



# Borderline personality disorder associates with violent criminality in women: A population based follow-up study of adolescent psychiatric inpatients in Northern Finland



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## ABSTRACT

Various psychiatric problems in adolescence and early adulthood have been shown to associate with criminal behaviour. In this study the association of personality disorders (PDs) with criminal behaviour was examined in adolescents treated in psychiatric hospitals.

The study sample consisted of 508 adolescents (age 13–17) admitted to acute psychiatric inpatient care between April 2001 and March 2006. Crime data was obtained from the Finnish Legal Register Centre on September 2013. The Schedule for Affective Disorder and Schizophrenia for School-Age Children Present and Lifetime (K-SADS-PL) was used to assess psychiatric diagnoses in adolescence. The information on PDs in early adulthood was based on follow-up information on psychiatric treatments in either out- or inpatient settings until the end of 2012, and was extracted from the National Care Register for Health Care provided by the Finnish National Institute for Health and Welfare.

A total of 22 (39%) of the 57 subjects with PD had committed a crime. In women, the likelihood for violent criminality was significantly increased in those with Borderline PD (OR 6.09, CI 1.24–29.84,  $p = 0.009$ ) and was also associated with conduct disorder (OR 4.26, CI 1.38–13.19,  $p = 0.012$ ), child welfare placement (OR 11.82, CI 3.61–38.76,  $p < 0.001$ ) and parent's substance use disorder (OR 7.74, CI 2.30–26.10,  $p = 0.001$ ). In men, no association was observed between PD and any kind of criminal behaviour. Significant predictors for violent criminality in males were conduct disorder (OR 4.05, CI 1.75–9.38,  $p = 0.001$ ), substance use disorder (OR 2.51, CI 1.22–5.17,  $p = 0.012$ ) and special services at school (OR 2.58, CI 1.16–5.76,  $p = 0.021$ ).

Females with Borderline PD showed an increased risk for violent offending. This suggests Borderline PD as a potential explanatory factor for violent assaults by females and highlights the importance of recognizing the risk for violence in young women with a Borderline PD.

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## 1. Introduction

The prevalence of criminal behaviour peaks in late adolescence [1]. Various independent psychosocial predictors of crime in adolescence have been identified, such as low family income, parental punishment, and parental psychiatric disorders or

substance abuse [2,3]. Early aggressive behaviour [4], substance use disorder and antisocial behaviour in adolescence have also been found to associate with later criminality [1,5,6].

Personality disorders (PDs) are long-lasting behavioural patterns that significantly differ from social standards and expectations. Symptoms of clinically significant PDs often appear in childhood or adolescence. They are often harmful and manifest in several areas of life [7,8].

The relationship between PDs and criminal behaviour has been well established in the literature. According to Esbec et al. [9] subjects with cluster A PDs (e.g. paranoid, schizoid and schizotypal) are generally not violent, but they may demonstrate

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suspicious attitudes, bizarre thoughts and social isolation which can be associated with the most serious types of violent behaviour. Subjects with cluster B PDs (e.g. antisocial, borderline, histrionic and narcissistic) are most commonly related with criminal behaviour [9]. Subjects with cluster C PDs (avoidant, dependent and obsessive-compulsive) demonstrate a need for security and are often over-controlling and they are found to be the PD group least to prone to violence. Another study [10] also showed that adolescents with cluster A or cluster B symptoms have an up to 5–7 times higher risk of committing certain violent acts whereas a cluster C PD during adolescence was not associated with an elevated risk of violent crime.

Earlier studies have reported associations with the types of PD and criminality. In particular, people with an antisocial or borderline PD have been found to be more likely to commit crimes [11]. Assessment of the diagnosis of antisocial PD even requires criminal or unlawful behaviour to have taken place [7,8,12]. Some studies have suggested that particular PD features may lead to a certain kind of criminality, for example that subjects with antisocial PD engage more in crimes against property, whereas subjects with borderline PD are seen as emotionally unstable and impulsive, which may lead to physical violence [13,14].

The majority of the previous studies examining association of PD's to criminal offending have been conducted using adult samples. The objective of this follow-up study is to investigate the association of PDs assessed in late adolescence and early adulthood to criminal behaviour among a clinical sample of adolescent inpatients treated in psychiatric hospital between the ages of 13 and 17 years of age. Our study setting enabled us to take into account various clinical and socio-demographic factors assessed during index hospitalizations throughout adolescence. Criminal offences were categorized into violent and non-violent offences.

## 2. Materials and methods

This study is part of the STUDY-70-project, a clinical follow-up project initiated to examine the association of various psychosocial risk factors with psychiatric disorders and substance abuse among hospital-treated adolescents. The sample consists of adolescents aged 13–17 years (mean value 15.5 y; SD 1.3) admitted to the inpatient adolescent psychiatric unit at Oulu University hospital between April 2001 and March 2006 (index hospitalization). From the 637 adolescents admitted to Unit 70 during the study period, individuals over 18 years ( $n = 1$ ) and adolescents with intellectual disability ( $n = 26$ ) or an organic brain disorder ( $n = 3$ ) were excluded from the study population. In addition, individuals whose inpatient stay was too short for their interviews to be completed ( $n = 22$ ) and adolescents who did not or whose guardians did not give a written informed consent to participate ( $n = 77$ ) were excluded from the study. The study protocol was approved by the Ethics Committee of Oulu University Hospital, Finland.

### 2.1. Participants and procedures

The final study sample includes 508 adolescents (208, 41% boys; 300, 59% girls), accounting for 84% of all eligible adolescents. 98% of the adolescents were Caucasian and 2% of other origin. All study subjects and their legal guardians provided written, informed consent to participate in the study.

Adolescents were interviewed using the semi-structured Schedule for Affective Disorder and Schizophrenia for School-Age Children Present and Lifetime (K-SADS-PL) [15–17]. If any information remained uncertain or unreliable the parents were also interviewed. Adolescents were also interviewed using European Addiction Severity Index (EuropASI) [18].

Information on hospital discharges and out-patient visits were extracted from Care Register for Health Care (CRHC) provided by Finnish National Institute for Health and Welfare. The life-time inpatient treatment of study subjects was available on hospital discharges. Details of out-patient visits in specialized level care were available from 1998. In this study the information of registries was available until the end of 2012. All psychiatric diagnoses in these registries were based on ICD-9 classification until year 1996 and ICD-10 classification for subsequent years.

### 2.2. Measures and data analysis

#### 2.2.1. Crimes

For this study, criminal offences were categorized into three subgroups: (1) no crimes, (2) non-violent crimes and (3) violent crimes. Violent crimes included homicide, assault and battery, robbery, arson, violation of domestic peace and firearm offence. The remaining criminal offences were regarded as non-violent crimes. Information on criminal offending was obtained from the Finnish Legal Register Centre on September 2013. In Finland a person can be recorded in the criminal register from the age of 15 after having been sentenced to either unconditional or conditional imprisonment, community service, dismissal, a juvenile penalty or a fine in lieu of a juvenile penalty, a fine (supplementary fine) or period of community service in addition to conditional imprisonment or a sentence has been waved due to lack of criminal responsibility.

In our study sample consisted of 124 (24.4%) young persons (80, 38.5% of men; 44, 14.7% of women) who had committed a crime. A total of 44 (8.7%) study subjects (2, 10.1% of men; 23, 7.7% of women) had committed non-violent crimes and 80 (15.7%) study subjects (59, 28.4% of men; 21, 7.0% of women) violent crimes.

#### 2.2.2. Personality disorders

All PD diagnoses were identified from CRHC and reviewed according to DSM-IV-TR criteria by a professional psychiatrist (L.K.) with long-term experience in psychiatry. PDs were classified into three clusters according to the DSM-IV-TR criteria. The DSM-IV-TR diagnostic criteria [7] were used in this study because the DSM-5 was not in use in Finland at the time the study was conducted. The validation process of PD cases of Study-70 project has been described in more detail earlier [19].

The final study sample consisted of 24 (42%) men and 33 (58%) women with a later PD diagnosis, after excluding the subjects with concurrent schizophrenia or schizoaffective disorder diagnosis. Seven (12%) of the subjects (3, 12.5% males and 4, 12.1% females) had multiple PD diagnoses, which were categorized according to the primary PD diagnosis. Seven subjects had diagnoses of borderline PD and other PD (6 PD NOS, 1 obsessive-compulsive) and they were diagnosed as Cluster B (all borderline PD). One subject had diagnoses of schizotypal PD and PD NOS and he was diagnosed as Cluster A (schizotypal PD). One subject had diagnoses of paranoid and avoidant PD and he was diagnosed as Cluster A (paranoid PD). One subject had diagnoses of antisocial and borderline PDs and he was diagnosed as Cluster B (antisocial PD). One subject had diagnoses of passive-aggressive and PD NOS, but the PD NOS diagnosis was used instead.

#### 2.2.3. Control group

The control group consisted of 451 study subjects (184 men and 267 women), who were not diagnosed to as having PD by the end of the register-based follow-up in 2012. During the index hospitalization period these patients were diagnosed as having either

anxiety disorder, affective disorder, substance use disorder, conduct disorder or psychosis.

#### 2.2.4. Covariates

All psychiatric diagnoses of the study subjects, with the exception of PD diagnoses, were obtained using the K-SADS-PL interview during index hospitalization. Each interview was conducted by psychiatrists or trained medical students. The diagnoses were based on DSM-IV-TR—classification and categorized into the following groups: psychotic disorders (295, 296.0, 296.4–9, 297.1–3, 298.8–9, 301.13, 301.22), substance use disorders (303.9, 304.0–6, 304.8–9, 305.0, 305.2–7, 305.9), affective disorders (296.2–3, 300.4, 311), anxiety disorders (300.00–02, 300.21–23, 300.29, 300.3, 308.3, 309.81) and conduct disorders (299.80, 312.8–9, 313.81, 314). More than one psychiatric diagnosis was possible.

K-SADS-PL interviews also provided information about the adolescent's family structure prior to hospitalization. Four sub-categories were created based on the K-SADS-PL information. These were (1) living with both biological parents; (2) single biological parent, shared custody or reconstituted family; (3) child welfare placement and (4) other family structure (including foster home, adoption, residential care home or living alone).

Other covariates for this study include age, gender, parental employment status, parents' psychiatric and substance use disorders, domestic violence and maltreatment, special services at school, repeating a year at school, self-mutilation, suicide ideation, suicide attempt, impulsivity, family type, family size and sexual abuse (see details in Tables 2 and 3). Parental employment status and parents' psychiatric and substance use disorders were obtained from The European Addiction Severity Index (EuropASI). Additional information was gathered from K-SADS-PL. The level of functioning at admission to index hospitalization hospital was measured using the Children's Global Assessment Scale (CGAS) [20].

#### 2.3. Statistical methods

Pearson's Chi-square test or Fisher's exact test were used to analyze statistical significances of categorical variables and Student's *t*-test for continuous variables. A stepwise logistic regression analysis was used to examine the association between PDs and criminal offending, separately for men and women after controlling for covariates. All statistical tests were two-sided and a limit for statistical significance was set at  $p < 0.05$ . IPM SPSS statistics 22 software was used to perform all statistical tests.

### 3. Results

Twenty-two (38.6%) of the 57 subjects with PD had committed a crime (13, 54.2% of men; 9, 18.2% of women), while the corresponding numbers in the control group were 102 (22.6%) subjects having committed a crime (67, 36.4% of men; 35, 13.1% of women). Criminality was statistically significantly more prevalent among those with PD ( $p = 0.008$ ), particularly in women with PD ( $p = 0.038$ ) and marginally in men with PD ( $p = 0.093$ ).

Violent (17, 29.8% vs. 6.3 14%), and not non-violent crimes (5, 5.8% vs. 39, 8.6%), were more common in subjects with PD compared to controls ( $p = 0.008$ ). Females with PD had more commonly committed violent (6, 18.2% vs. 20, 7.5%), and not non-violent (3, 9.1% vs. 20, 7.5%) offences compared to controls ( $p = 0.025$ ). No significant differences were found in men between subjects with and without PD in violent (11, 45.8% vs. 48, 26.1%) and non-violent crimes (11, 45.8% vs. 117, 63.6%) ( $p = 0.122$ ).

The age at first criminal offence (any, violent, non-violent offending) did not differ statistically between men with and without PD. In women, violent criminality started later (22.5y vs.

19.2y,  $p$ -value 0.006) in those with PD. The mean onset age of PD was slightly higher in males (20.3 years, SD = 3.2) than in females (19.2 years, SD 3.9) ( $p = 0.125$ ).

Table 1 shows the types of PD of study subjects. Borderline PD was the most common, accounting for 78% of all females with PDs committing criminal offences. Among males with PD and criminal offences, borderline (38.5%), antisocial (30.8%), and PD NOS (23.1%) were the most common PD types.

Table 2 for females and Table 3 for males outline the various characteristics of study subjects with and without PD in relation to their criminal offending. As seen in Table 2, female adolescents with PD in both criminal and non-criminal groups had significantly more often suffered from anxiety disorder during index hospitalization than those without a PD. Further, in women without any registered criminal offences those with PD had required special services at comprehensive school twice as often as women without a PD.

Table 3 shows that, in adolescent males with a history of criminal offending, no statistically significant associations were observed between PD and any male characteristics. In males without a history of criminal offending, suicidal ideation was more common in males with a PD compared to those without PD.

The associations of PD and various characteristics of female adolescents to criminality are outlined in Table 4. After adjustment for covariates, a diagnosis of Borderline PD was shown to increase the likelihood of any type of criminal offence by over four-fold and that of violent offences by up to 6-fold, while no association was observed with non-violent criminal offending. Of all covariates, affective disorder was less likely in female adolescents with any and non-violent criminal offending, while conduct disorder was positively related to violent criminality and substance use disorder. Furthermore, living in a child welfare placement was characteristic of any and violent criminal offending and parent's substance use was associated with all types of criminality. Suicidal ideation was less likely in females with any or violent criminal offences and sexual abuse was less common in females with nonviolent criminal offending.

Table 5 shows that PD did not statistically significantly associate to criminality in male adolescents. Of the covariates, conduct disorder and use of special services at school were related to an increased likelihood for any and violent criminality. A large family background decreased the likelihood for any and violent criminality. The age at index hospitalization was higher among those committing any criminal offence.

**Table 1**

Criminality among adolescents with different types of personality disorder (PD).

Men	Violent crimes	Non-violent crimes	No criminality	Total sample
	<i>n</i> (%) ( <i>n</i> =11)	<i>n</i> (%) ( <i>n</i> =2)	<i>n</i> (%) ( <i>n</i> =11)	<i>n</i> (%) ( <i>n</i> =24)
Paranoid PD	1 (9.1)	0	0	1 (4.2)
Schizotypal PD	0	0	3 (27.3)	3 (12.5)
Antisocial PD	4 (36.4)	0	0	4 (16.7)
Borderline PD	4 (36.4)	1 (50.0)	3 (27.3)	8 (33.3)
Avoidant PD	0	0	1 (9.1)	1 (4.2)
PD NOS	2 (18.2)	1 (50.0)	4 (36.4)	7 (29.2)
Women	Violent crimes	Non-violent crimes	No criminality	Total sample
	<i>n</i> (%) ( <i>n</i> =6)	<i>n</i> (%) ( <i>n</i> =3)	<i>n</i> (%) ( <i>n</i> =24)	<i>n</i> (%) ( <i>n</i> =33)
Antisocial PD	1 (16.7)	0	0	1 (3.0)
Borderline PD	4 (66.7)	3 (100.0)	18 (75.0)	25 (75.8)
Avoidant PD	0	0	3 (12.5)	3 (9.1)
PD NOS	1 (16.7)	0	3 (12.5)	4 (12.2)

**Table 2**  
Characteristics of female study subjects ( $n=300$ ) according to criminal offending and personality disorder (PD) diagnosis.

	Any crime ( $n=44$ )			No crime ( $n=256$ )		
	PD ( $n=9$ )	Control population ( $n=35$ )	$p$ -value	PD ( $n=24$ )	Control population ( $n=232$ )	$p$ -value
Age at index hospitalization, mean (sd)	15.44 (1.2)	15.77 (1.1)	0.446	15.67 (1.2)	15.42 (1.3)	0.385
CGAS at admission to index hospitalization <sup>a</sup>	42.6	43.0	0.879	42.5	41.6	0.635
<i>Socio-demographics</i>						
<i>Family type</i>						
Two biological parents	2 (22.2)	5 (14.3)	0.619	10 (41.7)	115 (49.6)	0.461
One biological parent (blended, single)	1 (11.1)	13 (37.1)	0.233	11 (45.8)	59 (25.4)	0.033
Child welfare placement	3 (33.3)	13 (37.1)	0.832	1 (4.2)	20 (8.6)	0.703
Other (foster family, alone, etc.)	3 (33.3)	4 (11.4)	0.138	2 (8.3)	38 (16.4)	0.389
Family size, $\geq 6$ children	2 (22.2)	4 (11.4)	0.586	5 (20.8)	38 (16.5)	0.570
<i>School-related factors</i>						
Repeated a year at school	2 (22.2)	8 (22.9)	1.000	3 (12.5)	16 (6.9)	0.401
Special services at school	6 (66.7)	18 (51.4)	0.477	17 (70.8)	86 (37.1)	0.001
<i>Parental factors</i>						
Parent unemployed	2 (22.2)	5 (14.3)	0.619	3 (12.5)	46 (19.8)	0.586
Parent's psychiatric diagnosis	2 (22.2)	9 (25.7)	1.000	5 (20.8)	57 (24.6)	0.684
Parent's substance use	5 (55.6)	22 (62.9)	0.716	7 (29.2)	69 (29.7)	0.953
<i>Adverse life events</i>						
Domestic violence	4 (44.4)	16 (45.7)	1.000	8 (33.3)	64 (27.6)	0.551
Physical maltreatment by parents	3 (33.3)	14 (40.0)	1.000	6 (25.0)	56 (24.1)	0.925
Sexual abuse	5 (55.6)	12 (34.3)	0.275	8 (33.3)	43 (18.5)	0.105
<i>Suicidality and impulsive behaviour</i>						
Suicide ideation	2 (22.2)	12 (34.3)	0.695	14 (58.3)	123 (53.0)	0.619
Suicide attempt	3 (33.3)	7 (20.0)	0.402	6 (25.0)	62 (26.7)	0.856
Self mutilation behaviour	6 (66.7)	10 (28.6)	0.053	10 (41.7)	91 (39.2)	0.816
Impulsivity	3 (33.3)	9 (25.7)	0.687	4 (16.7)	26 (11.2)	0.500
<i>Psychiatric disorders at index hospitalization</i>						
Psychotic disorder	2 (22.2)	4 (11.4)	0.586	1 (4.2)	33 (14.2)	0.219
Anxiety disorder	7 (77.8)	8 (22.9)	0.004	12 (50.0)	61 (26.3)	0.014
Affective disorder	5 (55.6)	15 (42.9)	0.710	18 (75.0)	137 (59.1)	0.128
Conduct disorder	5 (55.6)	19 (54.3)	1.000	6 (25.0)	73 (31.5)	0.514
Substance use disorder	4 (44.4)	20 (57.1)	0.710	8 (33.3)	76 (32.8)	0.954

The answers indicate positive response (yes), if not otherwise stated.

<sup>a</sup> Data missing for 8 female study subjects (1 PD, 7 controls).

#### 4. Discussion

In our study we examined the association of PD to criminal offending in a sample of adolescent psychiatric inpatients follow-up through national health care and criminal registers from adolescence (13–17 years) up to their late adolescence and early adulthood. To the best of our knowledge, only a limited number of previous studies have completed in adolescent populations.

Both men and women with PD in our study population had engaged in violent crimes more often than subjects without PD. Our study demonstrated that, particularly, the presence of Borderline PD among females who were admitted to psychiatric inpatient care under the age of 18, increased the likelihood of violent criminal offending. Our finding was female specific, because no association with PD and criminal offending was found among men.

Over one half of all males and nearly one third of females with PD in our study who were assessed in psychiatric inpatients during early adulthood had committed a crime after the age of 15 years—this being the age from which a crime can be recorded in the Finnish criminal register. Our finding is in line with a previous study [14], in which PD associated statistically with both emotional and instrumental violent behaviour among psychiatric patients. In a community-based longitudinal study, Johnson et al. [10] also found an association of PD in adolescence to violence in the general population. According to their findings, violent acts were more common among adolescents with PD than those without PD (38% vs. 19%,  $p < 0.001$ ).

In general, this study showed that PDs associated with violent criminal offending among young adult female subjects who had

required psychiatric hospitalization during adolescence. Our finding is in line with a study by Weizmann-Henelius et al. [21]. They studied women who had committed violent crimes among forensic psychiatric patients and prison convicts. According to their findings, PD was common in both groups: 66.7% of hospitalized and 82.6% of imprisoned offenders had a PD. Furthermore, in a Finnish study [22] PDs were identified as the most common psychiatric diagnoses in a ten year follow-up study among violent female criminal re-offenders. Over eighty per cent of females were diagnosed with PD in their study.

Borderline PD was the most common diagnosis among females with PD who had committed violent crimes in our study. Previous review articles [23] have found Borderline PD to be common among female criminals. Coid et al. [24] reported an over five-fold risk in violence among subjects with Borderline PD but, unfortunately, they did not examine gender differences, thus limiting the capacity to compare their results with ours. Our findings suggest that Borderline PD may be a significant risk factor for violent offending specifically in females in young adulthood. Previous studies have shown that subjects with Borderline PD are often traumatized during their childhood [25]. It has also been found that parents of children with Borderline PD may have poor parenting skills [26] and psychiatric problems [27], which may contribute to the subsequent development of criminal behaviour in their offspring. In addition, violent or criminal behaviour and comorbid antisocial PD has been found to associate with violent behaviour in patients with Borderline PD [28].

Although Borderline PD is viewed as a risk for violent criminality [11], it has been shown that Borderline PD does not seem to significantly increase the risk for violence in the general



**Table 3**Characteristics of male study subjects ( $n=208$ ) according to criminal offending and personality disorder (PD) diagnosis.

	Any crime ( $n=80$ )			No crime ( $n=128$ )		
	PD ( $n=13$ )	Control population ( $n=67$ )	$p$ -value	PD ( $n=11$ )	Control population ( $n=117$ )	$p$ -value
Age at index hospitalization, mean (sd)	16.23 (1.0)	15.46 (1.4)	0.059	15.27 (1.6)	15.28 (1.4)	0.983
CGAS at admission to index hospitalization <sup>a</sup>	41.5	42.9	0.615	37.3	43.2	0.095
<i>Socio-demographics</i>						
<i>Family type</i>						
Two biological parents	0 (0)	13 (19.4)	0.112	3 (27.3)	41 (35.0)	0.747
One biological parent (blended, single)	2 (15.4)	24 (35.8)	0.204	5 (45.5)	40 (34.2)	0.516
Child welfare placement	8 (61.5)	22 (32.8)	0.065	3 (27.3)	19 (16.2)	0.400
Other (foster family, alone etc.)	3 (23.1)	8 (11.9)	0.358	0 (0)	17 (14.5)	0.374
Family size, $\geq 6$ children	1 (7.7)	6 (9.0)	1.000	2 (18.2)	28 (24.3)	1.000
<i>School-related factors</i>						
Repeated a year at school	6 (46.2)	17 (25.4)	0.180	2 (18.2)	23 (19.7)	1.000
Special services at school	10 (76.9)	52 (77.6)	1.000	6 (54.5)	62 (53.0)	1.000
<i>Parental factors</i>						
Parent unemployed	5 (38.5)	20 (29.9)	0.531	5 (45.5)	25 (21.4)	0.128
Parent's psychiatric diagnosis	2 (15.4)	6 (9.0)	0.610	1 (9.1)	17 (14.5)	1.000
Parent's substance use	5 (38.5)	21 (31.3)	0.748	5 (45.5)	28 (23.9)	0.150
<i>Adverse life events</i>						
Domestic violence	4 (30.8)	22 (32.8)	1.000	3 (27.3)	30 (25.6)	1.000
Physical maltreatment by parents	4 (30.8)	21 (31.3)	1.000	1 (9.1)	26 (22.2)	0.456
Sexual abuse	1 (7.7)	1 (1.5)	0.300	0 (0)	5 (4.3)	1.000
<i>Suicidality and impulsive behaviour</i>						
Suicide ideation	4 (30.8)	17 (25.4)	0.735	6 (54.5)	26 (22.2)	0.028
Suicide attempt	2 (15.4)	10 (14.9)	1.000	3 (27.3)	11 (9.4)	0.102
Self mutilation behaviour	0 (0)	12 (17.9)	0.199	2 (18.2)	13 (11.1)	0.617
Impulsivity	7 (53.8)	32 (47.8)	0.688	5 (45.5)	32 (27.4)	0.294
<i>Psychiatric disorders at index hospitalization</i>						
Psychotic disorder	1 (7.7)	3 (4.5)	0.515	2 (18.2)	24 (20.5)	1.000
Anxiety disorder	3 (23.1)	10 (14.9)	0.435	1 (9.1)	15 (12.8)	1.000
Affective disorder	4 (30.8)	22 (32.8)	1.000	7 (63.6)	43 (36.8)	0.108
Conduct disorder	10 (76.9)	52 (77.6)	1.000	5 (45.5)	55 (47.0)	0.921
Substance use disorder	8 (61.5)	35 (52.2)	0.538	3 (27.3)	41 (35.0)	0.747

The answers indicate positive response (yes), if not otherwise stated.

<sup>a</sup> Data missing for 6 male study subjects (2 PDs, 4 controls).

adult population [29]. Differences in Borderline personality features may explain these findings. Black et al. [30] established that Borderline PD is also common in male offenders. They stated that Borderline features such as transient paranoia, odd sensory experiences or pseudo-hallucinations may contribute to criminal behaviour.

According to Kernberg's conceptualization, subjects with Borderline PD can be divided into three separate groups [31]. One group features aggressive and antisocial features, and less controlled behaviour than the two other non aggressive groups with characteristics of non paranoid and antisocial features with better social functioning and diminished social closeness. Unfortunately, no gender specification is shown in this conceptualization. Bradely et al. [32] found gender differences among adolescents with Borderline PD features. Boys with Borderline PD were more aggressive, disruptive and more prone to antisocial behaviour. In addition, according to their findings girls with Borderline PD demonstrated high functioning internalizing, histrionic, depressive internalizing and angry externalizing behaviours. Therefore, it has been assumed that these externalizing personality features can increase the risk of developing violent behaviour [31]. To better understand the development of violent behaviour in subjects with Borderline PD it is also important to study further potential environmental and developmental factors for PDs in adolescence and childhood.

Our study showed that PD was not a specific characteristic of male adolescents in terms of criminality. One explanation for this finding may be that the distribution of different types of PD in males were very dispersed unlike in females with PD, where the majority had Borderline PD. Heterogeneity of PD diagnoses in

males may lead to unstable and adverse associations of PD with criminality. It is also possible that, in our study, conduct and substance use disorders and utilization of special services in school in male adolescents acted as stronger explaining factors for criminal behaviour than PD and may have masked the potential impact of PD on criminality in male adolescents.

Conduct disorder in adolescence showed an over four-fold association to violent crimes among both genders. Previous findings have demonstrated positive correlations in conduct disorder criteria and psychopathy in the Psychopathy Checklist Revised (PCL-R) among both genders [33]. Goodman et al. [34] have studied the effects of childhood antisocial behaviours on the severity of Borderline PD among female inpatients. They reported that rule-breaking in childhood in particular, may be a marker for Borderline PD symptoms later in life. Conversely, the comorbidity of conduct disorder has been found to be similar among subjects with and without Borderline PD [35].

The descriptive statistics of our study revealed that all boys with antisocial PD had committed violent crimes. Unfortunately, no deeper analyses were justified due to the small number of males with antisocial PD in our sample. In the literature, however, antisocial PD is identified as one of the greatest risk factor for violent criminality [10,13,14]. In a large 10-year follow-up study of Finnish men born in 1981, Elonheimo et al. [5] found that 2.7% of the males were diagnosed with antisocial PD but they accounted for 27% of all crimes conducted by the study group. In a review study by Fountoulakis et al. [11] antisocial PD has been found to associate with violent crimes in both genders and different ethnic groups. In our study only one female was diagnosed with antisocial PD. It has been argued, that antisocial PD is often underreported in

**Table 4**

The association of personality disorder to criminality in female study subjects after controlling for various covariates.

	OR <sup>a</sup>	95% C.I.	p-value
<i>Any crime</i>			
Personality disorder			
Borderline PD	4.37	1.44–13.27	0.009
Other PD	2.07	0.31–13.62	0.451
Covariates:			
Substance use disorder	2.57	1.23–5.38	0.012
Affective disorder	0.44	0.20–0.96	0.040
Child welfare placement	6.69	2.84–15.76	<0.001
Parent's substance use	3.91	1.84–8.28	<0.001
Suicide ideation	0.38	0.17–0.84	0.018
<i>Violent crime</i>			
Personality disorder			
Borderline PD	6.09	1.24–29.84	0.009
Other PD	5.27	0.56–50.04	0.148
Covariates:			
Conduct disorder	4.26	1.38–13.19	0.012
Child welfare placement	11.82	3.61–38.76	<0.001
Parent's substance use	7.74	2.30–26.10	0.001
Suicide ideation	0.21	0.06–0.75	0.015
<i>Non-violent crime</i>			
Personality disorder			
Borderline PD	2.04	0.51–8.16	0.315
Other PD	ne <sup>b</sup>		
Covariates:			
Affective disorder	0.28	0.11–0.71	0.007
Parent's substance use	3.06	1.24–7.53	0.015
Sexual abuse	2.70	1.05–6.92	0.039

<sup>a</sup> A logistic regression model predicting the criminal offending (any, violent, non-violent) with personality disorder (method = enter) and all characteristics of female study subjects presented in Table 1 (method = stepwise). Only the results of statistically significant covariates are shown in the table.

<sup>b</sup> ne = not estimable.

**Table 5**

The association of personality disorder to criminality in male study subjects after controlling for various covariates.

	OR <sup>a</sup>	95% C.I.	p-value
<i>Any crime</i>			
Personality disorder			
Borderline PD	2.21	0.41–12.01	0.359
Other PD	1.63	0.53–5.00	0.396
Covariates:			
Conduct disorder	3.40	1.73–6.70	<0.001
Special services at school	2.52	1.26–5.05	0.009
Family size, ≥6 children	0.39	0.15–0.99	0.049
Age at index hospitalization	1.29	1.02–1.64	0.034
<i>Violent crime</i>			
Personality disorder			
Borderline PD	2.01	0.34–11.93	0.442
Other PD	1.91	0.55–6.63	0.308
Covariates:			
Conduct disorder	4.05	1.75–9.38	0.001
Substance use disorder	2.51	1.22–5.17	0.012
Special services at school	2.58	1.16–5.76	0.021
Family size, ≥6 children	0.33	0.11–0.99	0.049
<i>Non-violent crime</i>			
Personality disorder			
Borderline PD	2.02	0.20–20.42	0.552
Other PD	0.76	0.09–6.40	0.798

<sup>a</sup> A logistic regression model predicting the criminal offending (any, violent, non-violent) with personality disorder (method = enter) and all characteristics of male study subjects presented in Table 2 (method = stepwise). Only the results of statistically significant covariates are shown in the table.

women due to its criteria of conduct disorder symptoms in childhood [36]. Future studies with longer follow-up are warranted in order further to examine the role of antisocial PD to criminal offending in males as the move into young adulthood. Among boys with PD, those who had committed any crime were

older at the time of index hospitalization, and they had fewer affective disorders than boys without crimes. In addition, a large family size was shown to be a protective factor for criminality among boys.

In our study, parental substance abuse associated both with violent and non-violent offending among female offspring diagnosed with PD later in life. This finding is consistent with previous studies which have shown that parental substance use has found to associate with children's antisocial PD [37,38] and Borderline PD [35]. In our analyses, child welfare placement in adolescence associated with criminality among women with PD. This is in line with another study's finding that, if a child had been placed in a child welfare institution because of behavioural problems they were more likely to be arrested for a crime later in life [37]. Unfortunately, the reason for child welfare placements and the age at which the child was placed there were not recorded in our database. Previous findings have showed that early parental separation have associated with later criminality among both genders [2,39]. Further, in a study of high secure hospital patients, Pert et al. [40] found that patients with PD have been placed in institutionalized care in their childhood more often than patients with schizophrenia.

Gender specific studies on the role of PDs in criminality remain scarce, so our study findings represent an important addition to previous literature. One strength of our study is the assessment of psychiatric diagnoses at index hospitalization, which were based on validated semi-structured diagnostic interviews conducted during hospitalization. All PD diagnoses were identified from the comprehensive national health care registers. According to previous studies [41,42], the validity of large-scale register studies using Finnish national registers has been shown to be acceptable. Police registries in Finland are very comprehensive, covering all criminal offences committed from the age of 15 years [43]. Further, our study population is homogenous, consisting of adolescents from a large area of Northern Finland.

Our study has several limitations. First, our study sample consisted of psychiatric inpatients and thus our findings cannot be extrapolated to the general population. More PD diagnoses and crimes would have been obtained had the follow-up time been longer. Another limitation is that the assessment of PD diagnoses was based solely on the information gathered from the national health care registers. It has been established that unstructured clinical interviews poorly recognize PDs [44]. PDs are also likely to be under diagnosed in clinical reports and registers as a cause of psychiatric care. Unfortunately, we had no access to case notes (records) and we were not able to determine the severity of PDs as this was not coded in CRHC. The information on reasons for placements in institutional care and number of child welfare placements was also lacking.

## 5. Conclusions

An association between PD and an increased likelihood for violent criminal offending among females who were admitted to psychiatric inpatient care in adolescence was observed in our study. This may be explained by Borderline PD, which accounted for the majority of PDs in females. Borderline PD associated with violence criminality among women with PD. These findings were female specific, with no association between PD and criminal offending found among men.

An improved understanding of underlying PDs and the types that predispose to violent crimes would be useful when designing early intervention strategies. It is also important to recognize the risk for violence in young women with a Borderline PD and to consider the possibility of a latent PD in those girls who commit violent crimes.

## Conflict of interest

The authors declare that they have no conflicts of interest concerning this article.

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