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Health care utilization in children and adolescents with psychiatric disorders

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Abstract

Objective: Mental illness is increasing among young people and likewise the request for health care services. At the same time, somatic comorbidity is common in children and adolescents with psychiatric disorders. There is a lack of studies on health care use in children and adolescents, and the hypothesis was that children and adolescents with psychiatric disorders use more primary-, and specialized somatic health care compared to children without psychiatric disorders.

Methods: In this retrospective population-based register study, all individuals aged 3–17 years living in Västra Götaland region in Sweden in 2017 were included ($n = 298{,}877$). Linear and Poisson regression were used to compare health care use during 2016–2018 between children with and without psychiatric diagnoses, controlling for age and gender. The results were reported as unstandardised beta coefficient (ß) and adjusted prevalence ratio (aPR) respectively.

Results: Having a psychiatric diagnosis was associated with more primary care visits (ß 2.35, 95% CI 2.30–2.40). This applied to most diagnoses investigated. Girls had more primary care visits than boys. Likewise, individuals with psychiatric diagnoses had more specialized somatic outpatient care (ß 1.70, 95% CI 1.67–1.73), both planned and unplanned (ß 1.23, 95% CI 1.21–1.25; ß 0.18, 95% CI 0.17–0.19). Somatic inpatient care was more common in those having a psychiatric diagnosis (aPR 1.65, 95% CI 1.58–1.72), with the diagnoses of psychosis and substance use exerting the greatest risk.

Conclusions: Psychiatric diagnoses were associated with increased primary-, somatic outpatient- as well as somatic inpatient care. Increased awareness of comorbidity and easy access to relevant health care could be beneficial for patients and caregivers. The results call for a review of current health care systems with distinct division between medical disciplines and levels of health care.

KEYWORDS
children, health care utilization, psychiatric disorders

1 | INTRODUCTION

Knowledge on health care utilization is essential for planning and prioritizing resources in health care. Specifically, information on patterns of health care use in individuals with disorders with a high degree of disability or comorbidity could be of interest. Children with psychiatric disorders have an increased risk for somatic comorbidity,[1,2] plausibly increasing health care utilization in this group. In a previous study we investigated somatic-psychiatric comorbidity and found associations between a wide range of somatic and psychiatric conditions during all of childhood.[2] Moreover, mental health problems are increasing among youth in Sweden. Reports from Europe, but also Sweden specifically, indicate that the needs of specialized child and adolescent mental health care (CAMH) cannot be met.[3,4] First line mental health services for children are usually organized within primary health care, but the pathways into specialized CAMH services are heterogenous. Increased knowledge on where and to what extent children and adolescents with psychiatric diagnoses seek health care would be valuable in order to better coordinate and optimize health care for this group.

Previous studies indicate increased health care utilization in children and adolescents with psychiatric diagnoses, however, the vast majority of studies are conducted on the adult population. In a recent systematic review, somatic-psychiatric comorbidity was found to be associated with longer length of stay (LOS), higher costs and more rehospitalizations.[5] Similarly, a meta-analysis specifically studying the impact of severe mental illness on service use found significant impact on the use of somatic health care services.[6] The authors conclude that existing studies are heterogenous and call for high quality research including subgroup analyses to enable targeted interventions for these patients.

When it comes to children and adolescents, the literature is sparser. Mental health conditions have been found to increase LOS and total hospital costs (THC) for somatic conditions.[7,8] The conditions associated with the highest additional resource use were depression, anxiety and substance use.[7] Wilkes et al. found billing costs for somatic disorders to be 1.8 times greater for individuals with a psychiatric disorder compared to those without psychiatric disorders.[1] A large case control study in Australia found children and adolescents hospitalized for mental disorders to have more subsequent emergency department visits, hospital admissions and use of ambulatory services, however this study included both somatic and mental health care use.[9] In a Swedish study on 3100 preschool children, children with comorbid states were found to have made more visits to their general practitioner and had more inpatient care than children without mental health- or somatic problems, however, no comparison was made between children with and without mental health problems.[10]

Given the known comorbidity and the lack of studies on health care use in children, the aim of this study was to describe patterns and characteristics of health care use in children and adolescents with psychiatric disorders in a population-based retrospective register study.

Significant outcomes

- Psychiatric diagnoses were associated with increased primary-, somatic outpatient- and somatic inpatient care.
- Girls had more primary care visits compared to boys, while boys had more planned somatic outpatient care than girls.
- Increased awareness of comorbidity and access to relevant health care could be beneficial for patients and care givers.

Limitations

- Sociodemographic data was not available, and thus not included in the analyses.
- The reason for primary care visits (i.e., psychiatric or somatic) was not considered.

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2 | MATERIALS AND METHODS

2.1 | Participants

The study population was based on individuals aged 3–17 years, who were residents of Västra Götaland in 2017. Region Västra Götaland is geographically, demographically, and socioeconomically representative of Sweden, with complete health care provision for children and adolescents. All individuals aged 3–17 years in 2017 who visited primary or specialist health care in 2016–2018 ($n = 294{,}021$) were included in the study. Data on diagnoses, type of visit or inpatient care, age and gender were obtained from the data base Vega. Based on gender and age, the study population was then completed with those individuals aged 3–17 in region Västra Götaland in 2017 who had no health care visits or contacts during 2016–2018, resulting in a population of 307,638 individuals. The latter information was retrieved from Statistics Sweden. Participants with eating disorder (F50), intellectual disability (F70-79) or autism

spectrum disorder (ASD) (F84) were excluded from the study. This is because the regional care of Västra Götaland is structured in such a way that ASD and intellectual disability are, or were at the time of inclusion, handled in the somatic care while eating disorders are associated with somatic complications. After exclusions, 298,877 participants remained. For participant characteristics see Table 1.

2.2 | The Swedish health care system

The health care system in Sweden is tax funded and organized into primary care, specialized outpatient care and inpatient care. Health care is free of charge up to 18 years of age. Primary care includes child health care centres (for children up to age 6), youth clinics and in region Västra Götaland also first-line mental health care for children and adolescents. This implies for example initial assessment of mental health problems and short-term psychological treatment of mild to moderate depression and anxiety conditions.

2.3 | The regional health care data base Vega

Vega includes information about all primary and specialist health care in Region Västra Götaland, Sweden,

and covers all hospitals, specialized in- and outpatient care, and all private and public primary healthcare centres in the region. The database includes information about place of residence, age, sex, healthcare contacts (e.g., visits, digital contacts etc.), and diagnoses. Diagnoses included in Vega are coded according to the International Statistical Classification of Diseases and Related Health Problems 10th revision, ICD-10.

2.4 | Variables

Psychiatric diagnoses included were chosen to cover common childhood psychiatric conditions (Table 2). To simplify for the reader, the term *anxiety* was used for neurotic, stress-related and somatoform disorders, and *psychotic conditions* was used for schizophrenia, schizotypal and delusional disorders. Psychiatric diagnoses were both analyzed separately and grouped together into a dichotomous variable of psychiatric diagnosis or no psychiatric diagnosis. The outcome of health care visits was examined as the level of primary health care visits and planned and unplanned somatic in- and outpatient care visits.

2.5 | Statistical analyses

The association between psychiatric diagnoses and the level of health care visits was examined using linear

TABLE 1 Background characteristics for individuals with and without a psychiatric diagnosis.

	No psychiatric diagnosis (*n* = 273,882) *n* (%)/*M* (SD)	Psychiatric diagnosis (*n* = 24,995) *n* (%)/*M*(SD)	*p*
Age, *n*			<0.001
3–6 years	80,084 (29.2)	2637 (10.6)	
7–12 years	104,347 (38.1)	9407 (37.6)	
13–17 years	89,451 (32.7)	12,951 (51.8)	
Gender, *n*			0.028
Girls	133,535 (48.8)	12,007 (48.0)	
Boys	140,280 (51.2)	12,986 (52.0)	
Primary care visits, *M*	5.3 (6.5)	8.1 (8.3)	<0.001
Primary care visits physician, *M*	2.5 (2.8)	3.4 (3.2)	<0.001
Primary care visits non physician, *M*	2.9 (5.3)	4.7 (6.8)	<0.001
Somatic outpatient care visits, *M*	3.0 (7.2)	6.0 (10.2)	<0.001
Planned somatic outpatient care visits, *M*	2.2 (6.2)	4.8 (9.2)	<0.001
Unplanned somatic outpatient care visits, *M*	0.6 (1.2)	1.0 (1.8)	<0.001
Somatic inpatient care visits, *M*	0.1 (0.6)	0.1 (0.6)	<0.001

Note: *p*-values are derived from chi-square test or Mann–Whitney *U* test.

regressions adjusting for age and gender. Due to non-normal distribution in most outcomes, all outcomes were trimmed (i.e., outliers were excluded) and were estimated using robust estimator from the MASS R package.[11] Because of the robust estimation, R^2 is not reported. Potential associations between psychiatric diagnoses, gender and age were examined in the analyses. The results from the robust regressions were reported as unstandardised beta coefficient (ß) representing numbers of visits. Due to too skewed distribution in somatic inpatient care, this variable was recoded as a dichotomous variable of having either inpatient care during 2016–2018 or not. The potential impact of psychiatric diagnosis on the risk of inpatient care was thereafter examined using Poisson regression with a robust variance–covariance estimator adjusting for age and gender. The results from the Poisson regression were reported as adjusted prevalence ratio (aPR) representing the differences in prevalence of somatic inpatient care between groups.[12,13] All analyses were conducted using a 95% confidence interval (CI).

2.6 | ETHICS STATEMENT

The study was approved by The Regional Ethical Review Board in Göteborg in 2017.

3 | RESULTS

3.1 | Primary care visits

After adjusting for gender and age, a patient with a psychiatric diagnosis had on average 2.35 (95% CI 2.30–2.40) more primary care visits, compared to a patient without a psychiatric diagnosis. A psychiatric diagnosis was related to 0.98 (95% CI 0.95–1.01) more physician visits and 1.11 (95% CI 1.08–1.14) more visits to non-physicians compared to not having a psychiatric diagnosis (Table 3).

There was an interaction between gender and psychiatric diagnosis where girls with a diagnosis had on average more primary care visits compared to boys ($\beta = 2.50$ (95% CI 2.40, 2.60)), see Table 4. Also, there was an interaction with age and psychiatric diagnosis where even

TABLE 2 Classification of psychiatric diagnoses.

Psychiatric diagnoses	ICD-10 code	N
Mental and behavioral disorders due to psychoactive substance use	F10-F19	720
Schizophrenia, schizotypal and delusional disorders	F20-F29	84
Affective disorders	F30-F39	5581
Neurotic, stress-related and somatoform disorders	F40-F48	13,292
CD, ODD	F91	1201
ADHD	F90	10,086

Abbreviations: ADHD, attention deficit hyperactivity disorder; CD, conduct disorder; ICD, International Statistical Classification of Diseases and Related Health Problems 10th revision; ODD, oppositional defiant disorder.

TABLE 3 Associations between presence of psychiatric diagnosis and health care visits, adjusted for gender and age.

	Primary care visits β (95% CI)	Primary care visits physicians β (95% CI)	Primary care visits non-physicians β (95% CI)	Somatic outpatient care visits β (95% CI)	Planned somatic outpatient care visits β (95% CI)	Unplanned somatic outpatient care visits β (95% CI)
Girls	0.64	0.17	0.39	−0.23	−0.14	−0.06
	(0.61–0.67)	(0.16–0.19)	(0.37–0.40)	(−0.25 to −0.21)	(−0.15 to −0.13)	(−0.06 to −0.05)
Age						
3–6 years	2.53	0.86	1.72	0.82	0.55	0.16
	(2.50–2.59)	(0.85–0.88)	(1.70–1.74)	(0.79–0.84)	(0.53–0.57)	(0.15–0.16)
7–12 years	−0.52	0.22	−0.61	0.42	0.32	0.05
	(−0.55 to −0.49)	(0.21–0.24)	(−0.62 to −0.59)	(0.40–0.44)	(0.31–0.34)	(0.05–0.06)
13–17 years. Ref.	–	–	–	–	–	–
Psychiatric diagnosis	2.35	0.98	1.11	1.70	1.23	0.18
	(2.30–2.40)	(0.95–1.01)	(1.08–1.14)	(1.67–1.73)	(1.21–1.25)	(0.17–0.19)

Abbreviations: β, unstandardized beta coefficient; 95% CI, 95% confidence interval.

though all age groups with a psychiatric diagnosis had more visits compared to patients without a diagnosis, the difference was even more pronounced in the older (i.e., 13–17 years) age group compared to the younger age groups (i.e., 3–6 years: β −1.04 (95% CI −1.20, −0.88) and 7–12 years: $\beta = -0.97$ (95% CI −1.08, −0.86) respectively).

Being diagnosed with either affective ($\beta = 4.40$ (95% CI 4.28–4.52)), ODD/CD ($\beta = 2.27$ (95% CI 2.04–2.50)), anxiety ($\beta = 4.16$ (95% CI 4.08–4.24)), substance use ($\beta = 1.86$ (95% CI 1.54–2.18)), or psychosis ($\beta = 1.92$ (95% CI 0.87–2.98)), was related to a higher level of primary care visits, see Figure 1. A similar pattern was found also for primary care visits to non-physicians while being diagnosed with psychosis was not related to more primary care visits to physicians. Among girls, diagnoses of ADHD ($\beta = 1.69$ (95% CI 1.67–1.71)), affective disorder ($\beta = 5.42$ (95% CI 5.26–5.58)), ODD/CD ($\beta = 3.88$ (95% CI 3.42–4.34)), anxiety ($\beta = 4.64$ (95% CI 4.54–4.74)), substance use ($\beta = 5.09$ (95% CI 4.64–5.56)), or psychosis ($\beta = 4.08$ (95% CI 2.24–5.92)) were all related to a higher level of primary care visits while only a diagnosis of either affective ($\beta = 1.55$ (95% CI 1.37–1.73)), ODD/CD ($\beta = 0.83$ (95% CI 0.53–1.12)) or anxiety ($\beta = 1.94$ (95% CI 1.82–2.06)) was related to more visits among boys, see Figure 2. Overall, being a girl with a specific psychiatric diagnosis was related to more primary care visits in comparison with a boy with the same psychiatric diagnosis.

3.2 | Somatic outpatient care visits

Being diagnosed with a psychiatric diagnosis was related to more somatic outpatient visits (Table 3). A patient with a psychiatric diagnosis had on average 1.70 (95% CI 1.67–1.73) more somatic outpatient care visits compared to a patient without a psychiatric diagnosis. A patient with a psychiatric diagnosis had on average 1.23 (95% CI 1.21–1.25) more planned and 0.18 (95% CI 0.17–0.19) more unplanned somatic outpatient visits in comparison to an

TABLE 4 Associations between presence of psychiatric diagnosis and health care visits adjusted for gender and age, and interaction effects between psychiatric diagnosis and gender and age respectively.

	Primary care visits β (95% CI)	Primary care visits physicians β (95% CI)	Primary care visits non-physicians β (95% CI)	Somatic outpatient care visits β (95% CI)	Planned somatic outpatient care visits β (95% CI)	Unplanned somatic outpatient care visits β (95% CI)
Girls	0.45	0.12	0.28	−0.22	−0.12	−0.06
	(0.42–0.48)	(0.10–0.13)	(0.27–0.30)	(−0.24 to −0.20)	(−0.13 to −0.10)	(−0.07 to −0.06)
Age						
3–6 years	2.64	0.89	1.79	0.73	0.46	0.16
	(2.60–2.67)	(0.87–0.91)	(1.77–1.81)	(0.71–0.75)	(0.44–0.47)	(0.15–0.17)
7–12 years	−0.38	0.26	−0.54	0.34	0.24	0.06
	(−0.42 to −0.35)	(0.24–0.26)	(−0.56 to −0.52)	(0.32–0.36)	(0.23–0.26)	(0.05–0.06)
13–17 years. Ref.	–	–	–	–	–	–
Psychiatric diagnosis	1.84	0.77	0.95	1.19	0.80	0.17
	(1.75–1.93)	(0.72–0.73)	(0.90–1.00)	(1.14–1.25)	(0.76–0.84)	(0.15–0.18)
Girls x psychiatric diagnosis	2.50	0.67	1.59	0.08	−0.07	0.07
	(2.40–2.60)	(0.62–0.73)	(1.53–1.65)	(0.01–0.14)	(−0.11 to −0.02)	(0.06–0.09)
Age x psychiatric diagnosis						
3–6 years	−1.04	0.10	−1.08	1.95	2.11	−0.03
	(−1.20 to −0.88)	(0.01–0.19)	(−1.17 to −0.99)	(1.85–2.06)	(2.04–2.19)	(−0.06 to −0.00)
7–12 years	−0.97	−0.28	−0.71	0.91	1.00	−0.05
	(−1.08 to −0.86)	(−0.34 to −0.22)	(−0.77 to −0.65)	(0.84–0.98)	(0.95–1.05)	(−0.07 to −0.03)
13–17 years. Ref.	–	–	–	–	–	–

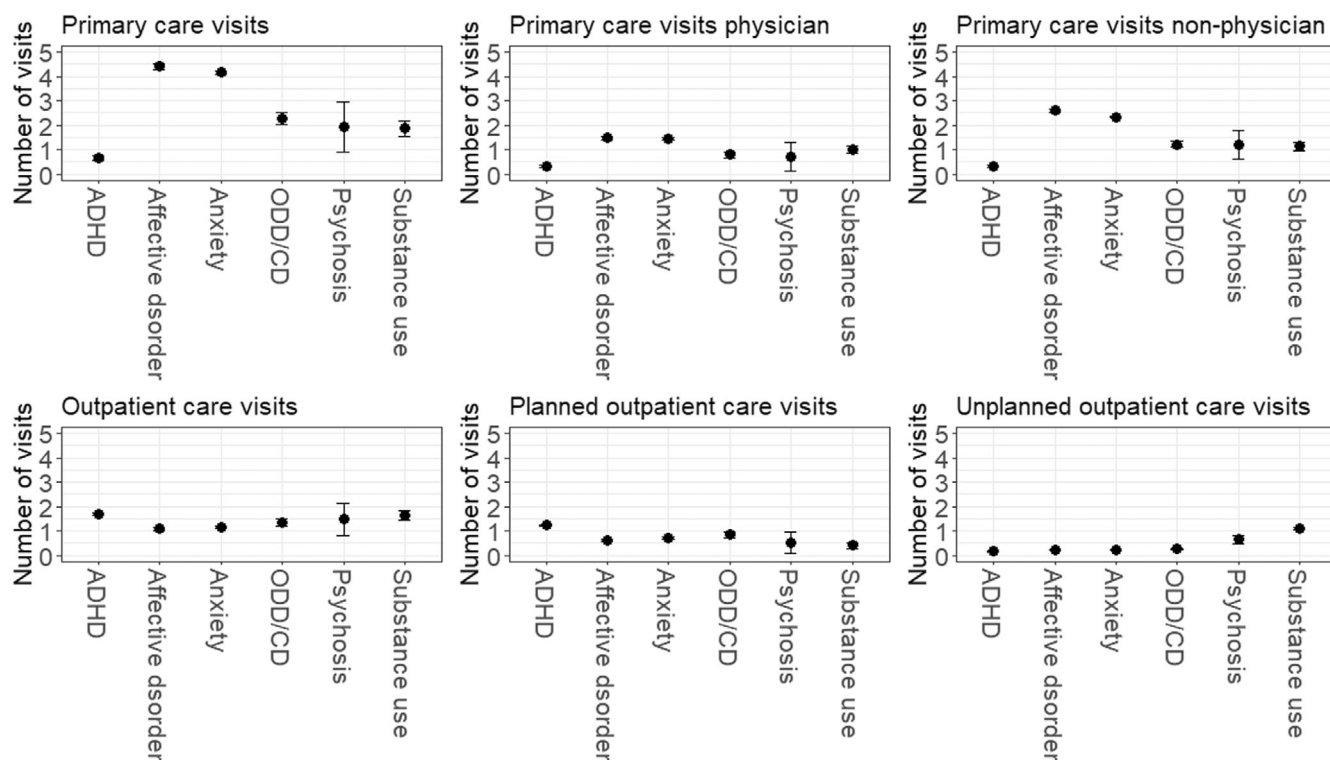Abbreviations: β, unstandardized beta coefficient; 95% CI, 95% confidence interval.

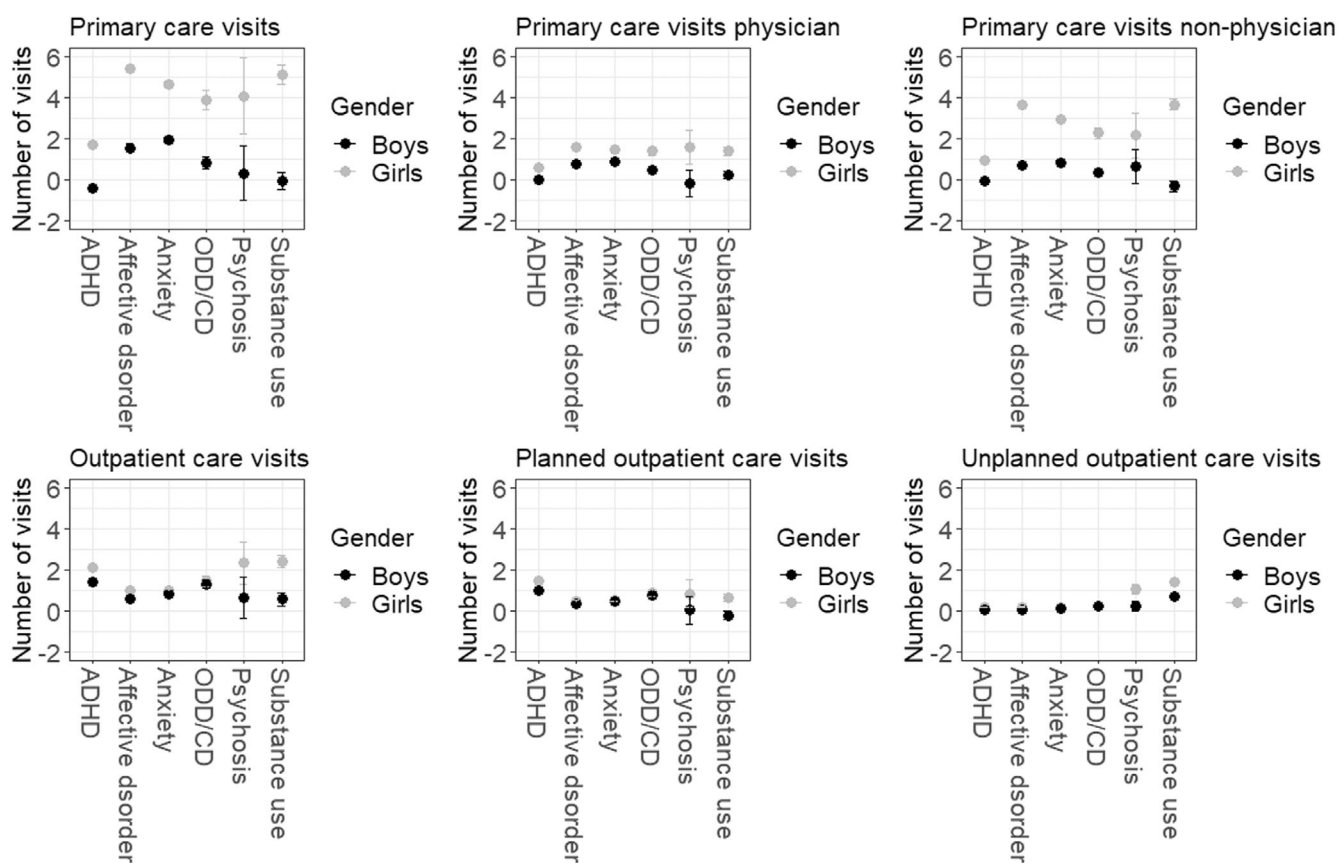**FIGURE 1** Specific psychiatric diagnoses and their relationship with health care visits.

FIGURE 2 Gender differences in the relationship between specific psychiatric diagnoses and health care visits. ADHD, attention deficit hyperactivity disorder; CD, conduct disorder; ODD, oppositional defiant disorder.

individual without a psychiatric diagnosis. There were interactions between gender and psychiatric diagnosis where boys with a psychiatric diagnosis had more planned somatic visits compared to girls ($\beta = -0.07$ (95% CI -0.11 to -0.02)) while the opposite was observed for unplanned somatic outpatient care ($\beta = 0.07$ (95% CI 0.06–0.09)), Table 4. The younger patient groups (i.e., 3–6 years ($\beta = 2.11$ (95% CI 2.04–2.19)) and 7–12 years ($\beta = 1.00$ (95% CI 0.95–1.05))) with a psychiatric diagnosis had more planned and more somatic outpatient care visits in general while older patients (i.e., 13–17 years) had more unplanned somatic outpatient care visits (i.e., 3–6 years: β -0.03 (95% CI -0.06 to -0.01) and 7–12 years: $\beta = -0.05$ (95% CI -0.07 to -0.03), respectively).

Next, the association between specific psychiatric diagnoses and somatic outpatient care visits was examined. Analyses showed that all psychiatric diagnoses examined were related to a higher level of somatic outpatient care visits (Figure 1). This was also found for planned and unplanned somatic outpatient care visits while being diagnosed with psychosis was not significantly related to more planned somatic outpatient care visits. There were overall no gender differences for the association between specific psychiatric diagnosis and somatic outpatient care visits with the exception that girls with substance use had significantly more somatic outpatient care visits compared to boys ($\beta = 2.40$ (95% CI 2.13–2.67) vs. $\beta = 0.56$ (95% CI 0.25–0.87)), see Figure 2.

3.3 | Somatic inpatient care visits

Having a psychiatric diagnosis was related to a 65% higher prevalence (i.e., aPR 1.65 (95% CI 1.58–1.72)) of somatic inpatient care (Table 5). Notably, having a psychiatric diagnosis was related to higher prevalence of health care consumption in all outcomes, ranging from 6% (primary care visits) to 65% higher prevalence of somatic inpatient care visits. Further analyses of the potential association between specific psychiatric diagnoses and the risk of somatic inpatient care demonstrated that all examined diagnoses were related to a higher prevalence (Figure 3). Finally, gender differences were examined showing that girls with ADHD were more likely of having inpatient care in comparison to boys with the same diagnosis (aPR = 1.91 (95% CI 1.68-2.17) vs. aPR = 1.26 (95% CI 1.13-1.40)), see Figure 3.

4 | DISCUSSION

The results of the present study show a robust pattern of increased health care use for children and adolescents

TABLE 5 Poisson regression model for the prevalence of health care visits in children and adolescents with and without psychiatric diagnoses.

	Primary care visits aPR (95% CI)	Primary care visits physician aPR (95% CI)	Primary care visits non physician aPR (95% CI)	Somatic outpatient care visits aPR (95% CI)	Planned somatic outpatient care visits aPR (95% CI)	Unplanned somatic outpatient care visits aPR (95% CI)	Somatic inpatient care visits aPR (95% CI)
Girls	1.03 (1.03–1.04)	1.03 (1.2–1.03)	1.08 (1.07–1.08)	0.94 (0.93–0.94)	0.94 (0.93–0.94)	0.89 (0.88–0.90)	0.88 (0.85–0.90)
Age							
3–6 years	1.15 (1.15–1.16)	1.14 (1.13–1.14)	1.48 (1.47–1.48)	1.28 (1.27–1.29)	1.38 (1.37–1.39)	1.36 (1.34–1.37)	1.22 (1.17–1.26)
7–12 years	1.04 (1.04–1.05)	1.07 (1.07–1.08)	0.96 (0.96–0.97)	1.16 (1.15–1.17)	1.24 (1.22–1.25)	1.13 (1.12–1.15)	0.92 (0.89–0.95)
13–17 years. Ref.	–	–	–	–	–	–	–
Psychiatric diagnosis	1.06 (1.06–1.07)	1.15 (1.15–1.16)	1.17 (1.17–1.18)	1.38 (1.37–1.39)	1.62 (1.60–1.63)	1.34 (1.32–1.36)	1.65 (1.58–1.72)

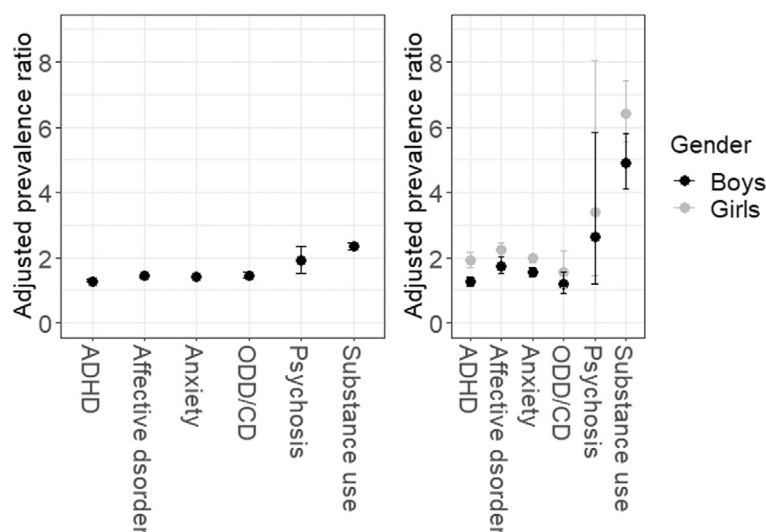Abbreviations: aPR, adjusted prevalence ratio; 95% CI, 95% confidence interval.

FIGURE 3 Specific psychiatric diagnoses and their relationship with the risk of somatic inpatient care overall and by gender. ADHD, attention deficit hyperactivity disorder; CD, conduct disorder; ODD, oppositional defiant disorder.

with psychiatric diagnoses—a finding pertaining to different levels of health care and for a broad range of psychiatric diagnoses.

First, children and adolescents with a psychiatric diagnosis had on average 2.35 more primary care visits during the study period compared to their counterparts without a diagnosis. There are several plausible explanations for this finding. In Sweden, first line of psychiatric health care falls under the organization of primary care. For example, in 2017, primary care was responsible for initial assessment of depression and up to six sessions of psychotherapeutic treatment before referral to specialized CAMH services. Moreover, an interaction effect with gender was found, and the difference increased with age which is in line with prevalence rates of depression. Another plausible explanation for the high number of primary care visits could be the recommendation of somatic assessment before referral to specialized CAMH services. However, many children are referred from school health care or through parental or own referral, thus, to what extent this impacts the number of primary care visits is unknown. Moreover, previous studies have indicated that increased rates of mental health problems in youth in combination with under-dimensioned mental health services, prevent individuals to get access to specialized CAMH services[14] and that many adolescents do not receive treatment for their illness.[15] In a nationally representative German sample, only one out of five children and adolescents with abnormal scores on mental health screening instruments had been in contact with mental health services within the last 12 months.[16] A study from 2000 showed that almost one in five children in pediatric settings may have significant psychiatric disorders, indicating an important role for general practitioners and pediatricians in recognizing and assessing mental health problems in youth.[17]

Somewhat surprisingly, a diagnosis of ADHD was not associated with more visits in primary care. While there is a substantial literature on the comorbidity of ADHD in children,[18,19] it is plausible that these patients are seen in specialist somatic care rather than primary care. According to regional guidelines on division of responsibility between primary care and CAMH services, the responsibility for issues related to a diagnosis of ADHD are on CAMH services, regardless of the level of difficulty. Thus, some of the results of this study might be interpreted in the way that patients are treated at the assigned level of health care.

Second, children and adolescents with psychiatric diagnoses were more likely to attend somatic outpatient care compared to children and adolescents without psychiatric diagnoses. The difference was most attenuated for younger patients in planned somatic care, where an increased risk of up to three times was noted. In 2010, Gillberg coined the acronym ESSENCE (Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations) stating that comorbidity between different developmental conditions such as neuropsychiatric diagnoses and neurological disorders is common but does usually not get the attention needed from different disciplines.[20] In this study, individuals with ASD and intellectual disability were excluded, however, symptom presentation in young children might be less specific and long wait times for neuropsychiatric examinations might require longer time frames in studies to explore the paths in health care for children with several or complex symptoms. Moreover, previous studies have shown a considerable comorbidity between a wide range of psychiatric and somatic conditions,[2,21] plausibly indicating a need for multiple health care contacts at different service units. Somatic comorbidity and increased risk of injuries requiring medical attention[22] probably contribute to the

increased frequency of unplanned somatic outpatient care for children and adolescents with psychiatric disorders. The results indicate a considerable burden on patients with psychiatric diagnoses having multiple contacts with professionals at different health care units. In a German study, approximately 80% of individuals using mental health services also frequented somatic health services.[16] The contemporary trend of specialization in health care plausibly further increases the risk of children and families being referred between units with time spent waiting to get adequate support and treatment. The organization of health care has previously been identified as a main barrier for access to somatic health care in adults with severe mental illness.[23]

Likewise, there was an increased risk for somatic inpatient care, with conditions possibly requiring medical examination and treatment (e.g., psychosis and substance use) exerting the greatest risk. Adolescents with first onset psychosis might initially receive treatment in somatic inpatient care depending on the presentation, and in order to rule out somatic causes. Substance use on the other hand is associated with increased risk of acute medical conditions such as seizures and intoxication, as well as injuries.[24] There was however an increased risk for somatic inpatient care for all psychiatric conditions investigated.

Third, several gender differences were noted. Girls had more primary care visits compared to boys, also when analyzing visits to physicians and non-physicians separately. A plausible explanation could be the differences in prevalence rates of depression and anxiety between adolescent girls and boys, since first line treatment for these conditions are provided by primary care. This finding is in line with other Swedish studies on the adult population, showing that women have more primary care visits while men are more likely to receive specialist inpatient care.[25] Cultural norms have been proposed a plausible reason for lower health care seeking behavior in med.[26] Possibly this pattern appears already during adolescence. In the present study, boys were not at increased risk of inpatient care compared to girls, instead, girls with ADHD were at increased risk for somatic inpatient care compared to boys with the same diagnosis. ADHD is associated with both psychiatric[27] and somatic[18] comorbidity, but there is no apparent reason for this gender difference in somatic inpatient care. Girls were found to have more unplanned somatic outpatient care, whilst boys had more planned somatic outpatient care. This stands in contrast to previous studies on injuries requiring medical attention[28] and emergency department visits[29] indicating higher levels of unplanned somatic outpatient care among boys.

5 | STRENGTHS AND LIMITATIONS

The study is strengthened by the large study population and the good coverage of the register used. Region Västra Götaland is sociodemographically representative of Sweden, implying that results can be generalized to the Swedish population. However, the following limitations need to be considered. First, no sociodemographic data was included in the analyses since this information is not available in the Vega database. Region Västra Götaland is representative of Sweden in terms of sociodemography, however, socioeconomic factors have been shown to influence somatic as well as mental health in children.[30] Second, individuals with ASD were excluded from the study due to organizational factors. The regional health care of Västra Götaland is structured in such a way that ASD and mental retardation are, or were at the time of inclusion, handled in the somatic care, which would make interpretation of data difficult if included. ASD has been found to be associated with somatic disorders[31] and longer LOS in inpatient care[7] but a lower rate of injuries requiring medical attention.[22] Thus, further examining the pattern of health care utilization in children and adolescents with ASD would be of great interest. Third, only diagnoses and health care visits during the 3-year study period were considered. A longer time frame would be of interest to further describe health care utilization and contingent associations to timing of psychiatric diagnoses. Fourthly, the reason for primary care visits (i.e., psychiatric or somatic) was not considered. Including this information would further contribute to the understanding of the increased number of primary care visits among children and adolescents with psychiatric disorders.

To conclude, psychiatric diagnoses were associated with increased primary-, somatic outpatient- as well as somatic inpatient care. Increased awareness of comorbidity and easy access to relevant health care could be beneficial for patients and caregivers. Moreover, the results call for a review of current health care systems with distinct division between medical disciplines and levels of health care.

CONFLICT OF INTEREST STATEMENT
The authors declare that they have no competing interests.

PEER REVIEW

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/acps.13590.

DATA AVAILABILITY STATEMENT

Ethical Review Board approval was obtained for public sharing and presentation of data on group level only. This means that the data used in this study can only be used for the approved research and cannot be shared by the authors.

ETHICS STATEMENT

The study was approved by the regional ethics board in Gothenburg in 2017 (035-17). All parts of the study were carried out in accordance with relevant ethical guidelines and recommendations.

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