subject had psychotic disorder at any of the three time-points he was not classified into any other group. Furthermore, subjects were classified into anxiety and depressive groups only if they did not have antisocial personality or substance use disorder. Only subjects with adjustment disorder who could not be classified into any of the other five disorder groups were classified into the adjustment disorder group. Otherwise, the subject could belong to more than one disorder group. It should also be noted that not all subjects with psychiatric diagnoses could be categorized into specific groups.

Register information on crime

Data on the cohort's criminality were gathered from the National Police Register, an electronic database kept by the Finnish Police Administration. This nationwide register is a rather new procedure, dating back to 1997. It includes all incidents where it has come to the police's notice that someone has committed an offense. However, mere admonitions are not usually registered, or municipal parking fines. Furthermore, petty traffic infractions such as minor speeding were excluded from the data as trivial.

The current study is limited to crime registered in 1998–2001 when the subjects were 16–20 year old. Data are removed from the register according to a schedule on the basis of limitation of prosecution by lapse of time. Data were collected from the register at two time points (at the beginning of the years 2000 and 2002) to ensure that the data of the years 1998–2001 are complete. Register information of the year 1997 was not included because of missing data.

On the basis of the police data, subjects were classified into four groups: those with (1) no registered offenses; (2) one or two offenses; (3) three to five offenses; and (4) more than five offenses during the 4-year period. Furthermore, criminality was divided into five categories: drug, violent, property, traffic, and drunk driving offenses. The subjects could belong to more than one offense group. *Drug offenses* referred to various kinds of drug-related activity, all forbidden in Finland: manufacturing, importing, exporting, distributing, or possessing illegal drugs. We defined *violence* as overt aggressive behavior toward another human being. The main subgroups of violence were various kinds of assault and battery, and robbery. *Property crime* included covert behavior targeted not at humans but at property. This category included stealing, illicit use of other's motor vehicle, receiving stolen goods, and damaging other's property. Also economic crime (such as fraud, embezzlement, forgery) belonged to this category. *Traffic offenses* consisted of reckless driving and driving without a license. In Finland, *drunk driving* is an offense when alcohol in blood exceeds 0.05%.

Socio-economic status in childhood

In order to control socio-economic status (SES), a variable concerning parents' education was extracted from the 1989 data, when the subjects were 8 years old. The subjects' parents had filled in the Rutter Scale [32], consisting of 31 items on a scale of 0–2, including a question on their education level. Low SES was indicated if neither of the parents had completed upper secondary school after basic education (together constituting 12 years of schooling). In

Finland, basic education consists of a 9-year comprehensive school after which education can be continued either in a vocational school or upper secondary school. As reported previously, low parental education level at age 8 predicted strongly both repeated crime and most crime categories in late adolescence [34].

Statistical analyses

Psychiatric diagnoses were analyzed as categorical response variables. Logistic regression was used to analyze the associations between the explanatory and response variables [19]. The associations were quantified by calculating odds ratios (OR) and their 95% confidence intervals (95% CI). To study independent associations between the offending categories and psychiatric disorders, multivariate analyses included all crime types and data on parental socioeconomic status in childhood. All tests were two-sided. Statistical computations were performed using the SAS system for Windows, release 9.1.3/2003.

Results

Table 1 depicts the amount of offending in different diagnostic groups. There were altogether 3,001 registered offenses during the 4-year period (1998–2001). Although those with at least one psychiatric disorder formed only 10% of the sample, they accounted for 49% of all crimes. Especially those with antisocial personality (APD) and substance use (SUD) disorders had high levels of crime, being responsible for most of the crimes committed by those with psychiatric disorders. Although the APD group formed only 2.7% and the SUD group only 1.8% of the sample, they were responsible for 27% and 24% of all crimes, respectively.

Table 2 shows the descriptive characteristics of the associations between offending level and type and psychiatric disorders. Almost half of the psychiatrically diagnosed young men had also been registered for crime, versus 19% of the non-diagnosed. In logistic regression analysis adjusted with parental education level at age 8, crime in general was associated with all specific diagnoses except depressive disorder (Table 3). Furthermore, all crime types were associated with psychiatric diagnoses. Specifically, all crime types were strongly associated with APD and SUD. In addition, violent and property offending were linked to anxiety and adjustment disorders, the latter also to psychotic disorder; drug offending was linked to psychotic disorder; and drunk driving to anxiety disorder. None of the crime types was associated with depression, however.

Offending level was linearly associated with psychiatric diagnoses, as the likelihood of having been diagnosed increased along with the number of offenses. As many as 59% of those with more than five offenses had psychiatric disorders (Table 2). Of those with SUD, 81% had been registered for crime, and 52% for more than five offenses. Of those with APD, the corresponding figures were 62% and 36%.

In *multivariate* analyses (Table 4), after controlling for the other crime categories and parental edu-

Table 1 Descriptive characteristics of psychiatric disorders and crime

	Number of cases (total 2,712)	Number of crimes (total 3,001)	Mean (SD)	Md (Q1, Q3)	Max[a]	Percentage of all crimes
Psychiatric disorder						
No	2,429	1,525	0.6 (5.4)	0 (0, 0)	237	50.8
Yes	283	1,476	5.2 (15.7)	0 (0, 4)	155	49.2
Antisocial personality disorder	73	796	10.9 (25.2)	2 (0, 10)	155	26.5
Substance use disorder	48	714	14.9 (24.9)	6 (1, 15)	127	23.8
Psychotic disorder	14	18	1.3 (2.7)	0 (0, 1)	10	0.6
Anxiety disorder	48	67	1.4 (2.6)	0 (0, 1.5)	10	2.2
Depressive disorder	38	18	0.5 (1.2)	0 (0, 0)	6	0.6
Adjustment disorder	35	58	1.7 (2.3)	0 (0, 3)	8	1.9

SD = Standard deviation, Md = Median, Q1 = Lower quartile, Q3 = Upper quartile, Max = Maximum value, [a]Minimum = 0

Table 2 Descriptive characteristics of offending frequency and type, and psychiatric disorders

	N	No psychiatric disorder n = 2,429 %	Any psychiatric disorder n = 283 %	Antisocial personality disorder n = 73 %	Substance use disorder n = 48 %	Psychotic disorder n = 14 %	Anxiety disorder n = 48 %	Depressive disorder n = 38 %	Adjustment disorder n = 35 %
Crime									
No	2,112	80.9	51.9	38.4	18.8	57.1	58.3	79.0	54.3
Yes	600	19.1	48.1	61.6	81.2	42.9	41.7	21.0	45.7
Number of crimes									
1–2	391	14.0	17.7	13.7	18.8	28.6	27.1	15.8	17.1
3–5	111	3.4	9.9	12.3	10.4	7.1	4.2	2.6	17.1
>5	98	1.7	20.5	35.6	52.1	7.1	10.4	2.6	11.4
Crime type									
Drug									
No	2,621	98.2	83.0	72.6	50.0	85.7	95.8	97.4	94.3
Yes	91	1.8	17.0	27.4	50.0	14.3	4.2	2.6	5.7
Violent									
No	2,530	94.8	80.6	69.9	58.3	92.9	85.4	92.1	80.0
Yes	182	5.2	19.4	30.1	41.7	7.1	14.6	7.9	20.0
Property									
No	2,427	92.5	64.0	54.8	25.0	71.4	70.8	92.1	71.4
Yes	285	7.5	36.0	45.2	75.0	28.6	29.2	7.9	28.6
Traffic									
No	2,425	90.8	77.4	57.5	58.3	85.7	89.6	92.1	88.6
Yes	287	9.2	22.6	42.5	41.7	14.3	10.4	7.9	11.4
Drunk driving									
No	2,573	96.0	85.5	74.0	66.7	100	89.6	100	91.4
Yes	139	4.0	14.5	26.0	33.3	0	10.4	0	8.6

cational level in childhood, drug and property offenses were independently associated with APD, SUD, and psychotic disorder. Property offending was also independently linked to anxiety and adjustment disorders. Traffic offenses were independently associated with APD.

Discussion

To our knowledge, this is the first representative population-based sample including all police contacts, not only convictions, and psychiatric diagnoses among young males. Our study also distinguished between different crime types, of which traffic and property crime were the most common and the latter independently associated with most psychiatric disorders. We found elevated levels of all crime types among the psychiatrically diagnosed, and they committed about half of the total volume of crime. In particular, substantial shares of crime were committed by those with antisocial personality (APD) or substance use (SUD) disorders, although also psychotic, anxiety, and adjustment disorders were associated with offending.

The strong link between APD and SUD and offending was expected on the basis of previous reports showing the social burden caused by these disorders [9, 10]. Accordingly, in an Australian study based on register linkage data of convictions and

Table 3 Associations between offending frequency and type, and psychiatric disorders

	Any diagnosis		Antisocial personality disorder		Substance use disorder		Psychotic disorder		Anxiety disorder		Depressive disorder		Adjustment disorder	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
	p	χ^2, df[a]	p	χ^2, df	p	χ^2, df	p	χ^2, df	p	χ^2, df	p	χ^2, df	P	χ^2, df
Any crime	3.6	2.7–4.6	5.3	3.2–8.9	17.4	8.0–37.9	3.5	1.2–10.3	3.0	1.7–5.4	1.2	0.5–2.6	3.1	1.5–6.1
	<0.001	88.5, 1	<0.001	40.8, 1	<0.001	52.1, 1	0.022	5.2, 1	<0.001	13.4, 1	0.709	0.1, 1	0.001	10.2, 1
Number of crimes														
1–2 offenses	1.9	1.3–2.6	1.5	0.6–3.4	6.3	2.4–16.4	3.1	0.9–10.4	2.7	1.4–5.3	1.2	0.5–3.0	1.8	0.7–4.4
3–5 offenses	4.2	2.7–6.8	7.1	3.2–15.8	12.4	3.9–39.4	3.6	0.4–30.2	1.6	0.4–7.0	0.7	0.4–1.5	6.2	2.4–16.2
>5 offenses	17.3	10.3–25.8	33.6	17.2–65.7	119.2	49.4–287.4	7.5	0.9–63.3	8.2	3.0–22.4	1.6	0.2–12.1	6.6	1.8–23.4
	<0.001	161.5, 3	<0.001	113.8, 3	<0.001	122.2, 3	0.105	6.1, 3	<0.001	20.8, 3	0.921	0.5, 3	<0.001	19.1, 3
Crime type														
Drug	10.6	6.8–16.6	19.7	10.4–37.4	50.0	23.4–94.5	9.2	2.0–42.6	2.3	0.5–10.0	1.4	0.2–10.8	3.2	0.7–13.9
	<0.001	106.3, 1	<0.001	83.2, 1	<0.001	125.5, 1	0.005	8.1, 1	0.251	1.3, 1	0.719	0.1, 1	0.120	2.4, 1
Violent	3.9	2.7–5.6	6.4	3.3–10.9	10.9	5.7–20.5	1.6	0.2–12.4	3.0	1.3–7.0	1.5	0.5–5.1	4.2	1.8–9.8
	<0.001	106.3, 1	<0.001	35.3, 1	<0.001	54.0, 1	0.663	0.2, 1	0.009	6.8, 1	0.488	0.5, 1	0.001	10.6, 1
Property	6.4	4.7–8.6	8.6	5.1–14.7	33.6	16.6–68.2	5.8	1.8–19.2	5.0	2.6–9.5	1.0	03–3.5	4.0	1.8–8.7
	<0.001	147.3, 1	<0.001	63.8, 1	<0.001	95.0, 1	0.004	8.3, 1	<0.001	23.4, 1	0.939	0.006, 1	<0.001	11.8, 1
Traffic	2.6	1.8–3.5	6.1	3.6–10.4	6.3	2.4–16.4	1.7	0.4–7.7	1.1	0.4–2.8	0.9	0.3–2.8	1.2	0.4–3.5
	<0.001	31.7, 1	<0.001	45.6, 1	<0.001	33.7, 1	0.484	0.5, 1	0.820	0.05, 1	0.790	0.07, 1	0.711	0.1, 1
Drunk driving	3.7	2.5–5.6	7.9	4.3–14.4	10.5	5.4–10.5	na[b]	na	2.6	1.0–6.9	na	na	2.0	0.6–6.6
	<0.001	41.4, 1	<0.001	45.5, 1	<0.001	48.4, 1			0.046	4.0, 1			0.268	1.2, 1

Results of logistic regression analyses adjusted for parental education level in childhood
[a]df = degree of freedom
[b]Calculation not applicable; OR, odds ratio; CI, confidence interval

Table 4 Independent associations between different crime types and psychiatric disorders

	Any diagnosis		Antisocial personality disorder		Substance use disorder		Psychotic disorder		Anxiety disorder		Depressive disorder		Adjustment disorder	
Crime type	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
	P	χ^2a	p	χ^2	P	χ^2	p	χ^2	p	χ^2	p	χ^2	p	χ^2
Drug	5.0	3.0–8.3	8.4	5.0–17.5	15.0	6.6–34.0	6.4	1.2–35.5	1.3	0.3–5.7	1.5	0.2–11.8	1.8	0.4–8.4
	<0.001	38.5	<0.001	31.7	<0.001	41.7	0.033	4.5	0.766	0.9	0.706	0.0006	0.448	0.6
Violent	1.4	0.9–2.2	1.5	0.7–3.2	1.7	0.7–3.8	0.5	0.1–5.1	1.5	0.6–3.7	1.8	0.5–6.7	2.6	0.9–7.1
	0.130	2.3	0.318	1.0	0.230	1.4	0.588	0.3	0.437	0.6	0.367	0.8	0.065	3.4
Property	4.1	2.8–5.8	3.3	1.7–6.6	14.7	6.4–33.9	5.4	1.4–20.6	4.6	2.2–9.7	1.0	0.3–3.0	2.9	1.1–7.3
	<0.001	58.2	<0.001	11.8	<0.001	39.9	0.014	6.0	<0.001	16.0	0.972	0.001	0.025	5.0
Traffic	1.1	0.7–1.7	2.2	1.1–4.5	1.1	0.4–2.8	1.4	0.3–7.1	0.5	0.2–1.5	1.0	0.3–3.6	0.6	0.2–2.2
	0.669	0.2	0.030	4.7	0.076	3.2	0.656	0.2	0.076	3.2	0.937	0.006	0.469	0.5
Drunk driving	1.2	0.7–2.1	1.7	0.7–3.8	1.3	0.5–3.5	na[b]	na	1.9	0.6–5.9	na	na	1.1	0.3–4.6
	0.502	0.5	0.218	1.5	0.624	0.2	0.975	0.001	0.280	1.7	0.989	0.0006	0.867	0.02

Results of multivariate logistic regression analyses for all crime types adjusted for parental education level in childhood
[a]Degree of freedom for all analyses is 1
[b]Calculation not applicable; OR, odds ratio; CI, confidence interval

contacts with psychiatric services, prior psychiatric contact was found for 25% of offenders, personality disorder and substance misuse accounting for much of this relationship [41]. Substance use disorders, especially alcohol abuse, have been shown to independently predispose to crime [11] and a substantial portion of crime, particularly violence, occurs under the influence of alcohol or drugs [25]. Impaired executive cognitive functioning during intoxication is known to increase the risk for violent behavior [29], offending, and risk-taking [24]. Antisocial behavior and substance abuse often co-occur [30] and are known to be associated with poor impulse control [4], novelty seeking [21], and aggressiveness [16], indicating a shared genetic background [23]. Accordingly,

in our previous report we showed conduct and hyperactivity problems at age 8 to strongly predict offending in late adolescence, emphasizing efforts to prevent criminality already in childhood [34].

Anxiety and adjustment disorders were associated with crime, while depressive disorder was not. Previously, both depression and anxiety have been suggested to co-occur with violence and other antisocial behaviors [26, 37], and prisoners have been found to suffer from elevated levels of major depression [10]. In the Dunedin study, depression and anxiety were weakly related to violence, but not after controlling for comorbidity [2]. These conflicting findings in different study settings imply that rather than predisposing to crime, depression may result from

punitive sanctions [39], whereas anxiety disorder may be present also prior to the encounter with the criminal justice system. Depression may develop later as negative consequences related to antisocial behavior accumulate [26]. Furthermore, the core symptoms of depression, such as reduction of energy and activity, may also decrease the odds on criminal behavior. The depressed may also be less inclined to spend time with friends and to be involved in such group activity that delinquency typically is [8]. Furthermore, antisociality accompanied by anxiety disorder has been found to be related to a high level of disability and poor quality of life [33]. Anxiety and adjustment disorders may also relate to poor sense of coherence, a concept found to be linked to delinquency [31].

The number of subjects with psychotic disorder was only 14, and therefore, the results should be interpreted with caution. Furthermore, only a small portion of crime was attributed to those with psychotic disorder. Drug and property offending were associated with psychotic disorder even after adjusting for the other crime types and socio-economic background in childhood. Social impairment, substance abuse, and poor life opportunities related to psychotic disorders [28] probably account for these findings. Illicit drug use is known to be more common among young people with psychosis than in the general population [20]. In addition, there is increasing evidence that illicit drug use, especially cannabis, predisposes to psychosis [13, 42]. Moreover, the connection between property crime and psychosis has been previously found in clinical samples of schizophrenics [5, 40]. It should also be noted that poor information processing, especially impaired executive functioning, is related to psychotic disorder [14], possibly increasing the risk of being caught by the police.

Contrary to previous studies [2, 38, 40, 41], no association between psychotic illness and violent crime was found, probably due to the limited number of subjects decreasing statistical power. However, our findings may support the hypothesis that violence accompanying psychotic illness is related to other factors than psychotic illness per se, such as severity of the illness [22], concomitant antisocial behavior [5], and substance use [9, 40].

The frequency of offending was linearly associated with the risk for psychiatric diagnoses. The most active offenders (with at least six offenses) suffered from most disorders, including APD, SUD, anxiety, and adjustment disorders. The results indicate a robust association between recidivism and a wide range of comorbid psychiatric disorders. Of the crime types, drug and property offending had the most associations with the diagnoses after controlling for the other crime types and childhood SES. Given that violence is generally considered an especially serious form of crime, and in previous studies linked to psychiatric disorders, it was interesting that in our study, violent crime was not independently associated with any disorders. Violence may be attributed more to impulsiveness than actual mental disorder; it may arise out of situational factors, provocation, and an emotional surge, whereas drug and property crime may involve more premeditation and, therefore, indicate more deviance. Mentally disordered drug and property offenders may also be more susceptible to detection than others who are presumably more able to conceal these acts. Furthermore, as stated above, drug use may also predispose to mental disorder [7, 13, 20].

Limitations

The strengths of this study include the use of a representative community sample and large national datasets. However, as the study design was not longitudinal, this study did not address causality, and it cannot be determined whether psychiatric disorders cause crime, increase the risk of getting caught, whether it is the criminal justice sanctions exacerbating the disorders, or whether disorders and crime co-occur because of some common cause. It is also to be noted that the present study did not address the seriousness of offending, and the results do not justify extending the institutional containment or repression of those with psychiatric disorders as a group.

In the military headquarters, legal officers receive information on the conscripts from the criminal justice authorities. However, the prevalent practice is that military physicians are given access to that data only in isolated cases when they apply for it from the headquarters, and they very seldom do (Colonel A. Peitso, Center for Military Medicine, the Finnish Defense Forces, personal communication, March 2007). Furthermore, past contacts with the authorities are only one indication of possible disorders, while psychiatric diagnoses are based on ICD-10 diagnostics and discussions with the patient the symptoms of whom are assessed in their totality. Therefore, it is unlikely that this information significantly biased our results.

Data on crime always are incomplete. The Police Register includes offenses that have come to the police's notice and have been registered. The role of police activity is particularly decisive in drug crime, in the absence of an outsider victim. Also the rates of traffic and drunk driving offenses substantially depend on police surveillance. Furthermore, the police may exercise some discretion as to what incidents to register, and the practices may vary by officer, suspect, and police district. However, in Finland, it is not in the discretion of the police whether to register a crime or not on the basis of a mental disorder (it is up to the prosecutor not to require punishment or the court not to punish). In addition, the Police Register is continuously updated and well-maintained, and

corruption in Finland is among the very lowest in the world (www.transparency.org). The importance of accurate registering of every offense is emphasized in the instructions given by the Police Administration. The problem of "false positives" is not considered a critical source of bias either, due to rigid regulation and control of the Finnish police. In sum, the Finnish Police Register yields reliable and unique information on crime.

Police data were preferred to court data that only include convictions and ignore a huge amount of crime. Self-report methodology, in turn, would reveal also undetected offenses, but is subject to biases due to forgetting, distortion, and reluctance to mention certain, typically the more serious, acts. Furthermore, self-reports may be especially unreliable among the mentally ill.

There are very few countries in the world, most notably the Nordic countries, with a long-standing tradition of psychiatric registers. The diagnoses were collected in the Finnish Military Register for both clinical and research purposes. They were based on health examinations performed by general physicians or senior psychiatrists having access to all available documents from health services. The register is well-maintained and updated weekly. Including register information from three time points increases the reliability of the results. However, the psychiatric diagnoses were not determined through standardized structured interviews. Nevertheless, also the Finnish National Military Register gives comprehensive and unique information not available in most countries.

Conclusions and clinical implications

Crime and psychiatric diagnoses accumulate on the same young males who tend to be identified both by the police and military physicians. Of the various diagnoses, youth crime is predominantly associated with antisocial personality and substance use disorders. Efforts to reduce crime should focus on boys manifesting a risk for developing antisocial or substance use problems. Since both of these disorders are known to originate from childhood problem behavior [12, 35], early intervention is emphasized [15].

Of the various offending groups, especially drug, property, and repeat offenders need mental health and substance use assessment. Integrated mental heath services have been found to reduce recidivism [17, 18], although more empirical knowledge on the treatment of young recidivists is still needed, and treatment outcomes for different crime categories have been somewhat contradictory [17]. In sum, there is a need to develop early, evidence-based interventions especially for drug, property, and repeat offenders.

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