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Parental psychiatric disease and risks of attempted suicide and violent criminal offending in offspring: A population-based cohort study

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Access to Data and Data Analysis

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Abstract

Importance—Self-directed and interpersonal violence share some common risk factors such as a parental history of mental illness. However, relationships between the full spectrum of parental psychiatric disease and these 2 related outcomes are unclear.

Objective—To examine associations between the full spectrum of parental psychiatric disease and risks of attempted suicide and violent offending among offspring.

Design, Setting, and Participants—Population-based cohort study of all persons born in Denmark 1967 through 1997, followed up from their 15th birthday until occurrence of adverse outcome or December 31, 2012, whichever came first.

Exposures—Array of parental psychiatric disorders and parental suicide attempt, delineated from records of secondary care treatments.

Main Outcomes and Measures—Using survival analyses techniques, incidence rate ratios were estimated for offspring suicide attempt and violent offending.

Results—We examined 1,743,525 cohort members (48.7 % female, total follow-up, 27.2 million person-years). Risks for offspring suicide attempt and violent offending were elevated across virtually the full spectrum of parental psychiatric disease. Incidence rate ratios were the most elevated for parental diagnoses of antisocial personality disorder (suicide attempt, 3.96; 95% CI, 3.72-4.21; violent offending, 3.62; 95% CI, 3.41-3.84), and cannabis misuse (suicide attempt, 3.57; 95% CI, 3.25-3.92; violent offending, 4.05; 95% CI, 3.72-4.39), and for parental suicide attempt (suicide attempt, 3.42; 95% CI, 3.29-3.55; violent offending, 3.31; 95% CI, 3.19-3.44). Parental mood disorders (and bipolar disorder in particular) conferred more modest risk increases. A history of mental illness or suicide attempt in both parents was associated with double the risks compared with having just 1 affected parent. Associations between parental psychiatric disease and offspring violent offending were stronger for female than for male offspring, whereas little sex difference in risk was found for offspring suicide attempt.

Conclusions and Relevance—The similarities in risk patterns observed between the 2 outcomes may evidence a shared etiology. Early interventions to tackle parental mental disorders may be beneficial to both parents and children.

Introduction

Violence, both interpersonal and self-directed, presents a serious public health concern constituting a significant cause of premature death, disability and ill health.^{1,2} Studies from both psychiatric and forensic populations suggest that these 2 behaviors are associated, with elevated risks for aggression being found amongst those who engage in self-harm and vice versa.^{3,4} For example, elevated suicide risk was reported among violent offenders, particularly in those convicted for homicide or attempted homicide.⁵ The 2 behaviours are

thought to share common determinants such as emotional dysregulation, lack of impulse control, poor problem-solving skills, substance use, and mental illnesses.^{3,4} It has been well-established that suicidal and violent behaviors aggregate within families, via possible interplay between genetics, epigenetics, and social and environmental influences.^{6–8} Elevated risks for the 2 behaviors in offspring have also been linked with a parental history of mental illnesses.^{9–13} However, to our knowledge, no studies have investigated the full spectrum of parental psychiatric disease and both offspring suicide attempts and violent offending jointly in the same population. Previous studies examining broadly defined parental mental disorders (such as “personality disorders”) may also mask important heterogeneity according to diagnostic sub-categories.^{10–12} For example, borderline personality disorder is often linked with elevated risks for attempted suicide^{14,15} whereas interpersonal violence is closely related to antisocial personality disorder.^{16,17} However, it remains unclear how a parental diagnosis of these disorders is associated with risks of suicidal and violent behaviors in offspring, and how these risks compare between the 2 outcomes and in relation to other parental diagnoses.

For the study reported herein, we examined the associations between the full spectrum of parental psychiatric disease and attempted suicide and violent offending among offspring. To enable like-for-like comparison, relative risks for both adverse outcomes were estimated in the same cohort at risk. The full spectrum of parental psychiatric disease investigated was delineated as follows:

- (1) Any mental disorders
- (2) Any organic mental disorders; specifically, dementia in Alzheimer disease, and vascular dementia
- (3) Any substance use disorders; specifically, alcohol misuse, and cannabis misuse
- (4) Schizophrenia and related disorders (hereafter “broad schizophrenia”); specifically, schizophrenia (hereafter “narrow schizophrenia”), and schizoaffective disorder
- (5) Any mood disorders; specifically, bipolar disorder, recurrent depressive disorder, and single and recurrent depressive disorders
- (6) Any anxiety and somatoform disorders; specifically, obsessive compulsive disorder
- (7) Any personality disorders; specifically, borderline personality disorder, and antisocial personality disorder
- (8) Suicide attempt.

We also examined associations by offspring sex, and by exposure to psychiatric disease in the mother only, father only, and in both parents.

Methods

Study population

The study was approved by the Danish Data Protection Agency. Since 1968, all persons living in Denmark have been registered in the Danish Civil Registration System, which captures information such as date of birth, parents' identities, and continuously updated information on vital status.¹⁸ The unique personal identification number enables accurate linkage across all national registers. The study cohort included all persons born in Denmark to Danish-born parents during 1967 through 1997 who resided in the country on their 15th birthday (N=1,743,525, 48.7% female). Because this project was based exclusively on registry data, according to the Danish Act on Processing of Personal Data, Section 10, informed consent from persons in the study population was not required.

Parental mental disorders

Histories of mental illness for cohort members' parents were obtained from the Psychiatric Central Research Register,¹⁹ which contains data on all admissions to psychiatric inpatient facilities from 1969 onwards. Information on all contacts with outpatient psychiatric departments and psychiatric emergency care was included from 1995 onwards. The *International Classification of Diseases* codes (Tenth Revision and Eighth Revision) used to delineate the parental mental disorders examined are presented in eTable 1 in the Supplement. Onset of each parental mental disorder of interest was defined as the date of first contact (inpatient, outpatient, or psychiatric emergency care). Individuals with more than 1 disorder were included in the analysis for each specific disorder.

Parental and offspring suicide attempt

The classification of attempted suicide was identical to that applied previously²⁰ using information from the Psychiatric Central Research Register¹⁹ and National Patient Register.²¹

Offspring violent offending

Data from the National Crime Register were available from 1980 onwards.²² We defined interpersonal violence as all convictions for homicide, assault, robbery, aggravated burglary or arson, possessing a weapon in a public place, violent threats, extortion, human trafficking, abduction, kidnapping, rioting or other public order offenses, terrorism, and all sexual offenses (except for possessing child pornographic material). We considered the first violent offense conviction after cohort members' 15th birthdays because this is the age for adult criminal responsibility in Denmark.

Socioeconomic status

Parental socioeconomic status (SES), assessed in the year of cohort members' 15th birthdays, was measured via paternal and maternal income, highest educational attainment, and employment status.²³ To examine effects of interactions between parental SES and parental mental disorder, SES was stratified as lower, middle, and higher. These classifications were applied as described previously.²⁴

Study design and statistical analyses

Cohort members were followed up from their 15th birthday until date of adverse outcome of interest, death, emigration from Denmark, or December 31, 2012, whichever came first. The 2 adverse outcomes were analysed separately. The cohort was followed up for a total of 27.2 million person-years. Persons with a first suicide attempt before follow-up at age 15 years were excluded from the suicide attempt analyses. Log-linear Poisson regression models, implemented in R, version 3.1.2, were fitted to estimate incidence rate ratios (IRRs). All models were adjusted for offspring age, sex, calendar year, and their interactions. In addition, the potential confounding and modifying effects of parental SES were also assessed. Offspring age, calendar year, and parental psychiatric history were treated as time-varying covariates; other covariates were time-fixed. Likelihood ratio-based 95% confidence intervals were calculated for each IRR estimate, and likelihood ratio interaction tests were used to assess effect modification by offspring sex and parental SES.

Results

A total of 44,472 cohort members (2.6% of the study population) first attempted suicide and 55,404 (3.2%) were convicted of a first violent offense during the study period, with the median age of onset for the two outcomes being 21.6 and 20.6 years, respectively. Males represented 46.7% of those who had attempted suicide and 90.0% of those with a violent offense conviction. Of the 91,800 persons who had at least 1 adverse outcome during the follow-up period, 39.6% attempted suicide only, 51.6% were only convicted of a first violent offense, and 8.8% had both outcomes. Table 1 gives the number of incident cases and incidence rates in relation to the full spectrum of parental psychiatric disease, with at least 1 parent being affected. The highest incidence rates, for both adverse outcomes, were linked with parental cannabis misuse and attempted suicide.

Incidence rate ratios for the 2 outcomes by types of parental disorder, adjusted for age, sex, and calendar year, are presented in Table 2. For each parental exposure examined, the reference group for IRR estimation was the group with neither parent affected by the particular disorder of interest. Risks for offspring suicide attempt and violent offending were elevated across the full spectrum of parental psychiatric disease, except for Alzheimer disease, for which no significant link with offspring violent offending was found. For both offspring outcomes, the associations were particularly strong for parental antisocial personality disorder, cannabis misuse, and parental suicide attempt. Conversely, parental mood disorders, in particular bipolar disorder, conferred some of the lowest risk elevations, especially in relation to offspring violent offending.

We next investigated separately: (1) those exposed to the parental disorder of interest only versus (2) those exposed to the disorder of interest in addition to other parental disorders. These results are presented in Tables 3 and 4. The reference group for IRR estimation was the group with neither a history of parental mental illnesses nor parental suicide attempt. Exposure to more than 1 parental disorders was common. Offspring of parents with cannabis misuse or antisocial personality disorder in addition to other disorders, or those with a parental history of both mental illness and suicide attempt, were at particularly high risks for both adverse outcomes. However, risks remained elevated for most of the parental diagnoses

even when exposures to multiple parental disorders had been accounted for. Again, risks for both adverse outcomes were particularly high among those who were exposed only to parental antisocial personality disorder, or among those with a parental history of suicide attempt without mental disorder. Exposure to parental cannabis misuse only was also strongly linked with elevated risk for offspring violent offending. However, no significant associations between parental cannabis misuse and offspring suicide attempt were found after exposures to multiple disorders was accounted for.

Results adjusted for parental SES are given in eTable 2 in the Supplement. Comparison with Table 1 shows that between 20% and 50% of the elevated risks for offspring suicide attempt and violent offending were accounted for by those confounding influences. However, even after making this additional adjustment, risk of violent offending was still particularly elevated among those with a parental history of suicide attempt, or with a diagnosis of antisocial personality disorder or cannabis misuse, while attempted suicide risk remained raised particularly for those exposed to parental suicide attempt or antisocial personality disorder. There were also significant interactions between parental mental disorder and parental SES for the risk of both adverse outcomes ($\chi^2[22] = 120.8$, $P < .001$ for suicide attempt; $\chi^2[22] = 170.4$, $P < .001$ for violent offending). Further details can be found in eResults 1 and eTable 3 in the Supplement.

The Figure shows the IRRs for the 2 offspring outcomes in relation to whether the mother only, father only, or both parents had a history of any psychiatric diagnosis or suicide attempt, stratified by offspring sex. Compared with having only 1 affected parent, a history of psychiatric disease in both parents was associated with doubled risks of both adverse outcomes in offspring. The associations between parental psychiatric disease and offspring violent offending were stronger for female than for male offspring ($P < .001$), particularly when both parents were affected. Conversely, there was little heterogeneity in IRR estimates for attempted suicide by offspring sex. Further discussion of these results is reported in eResults 2 in the Supplement.

Results from further investigation of offspring sex-specific associations with the full spectrum of parental psychiatric disease, with at least 1 parent being affected, are given in eTables 4 and 5 in the Supplement. The sex-specific IRRs for suicide attempt were generally of comparable magnitude, whereas IRRs for violent offending were greater for female than for male offspring for most types of parental psychiatric disease.

Discussion

Main findings

Elevated risks for offspring attempted suicide and violent offending were evident across a broad spectrum of parental psychiatric disease. Risks were particularly elevated for parental diagnoses of antisocial personality disorder, cannabis misuse, and prior suicide attempt, whereas lower elevations in risk were seen in relation to parental mood disorders - bipolar disorder in particular. The similarities in relative risk patterns observed for both adverse outcomes indicate that self-directed and interpersonal violence may have a shared etiology. A history of mental illnesses or suicide attempt in both parents was associated with doubled

risks versus having only 1 affected parent. Associations between parental psychiatric disease and offspring violent offending were stronger for female than for male offspring, whereas the sex-specific IRRs for offspring suicide attempt were generally comparable.

Existing evidence and interpretations

This is the first study to investigate the full spectrum of parental psychiatric disease and offspring suicide attempt and violent offending in the same population. Our findings for suicide attempt align with those from a Swedish national registry study, which found that risks were particularly elevated for offspring exposed to parental personality disorders, suicide attempt, and substance misuse.¹⁰ Similarly, the World Mental Health surveys revealed that elevated risk of offspring suicide attempt was linked with parental depression, panic or generalized anxiety disorder, substance misuse, and suicidal behavior.⁹ However, neither parental personality disorders nor sub-categories within substance use were investigated.⁹ Specific types of personality disorders were also not examined in the Swedish study.¹⁰

Strong associations between parental personality disorders and substance misuse and offspring violent offending have previously been reported from a Danish national registry study.¹¹ By examining sub-categories within these disorders, we additionally revealed that offspring violent offending risks were especially elevated in relation to parental cannabis misuse and antisocial personality disorder, even after adjustment for other parental disorders. Among persons with a personality disorder diagnosis, attempted suicide is particularly strongly linked with borderline personality disorder^{14,15} whereas interpersonal violence is closely related to antisocial personality disorder.^{16,17} By investigating these 2 adverse behaviors in the same population, we found that risks for both were more strongly associated with parental antisocial personality disorder than with parental borderline personality disorder.

Shared genetic vulnerability to psychiatric disease may be 1 possible pathway that could explain our findings,²⁵ although the intergenerational transmission of suicidal risks has been reported to be independent of familial transmission of mental disorders.^{6,9,10,26} In the full spectrum of disorders examined here, the strongest associations with offspring suicide attempt and violent offending were found with parental antisocial personality disorder, substance use disorder, and suicide attempt. These associations remained relatively strong even after adjustment for parental SES or other parental disorders, except for the link between parental cannabis misuse and offspring suicide attempt, which was no longer significant after the effects of other parental disorders were accounted for. Substance misuse and antisocial personality disorder, as well as suicidal behavior and violence perpetration, are often characterised by behavioral dysregulation and impulsive-aggressive traits,^{4,17} which may also contribute to elevated risks of deaths from accidents and other causes amongst those with a history of self-harm.²⁷ Evidence has supported the heritability of these traits, which have also been identified as possible intermediate phenotypes for suicidal behavior.^{28–30} The intergenerational transmission of such traits may thus contribute to the particularly high risks for suicidal behavior and violent offending among those with a parental history of antisocial personality disorder, substance misuse and suicide attempt. In

addition, higher levels of impulsivity and aggression in offspring and their parents were more strongly linked with younger than with older age suicidal behaviors.^{31–33} The early median ages of onset of offspring adverse outcomes in our cohort may thus lend further support to the familial transmission of these traits.

Children of parents with a history of psychiatric disease are at increased risk of being additionally exposed to other adversities such as maladaptive parenting practice, family violence, abuse, neglect, and financial hardship, and the impact of these harmful environmental factors on offspring risks of suicidal behavior and violence perpetration is thought to be cumulative.^{34–37} However, even after SES adjustment, many of the links between parental psychiatric disease and offspring suicide attempt and violent offending in our study remained significantly elevated. Exposure to adversities during childhood and sensitive developmental periods may also lead to alteration of gene expression via epigenetic processes, resulting in altered neurobiological function such as stress-responsive systems, increasing vulnerability for adverse outcomes such as suicidal and aggressive behaviors in later life.^{29,38}

Our study revealed that having 2 parents affected by psychiatric disease doubled the risks for both adverse outcomes versus cohort members with only 1 affected parent. Evidence for assortative mating has been reported in psychiatric populations.³⁹ The doubling of risks observed could be attributed not only to the inheritance of disorders or traits from both parents but also to disturbed family environments exacerbated by having 2 parents affected by mental illnesses. Our study has also shown that, for most of the parental disorders examined, associations between parental psychiatric disease and offspring violent offending were stronger for female than for male offspring. Because females perpetrate violent crimes less frequently than males and aggressive behavior in women is viewed as being less culturally acceptable than in men, it has been suggested that a higher “risk threshold” for violent criminality exists for women than for men.^{40,41} Research on adolescence has also indicated that the cumulative effects of risk factors for delinquency are stronger among girls than for boys.⁴⁰ These aspects may explain the larger female than male relative risks for violent offending observed in this study, but further research is needed to explore why for certain parental diagnoses, for example, bipolar disorder (eTable 5 in the Supplement), there was no evidence of greater relative risk for violent offending in male versus female offspring.

Strengths and limitations

The main strengths of our study include examination of a complete national cohort, providing abundant statistical power to examine rare exposures and outcomes. Because all exposures and outcomes were collected prospectively, recall bias was eliminated, an issue that would be pertinent to retrospective self-reporting of parental psychiatric disease by offspring. The Danish Psychiatric Central Research Register also enabled us to investigate the full spectrum of parental mental disorders, including more narrowly defined categories. In examining the same cohort, we were also able to compare risks for the 2 outcomes without differential intercohort biases. The most important limitation of our study was that, although we controlled for parental SES, we were not able to adjust for other potential

confounders such as parental criminal histories⁷ or cohort members' experiences of abuse. Data on criminal offending were only available from 1981 onward, and childhood abuse episodes are not routinely recorded in the registers. In addition, milder cases of mental disorders, self-harm, and substance misuse treated in primary care only are not recorded in the Danish Psychiatric Central Research Register. Hence, our cases of suicide attempt and parental mental disorders only included those with a severity that resulted in secondary care treatment.

Conclusions

Elevated risks of both attempted suicide and violent offending in offspring are evident across a broad spectrum of parental psychiatric disease, with the links being strongest in relation to parental antisocial personality disorder, cannabis misuse and attempted suicide. Children with 2 affected parents are particularly vulnerable. Psychiatrists and other professionals treating adults with mental disorders and suicidal behavior should consider also evaluating the mental health and psychosocial needs of their patients' children. Early interventions could benefit not only the parents but also their offspring. In particular, interventions that aim to reduce the incidence of and ameliorate the effects of parental substance misuse may help to reduce their offspring's future risks for suicidality and violence.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Key Points

Question: How are risks of attempted suicide and violent offending in offspring related to the full spectrum of parental psychiatric disease?

Findings: In this population-based cohort study of 1,743,525 persons, risks for offspring suicide attempt and violent offending were significantly elevated across virtually the full spectrum of parental psychiatric disease. For both adverse outcomes in offspring, the greatest elevations in risk were linked with parental diagnoses of antisocial personality disorder, cannabis misuse, and prior suicide attempt.

Meaning: The similarities in relative risk patterns observed may evidence a shared etiology between self-directed and interpersonal violent behaviors.

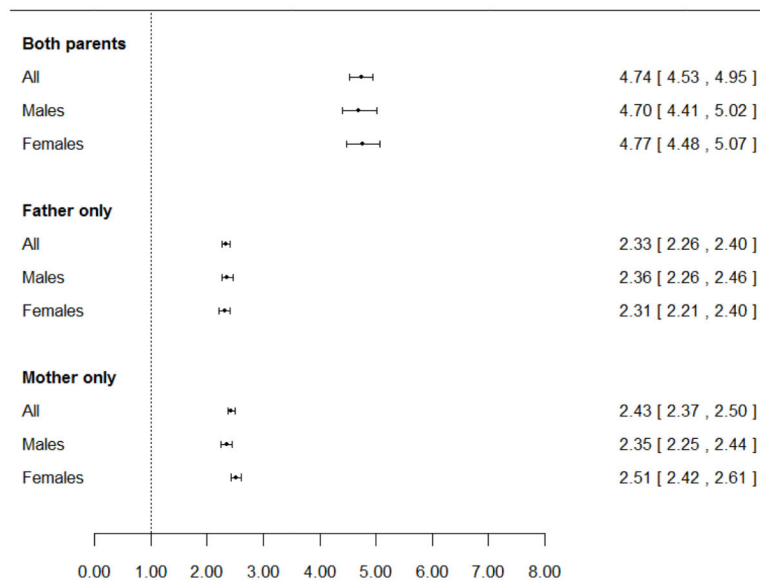
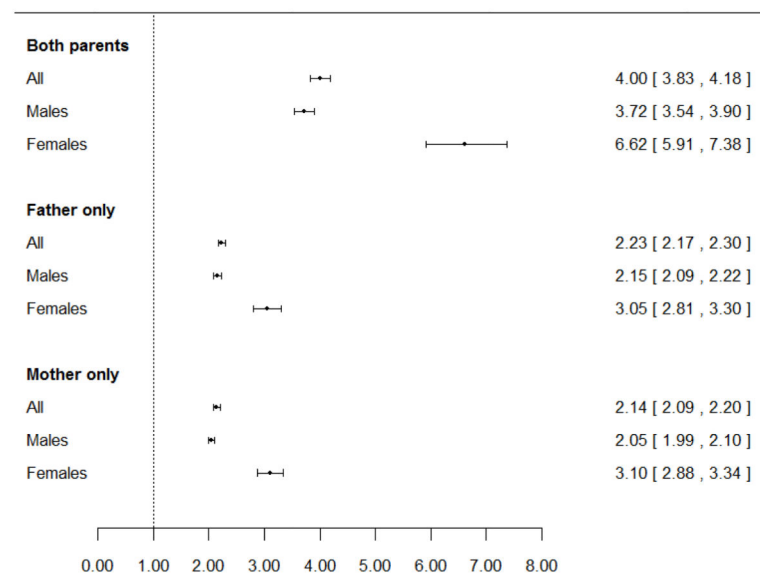
(a) Offspring suicide attempt**(b) Offspring violent offending**

Figure. Incidence rate ratios (IRRs) and 95% CIs for offspring suicide attempt and offspring violent offending, according to whether the mother only, the father only or both parents were affected by any psychiatric disorder, stratified by offspring sex

The reference group was individuals with neither parent having a psychiatric diagnosis or history of suicide attempt. Models adjusted for offspring sex and age, calendar year, and the interactions between these variables. Symbols indicate IRR, and error bars, 95% CI.

Table 1
Number of incident cases and incidence rates per 100,000 person-years for suicide attempt and violent offending in relation to cohort members with at least 1 parent affected by a specific psychiatric diagnosis or a history of suicide attempt

Parental psychiatric diagnosis or suicide attempt	Attempted suicide			Offspring		
	Incident cases, no.	Incidence rate per 100,000 person-years	Incident cases, no.	Incidence rate per 100,000 person-years	Incident cases, no.	Incidence rate per 100,000 person-years
	Total	44,472	162.5	55,404	203.5	
None	31,460	133.0	41,011	174.4		
Any mental disorders	12,286	341.0	13,451	375.9		
Organic mental disorders	828	278.7	819	278.0		
Dementia in Alzheimer disease	95	199.3	69	146.0		
Vascular dementia	41	167.2	49	201.4		
Any substance use disorders	5715	422.2	6644	496.7		
Alcohol misuse	4887	413.6	5612	480.5		
Cannabis misuse	439	718.0	564	937.5		
Broadly-defined schizophrenia ^a	1660	326.6	1783	352.6		
Narrowly-defined schizophrenia ^b	568	384.1	580	392.8		
Schizoaffective disorder	189	325.8	169	290.8		
Mood disorders	4121	311.0	3961	299.4		
Bipolar disorder	548	249.8	549	250.3		
Recurrent depressive disorder	1322	306.7	1215	281.4		
Single and recurrent depressive disorders	3532	309.0	3390	297.0		
Anxiety and somatoform disorders	6628	404.0	7021	430.5		
Obsessive-compulsive disorder	94	351.6	75	280.0		
Specific personality disorders	4723	384.3	5138	421.0		
Borderline type personality disorder	389	563.4	368	531.3		
Antisocial personality disorder	1027	574.4	1154	654.1		
Attempted suicide	2841	737.0	3171	822.8		

Schizophrenia and related disorders.

Schizophrenia only.

Table 2
Suicide attempt and violent offending in offspring in relation to having at least 1 parent affected by a specific psychiatric diagnosis or a history of suicide attempt^a

Parental psychiatric diagnosis or suicide attempt	IRR (95% CI)	
	Suicide attempt	Violent offending
Any mental disorders	2.53 (2.47-2.58)	2.25 (2.21-2.30)
Organic mental disorders	2.20 (2.05-2.35)	1.91 (1.78-2.04)
Dementia in Alzheimer disease	1.79 (1.45-2.17)	1.18 (0.92-1.48)
Vascular dementia	1.42 (1.03-1.91)	1.70 (1.27-2.23)
Any substance use disorders	2.93 (2.84-3.01)	2.87 (2.80-2.94)
Alcohol misuse	2.85 (2.76-2.93)	2.76 (2.68-2.84)
Cannabis misuse	3.57 (3.25-3.92)	4.05 (3.72-4.39)
Broadly-defined schizophrenia ^b	2.11 (2.01-2.22)	1.86 (1.78-1.95)
Narrowly-defined schizophrenia ^c	2.35 (2.16-2.55)	2.01 (1.85-2.18)
Schizoaffective disorder	2.10 (1.81-2.41)	1.55 (1.33-1.79)
Mood disorders	2.04 (1.97-2.10)	1.64 (1.59-1.70)
Bipolar disorder	1.58 (1.45-1.72)	1.35 (1.24-1.46)
Recurrent depressive disorder	1.88 (1.78-1.99)	1.53 (1.44-1.62)
Single and recurrent depressive disorders	2.00 (1.93-2.07)	1.62 (1.57-1.68)
Anxiety and somatoform disorders	2.62 (2.56-2.69)	2.34 (2.28-2.40)
Obsessive-compulsive disorder	1.89 (1.53-2.30)	1.32 (1.04-1.64)
Specific personality disorders	2.62 (2.55-2.70)	2.31 (2.25-2.38)
Borderline type personality disorder	2.86 (2.59-3.16)	2.36 (2.13-2.61)
Antisocial personality disorder	3.96 (3.72-4.21)	3.62 (3.41-3.84)
Attempted suicide	3.42 (3.29-3.55)	3.31 (3.19-3.44)

Abbreviation: IRR, incidence rate ratio.

^a Adjusted for offspring sex and age, calendar year, and the interactions between these variables. Reference group: neither parent had the particular exposure of interest.

^b Schizophrenia and related disorders.

^c Schizophrenia only.

Table 3
Offspring suicide attempt in relation to having at least 1 parent affected by a specific psychiatric diagnosis, by exposure to the specific diagnosis only or additionally to other diagnoses

Parental psychiatric diagnosis or suicide attempt	Exposure			
	No.	IRR (95% CI) ^a		
		Specific diagnosis only ^b	Specific diagnosis in addition to other parental disorders	Specific diagnosis only in addition to other parental disorders
Any mental disorders	10171 ^c	2115 ^d	2.36 (2.31-2.42) ^c	4.41 (4.22-4.61) ^d
Organic mental disorders	132	696	1.65 (1.39-1.95)	3.02 (2.80-3.25)
Dementia in Alzheimer disease	24	71	1.44 (0.94-2.10)	2.72 (2.13-3.40)
Vascular dementia	16	25	1.53 (0.90-2.41)	2.01 (1.32-2.91)
Any substance use disorders	1085	4630	2.53 (2.38-2.69)	3.52 (3.41-3.63)
Alcohol misuse	935	3952	2.45 (2.29-2.61)	3.50 (3.38-3.62)
Cannabis misuse	11	428	1.54 (0.80-2.64)	4.59 (4.16-5.04)
Broadly-defined schizophrenia ^e	263	1397	1.77 (1.57-2.00)	2.76 (2.62-2.92)
Narrowly-defined schizophrenia ^f	94	474	2.17 (1.76-2.64)	3.06 (2.80-3.35)
Schizoaffective disorder	7	182	1.74 (0.75-3.36)	2.62 (2.26-3.02)
Mood disorders	858	3263	1.63 (1.52-1.74)	2.71 (2.62-2.81)
Bipolar disorder	52	496	1.19 (0.90-1.55)	2.09 (1.91-2.28)
Recurrent depressive disorder	0	1322	...	2.30 (2.18-2.43)
Single and recurrent depressive disorders	525	3007	1.71 (1.56-1.86)	2.53 (2.43-2.62)
Anxiety and somatoform disorders	1700	4928	2.21 (2.10-2.32)	3.28 (3.18-3.38)
Obsessive-compulsive disorder	18	76	1.72 (1.04-2.64)	2.56 (2.03-3.19)
Specific personality disorders	579	4144	2.12 (1.95-2.29)	3.18 (3.08-3.28)
Borderline type personality disorder	27	362	2.36 (1.58-3.36)	3.65 (3.28-4.04)
Antisocial personality disorder	60	967	3.06 (2.35-3.90)	4.90 (4.59-5.22)
Attempted suicide	726 ^g	2115 ^d	3.12 (2.89-3.35) ^g	4.41 (4.22-4.61) ^d

Abbreviations: ellipses, not applicable; IRR, incidence rate ratio.

^aIRRs adjusted for offspring sex and age, calendar year, and the interactions between these variables. Reference group: neither parent has a mental illness diagnosis or a history of suicide attempt.

^bNot exposed to other parental mental disorders in the defined full spectrum except for the disorder of interest.

^cOffspring with suicide attempt with a history of any parental mental disorder but no history of parental suicide attempt.

^dOffspring with suicide attempt with a history of parental mental disorder and parental suicide attempt.

^eSchizophrenia and related disorders.

^fSchizophrenia only.

^gOffspring with suicide attempt with a history of parental suicide attempt but no history of parental mental disorder.

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Table 4
Offspring violent offending in relation to having at least 1 parent affected by a specific psychiatric diagnosis, by exposure to the specific diagnosis only or additionally to other diagnoses

Parental psychiatric diagnosis or suicide attempt	No.			Exposure		IRR (95% CI) ^a
	Specific diagnosis only ^b	Specific diagnosis in addition to other parental disorders	2229 ^d	Specific diagnosis only ^b	Specific diagnosis in addition to other parental disorders	
Any mental disorders	11222 ^c		2229 ^d	2.12 (2.07-2.16) ^c	3.96 (3.79-4.13) ^d	
Organic mental disorders	127		692	1.45 (1.21-1.71)	2.48 (2.30-2.67)	
Dementia in Alzheimer disease	15		54	0.86 (0.50-1.37)	1.69 (1.28-2.19)	
Vascular dementia	13		36	1.23 (0.67-2.02)	2.72 (1.93-3.71)	
Any substance use disorders	1356		5288	2.60 (2.46-2.74)	3.28 (3.19-3.37)	
Alcohol misuse	1148		4464	2.47 (2.33-2.62)	3.23 (3.13-3.33)	
Cannabis misuse	33		531	4.14 (2.88-5.71)	4.82 (4.42-5.24)	
Broadly-defined schizophrenia ^e	295		1488	1.52 (1.36-1.70)	2.36 (2.24-2.48)	
Narrowly-defined schizophrenia ^f	92		488	1.67 (1.35-2.03)	2.57 (2.35-2.81)	
Schizoaffective disorder	5		164	0.86 (0.31-1.85)	1.89 (1.62-2.20)	
Mood disorders	776		3185	1.20 (1.12-1.29)	2.20 (2.12-2.28)	
Bipolar disorder	48		501	0.89 (0.66-1.17)	1.73 (1.58-1.88)	
Recurrent depressive disorder	0		1215	...	1.81 (1.71-1.91)	
Single and recurrent depressive disorders	485		2905	1.26 (1.15-1.38)	2.04 (1.97-2.12)	
Anxiety and somatoform disorders	1870		5151	2.00 (1.91-2.10)	2.84 (2.76-2.93)	
Obsessive-compulsive disorder	13		62	1.01 (0.56-1.67)	1.78 (1.37-2.26)	
Specific personality disorders	745		4393	2.08 (1.94-2.24)	2.68 (2.60-2.77)	
Borderline type personality disorder	22		346	1.43 (0.91-2.12)	2.98 (2.68-3.31)	
Antisocial personality disorder	88		1066	3.47 (2.80-4.25)	4.24 (3.99-4.51)	
Attempted suicide	942 ^g		2229 ^d	3.35 (3.13-3.57) ^g	3.96 (3.79-4.13) ^d	

Abbreviations: ellipses, not applicable; IRR, incidence rate ratio.

^aIRRs adjusted for offspring sex and age, calendar year, and the interactions between these variables. Reference group: neither parent has a mental illness diagnosis or a history of suicide attempt.

^bNot exposed to other parental mental disorders in the defined full spectrum except for the disorder of interest.

^cOffspring with violent offending with a history of any parental mental disorder but no history of parental suicide attempt.

^dOffspring with violent offending with a history of parental mental disorder and parental suicide attempt.

^eSchizophrenia and related disorders.

^fSchizophrenia only.

^gOffspring with violent offending with a history of parental suicide attempt but no history of parental mental disorder.

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