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To cite this article: Ove Heradstveit, Bente Storm Mowatt Haugland, Sondre Aasen Nilsen, Tormod Bøe, Børge Sivertsen & Mari Hysing (2021): Parental Mental Illness as a Risk Factor for Adolescent Psychiatric Disorders: A Registry-Based Study of Specialized Child and Adolescent Health Services, *Child & Youth Services*, DOI: [10.1080/0145935X.2021.1997584](https://doi.org/10.1080/0145935X.2021.1997584)

To link to this article: <https://doi.org/10.1080/0145935X.2021.1997584>



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Published online: 08 Nov 2021.



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# Parental Mental Illness as a Risk Factor for Adolescent Psychiatric Disorders: A Registry-Based Study of Specialized Child and Adolescent Health Services

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## ABSTRACT

Parental mental illness is a major risk factor for youth psychopathology, but few studies have used data from child and adolescent mental health services (CAMHS) to investigate this group. We used a unique linkage between a CAMHS-registry and a large population-based survey of Norwegian adolescents aged 16–19 years. Nine hundred and seventy adolescents received CAMHS, of whom 87 (9%) were registered with a parent with mental illness. These adolescents had increased odds for a range of psychiatric disorders and comorbidity compared with CAMHS-patients. These findings underscore the need to consider parental mental illness when assessing and treating adolescents with psychiatric disorders.

## KEYWORDS

Adolescents; parental mental illness; psychiatric comorbidity; psychiatric disorders; registry-based study

## Introduction

A considerable number of youths grow up with parents with mental illness, representing an important risk factor for the generational transmission of psychiatric problems. International estimates suggest that 4–23% of children aged 18 or younger have at least one parent with mental illness (Leijdesdorff et al., 2017). In Norway, a report from 2011 estimated that 135,000 children and adolescents below the age of 18 years (12% of the

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total population) have a parent with severe cases of mental illness and/or alcohol abuse problems (Torvik & Rognmo, 2011). This is closely aligned with a recent large-scale, population-based study that estimated that 11% of Swedish children have a parent with a mental illness treated in secondary care (Pierce et al., 2020).

Psychopathology is common in the offspring of parents with mental illness. A meta-analysis estimated that approximately one-third of children of parents with mental illness will also develop a serious mental illness by adulthood (Rasic et al., 2014). Children of parents with mental illness have a higher risk of premature death, drop-out from school, and unemployment (Christoffersen & Soothill, 2003; Farahati et al., 2003; Henin et al., 2005; Hussong et al., 2008). This increased risk of psychopathology and functional impairment may be due to an interplay between genetic vulnerability, risk factors during pregnancy (e.g., stress, smoking), adverse life events (e.g., divorce, neglect), and maladaptive parent-offspring interactions and/or parenting (e.g., family conflicts, inconsistent parenting, low parental emotional availability) in families with parental mental illness (Fudge et al., 2004; Reupert & Maybery, 2016; Shalev et al., 2019; Van Loon et al., 2014; Wesseldijk et al., 2018). Also, the social adversity that accompanies parental mental illness, such as stigma, shame, and poverty, appears to be an important explanatory factor for negative outcomes in offspring (Beardselee et al., 1998).

Some studies point to a specific risk (i.e., homotypical continuity), where offspring develop the same disorder as their parent (for a review, see van Santvoort et al., 2015), while an increasing body of literature highlight that the link between parental mental illness and youth outcomes is complex and probably characterized by more generalized risk of transmission (i.e., heterotypic continuity). A large-scale population-based study reported that although many parental mental disorders were significantly associated with offspring psychopathology, little specificity was found (McLaughlin et al., 2012). Similarly, parental mental illness is associated with both externalizing and internalizing mental health problems, including anxiety, depression, and conduct disorders (Avenevoli & Merikangas, 2006; Campbell et al., 2009; Dean et al., 2018; Henin et al., 2005; Leijdesdorff et al., 2017; Maybery et al., 2009; Middeldorp et al., 2016; Naughton et al., 2019; Weissman et al., 2006; Wickramaratne & Weissman, 1998).

Several studies have examined parental mental illness among children and adolescents receiving CAMHS (for a review, see Campbell et al., 2021), indicating that prevalence rates of parental mental illness in this setting range from 16 to 79% depending on operationalization and measures applied. On the other hand, the most common parental psychiatric diagnoses among youth receiving CAMHS are anxiety and mood disorders (Naughton et al., 2018). Very few studies have investigated patterns of

psychopathology in adolescents with a parent with mental illness in this setting. A notable exception is a recent Australian study from four different CAMHS locations which reported that children of parents with mental illness ( $n = 134$ ; mean age: 13 years) had higher problem scores on global functioning levels, several social and health measures, and externalizing and internalizing mental health symptoms, compared with individuals without parental mental illness (Naughton et al., 2019). However, the study did not report on formal psychiatric diagnoses.

Thus, further research is clearly needed to shed light on the patterns of psychopathology among offspring of parents with mental illness that receive treatment in CAMHS. Better knowledge about the consequences of parental mental health may potentially empower more tailored treatment efforts to attenuate the generational transmission of psychiatric disorders. Considering research that demonstrates a high load of risk factors for psychopathology in offspring of parents with mental illness (e.g., Naughton et al., 2019; Reupert & Maybery, 2016), these youths may constitute a particularly vulnerable group that has more serious psychopathology than other youths attending CAMHS.

The present study aimed to investigate patterns of psychiatric disorders in adolescents with a parent with mental illness, compared with other adolescents in a Norwegian CAMHS-setting. The lack of previous research on CAMHS-data limits our ability to draw specific hypotheses on which pattern of psychopathology to expect among adolescents who have parents with mental illness compared to other adolescents attending CAMHS. As these families were expected to have an increased load of risk factors for psychiatric disorders (Reupert & Maybery, 2016; Robson & Gingell, 2012; Shalev et al., 2019), and as the generational transmission seems to be generalized and non-specific (Naughton et al., 2019), we expected to find a higher rate of psychopathology across a range of different diagnoses. We also expected to find a higher duration of registered contact with CAMHS among adolescents with parents with mental illness, as an indication of the severity of psychopathology in this group.

## Methods

### *Participants and procedure*

The present study used data from a linkage between a large population-based study and registry-based data on diagnostic profiles from CAMHS.

The population-based *youth@hordaland (y@h)-survey* was conducted in March 2012 and included adolescents aged 16–19 years living in the Hordaland county in Western Norway. The *y@h-survey* is thoroughly described in previous publications (e.g., Skogen et al., 2013). A total of

10,257 adolescents participated in the survey, comprising 53% of the total adolescent population ( $n = 19,430$ ). Participants received information about the study per email and 1 h was used at school to complete the web-based questionnaire. Adolescents not going to school were allowed to participate, as they received the questionnaire by mail at their home address. In addition, mental health services and other institutions (e.g., child welfare service institutions and inpatient psychiatric hospitals) were contacted to let adolescents from these settings participate. Informed consent was retrieved from all participants before inclusion. A total of 846 (8.2%) of the adolescents that participated in the y@h did not consent to linkage with official registries. Consequently, 9411 adolescents from the y@h-survey were available for linkage with the registry.

The *Norwegian Patient Registry (NPR)* is the official registry on CAMHS use in Norway and includes information on psychiatric diagnoses based on Axis 1 in the International Classification of Diseases (tenth version; ICD-10) (WHO, 1992), data on the treatment provided, and adverse psychosocial conditions (based on Axis 5; ICD-10) for each patient. The present study used a linkage in which data from the NPR spanned from January 2008 to March 2018. In this period, the age of the included adolescents spanned from 12 to 19 years.

The study was approved by the Regional Committee for Medical and Health Research Ethics (REC) in Western Norway (2011/811/REK Vest) and NSD (371974 and 259631).

### **Representativeness of the CAMHS sample**

In Norway, ~5% of youth below 18 years of age receive interventions from CAMHS yearly (Indergård et al., 2019). A previous study that used a linkage between the y@h-survey and the NPR found 9.1% of the individuals that participated in the y@h had received services from CAMHS during the past four years (Heradstveit et al., 2019). This study also reported that individuals that consented to registry-linkage with NPR, and thus were eligible for inclusion, were for the most part similar to the adolescents that did not consent with regard to sociodemographic characteristics (Heradstveit et al., 2019). However, adolescents who refused consent had somewhat higher alcohol consumption and self-reported symptoms of conduct problems (effect sizes = 0.11) and were slightly older (17.6 vs. 17.4 years).

## **Materials**

### **Parental mental illness**

For all youth who receive treatment within Norwegian CAMHS, symptoms, impairment levels, and psychosocial conditions are classified according to a

multiaxial classification system based on ICD-10 (Indergård et al., 2019; WHO, 1992). Therefore, data available in the CAMHS include both psychiatric diagnoses (i.e., Axis 1-diagnoses of the ICD-10), and adverse familial and environmental conditions (i.e., Axis 5-diagnoses of the ICD-10) (Willemse et al., 2003). Included in the latter category is a diagnosis of “Parental mental disorder/deviance.”

During the period when the adolescents had contact with CAMHS, information on parental mental illness had been coded in NPR by clinical professionals. This had been done in accordance with Axis 5 in the ICD-10 diagnostic manual (WHO, 1992). Satisfactory reliability and validity of the psychosocial Axis 5 have been reported (van Goor-Lambo et al., 1994), and it has been concluded that the reported rates of Axis 5-diagnoses in the Norwegian CAMHS are acceptable (Indergård et al., 2019). A total of 698 individuals (72.0% of the study sample) had a valid registration on Axis 5 (i.e., either a specific Axis 5-diagnosis, a code that indicates that no Axis 5-diagnoses were present, or a code that indicated that there was insufficient information to evaluate a potential Axis 5-diagnosis). Parental mental illness was defined as having a registered diagnosis of “2.0 Parental mental illness/deviancy” on Axis 5. A total of 87 individuals (9.0% of the study sample) were registered with parental mental illness in our sample. No data on specific diagnoses of parental mental illness were available.

### ***Adolescent psychiatric disorders***

Information on psychiatric disorders in adolescents was coded in the NPR by clinical professionals during the treatment. These diagnoses were coded in accordance with Axis 1 in the ICD-10 diagnostic manual. We grouped all diagnoses into broader diagnostic categories (see [Appendix 1](#) for details), in close alignment with a previous study (Heradstveit et al., 2019). Thus, the individuals were assigned to one or more of the following categories: anxiety, mood disorders, conduct disorders, attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorders (ASD), eating disorders, trauma-related disorders, psychotic disorders, and “other Axis 1 diagnoses.” In addition, 317 individuals (32.6%) had no Axis 1 psychiatric disorders.

Furthermore, we constructed several sub-categories of psychiatric diagnoses (see [Appendix 1](#) for details). However, conduct disorders, ADHD, psychotic disorders, and “other Axis 1 diagnoses” were not subcategorized.

We also summed all the broader psychiatric diagnoses (i.e., anxiety, mood disorders, ADHD, conduct disorders, eating disorders, trauma-related disorders, psychotic disorders, and other Axis 1 diagnoses) into a continuous variable that theoretically ranged from 0 to 8 (min = 0, max =

5, mean [ $M$ ] = 0.99, standard deviation [ $SD$ ] = 0.92). This variable indicated the degree of psychiatric comorbidity.

### ***CAMHS: duration, distinct admissions, and timing of established contact***

Contact with CAMHS was defined as having a valid registration within the NPR. In Norway, the majority of contacts with CAMHS comprise outpatient clinical consultations, including direct contact (i.e., face to face sessions between professional health worker(s), the adolescent, and/or the family) and indirect contact (i.e., co-operation between professional health workers and the adolescent's network, such as school personnel) (Indergård et al., 2019). A minority of the adolescents in CAMHS receive inpatient psychiatric hospital care. Approximately 57,000 Norwegian children and adolescents receive CAMHS yearly with 3000 occurrences of inpatient psychiatric hospital admissions. These numbers suggest that around 5% of children and adolescents admitted to CAMHS receive this type of care (Indergård et al., 2019).

A continuous variable was constructed for the duration of each adolescent's contact with CAMHS, which counted the number of months with a registered contact with the services. This variable spanned from 1 to 65 months ( $M = 11.45$ ;  $SD = 10.33$ ). Also, a continuous variable for the distinct number of admissions to CAMHS was constructed, spanning from 1 to 9 admissions ( $M = 1.34$ ;  $SD = 0.72$ ). Admission to inpatient hospital care, removal from one clinic to a clinic at another geographic location, as well as repeated admissions to CAMHS after terminated treatment, constitute separate entries of admissions to CAMHS.

Finally, a dichotomous variable was constructed separating adolescents having established contact with CAMHS before the  $y@h$ -survey (defined as the first contact until March 2012) from those establishing contact after the survey (defined as the first contact after March 2012).

### ***Sociodemographic variables***

Information on the *sex and age* of all participants was retrieved from the personal identification number in the Norwegian Population Registry and was available for all participants from the  $y@h$ -sample. Three measures of self-reported *socioeconomic status* were used. This included the perceived economic well-being of the family (response categories: 'poorer than others', 'equal to others', and 'better than others'), as well as maternal and paternal educational attainment (both with response categories: 'primary school', 'high school', and 'college/university'). One item asked whether the adolescents' parents lived together. All these variables have been described more thoroughly in previous publications from the  $y@h$ -survey (e.g., Heradstveit et al., 2019).

## **Statistical analyses**

Firstly, we provide descriptive statistics of sociodemographic variables and characteristics of CAMHS-contact stratified by parental mental illness status. In addition, we calculated the difference in the number of psychiatric diagnoses and comorbidity across parental mental illness status. Independent samples *t*-tests were used to compare means between the groups. Secondly, we describe the occurrence of specific psychiatric disorders in the total sample and stratified by parental mental illness status. Chi-square tests were used to assess statistically significant differences between adolescents with parental mental illness and those without. Finally, we used logistic regression analyses to provide effect-size estimates of associations between parental mental illness and psychiatric disorders among adolescents in the study sample. Before these analyses, we included the interaction term for “parental mental illness” and “gender” on the association with mental disorders, and in cases where a significant interaction was found, the analyses relating to this specific mental disorder were stratified by gender. Analyses were first conducted in unadjusted models, and then in models adjusting for the potential confounding effects of parental SES. All data were analyzed using STATA version 15 (StataCorp, 2018).

## **Results**

Of the 9,411 youth/adolescents (individuals) included (in this linkage), 970 adolescents (10.3%) had contact with CAMHS and comprised the main study sample. The majority of the study sample ( $n = 883$ ; 91.0%) had established contact with CAMHS before the y@h-survey, with similar estimates across the parental mental illness-group ( $n = 81$ ; 93.1%) and those with parents with no mental illness ( $n = 802$ ; 90.8%;  $p = 0.479$ ).

### **Sociodemographic characteristics**

A total of 87 individuals were identified as having a parent with mental illness, constituting 9.0% of the study sample. As shown in [Table 1](#), adolescents with parental mental illness were more often girls and had lower perceived economic well-being compared to their peers in CAMHS with parents without mental illness (all  $ps < 0.05$ ). Also, they had a considerably lower rate of parents living together ( $p < 0.001$ ).

### **Characteristics of CAMHS-contact**

[Figure 1](#) shows the distribution of the duration of the contact with CAMHS, in the number of months with contact, stratified by parental

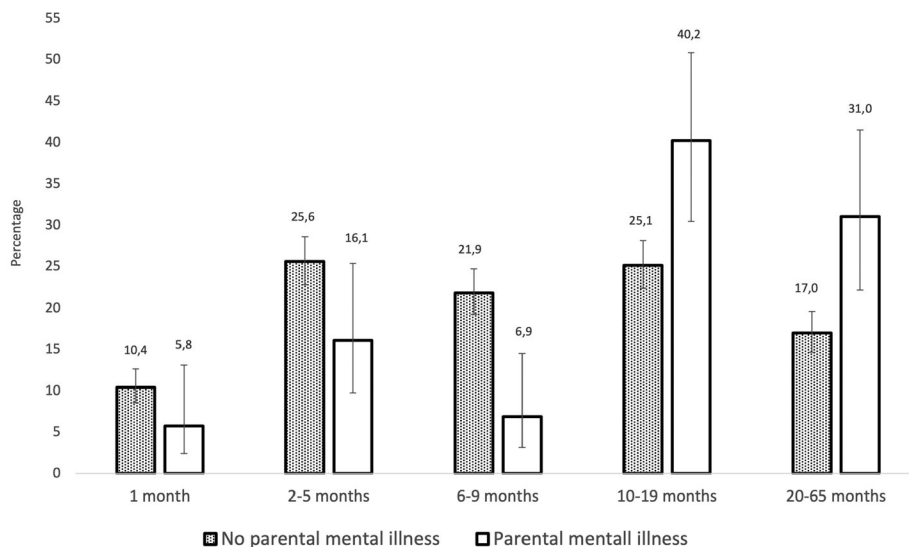


**Table 1.** Descriptive characteristic of the study sample ( $n = 970$ ).

	No parental mental illness ( $n = 883$ )	Parental mental illness ( $n = 87$ )	<i>p</i> -Value
<b>Sociodemographic variables</b>			
Gender: female, % ( $n$ )	<b>59.3 (524)</b>	<b>71.3 (62)</b>	<b>.030</b>
Age, mean (95% CI)	17.29 (17.23, 17.34)	17.37 (17.19, 17.55)	.364
Perceived economic well-being, % ( $n$ )			<b>.040</b>
Poorer than others	<b>12.5 (107)</b>	<b>21.7 (18)</b>	
Equal to others	<b>66.1 (566)</b>	<b>61.4 (51)</b>	
Better than others	<b>21.4 (183)</b>	<b>16.9 (14)</b>	
Maternal educational level, % ( $n$ )			.070
Primary school	14.7 (89)	17.7 (11)	
High school	40.5 (245)	51.6 (32)	
University/college	44.8 (271)	30.6 (19)	
Paternal educational level, % ( $n$ )			.562
Primary school	14.4 (80)	17.3 (9)	
High school	50.1 (278)	50.0 (26)	
University/college	35.5 (197)	32.7 (17)	
Parents living together, % ( $n$ )	<b>49.5 (403)</b>	<b>25.9 (21)</b>	<b>&lt;.001</b>
<b>Characteristics of CAMHS-contact</b>			
Months of contact with CAMHS, M (95% CI)	<b>10.88 (10.23, 11.53)</b>	<b>17.16 (14.35, 19.97)</b>	<b>&lt;.001</b>
Number of CAMHS-admissions, M (95% CI)	<b>1.32 (1.27, 1.36)</b>	<b>1.57 (1.39, 1.76)</b>	<b>.001</b>

CAMHS: child and adolescent mental health services; y@h: the youth@hordaland-survey.

Bold fonts denote statistically significant group differences.



**Figure 1.** Adolescents' duration of contact with CAMHS in the number of months across parental mental illness status ( $n = 970$ ). *Note.* CAMHS: child and adolescent mental health services. Numbers provided above bars present frequencies in percent. *p*-Value for linear trend  $<0.001$ .

mental illness. As demonstrated, adolescents with parental mental illness had longer-lasting contact with the CAMHS compared with adolescents with parents without mental illness ( $p \leq 0.001$ ; Table 1). They also had a higher number of distinct CAMHS admissions ( $p \leq 0.001$ ).

**Table 2.** Number of psychiatric diagnoses among adolescents with and without parents with a mental illness ( $n = 970$ ).

	No parental mental illness ( $n = 883$ )	Parental mental illness ( $n = 87$ )	$p$ -Value
Number of psychiatric diagnoses, % ( $n$ )			<.001
No Axis 1-diagnosis	<b>34.9 (308)</b>	<b>10.3 (9)</b>	
1 psychiatric diagnosis	<b>42.9 (379)</b>	<b>47.1 (41)</b>	
2 psychiatric diagnoses	<b>17.0 (150)</b>	<b>24.1 (21)</b>	
3 or more psychiatric diagnoses	<b>5.2 (46)</b>	<b>18.4 (16)</b>	
Mean ( $SD$ )	0.93 (0.03)	1.51 (0.91)	

Bold represents statistically significant associations from Chi-square test.

### **Psychiatric comorbidity**

Adolescents with a parent with mental illness had a higher number of psychiatric diagnoses ( $M = 1.52$ ;  $SD = 0.91$ ) compared with their peers in CAMHS ( $M = 0.91$ ;  $SD = 0.03$ ;  $p < 0.001$ ) (Table 2). Psychiatric comorbidity (i.e., having at least two psychiatric diagnoses across different categories) was almost twice as high for those with a parent with mental illness (42.5%,  $n = 37$ ), compared to adolescents with parents without mental illness (22.2%,  $n = 196$ ).

### **Associations between parental mental illness and offspring psychiatric diagnoses**

Table 3 shows the total distribution of psychiatric diagnoses in the study sample and stratified by parental mental illness status. Adolescents with parental mental illness had higher rates of anxiety-, mood-, conduct-, and trauma-related disorders (all  $ps < 0.05$ ), as well as lower rates of “no Axis 1 psychiatric disorders” ( $p < 0.001$ ), compared with individuals with parents without mental illness.

In both unadjusted analyses and after adjustment for parental SES, parental mental illness was associated with higher odds for mood disorders (AOR = 2.42,  $p < 0.01$ ) and conduct disorders (AOR = 3.73,  $p < 0.05$ ). In unadjusted logistic regression analyses, parental mental illness was associated with anxiety disorders (OR = 2.28,  $p = 0.001$ ), trauma-related disorders (OR = 2.13,  $p < 0.05$ ), and ADHD (girls only; OR = 2.02,  $p < 0.05$ ), but these associations were not statistically significant after the adjustment for parental SES. No significant associations were found between parental mental illness status and ADHD (boys only), ASD, and eating disorders. See Table 4 for details.

## **Discussion**

The present study aimed to investigate patterns of psychiatric disorders in adolescents with parents with mental illness employing unique data with a linkage between a large population-based survey and a registry on

**Table 3.** Distribution of psychiatric disorders among adolescents by status of parental mental illness ( $n = 970$ )<sup>a</sup>.

	Total CAMHS- population ( $n = 970$ ) % (n)	No parental mental illness ( $n = 883$ ) % (n)	Parental mental illness ( $n = 87$ ) % (n)	<i>p</i> -Value <sup>b</sup>
Anxiety disorders	18.6 (180)	<b>17.2 (152)</b>	<b>32.2 (28)</b>	<b>&lt;.001</b>
Social anxiety disorder	5.1 (49)	4.5 (40)	10.3 (9)	–
Generalized anxiety disorder	2.2 (21)	1.8 (16)	5.8 (5)	–
Other phobic disorder	2.8 (27)	2.6 (23)	4.6 (4)	–
Obsessive/compulsive disorder	2.2 (21)	2.2 (19)	2.3 (2)	–
Other anxiety disorder	8.5 (82)	7.8 (69)	14.9 (13)	–
Mood disorders	24.9 (241)	<b>23.3 (206)</b>	<b>40.2 (35)</b>	<b>&lt;.001</b>
Unipolar depression	20.0 (194)	18.9 (167)	31.0 (27)	–
Bipolar disorder	1.9 (18)	1.7 (15)	3.5 (3)	–
Other mood disorders	5.1 (49)	4.5 (40)	10.3 (9)	–
ADHD	18.3 (177)	18.0 (159)	20.7 (18)	.537
Conduct disorders	3.9 (38)	<b>3.5 (31)</b>	<b>8.1 (7)</b>	<b>.038</b>
ASD	5.8 (55)	5.7 (50)	5.8 (5)	.991
Asperger syndrome	4.2 (41)	4.2 (37)	4.6 (4)	–
Other autism disorders	1.8 (17)	1.8 (16)	1.2 (1)	–
Eating disorders	6.0 (58)	5.8 (51)	8.1 (7)	.395
Anorexia nervosa	3.0 (29)	3.1 (27)	2.3 (2)	–
Bulimia nervosa	0.8 (8)	0.7 (6)	2.3 (2)	–
Other eating disorders	2.9 (28)	2.7 (24)	4.6 (4)	–
Trauma-related disorders	9.0 (87)	<b>8.3 (73)</b>	<b>16.1 (14)</b>	<b>.015</b>
Post-traumatic stress disorders	2.8 (27)	2.7 (24)	3.5 (3)	–
Adjustment disorders	5.1 (49)	4.4 (39)	11.5 (10)	–
Other trauma disorders	1.7 (16)	1.6 (14)	2.3 (2)	–
Psychotic disorders	2.4 (23)	2.2 (19)	4.6 (4)	n/a <sup>c</sup>
No psychiatric diagnosis	32.7 (317)	<b>34.9 (308)</b>	<b>10.3 (9)</b>	<b>&lt;.001</b>

CAMHS: child and adolescent mental health services; ADHD: attention-deficit/hyperactivity disorder; ASD: autism-spectrum disorders.

Bold fonts denote statistically significant differences.

<sup>a</sup>“Other psychiatric disorders” ( $n = 105$ ) is excluded from this analysis due to considerable conceptual heterogeneity.

<sup>b</sup>Calculated from Chi-square tests for independence comparing adolescents with parents with and without mental illness. Group differences are only calculated for main categories (i.e., not sub-categories) of the psychiatric diagnoses.

<sup>c</sup>*p*-Values are not calculated for psychotic disorders due to few cases.

**Table 4.** Logistic regression analyses for associations between parental mental illness-status and youth psychiatric disorders ( $n = 970$ ).

	Unadjusted model OR (95% CI)	<i>p</i> -Value	Adjusted for parental SES AOR (95% CI)	<i>p</i> -Value
Anxiety disorders, <i>n</i> (%)	<b>2.28 (1.41, 3.70)</b>	<b>.001</b>	1.47 (0.73, 2.95)	.278
Mood disorders, <i>n</i> (%)	<b>2.21 (1.40, 3.49)</b>	<b>&lt;.001</b>	<b>2.42 (1.31, 4.48)</b>	<b>.005</b>
ADHD: boys <sup>a</sup> , <i>n</i> (%)	0.54 (0.18, 1.63)	.278	0.68 (0.14, 3.42)	.644
ADHD: girls <sup>a</sup> , <i>n</i> (%)	<b>2.02 (1.06, 3.87)</b>	<b>.033</b>	1.24 (0.48, 3.19)	.661
Conduct disorders, <i>n</i> (%)	<b>2.40 (1.03, 5.64)</b>	<b>.043</b>	<b>3.73 (1.14, 12.23)</b>	<b>.030</b>
ASD, <i>n</i> (%)	1.02 (0.39, 2.62)	.974	1.72 (0.57, 5.21)	.337
Eating disorders, <i>n</i> (%)	1.43 (0.63, 3.25)	.396	1.59 (0.58, 4.36)	.368
Trauma-related disorders, <i>n</i> (%)	<b>2.13 (1.14, 3.96)</b>	<b>.017</b>	1.39 (0.55, 3.50)	.489

OR: odds ratio; AOR: adjusted odds ratio; ADHD: attention-deficit/hyperactivity disorders; ASD: autism-spectrum disorders; SES: socioeconomic status.

Psychotic disorders excluded from analysis due to few cases ( $n = 23$ ). “Other psychiatric disorders” ( $n = 105$ ) excluded from analyses due to considerable conceptual heterogeneity.

Bold fonts denote statistically significant associations.

<sup>a</sup>Stratified by gender due to significant interaction between parental mental illness and gender on association with ADHD ( $p = 0.043$ ).

CAMHS-use. It is well-established that the rate of parents with a mental illness in a population of adolescents with mental illness is higher than in the general population. Hence, it is noteworthy that only 9% of adolescents in CAMHS were registered with a parent with mental illness. This relatively low rate contrasts previous findings that show rates of serious mental illness and/or substance abuse problems at 11–12% in the general youth population (Pierce et al., 2020; Torvik & Rognmo, 2011), while as many as 66–71% of youth attending CAMHS have been shown to have parents with either diagnosed or suspected mental illness (Baker & Lees, 2014; Reay et al., 2015). Thus, our study suggests a considerable under-detection of parental mental illness in Norwegian CAMHS. Our findings further indicate that adolescents with a parent with mental illness constitute an important sub-group of treatment-seeking adolescents—with distinct psychosocial characteristics and with more extensive psychopathology and comorbidity compared with other individuals receiving CAMHS.

### ***Psychosocial characteristics***

Adolescents with parents with mental illness had more often poorer perceived economic well-being compared with other adolescents in CAMHS. This finding is well-aligned with results from a large Swedish study which indicated that children with parents with mental illness, in general, had a markedly higher risk of broad socioeconomic adversity compared to other children (Pierce et al., 2020). Furthermore, we found that a large proportion of the parental mental illness-group had parents that did not live together (74 vs. 50% among other adolescents in CAMHS). This finding is closely aligned with a previous study that found a particularly high level of parental divorce or separation (68%) among youth that had parents with mental illness in a CAMHS-setting (Robson & Gingell, 2012). Finally, adolescents with parental mental illness comprised more girls than other adolescents receiving CAMHS. This finding may be due to an under-utilization of specialized mental health care services for boys with parents with mental illness, compared with their female counterparts. However, this is mere speculation as our data do not allow for specific explanations for this gender difference.

### ***Patterns of psychiatric diagnoses***

As expected, an adolescent with a parent with mental illness had an increased risk of a range of psychiatric diagnoses compared with other adolescents receiving CAMHS. More specifically, anxiety-, mood-, conduct-, and trauma-related disorders were more common among adolescents with

parental mental illness. As such, our findings are consistent with previous studies suggesting that parental mental illness is a risk factor for a broad spectrum of psychiatric diagnoses in offspring [1, 4, 6–10], including anxiety, depression, and conduct problems (Avenevoli & Merikangas, 2006; McLaughlin et al., 2012; Wickramaratne & Weissman, 1998). The findings of the present study align with these previous findings but add novel insights in the respect that our data are from a CAMHS-setting.

We also found increased rates of trauma-related disorders among adolescents with parental mental illness compared with other adolescents attending CAMHS. This finding lends some support to a previous study that reported that parental trauma-related disorders were associated with offspring trauma-related disorders (Yehuda et al., 2001). However, our study adds to previous research by demonstrating a positive association between a generalized measure of parental mental illness and offspring trauma-related disorders. Furthermore, adolescents with a parent with mental illness also had an increased risk of ADHD, but only among girls. Given the high heritability of ADHD (Faraone et al., 2005) we would expect parental mental illness to be associated with increased risk for this disorder in both genders. However, the relatively low number of boys in the parental mental illness-group may potentially explain this finding and should be noted as a limitation of the present study.

We did not find any increased risk of ASD or eating disorders among adolescents with parental mental illness compared with other adolescents attending CAMHS. It is difficult to provide firm conclusions on how to interpret these findings. Our data did not include information on specific types of parental mental illness, limiting our ability to assess why parental mental illness was not associated with these particular types of offspring psychiatric diagnoses. Further studies are needed to validate these findings, as well as to explore potential mechanisms involved.

### ***Psychiatric comorbidity***

A higher degree of psychiatric comorbidity was found among adolescents with parental mental illness compared with their peers. Specifically, psychiatric comorbidity was approximately twice as common among adolescents with a parent with mental illness. These findings may indicate more severe psychiatric disorders and potentially more complex disorders among offspring of parents with mental illness. This interpretation is actualized by our finding that the duration of registered contact with CAMHS was longer, potentially indicating a prolonged need for mental health services compared with other adolescents in CAMHS. In addition, adolescents with a parent with mental illness had a higher number of distinct admissions to

CAMHS, indicating either (i) referrals within the CAMHS, such as from outpatient care to inpatient psychiatric hospital care, (ii) removal from a clinic at one geographic location to another, and/or (iii) re-referral to CAMHS after the termination of contact. Our data did not indicate which of these admission types that were increased for adolescents with parents with mental illnesses. This finding therefore should be elaborated in future studies.

### ***Parental socioeconomic status***

Parental SES attenuated the associations between parental mental illness and anxiety disorders, ADHD, and trauma-related disorders in our sample, while associations between parental mental illness and mood- as well as conduct disorders showed a suppression effect (i.e., the magnitude of the associations increased after the adjustment of parental SES). These findings highlight the complex interplay between SES and parental mental illness in their associations with offspring psychiatric disorders. Although our study cannot determine the causal relationship between these variables, it is interesting that parental mental illness was robustly associated with mood- and conduct disorders, independent of parental SES. A previous study found that both parental mental illness and low SES independently predicted offspring's internalizing and externalizing mental health problems, while the interaction between low SES and parental mental illness did not add anything beyond the main effects of low SES and parental mental illness on offspring psychopathology (Amone-P'Olak et al., 2011). As the literature is scarce in this respect, more research is needed on how parental mental illness and parental SES potentially interact in the prediction of offspring psychopathology.

### ***Clinical and scientific implications***

Previous studies have pointed to the need for more intense treatments for adolescents with parental mental illness compared with other youth with psychiatric disorders, as this group shows poorer outcomes on a range of mental health problems (Wesseldijk et al., 2018). In the present study, adolescents with parental mental illness received interventions with a longer duration from CAMHS compared with other adolescents. This finding suggests that once admitted to CAMHS, adolescents with parental mental illness are prioritized and receive extensive services. However, only 9% of adolescents in our CAMHS sample were registered with a parent with mental illness, which in light of previous reports most likely represent a gross underestimate of the true rate (Baker & Lees, 2014; Reay et al., 2015). On the other hand, it is likely that the present study thus reports on families

where the parental mental illness is quite severe. This should be considered when interpreting our results.

To meet the challenge of undetected parental mental illness in specialized mental health services, several scholars have argued that the best location and time to screen parents' mental health is in CAMHS and during the time when the child is assessed (Swartz et al., 2014; Wesseldijk et al., 2018). Particularly, when youth are in contact with CAMHS for treatment of psychopathology, this represents a potential entry-point for engaging also with parents who experience mental health problems that would otherwise go unrecognized and untreated (Campbell et al., 2021; Swartz et al., 2014). To bridge the gap between CAMHS and adult mental health services, the need for inter-agency collaboration has been recommended in a range of studies (Campbell et al., 2021; Robson & Gingell, 2012; Wesseldijk et al., 2018). Such efforts may benefit adolescents of parents with mental disorders, as a family-oriented approach to a larger extent would serve the needs of the whole family. Finally, the mental health of parents needs to be considered when treating children and adolescents, to develop and support parents' capacities to carry out their parental role (Agha et al., 2013; Campbell et al., 2021; Robson & Gingell, 2012).

A related implication of the low rate of parental mental illness in the present study is that a large number of adolescents living with parents with mental illness do not receive specialized mental health care services. Parents with severe mental illness are often reluctant to seek help on behalf of their offspring (Cowling et al., 2004), and efforts to strengthen both preventive interventions as well as mental health service utilization for this group of adolescents are important. We recommend that future research investigates the actual rate of mental health service utilization among children and youth with a parent with mental illness in both Norway and internationally.

Furthermore, the high degree of psychopathology and psychiatric comorbidity among adolescents with parental mental illness points to the need for extensive mental health services for this group, as well as preventive measures (Hosman et al., 2009; van Doesum & Hosman, 2009). Interventions to prevent mental health problems in offspring of parents with mental illness appear to be effective (Compas et al., 2009; Siegenthaler et al., 2012). As parent psychopathology may affect offspring mental health from early on in the child's life course (Manning & Gregoire, 2006), there is a need for prevention initiatives to start long before mental health problems are evident among the offspring in families with parental mental illness. Early detection and targeted prevention can be achieved if health workers who treat adult patients also focus on his/her parenting role as well as the offspring's health and needs. Notably, health personnel in Norway has, since 2010, had a duty to support and attend to the needs of offspring of parents with mental illnesses (Helse-og omsorgsdepartementet

[Ministry of Health & Care Services], 1997; Skogøy et al., 2018). We, therefore, underscore the need for studies that investigate the extent of preventive services children and adolescents with a parent with mental illness receive, as well as the effectiveness of these measures.

### **Strengths and limitations**

A strength of the present study was the linkage between a large population-based sample and official registry data from CAMHS including formal psychiatric diagnoses. The study also had some limitations. Most importantly, the measure of parental mental illness has several potentially problematic aspects relating to its reliability and validity. Our measure was based on professional clinicians' classification on ICD-10 Axis 5 for 'adverse familial and environmental conditions'. While satisfactory reliability and validity of this psychosocial axis have been reported (van Goor-Lambo et al., 1994) and the report rates of Axis 5 are acceptable (Indergård et al., 2019), it should be noted that one report shed doubt on the reliability of this scale (Willemse et al., 2003). It is likely that not all adolescents in the study sample with parental mental illness were detected, leading to underestimation of the rate of parental mental illness in the study sample. On the other hand, when clinical professionals have determined that an adolescent has a parent with mental illness, these cases may have been related to rather potent manifestations of these problems. It can therefore be argued that cases of parental mental illness in our sample have high ecological validity. However, our data did not specify the parents' diagnoses limiting the possibility of examining the relationship between the type of diagnosis in the parent vs. the child's diagnosis. The generalized measure of parental mental illness in our study and the lack of genetic variables and information on family dynamic/interaction, limit the possibility of interpreting our results in terms of mechanisms involved.

Furthermore, the response rate of the population-based y@h-study was 53%. As our sample of adolescents receiving CAMHS was retrieved from a linkage between the y@h and official registry, our study sample does not comprise all adolescents receiving psychiatric treatment in the target population. As socioeconomic status is higher in the y@h-survey than expected from national statistics of the general Norwegian population (Bøe et al., 2017), and as socioeconomic status is related to psychiatric disorders (Bøe et al., 2012), we cannot rule out that our study sample was somewhat more healthy than the true group of adolescents in CAMHS. This limitation may bias some of the prevalence rates in our study sample and these rates should therefore be treated with caution. On the other hand, representativeness issues are less prone to affect associations of variables (Wolke et al., 2009). In addition, not all individuals in the y@h-sample consented



to the linkage with registry-data, perhaps further limiting the representativeness of the sample. However, individuals that did not provide consent were fairly similar to the y@h-sample (Heradstveit, 2019), thus reducing the potential for non-consent to seriously bias our study sample.

Finally, we cannot determine the actual CAMHS utilization rates in offspring of parents with mental illness in the total population. In short, we advise that our findings are interpreted with caution due to the above-mentioned limitations. Future studies are encouraged to include psychometric robust measures of parental mental illness. Also, studies that compare the prevalence of parental mental illness across individuals within and outside of CAMHS would provide important contextual information that would further aid the interpretation of our findings.

## Conclusion

Adolescents with parental mental illness receiving specialized mental health services had a higher level of psychopathology compared to adolescents with parents without parental mental illness. They had a higher number of psychiatric diagnoses, more psychiatric comorbidity; higher prevalence of anxiety-, mood-, conduct-, ADHD-, and trauma-related disorders; and they received mental health services for a longer duration, compared with adolescents without parental mental illness in a CAMHS setting. Mental illness in parents needs to be given attention in mental health services for children and adolescents, whereas adult mental health services need to emphasize parenting and child outcomes when parents are in treatment. More research is needed on mental health service utilization among children and adolescents with a parent with mental illness. Also, the extent and effect of preventive services and treatment strategies for this group need further investigation.

## Acknowledgments

We thank the Bergen Child Study at the Regional Centre for Child and Youth Mental Health and Child Welfare at NORCE Norwegian Research Centre for collecting the data, and for making it available for this study.

## Disclosure statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Funding

This work was supported by the Western Norway Regional Health Authority under grant number “F-12136”.

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## Data availability statement

The datasets for this manuscript are not publicly available due to legal restrictions from the owner of the data set for the patient registry.

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## Appendix 1.

### Operationalization of broader diagnostic categories and sub-categories in the adolescent sample ( $n = 970$ )

Diagnostic category <sup>a</sup>	ICD-10 code	ICD-10 diagnosis
<b>Anxiety disorders</b>		
<i>Social phobia</i>	F401	Social phobia
<i>Generalized anxiety disorder</i>	F411	Generalized anxiety disorder
<i>Other phobic disorders</i>	F400	Agoraphobia
	F4000	Agoraphobia
	F402	Specific (isolated) phobias
	F408	Other phobic anxiety disorders
	F409	Phobic anxiety disorder, unspecified
<i>Obsessive/compulsive disorders</i>	F420	Predominantly obsessional thoughts or ruminations
	F421	Predominantly compulsive acts [obsessional rituals]
	F422	Mixed obsessional thoughts and acts
	F429	Obsessive-compulsive disorder, unspecified
<i>Other anxiety disorders</i>	F410	Panic disorder [episodic paroxysmal anxiety]
	F412	Mixed anxiety and depressive disorder
	F413	Other mixed anxiety disorders
	F418	Other specified anxiety disorders
	F419	Anxiety disorder, unspecified
	F452	Hypochondriacal disorders
	F930	Separation anxiety disorder of childhood
	F931	Phobic anxiety disorder of childhood
	F932	Social anxiety disorder of childhood
	F940	Elective mutism
<b>Mood disorders</b>		
<i>Unipolar depression</i>	F320	Mild depressive episode
	F3200	Mild depressive episode without somatic syndrome
	F3201	Mild depressive episode with somatic syndrome
	F321	Moderate depressive episode
	F322	Severe depressive episode without psychotic symptoms
	F323	Major depressive disorder, single episode, severe with psychotic features
	F328	Other depressive episodes
	F329	Depressive episode, unspecified
	F330	Major depressive disorder, recurrent, mild
	F331	Recurrent depressive disorder, current episode moderate
	F3310	Recurrent depressive disorder, current episode moderate, without somatic syndrome

(continued)

Continued.

Diagnostic category <sup>a</sup>	ICD-10 code	ICD-10 diagnosis	
<i>Bipolar disorder</i>	F332	Recurrent depressive disorder, current episode severe without psychotic symptoms	
	F333	Recurrent depressive disorder, current episode severe with psychotic symptoms	
	F338	Other recurrent depressive disorders	
	F339	Major depressive disorder, recurrent, unspecified	
	F310	Bipolar affective disorder, current episode hypomanic	
	F311	Bipolar affective disorder, current episode manic without psychotic symptoms	
	F312	Bipolar disorder, current episode manic severe with psychotic features	
	F313	Bipolar affective disorder, current episode mild or moderate depression	
	F314	Bipolar disorder, current episode depressed, severe, without psychotic features	
	F316	Bipolar affective disorder, current episode mixed	
	F317	Bipolar affective disorder, currently in remission	
	F318	Other bipolar disorders	
	F319	Bipolar affective disorder, unspecified	
	<i>Other mood disorders</i>	F341	Dysthymic disorder
F348		Other persistent mood [affective] disorders	
F349		Persistent mood [affective] disorder, unspecified	
F381		Other recurrent mood [affective] disorders	
F412		Mixed anxiety and depressive disorder	
Trauma-related disorders <i>Post-traumatic stress-disorder (PTSD)</i> <i>Adjustment disorders</i>		F431	Post-traumatic stress disorder
		F4320	Adjustment disorder, unspecified
		F4321	Adjustment disorder with depressed mood
	F4322	Adjustment disorder with anxiety	
	F4323	Adjustment disorder with mixed anxiety and depressed mood	
	F4324	Adjustment disorder with disturbance of conduct	
	F4325	Adjustment disorder with mixed disturbance of emotions and conduct	
	<i>Other trauma-related disorders</i>	F430	Acute stress reaction
		F438	Other reactions to severe stress
		F439	Reaction to severe stress, unspecified
Eating disorders <i>Anorexia nervosa</i>	F500	Anorexia nervosa	
	F501	Atypical anorexia nervosa	
<i>Bulimia nervosa</i> <i>Other eating disorders</i>	F503	Atypical bulimia nervosa	
	F504	Overeating associated with other psychological disturbances	
	F505	Vomiting associated with other psychological disturbances	
	F509	Eating disorder, unspecified	
Autism-spectrum disorders (ASD) <i>Asperger syndrome</i> <i>Other autism disorders</i>	F845	Asperger syndrome	
	F840	Childhood autism	
	F841	Atypical autism	
	F848	Other pervasive developmental disorders	
	F849	Pervasive developmental disorder, unspecified	
Conduct disorders <i>(No sub-categories)</i>	F910	Conduct disorder confined to family context	
	F911	Unsocialized conduct disorder	
	F912	Conduct disorder, adolescent-onset type	
	F913	Oppositional defiant disorder	
	F918	Other conduct disorders	
	F919	Conduct disorder, unspecified	
	F920	Depressive conduct disorder	
	F928	Other mixed disorders of conduct and emotions	
	F929	Mixed disorder of conduct and emotions, unspecified	

*(continued)*

Continued.

Diagnostic category <sup>a</sup>	ICD-10 code	ICD-10 diagnosis
Attention-deficit/hyperactivity disorder (ADHD) (No sub-categories)	F900	Hyperkinetic disorders
	F901	Disturbance of activity and attention
	F908	Other hyperkinetic disorders
	F909	Attention-deficit hyperactivity disorder, unspecified type
Psychotic disorders (No sub-categories)	F203	Undifferentiated schizophrenia
	F208	Other schizophrenia
	F209	Schizophrenia, unspecified
	F2090	Schizophrenia, unspecified
	F21	Schizotypal disorder
	F231	Acute polymorphic psychotic disorder with symptoms of schizophrenia
	F233	Acute paranoid psychosis without acute stressor
	F239	Acute and transient psychotic disorder, unspecified
	F2390	Acute and transient psychotic disorder, unspecified
	F28	Other psychotic disorder not due to a substance or known physiological condition
	F29	Unspecified non-organic psychosis
	F312	Bipolar disorder, current episode manic severe with psychotic features
	F323	Major depressive disorder, single episode, severe with psychotic features
	F333	Recurrent depressive disorder, current episode severe with psychotic symptoms
Other Axis 1 psychiatric diagnoses (No sub-categories)	F448	Other dissociative and conversion disorders
	F449	Dissociative [conversion] disorder, unspecified
	F454	Persistent somatoform pain disorder
	F458	Other somatoform disorders
	F480	Neurasthenia
	F489	Neurotic disorder, unspecified
	F510	Non-organic insomnia
	F512	Non-organic disorder of the sleep-wake schedule
	F54	Psychological and behavioral factors associated with disorders or diseases classified elsewhere
	F601	Schizoid personality disorder
	F633	Trichotillomania
	F640	Transsexualism
	F659	Disorder of sexual preference, unspecified
	F933	Sibling rivalry disorder
	F938	Other childhood emotional disorders
	F939	Childhood emotional disorder, unspecified
	F941	Reactive attachment disorder of childhood
	F942	Disinhibited attachment disorder of childhood
	F948	Other childhood disorders of social functioning
	F950	Transient tic disorder
	F951	Chronic motor or vocal tic disorder
	F952	Combined vocal and multiple motor tic disorder [de la Tourette]
	F980	Non-organic enuresis
	F981	Non-organic encopresis
	F988	Other specified behavioral and emotional disorders with onset usually occurring in childhood and adolescence
	F989	Unspecified behavioral and emotional disorders with onset usually occurring in childhood and adolescence
	F99	Mental disorder, not otherwise specified
	R418	Other symptoms and signs involving cognitive functions and awareness

(continued)



Continued.

<b>Diagnostic category<sup>a</sup></b>	<b>ICD-10 code</b>	<b>ICD-10 diagnosis</b>
	R440	Auditory hallucinations
	R441	Visual hallucinations
	R452	Unhappiness
	R454	Irritability and anger
	R455	Hostility
	R457	State of emotional shock and stress, unspecified
	R458	Other symptoms and signs involving emotional state
	R466	Undue concern and preoccupation with stressful events

<sup>a</sup>The main diagnostic categories are marked with bold fonts. Sub-categories are marked with italic fonts.