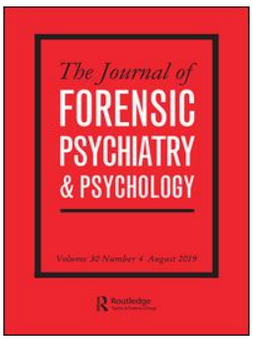

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Subsequent criminal participation among young people first admitted to psychiatric inpatient care during early and middle adolescence

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ABSTRACT

Adolescents brought before court suffer excessively of mental disorders. Less is known about subsequent criminal participation of adolescent psychiatric inpatients. Our register study comprised all subjects that had between 1980 and 2010 been admitted to psychiatric inpatient care in Finland for the first time in their lives at ages 13–17 (n = 16 842), identified in the Care Register for Health Care and followed up for up to 10 years in the Register of Prosecutions, Sentences and Punishments. Incidence of register entry for any crime was 2.4/100 person-years, 4.0 in males and 1.9 in females. Incidence of violent crime was 0.9/100 person-years, 1.5 in males and 0.3 in females. Greatest risk for subsequent crime was associated with diagnoses of conduct, personality and substance use disorders (F90–92, F60–69, F10–19). Schizophrenia group diagnoses (F20–29) were associated with lowest risk. Later criminality was manifold among those who already had a crime register entry before the index treatment. Need for psychiatric inpatient care during adolescence associates with a great risk of antisocial development. Treatment needs to address this risk by systematically implementing evidence-based interventions. Health and social policies need to ensure resources and skills to these treatments.

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KEYWORDS Adolescent psychiatry; inpatient treatment; criminality; register study

Background

Numerous studies have demonstrated that adolescents brought before court or seen in prison and probation services commonly suffer from mental disorders. In their meta-analysis comprising over 16000 detained juvenile delinquents, Fazel et al. (2008) found that just above a half of both boys and girls could be diagnosed with a conduct disorder. Major depression was detected in about one third of the girls and one-tenth of boys, ADHD in about

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one-fifth of the girls and one-tenth of the boys, and psychotic illness in about 3% of both sexes. These figures clearly exceed the prevalence of these disorders in general adolescent population (Birmaher et al., 2007; McClellan et al., 2013; Pliszka & Aacap Work Group on Quality Issues, 2007; Polanczyk et al., 2015). Juveniles in various punitive and corrective services also display a disproportional number of unmet needs and psychosocial adversities such as discord and violence in the family of origin, other traumatic experiences, educational needs, learning difficulties and neurocognitive deficits and relationship problems in their dating and steady relationships, and the psychosocial problems tend to persist to adulthood into the families of their own (Chitsabesan & Bailey, 2006).

The associations between mental disorders and delinquent behaviour in adolescence may have many causal pathways. Mental disorders may predispose to delinquent behaviour due to lowering behavioural controls, for example, because of impulsivity or aggression. Delinquency could, on the other hand, contribute to the development of mental disorders, for example, by negative influences on self-image and identity, or by bringing along a lifestyle that predisposes to trauma, or as a reaction to punitive consequences. Mental disorders and criminal behaviour also share in common many predisposing factors such as school problems, low socioeconomic status, family dysfunction and alcohol and drug abuse (Elonheimo et al., 2014; Engqvist & Rydelius, 2007; Yampolskaya et al., 2014). Finally, some diagnostic criteria of specific disorders such as conduct disorder are *per se* delinquent acts.

Less attention has been paid on later criminality in clinical child and adolescent psychiatric samples. Engqvist and Rydelius (2007) carried out a follow-up in registers of 1420 patients admitted to child and adolescent psychiatric (CAP)

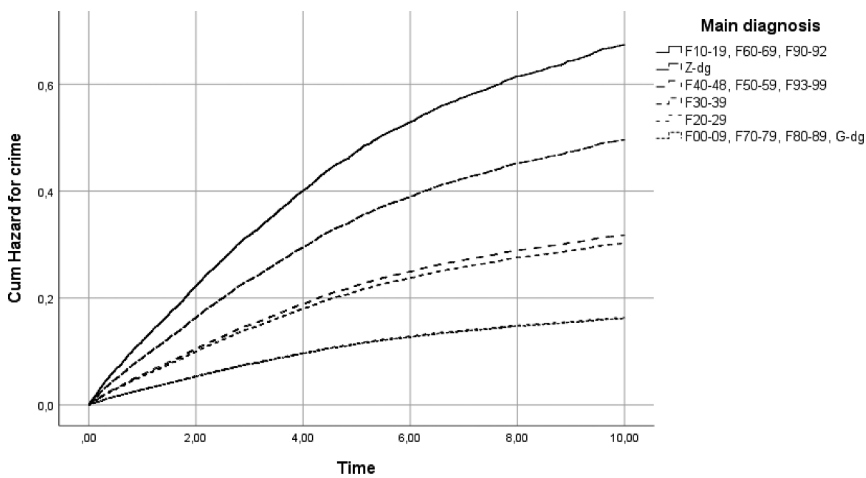

Figure 1. Cumulative hazard for any crime according to diagnostic groups.

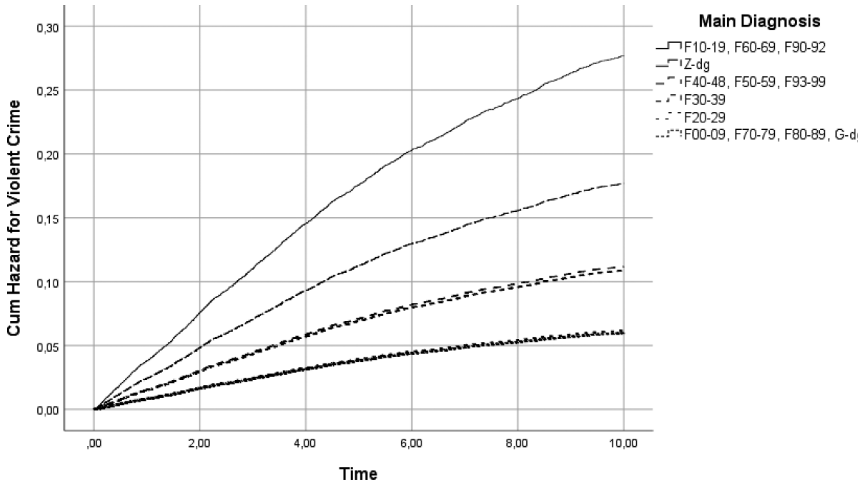

Figure 2. Cumulative hazard for violent crime according to diagnostic group.

services from a well-defined catchment area in Sweden in 1975–1990. The subjects were followed until 2003. Diagnostic distribution was reported according to ICD-10. In about a third, reason for the CAP contact was recorded with z-code. Of the psychiatric diagnoses, most common (22%) were emotional and behavioural disorders with childhood onset (F90–99), followed by neurotic stress-related and somatoform disorders (F40–49, 16%) and disorders of psychological development (F80–89, 4%). Of the former CAP patients, 38% obtained a crime record during the follow-up, 55% of the males and 22% of the females. Of all the males in the cohort, 17% had committed violent crimes, of females, 4%. Risk factors for later criminality among the former CAP sample were split family, problems at school, problems in social relationships, and behavioural problems as a reason for the CAP admission. In Norway, about a thousand adolescents who had been admitted to psychiatric inpatient care in 1963–1981 were followed in registers for on average 24 years (Kjelsberg & Dahl, 1998, 1999). During the index admission they were most commonly diagnosed with conduct disorder (45%), substance use disorder (36%) or psychosis (9%). About a half of the former inpatients had obtained a crime record during follow-up of 15–33 years, 63% of the males, and 39% of the females. Of all, 39% had committed crimes of violence. Crime record was predicted by certain diagnoses (conduct disorder, substance use disorder), rule-breaking in the school, aggressive communication style in the home, and substance use. In a Finnish follow-up study after adolescent psychiatric inpatient care (Arola et al., 2016), subsequent criminality was associated with obtaining a diagnosis of personality disorders by early adulthood. The risk was specifically associated with borderline PD in females and related to violent crime. In a study from Florida, subsequent juvenile justice system involvement was most common among those

adolescents placed in a residential psychiatric setting who could be characterized as multi-problem youth with a comorbid psychiatric diagnoses, psychosocial adversities and physical health complaints (Yampolskaya et al., 2014).

A large register study from Denmark (Walter et al., 2019) demonstrated that people first time discharged from psychiatric inpatient care at age 15 or more (median: 24 years) had an increased risk of a variety of negative outcomes including violent crime but also suicide and self-harm, accidental injuries and subsequent inpatient care. The discharged patients had a more than six-fold risk for violent convictions as compared to general population, the risk persisted high in a follow-up of over 10 years, and it was relatively greater in females than males. Negative outcomes were predicted by diagnoses related to substance use and personality disorders, and least common among patients with mood disorders. Unfortunately, no results stratified by age at discharge were given, thus specific aspects of adolescence cannot be addressed. An increased risk of violent offending after discharge from psychiatric inpatient care has been documented among adult people with schizophrenia (Doyle & Dolan, 2006; Fazel et al., 2010).

The later criminal activity of CAP patients appears increased in comparison to what comes to general population's acquiring a record by up to middle adulthood. From the UK, Piquero et al. (2007) reported that 40% of males born in 1953 admitted having been convicted for crime by age 40. In two Swedish studies, 31–38% of males and 6–9% of females had been registered by police for offending by age 25–30 (Stattin et al., 1989; Wikström, 1990). Of Finnish citizens born in 1959, 38% of males and 9% of females had a record in police register by age 27 (Pulkkinen, 1988). This comprises not only convictions but also being registered as a suspect. However more recently, Elonheimo et al. (2014) found that among those born in 1981 in Finland, 45% were recorded in police register were suspected for crimes between ages 15 and 30, 60% of males and 25% of females. Of the males, 17% had a register entry due to violent (including sexual) crimes, of females, 3%. Ivert et al. (2017) directly compared criminal participation of about 6000 former patients whose CAP contact had terminated in 2003–2005 with those in matched population controls and found that twice as many former CAP patients were registered for crimes at a mean age of 21.4 compared to the controls. The over-representation was larger for crimes of violence. Among the former CAP patient males, 38% had at least one entry in the crime register, compared to 22% of control males. The corresponding percentages for females were 24% and 13%. Later criminality was associated with problems characterised as externalising at admission to the index CAP treatment. In Walter et al.'s (2019) data, discharged psychiatric patients had more than six-fold more commonly convictions for violent crime in a follow-up of over ten years than controls. Among men, a six-fold difference was seen, in women more than 10-fold, but the study was not limited to a CAP sample.

Engqvist and Rydelius (2007) compared their findings on later criminality of CAP patients with corresponding reports from earlier decades and noticed that in their data, later criminality was more common: it was twice as common in males, and a seven-fold increase was seen among females. They suggested that these changes could be due to increasing alcohol consumption in the society, and such changes in school system that may leave children with special needs less supported. In the Norwegian study, secular trends in later criminality of former adolescent psychiatric patients were analysed among those diagnosed with conduct disorder (Kjelsberg, 2005). In females, but not in males, an increasing trend over time was found in overall criminal participation. In females, an increasing trend was also seen when focusing on violent crime only.

In sum, both studies focusing on mental health of juvenile delinquents and criminality of CAP patients yield a correlation and associate crime primarily with conduct disorder and externalizing (behavioural) problems. Studies on later criminality of CAP patients are scarce, and more recent data is also needed. Little is known about later criminality of CAP patients diagnosed with internalizing disorders and psychosis. Secular trends in criminal behaviour of former CAP patients also warrant further study. It is important to study these relationships to obtain information that can guide development of services to children and adolescents towards appropriately meeting their needs. The present study aims to explore later criminality of adolescents admitted to psychiatric inpatient care in 1980–2010 in Finland. In more detail we aim to analyse

(1) How commonly do adolescents admitted to psychiatric inpatient care obtain a crime record during 10 years after the first psychiatric inpatient treatment, and how soon after the index treatment do they start committing crimes?
(2) What are the primary diagnoses bearing the greatest risk for obtaining a subsequent crime record?
(3) Are there differences in the risk for obtaining a subsequent crime record among adolescents admitted to psychiatric inpatient care in 1980s, 1990s and 2000s?

Methods

The design of the present study is a register-based follow-up of a large national sample of CAP inpatients.

Register data

Subjects admitted into psychiatric inpatient treatment for the first time in their lives at ages 13–17 between 1980–2010 in Finland were identified in the Care Register for Health Care of the National Institute for Health and Welfare. The register is in operation since 1967 (Gissler & Haukka, 2004). All inpatient treatment periods in any health care institution are reported to this register, recording the treating institution, medical specialty, dates of admission and discharge, discharge diagnoses and in some cases specialty-specific additional information (for example: in psychiatry information of involuntary treatment). Altogether 17 112 adolescents aged 13–17 had been admitted to psychiatric inpatient care for the first time in their lives in 1980–2010. Of these 270 did not have a psychiatric (F) nor neurological (G) diagnosis and were excluded. This, the studied sample comprised 16 842 patients. Of them, 40.1% were males and 59.9% females.

Criminal history was obtained from the Register of Prosecutions, Sentences and Punishments kept by Statistics Finland. These statistics contain data on the sentences issued and waived, and charges rejected by courts of first instance. In addition to the prosecutions at district courts and at courts of appeal acting as courts of first instance, the statistics also contain data on the summary penal fines imposed by the prosecutor and on petty fines imposed by the police, customs officials or frontier guard authorities. As a rule, a person is recorded in the statistics as many times as aforementioned decisions have been made about him or her. Another main mode of recording applied in these statistics is the so-called principal offence rule, according to which each defendant or convicted person is described by the most serious offence under the severest punishment decision category of the court. Register entries after the index admission during follow-up of up to 10 years from the index admission were used as the outcome variable in the present study and register entries before the index admission were used as a covariate.

The study was duly accepted by the ethics committee of Tampere University Hospital and obtained appropriate permissions from the National Institute of Health and Welfare and Statistics Finland.

Measures

A subject's first admission to psychiatric inpatient care at age 13–17 years was studied as the index admission. For this, dates of admission and discharge, primary diagnosis and the patient's sex and age were recorded. More than one diagnoses can be recorded for an inpatient treatment period. They are

assumed to be recorded in such order that the diagnosis indicated first describes the most important reason for why the treatment period was needed. Therefore, we use the first indicated diagnosis as primary diagnosis.

Since 1996, diagnoses are recorded according to ICD-10 (World Health Organization, 1992). Earlier, psychiatric classification according to ICD-8 (World Health Organization, 1965) served in clinical practice between 1969 and 1986, and between 1987 and 1995 the diagnoses were reported to the register according to ICD-9 (World Health Organization, 1977). In the present study, diagnoses according to the earlier versions of diagnostic classification are converted to the current ICD-10. In the present study, primary diagnoses were grouped as follows: organic, intellectual disability and developmental disorders, including the few cases where a neurological (G) diagnosis was recorded as primary diagnosis (F00–09, F70–79, F80–89, G-diagnoses), schizophrenia group diagnoses (F20–29), severe mood disorders (F30–39), substance use disorders, personality disorders and conduct disorders (F10–19, F60–69, F90–92); eating, anxiety and childhood onset emotional disorders (F40–49, F59–59, F93–99) and Z-codes as the reason for the index admission.

For criminal conduct, date and title of the crime were recorded. The analyses were run separately for any crime and for violent crime including murder, attempted murder, manslaughter, attempted manslaughter, assault, aggravated assault, robbery, arson, fire-setting, sex crimes.

Statistical analyses

Incidence rates for (a) any, and (b) violent crime per 100 person years were calculated taking into account the competing risks and attrition within the 10-year time frame: each person was followed up until the first incident of the outcome of interest or to maximum 10 years, or to death, whichever occurred first. Incidence rates were compared between males and females, those in early (13–14-years-old) and middle (15–17-years-old) adolescence at index admission, between those with index admission at 1980s, 1990s and 2000s, between those with and without an entry in the crime register before the index admission and between diagnostic groups. Multivariate associations were studied using Cox regression which assesses relationship between survival time and covariates. Hazard ratios (95% confidence intervals) for a) any crime, and b) violent crime are given according to diagnostic group, sex, age group and decade of index admission, controlling also for whether or not the subject had a crime register entry before the index admission. Hazard curves are presented. Mean (sd) and median times (interquartile ranges (IQR) with 25^{th} percentile (Q1) and 75^{th} percentile (Q3) values) to defined a) any crime and b) violent crime after the discharge from the index admission are

Table 1. Primary diagnoses among subjects admitted to psychiatric inpatient care for the first time at ages 13–17 in 1980–2010 in Finland.

	All %	Males %	Females %	
	(n = 16 842)	(n = 6749)	(n = 10 093)	
				males vs. females p < .001
organic, intellectual disability and developmental (F00–09, F70–79, F80–89, G-diagnoses)	3.0	4.9	1.8	
schizophrenia group (F20–29)	11.5	14.1	9.7	
severe mood disorders (F30–39)	28.7	19.0	28.7	
substance use, personality and conduct disorders (F10–19, F60–69, F90–92)	21.4	29.4	21.4	
anxiety, eating and emotional disorders of childhood (F40–49, F59–59, F93–99)	31.9	27.9	31.5	
z-codes	3.8	4.6	3.8	

given for diagnostic groups. Due to large data size, cut-off for statistical significance is set at $p < 0.01$.

Results

Primary diagnoses

The distribution of primary diagnoses in the whole sample is seen in Table 1. Across decades, the proportion of severe mood disorders (F30–39) increased, from 8.7% in 1980–1989 to 21.0% in 1990–1999 745 and 35.7% in 2000–2010. The proportion of schizophrenia group diagnoses (F20–29) decreased across decades (23.4% vs. 13.4% vs 8.2%). The greatest stability was seen in the proportion of the group comprising substance abuse, personality disorders and conduct disorders (F10–19, F60–69, F90–92): 21.0% vs. 21.1% vs. 21.7%.

Criminal participation

In the whole sample, incidence rates for any criminal participation per 100 follow-up years were 9.1 for males and 2.6 for females ($p < 0.001$). Age at admission did not have statistically significant associations with later criminal participation. For the males who did not have any crime record before the index admission, incidence rate was 7.1, and for those who had a criminal record before index admission, 34.5 ($p < 0.001$). For females, the incidence rates were 2.3 and 13.4/100 person years, respectively (in both, $p < 0.001$).

Criminal conduct after index admission was in both sexes most common among those with primary diagnosis of substance use, personality or conduct

Table 2. Incidence rates for any crime and violent crime according to primary diagnosis, during the follow-up of maximum 10 years after the index admission among patients admitted to psychiatric inpatient treatment for the first time at ages 13–17 between 1980 and 2010 in Finland. (per 100 follow-up years).

	F00-09, F70-79, F80-89, G-diagnoses	F20–29	F30–39	F10–19, F60–69, F90–92	F40–49, F59–59, F93–99	Z-code
ANY CRIME						
all	2.6	2.4	3.0	11.5	3.9	7.2
males	3.4	4.0	6.5	18.9	8.0	12.6
females	1.2	1.9	2.9	6.2	2.1	3.9
p (males vs females)	< .001	< .001	< .001	< .001	< .001	< .001
VIOLENT CRIME						
all	1.0	0.9	1.1	4.5	1.4	1.9
males	1.4	1.5	2.4	7.0	2.9	3.6
females	0.4	0.3	0.7	2.1	0.6	1.7
p (males vs females)	0.004	< .001	< .001	< .001	< .001	< .001

disorder (F10–19, F60–69, F90–92). Second most commonly criminal conduct was recorded among those whose index admission had been recorded with Z-code. Smallest incidence of later criminal conduct was in the whole sample seen among those with schizophrenia group diagnoses (F20–29). (Table 2)

Violent crime

In males, violent crime incidence rate per 100 follow-up years was 3.6 and in females 0.9 ($p < 0.001$). Age at admission did not have statistically significant associations with later violent crime. In the males who did not have any crime record before the index admission, violent crime incidence rate was 2.7 per 100 follow-up years, and in those without prior criminal record, 10.0 ($p < 0.001$). In females, the incidence rates were 0.8 per 100 person years and 4.0 per 100 person years, respectively ($p < .001$).

Record of violent crime after index admission was in both sexes most common among those with primary diagnosis of substance use, personality or conduct disorder (F10–19, F60–69, F90–92). Second most commonly violent crime was recorded among those for whom a Z-code instead of a psychiatric diagnosis was given as reason for the index admission. Smallest incidence of later violent crime was in the whole sample seen in those with schizophrenia group diagnoses (F20–29) (Table 2)

Multivariate analyses

In multivariate analyses accounting for the shorter follow-up time in the latest cohort, the risk for obtaining a record for any crime as well as for a violent crime was statistically significantly increased in all other diagnostic groups except in the group comprising organic, intellectual disability and developmental disorders (F00–09, F70–79, F80–89, G-diagnoses), as compared to those with a diagnose in schizophrenia group (F20–29). In addition, both any and violent crimes after the index admission were recorded more commonly for males, for those with a prior crime record, and among those admitted in 1980's and 1990's as compared with the latest admitted group. Subsequent record for any crime as well as for violent crime was obtained more commonly by those who already had an entry for crime before the index admission. Adolescents admitted in middle adolescence slightly less commonly obtained a record for any crime than adolescents admitted in early adolescence. (Table 3, Figure 1, Figure 2)

Mean(sd)/median (IQR, Q1;Q3) time from discharge from the index admission to committing the first crime was 2.52(2.2)/1.94 (2.96, 0.75;3.71) years among males and 3.25(2.5)/2.74 (3.68, 1.16;4.84) years among females. Mean(sd)/median (IQR, Q1;Q3) time from discharge from the index admission to committing the first violent crime was 3.47(2.5)/3.03 (4.53, 1.62;6.15) years

Table 3. Hazard ratios (95% confidence intervals) for obtaining a crime record for any crime and for violent crime in maximum ten years after the index admission among those admitted psychiatrically for the first time at ages 13–17 in three decades.

		Any crime		Violent crime	
		HR (95% CI)	p	HR (95% CI)	p
Sex					
	female	reference		reference	
	male	2.6 (2.5–2.8)	< .001	3.2 (3.0–3.6)	< .001
Age					
	13–14	reference		reference	
	15–17	0.9 (0.9–1.0)	.008	1.0 (0.9–1.1)	.49
Year of index admission					
	2000–2010	reference		reference	
	1990–1999	1.4 (1.3–1.5)	< .001	1.2 (1.1–1.3)	< .001
	1980–1989	1.6 (1.5–1.7)	< .001	1.2 (1.1–1.3)	.001
Primary diagnosis at index admission					
	F20–29	reference		reference	
	F00–09, F70–79, F80–89, G	1.0 (0.8–1.2)	.91	(1) (0.7–1.4)	.87
	F30–39	1.9 (1.6–2.1)	< .001	1.8 (1.5–2.1)	< .001
	F40–49, F50–5, F93–99	1.9 (1.7–2.2)	< .001	1.8 (1.5–2.2)	< .001
	Z-code	3.0 (2.6–3.6)	< .001	2.9 (2.3–3.7)	< .001
	F10–19, F60–69, F90–92	4.1 (3.7–4.6)	< .001	4.5 (3.8–5.4)	< .001
Registered crime before index admission					
	no	reference		reference	
	yes	3.6 (3.3–3.9)	< .001	3.5 (3.1–4.0)	< .001

Note: HR = Hazard ratio; CI = Confidence interval

among males and 3.53(2.5)/3.08 (4.46, 1.51;5.97) years among females. Area limited by Q1 and Q3 of median time to any crime and to violent crime overlapped between all diagnostic group among both sexes, revealing that differences in median times were not statistically significant. (Table 4)

Discussion

Male former CAP inpatients displayed a greater risk for subsequent criminal participation than females, about three-fold regarding both crime in general and violent crime. This is in accordance with earlier studies among former CAP inpatients (Engqvist & Rydelius, 2007; Kjelsberg & Dahl, 1998, 1999) and with studies in the general population (Elonheimo et al., 2014; Pulkkinen, 1988; Stattin et al., 1989; Wikström, 1990). Compared to the males who did not have any crime record before the index admission, incidence rate for subsequent crime after CAP inpatient treatment was almost five-fold among those who had a crime record before index treatment. Incidence for violent crime was almost four-fold among those males who already had a crime

Table 4. Mean(sd) and median (IQR, Q1;Q3) time in years to the first crime and the first violent crime after discharge from the index admission.

	Diagnostic groups						Total
	F00–09 F70–89 F80–89 G-diagnoses	F20–29	F30–39	F10–19 F60–69 F90–92	Z-code	F40–48 F50–59 F93–99	
Time to (first) crime (years)							
Males							
Mean(sd)	2.98(2.1)	3.04(2.5)	2.88(2.3)	2.18(2.0)	2.51(2.4)	2.69(2.2)	2.52(2.2)
Median	2.91	2.32	2.34	1.64	1.8	2.1	1.94
IQR	3.29	3.25	3.31	2.60	2.89	2.90	2.96
Q1	1.13	1.03	0.96	0.59	0.71	0.93	0.75
Q3	4.42	4.28	4.27	3.19	3.6	3.83	3.71
Females							
Mean(sd)	3.85(2.4)	3.73(2.8)	3.42(2.4)	3.04(2.4)	3.12(2.4)	3.26(2.6)	3.25(2.5)
Median	3.83	2.87	3.14	2.62	2.79	2.65	2.74
IQR	2.48	4.46	3.72	3.4	3.61	3.72	3.68
Q1	2.43	1.63	1.26	1.06	0.87	1.18	1.16
Q3	4.91	6.09	4.98	4.46	4.48	4.98	4.84
All							
Mean(sd)	3.14(2.2)	3.2(2.6)	3.15(2.4)	2.49(2.2)	2.72(2.4)	2.91(2.4)	2.79(2.3)
Median	2.98	2.4	2.68	1.87	2.11	2.35	2.19
IQR	3.31	3.51	3.65	3.02	3.19	3.23	3.26
Q1	1.19	1.11	1.08	0.68	0.77	0.99	0.87
Q3	4.5	4.62	4.73	3.7	3.96	4.22	4.13
Time to (first) violent crime (years)							
Males							
Mean(sd)	3.84(2.3)	3.71(2.6)	3.58(2.5)	3.32(2.4)	3.6(2.6)	3.61(2.6)	3.47(2.5)
Median	3.59	3.19	3.2	2.89	3.34	3.16	3.03
IQR	3.77	3.82	3.88	1.49	3.51	3.59	3.59
Q1	1.99	1.62	1.50	1.37	1.42	1.62	1.48
Q3	5.76	5.44	5.38	4.86	4.93	5.21	5.07
Females							
Mean(sd)	2.27(1.5)	4.76(2.8)	3.58(2.5)	3.37(2.6)	3.72(2.4)	3.47(2.5)	3.52(2.5)
Median	2.28	4.33	3.29	2.92	3.49	3.09	3.08
IQR	2.55	5.09	3.96	3.74	4.35	3.64	3.79
Q1	0.93	2.63	1.39	1.30	1.50	1.46	1.41
Q3	3.48	7.72	5.35	5.04	5.85	5.10	5.20
All							
Mean(sd)	3.61(2.3)	3.91(2.6)	3.68(2.4)	3.33(2.5)	3.68(2.5)	3.57(2.5)	3.49(2.5)
Median	3.27	3.45	3.23	2.89	3.44	3.07	3.05
IQR	3.04	3.77	3.91	3.53	3.90	3.57	3.67
Q1	1.60	1.77	1.45	1.35	1.47	1.58	1.46
Q3	4.64	5.54	5.36	4.88	5.37	5.15	5.13

record before the index treatment. In females with a prior record, incidence rate for any crime was about six-fold, and for violent crime five-fold among those with a prior crime record as compared to those without a prior record. Thus, adolescent psychiatric inpatient treatment and subsequent adolescent

and later adult psychiatric care that will be offered after inpatient treatment was not successful in diverting adolescents with early onset criminal behaviour and severe mental disorders from criminal participation. Proceeding to criminal participation was not uncommon among those with no earlier delinquency, either, despite that after inpatient treatment adolescents will have been offered extensive support and follow-up from adolescent psychiatric services.

It has been suggested that inpatient care may even be harmful for adolescents with psychiatric disorders (Yampolskaya et al., 2014), resulting in undesired iatrogenic effects such as exacerbating emotional and behavioural problems due to disruption of attachment bonds. Modelling of negative behaviours within peer group may also take place. Particularly adolescents with multiple needs remain at high risk of negative outcomes, including crime, after inpatient treatment (Yampolskaya et al., 2014).

Mean and median times to first criminal activity (any crime) were short, only 2–3 years, and standard deviations, interquartile ranges and areas between Q1 and Q3 of median times suggest that the onset of criminal participation concentrated in a relatively short time in late adolescence/early adulthood. Mean and median times to violent crime were slightly longer, 3–4 years, but violent crimes also first emerged in a period rather concentrated in late adolescence/early adulthood. Criminal participation in males at large peaks in late adolescence (Elonheimo et al., 2014), and in this, the CAP sample bears a resemblance to general population. However, in females in general population, criminal participation tends to persist low. Future studies need to explore whether criminal participation of former CAP patients also ceases after the active period in early adulthood or perhaps continues as suggested by Kjelsberg and Dahl (1998, 1999)).

As could be expected based on earlier studies focusing on mental health of juvenile delinquents as well as on criminal behaviour of CAP patients, risk for obtaining a record for any crime as well as on violent crime was the greatest among those diagnosed with conduct disorder, personality disorder or substance use disorder at index admission (Engqvist & Rydelius, 2007; Fazel et al., 2010; Ivert et al., 2017; Kjelsberg & Dahl, 1998, 1999). However, several other findings related to diagnostic groups appear more unlikely.

Firstly, schizophrenia group disorders displayed the lowest incidence of any and violent crime. Psychoses have been associated with increased risk of violence both among adolescents and adults (Gammelgård et al., 2008; Naudts & Hodgins, 2006; Taylor & Bragado-Jimenez, 2009), and ample evidence suggests that persons who have or will develop schizophrenia are at increased risk for violent offending (Naudts & Hodgins, 2006). Early and very early onset schizophrenia tend to have a more severe course than adult-onset schizophrenia (Schimmelmann et al., 2013), and the violent behaviours by adolescent inpatients with schizophrenia group diagnoses may take place in

care institutions (Kaltiala-Heino et al., 2014, 2013) without resulting in crime register entries. Adolescents diagnosed with schizophrenia group disorders already in the first inpatient treatment are likely among those with a severe course of early onset schizophrenia spectrum disorder and thus will be provided intensive care in subsequent years, which may reduce risk of committing crimes in the community.

Second, having a Z-code as the reason for the index treatment was associated with second highest risk of later criminality. These subjects could not be diagnosed with any mental disorder. However, they may have been admitted for observation due to disruptive behaviours which could *per se* be precursors of their future criminality if not of mental disorders.

Internalizing non-psychotic disorders comprising anxiety disorders, eating disorders, and emotional disorders with onset in childhood (F40–49, F50–59, F93–99) as well as severe mood disorders (F30–39) during index admission at age 13–17 were also associated with a greater risk of any as well as of violent crime than schizophrenia group disorders. Internalizing disorders have not often been discussed as risk factors for rule-breaking or violence, even though for example, depression can during adolescence primarily emerge as irritated, not depressed mood (Birmaher et al., 2007), which could increase the risk of violent behaviour. Our findings suggest that in such severe form as when warranting inpatient treatment they nevertheless represent such severe fracture in adolescent development that they bear along with a greater risk of subsequent criminality than schizophrenia spectrum disorders. In adults, inpatient treatment due to mood disorders had low risk of subsequent violent crime, as compared to other diagnoses (Walter et al., 2019). However, diagnostic stability may in adolescence also be poorer than among adults. Future research needs to explore to what extend internalizing disorders persisting in the non-psychotic internalizing range increase the risk of criminality, and to what extend the actual risk is associated with later evolving externalizing psychopathology.

The risk for later criminality was greater in the earlier cohorts than in the latest. Two explanations could be thought for this. Firstly, the latest cohort comprised a much greater proportion of depression and anxiety disorders that bear a lower risk for criminality than externalizing disorders. Secondly, during the time period when the latest cohort entered the service system, adolescent psychiatric outpatient services have vastly increased in Finland (Pylkkänen, 2013), and child welfare services have also increased manifold. This could be expected to support the positive development of adolescents who suffer from mental disorders, and to prevent adolescents with mental disorders from developing towards delinquency. However, there is obviously still a lot of room for improvement. Evidence-based treatments for tackling disruptive behaviours and preventing antisocial and aggressive development such as system-oriented family therapies (Baldwin et al., 2012) and the

applications of such approaches to foster care Green et al., 2014) and cognitive behavioural approaches that target both the cognitive distortions favouring antisocial behaviour and motivation and skills to apply pro-social solutions (Armelius et al., 2007; McGlynn et al., 2013) should be implemented systematically. Successful completion of developmental tasks of adolescence is important for favourable adjustment in later developmental stages (Havighurst, 1948; Scheiffge-Krenke & Gelhaar, 2008), and severe mental disorders delay it. Psychiatric treatment should focus not only in symptom reduction but also to successful completion of developmental tasks, to support pro-social integration to the society.

Methodological considerations

The present study is based on registers where all the incidents of interest are obligatorily reported by hospitals and by criminal justice systems. The data were therefore comprehensive, and it was also uniquely large, comprising all persons admitted to psychiatric inpatient care for the first time at ages 13–17 from three decades, with more than 16000 subjects. The large and comprehensive data are a strength of this study.

The diagnoses were used as given by the treating hospitals. It was not possible to assess the validity of the psychiatric diagnoses, but studies have shown that psychiatric diagnostic work is very reliable in psychiatric inpatient care in Finland (Isohanni et al., 1997; Pihlajamaa et al., 2008).

A limitation is that we would not include any other clinical characteristics of the CAP patients, like was done in the earlier studies from Sweden and Norway (Engqvist & Rydelius, 2007; Ivert et al., 2017; Kjelsberg & Dahl, 1998, 1999). It is also regrettable that incidence rates could not be compared to earlier studies on subsequent criminal participation among former CAP patients, as those studies reported crude percentages instead of incidence rates. The same reason hinders our comparison to general population studies.

Conclusion

Former adolescent psychiatric inpatients proceed to criminal participation very often, despite that after psychiatric inpatient care, all will be offered extensive adolescent psychiatric treatment aiming at supporting normative development. Adolescent psychiatric services like do not focus enough on prevention of deviation to antisocial pathway among adolescents with severe mental disorders. Severe mental disorders represent a breakdown in normative development with a considerable risk of antisocial development. In clinical adolescent psychiatry, more effort should be directed at diverting adolescents from development towards severe antisocial and aggressive behaviours. Evidence-based treatments for these comprise system-oriented family therapies and applications of

cognitive behavioural therapy, and these should be implemented more thoroughly. Health and social policies need to ensure not only resources but also orientation and skills of the professionals that have potential for tackling antisocial development. More research is needed to properly understand the role of internalizing disorders for the developmental trajectory towards criminal participation.

Declarations

The study was duly accepted by the ethics committee Tampere University Hospital and obtained appropriate permissions from the National Health Institute and Statistics Finland.

All the authors have accepted the submission of the manuscript in its present form to the JFPP and agree on publishing the work in the Journal, if it is accepted.

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Disclosure statement

The authors declare that they have no competing interests.

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Author contributions

The first author discussed the core ideas of the present study, planned the analyses together with the other authors, interpreted the findings and had main responsibility for drafting the manuscript. The second author discussed the core ideas of the present study, planned the analyses together with the other authors, carried out the statistical analyses, interpreted the findings and participated in drafting the manuscript. The third author discussed the core ideas of the present study, planned the analyses together with the other authors, interpreted the findings and participated in drafting the manuscript.

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