ALISA KENTALA, TIMO HOLTTINEN, KAIJA PUURA, RIITTAKERTTU KALTIALA

HAVE SCHIZOPHRENIA SPECTRUM DISORDERS AMONG CHILDREN AND ADOLESCENTS INCREASED IN THE 2010s

ABSTRACT

Background: *The demand for child and adolescent mental health services and psychiatric care has increased significantly in Western countries during the 21st century. Schizophrenia spectrum disorders and schizophrenia itself are rare but severe conditions, and their incidence has been assumed to rise alongside the increase in general psychiatric symptoms.* ***Objective:*** *Our aim was to examine the absolute numbers and incidence proportions of schizophrenia spectrum disorders and schizophrenia during the 2010s and to compare the findings with those from previous decades, among children and adolescents in contact with specialist level psychiatric services.* ***Materials and Methods:*** *The study population consisted of all under 18-year-old patients who had contact with specialized psychiatric services between 2010 and 2019. They were identified from the Finnish Care Register for Health Care (HILMO), and psychiatric primary diagnoses were based on the ICD-10 classification. To compare changes across earlier decades, data from adolescents with their first inpatient contact in specialized psychiatric care between 1980 and 2009 were utilized. Statistical analyses included chi-square tests to assess differences between groups and Cox proportional hazards regression models to estimate risk.* ***Results:*** *The disorders were rare, and neither the number of diagnosed cases nor the risk of developing the disorder changed during the 2010s. The number of patients with schizophrenia spectrum diagnoses admitted for their first psychiatric inpatient treatment decreased compared to the previous decade, and the number of schizophrenia diagnoses has declined steadily since the 1980s. However, the absolute number of schizophrenia spectrum disorders stabilized at a higher level in the 2000s compared to earlier decades.* ***Conclusions:*** *Schizophrenia spectrum disorders have not increased among children and adolescents during 2010s. The variation in the number of schizophrenia spectrum disorders across decades with eventual stabilization at a higher level is likely due to changes in diagnostic practices. However, these severe disorders appear to be less influenced by broader societal changes than other disorders.*

KEYWORDS: PSYCHOSES, SCHIZOPHRENIA, CHILD AND ADOLESCENT PSYCHIATRY, REGISTER STUDY, SECULAR TRENDS

INTRODUCTION

The demand for child and adolescent mental health services and psychiatric care has increased in Western countries during the 21st century (1,2,3), to the extent that it has been described as a mental health crisis. In particular, anxiety and depressive symptoms among children and adolescents have become more prominent, and the use of psychiatric services has increased especially among adolescent girls (2,3).

Schizophrenia spectrum psychoses are severe mental disorders characterized by symptoms typically divided into positive and negative categories. Positive symptoms include hallucinations, delusions and disorganized behaviour, whereas negative symptoms include diminished emotional expression and social withdrawal (4,5). Schizophrenia most commonly manifests in adolescence or early adulthood. On average, onset occurs approximately five years earlier in males than in females (6,7). The onset is usually preceded by a prodromal phase, during which individuals experience non-specific symptoms such as anxiety and depression, as well as mild psychotic symptoms, including perceptual disturbances (5,7). Previous studies suggest that the incidence of schizophrenia in adults has increased globally over recent decades. This increase has been attributed to advances in scientific knowledge and

improvements in clinical recognition. In addition, it has been proposed that the improved identification of other psychiatric disorders and the associated increase in help-seeking behaviour have contributed, and will continue to contribute, to the rising number of schizophrenia diagnoses (8,9,10). An increase in the incidence of schizophrenia among children and adolescents has also been suggested, although this age group has been studied less extensively (8).

Only a very small proportion of schizophrenia spectrum psychoses emerge in childhood. In very early-onset schizophrenia (VEOS), the disorder manifests before the age of 13, with an estimated incidence of less than 0.04% (11,12). Early-onset schizophrenia (EOS) is defined as onset between the ages of 13 and 18. The incidence of schizophrenia increases significantly after the age of 15 (7,12,13). Both VEOS and EOS are severe disorders, characterized not only by core schizophrenia symptoms but also by substantial neurocognitive impairments (13).

Diagnosing schizophrenia during developmental years is particularly challenging, as children and adolescents are still undergoing maturation and comorbid psychiatric disorders are common, especially in association with schizophrenia. Symptoms of different disorders often overlap (11,12). Fewer than 10% of all schizophrenia diagnoses are made before the age of 18 (14). Although schizophrenia typically has an earlier onset in males, females tend to access psychiatric care approximately one year earlier than males. This has been attributed to clearer symptom presentation and better recognition in females (15).

It remains unclear to what extent the observed increase in mental health problems among children and adolescents and the rising demand for treatment (1,2,3) reflect a true increase in morbidity, and to what extent they may be explained by the medicalization of normal developmental challenges or by changes in environmental demands that increase the need for support in the presence of psychiatric symptoms (16,17). The expansion of treatment options and increased awareness have also contributed to higher service utilization (18). The growing demand for care among adolescents is particularly associated with depressive and anxiety disorders, while in children it is more often linked to behavioural symptoms such as ADHD. The need for care related to psychotic disorders might be expected to be less sensitive to societal discourse than that related to milder disorders. On the other hand, the incidence of schizophrenia spectrum psychoses during developmental age could increase if non-specific symptoms—potentially representing prodromal manifestations—more frequently lead to treatment contact and earlier diagnosis of psychotic disorders.

Since the late 1970s, a comprehensive, age-specific system of child and adolescent psychiatric services has been established in Finland (19). A Finnish register-based study examined the incidence and treatment of mental disorders among adolescents from the 1980s to 2010. The number of individuals diagnosed with schizophrenia at the time of first contact remained consistently low. The risk of receiving a later schizophrenia diagnosis among those initially treated for other disorders decreased from the 1980s to the 2000s (19). This may be attributable to improved diagnostic accuracy and earlier access to treatment during the 2000–2010 period, potentially reducing the risk of progression to psychotic disorders. Subsequent diagnostic conversion to schizophrenia occurred particularly among individuals with other schizophrenia spectrum disorders and severe mood disorders (19).

The Finnish Care Register for Health Care (HILMO) contains nationwide data on the use of health services, access to care, epidemics and other health-related issues (20). HILMO data are used for the compilation of national and international statistics, research and service planning (21). It is a comprehensive and reliable nationwide reporting system covering inpatient care in hospitals and health centres, as well as outpatient specialized care in the public sector (21). Given the severity of schizophrenia spectrum psychotic disorders, it is reasonable to assume that affected patients eventually receive care in specialized services, supporting the epidemiological representativeness of HILMO data for these conditions.

The aim of this study is to examine whether the number of children and adolescents diagnosed with schizophrenia or, more broadly, schizophrenia spectrum disorders has increased in Finland during the 2010s, in the context of heightened societal attention to mental health problems in developmental age and increased referrals to specialized psychiatric care. In addition, the incidence of schizophrenia spectrum disorders and schizophrenia is analysed according to developmental stage, sex and the disorders leading to initial treatment contact. Among adolescents admitted for their first inpatient psychiatric treatment, the incidence of schizophrenia spectrum disorders and schizophrenia is compared with corresponding figures from previous decades.

MATERIALS AND METHODS

The study population consisted of all individuals under 18 years of age who had contact with specialized psychiatric services between 2010 and 2019. They were identified from the Finnish Care Register for Health Care (HILMO). In this study,

the following information was used from all their psychiatric treatment episodes in specialized care: dates of admission and discharge up to the end of 2021, primary psychiatric diagnosis according to the ICD-10 classification, age at the time of contact and sex.

Psychiatric diagnoses were analysed at the level of the main ICD-10 categories of mental and behavioural disorders (F00–F09, F10–F19, etc.), with the exception of schizophrenia spectrum disorders. These were examined both as a whole (F20–F29) and separately, with a focus on schizophrenia and schizoaffective disorder (F20 + F25), which together form an extended definition of schizophrenia (22).

To assess potential changes compared with previous decades, the data were compared with a register-based cohort of individuals aged 13–17 years who were admitted to their first adolescent psychiatric inpatient episode between 1980 and 2009. This comparison dataset has been described previously (19,23,24). For this analysis, the current dataset was restricted using the same criteria to include adolescents aged 13–17 years who were admitted to their first psychiatric inpatient episode between 2010 and 2019.

STATISTICAL ANALYSES

The incidence of schizophrenia spectrum disorders and schizophrenia was examined by sex, age group and primary diagnosis at first contact using cross-tabulation. We explored the absolute numbers of emerging cases and incidence proportions as the number of new cases divided by the number of all patients, rather than by person-years of follow-up. Statistical significance was assessed using the chi-square test. The risk of receiving a diagnosis of schizophrenia spectrum disorder or schizophrenia was examined using multivariable Cox proportional hazards regression models, which account for differences in follow-up time among patients entering the study in different years. The outcomes were defined as: 1) a diagnosis within the F20-29 category and 2) an extended schizophrenia diagnosis. The explanatory variables included year of first contact, age group, sex and primary diagnosis at first contact. Hazard ratios (HRs) with 95% confidence intervals (CIs) are reported.

Among adolescents aged 13–17 years admitted for their first psychiatric inpatient treatment, the following were examined: 1) the absolute number of F20-29 diagnoses and 2) the number of extended schizophrenia diagnoses during the first treatment episode over the decade, and these were compared with corresponding figures from the 1980s, 1990s and 2000s. In annual analyses for the 2010s, cross-tabulations were used to examine trends in the number of first inpatient treatment episodes with an F20-29 primary diagnosis, as well as the total number of inpatient episodes associated with F20-29 diagnoses and with F20/F25 diagnoses.

Due to the large sample size and multiple testing, statistical significance was set at $p<0.01$.

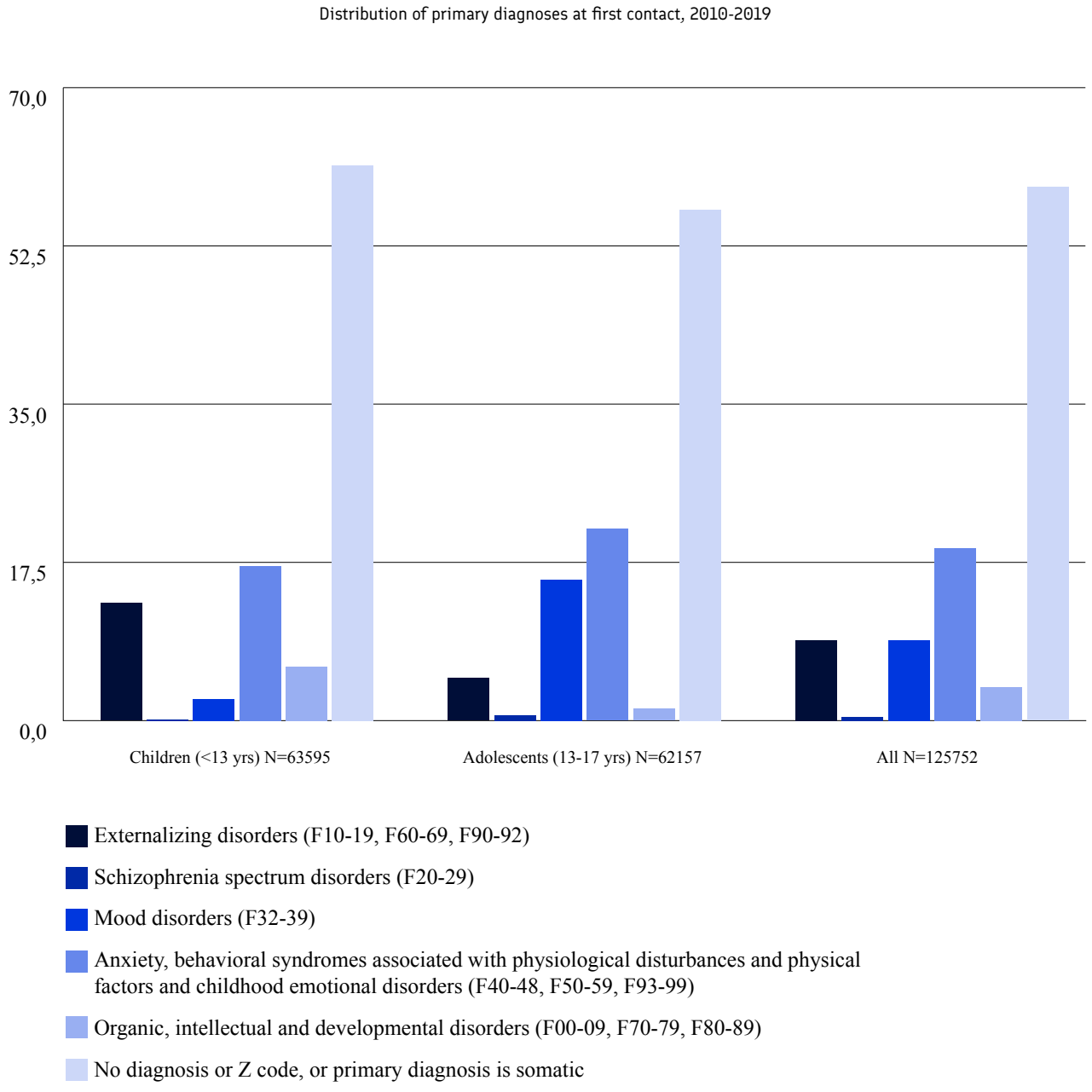
RESULTS

CHILDREN AND ADOLESCENTS AT FIRST CONTACT

The dataset included all children and adolescents who had their first contact with specialized psychiatric services (outpatient and inpatient care) between 2010 and 2019. Among these contacts, 62,157 were adolescents (aged 13–17 years), of whom 68.8% (n=42,764) were female and 31.2% (n=19,393) were male. The number of children (under 13 years of age) at first contact was 63,595, of whom 62.2% (n=39,556) were male and 37.8% (n=24,039) were female. Thus, the sex distribution among children was the reverse of that observed among adolescents.

Figure 1 presents the distribution of primary diagnoses assigned at first contact among children and adolescents in specialized psychiatric care between 2010 and 2019. Overall, 59.0% of individuals did not receive a psychiatric primary diagnosis at first contact.

Figure 1. Distribution of primary diagnoses among children and adolescents at first contact with specialized psychiatric care



SCHIZOPHRENIA SPECTRUM DIAGNOSES AND SCHIZOPHRENIA AMONG PATIENTS IN CHILD AND ADOLESCENT PSYCHIATRIC SERVICES IN THE 2010s

Among adolescents, 1.5% (n=403) received a schizophrenia spectrum diagnosis (F20–F29) at first contact. Among children, the corresponding proportion receiving an F20-29 diagnosis was 0.2% (n=43). A diagnosis of schizophrenia (F20/F25) at first contact was assigned to eight adolescents. No child received a schizophrenia diagnosis at first contact. During the follow-up period, 3.0% (n=3,802) of all individuals who had first contact received an F20-29 diagnosis. Among those who first presented in adolescence, the proportion was 4.9% (n=3,054), and among those who first presented in childhood, 1.2% (n=748). A schizophrenia diagnosis during follow-up was assigned to 0.7% (n=922) of all patients: 1.3% (n=820) among those first presenting in adolescence and 0.2% (n=102) among those first presenting in childhood.

Tables 1 and 2 present the incidence of F20-29 diagnoses among children and adolescents, and the incidence of F20/F25 diagnoses among adolescents, according to diagnoses at first contact.

Among individuals who first entered treatment in childhood, an F20-29 diagnosis during follow-up was most commonly assigned to those who had a mood disorder (F30–F39) at first contact. Among those first treated in adolescence, F20-29 diagnoses occurred most frequently in individuals whose initial diagnosis belonged to the category F00–F09, F70–F79 or F80–F89 (*Table 1*). Among adolescents at first contact with specialized psychiatric services, a schizophrenia diagnosis during follow-up was most commonly assigned to those who had already received another F20-29 diagnosis at first contact. Among those with other initial diagnoses, conversion to a schizophrenia spectrum disorder occurred in 1.2–1.5% of cases (*Table 2*). Due to the low number of cases, a corresponding analysis could not be conducted among those first treated in childhood.

MULTIVARIABLE ANALYSES

In the multivariable models, the risk of receiving any F20-29 diagnosis or, more specifically, a diagnosis of F20/F25 did not change over the course of the decade (*Tables 3 and 4*). No statistically significant time-dependent association was observed in the analysis (F20-29: HR=1.0, p=0.15; F20/25: HR=1.0, p=0.12). Compared with females, males had a 1.6-fold higher risk of receiving an F20-29 diagnosis and a 2.1-fold higher risk of receiving an F20/F25 diagnosis. Individuals whose first contact occurred during adolescence had a 4.6-fold higher risk of an F20-29 diagnosis and a 9.4-fold higher risk of an F20/F25 diagnosis compared with those whose first contact occurred in childhood. Compared with individuals who did not receive a psychiatric diagnosis at first contact, the risk of a subsequent F20-29 diagnosis was increased across nearly all diagnostic categories, with the exception of the group "Organic, intellectual, and developmental disorders" (F00–F09, F70–F79, F80–F89). Having a non-F20/F25 diagnosis within the F20-29 category at first contact strongly predicted a later schizophrenia diagnosis, with a 14.6-fold increased risk (*Tables 3 and 4*).

ADOLESCENTS AGED 13–17 AT FIRST INPATIENT ADMISSION: COMPARISON WITH PREVIOUS DECADES

The dataset included 15,020 adolescents whose first psychiatric inpatient episode occurred between the ages of 13 and 17 during the years 2010–2019. Of these, 69.7% (n=10,437) were female and 30.3% (n=4,547) were male. Among the adolescents, 37.4% were in early adolescence (13–14 years) and 62.6% in middle adolescence (15–17 years). *Table 5* presents the number of adolescents who received an F20-29 diagnosis or an F20/F25 diagnosis as the primary diagnosis during their first inpatient treatment episode between 2010 and 2019, compared with corresponding figures from previous decades. The number of individuals receiving a schizophrenia spectrum diagnosis at their first psychiatric inpatient episode has fluctuated across decades but has stabilized at a higher level in the 2000s compared to earlier decades, whereas the number of those receiving a schizophrenia diagnosis has decreased (*Table 5*).

Figure 2 shows the annual number of first inpatient treatment episodes with an F20-29 primary diagnosis, as well as the total number of inpatient episodes with F20-29 and F20/F25 primary diagnoses among adolescents during the 2010s. The relative proportions of both first inpatient episodes and all inpatient episodes with an F20-29 diagnosis decreased over the decade (Mantel–Haenszel test $p<0.001$ for both), as did the proportion of all inpatient episodes with an F20/F25 diagnosis ($p<0.001$). A modest decrease in absolute numbers is also observed in the curves representing the entire F20-29 category (*Figure 2*). First inpatient episodes with an F20/F25 diagnosis are not presented annually due to the low number of cases.

Table 1. Proportion of individuals who subsequently received an F20-29 diagnosis during follow-up among individuals with first contact in childhood and adolescence, according to diagnosis at first contact

Initial diagnosis	Children	Adolescents	p[1]
Externalizing disorders (F10-19, F60-69, F90-92)	1.1%	5.6%	<0.001
Mood disorders (F30-39)	3.1%	5.2%	<0.001
Anxiety, behavioural syndromes associated with physiological disturbances and physical factors and childhood emotional disorders (F40-48, F50-59, F39-99)	1.3%	4.7%	<0.001
Organic, intellectual and developmental disorders (F00-09, F70-79, F80-89)	0.9%	6.7%	<0.001
No psychiatric diagnosis	1.0%	3.7%	<0.001

[1] comparison between age groups

Table 2. Proportion of individuals who subsequently received an F20/25 diagnosis during follow-up among individuals with first contact in adolescence, according to diagnosis at first contact

Initial diagnosis	
Externalizing disorders (F10-19, F60-69, F90-92)	1.5%
Schizophrenia spectrum disorders (F20-29 excl. F25/F20)	22.8%
Mood disorders (F30-39)	1.4%
Anxiety, behavioural syndromes associated with physiological disturbances and physical factors and childhood emotional disorders (F40-48, F50-59, F39-99)	1.2%
Organic, intellectual and developmental disorders (F00-09, F70-79, F80-89)	1.5%
No psychiatric diagnosis	1.0%

Table 3. Hazard ratios with confidence intervals for schizophrenia spectrum (F20-29) diagnosis (hazard ratio [HR], 95% confidence interval [CI]) during follow-up among minors in specialized psychiatric care in the 2010s, according to sex, age, diagnosis at first contact and year of first contact

	HR (95% confidence interval)	p
Sex		
Female	reference	
Male	1.6 (1.5–1.7)	<0.001
Age group at first contact		
Child (<13 years)	reference	
Adolescent (13–17 years)	4.6 (4.2–5.1)	<0.001
Year of first contact (continuous variable)	1.0 (1.0–1.0)	0.15
Diagnosis at first contact		
No psychiatric diagnosis	reference	
Externalizing disorders (F10-19, F60-69, F90-92)	1.2 (1.1–1.4)	0.006
Mood disorders (F30-39)	1.4 (1.3–1.5)	<0.001
Anxiety, behavioural syndromes associated with physiological disturbances and physical factors and childhood emotional disorders (F40-48, F50-59, F39-99)	1.3 (1.2–1.4)	<0.001
Organic, intellectual and development disorders (F00-09, F70-79, F80-89)	1.2 (1.0–1.5)	0.11

Table 4. Hazard ratios with confidence intervals for schizophrenia (F20/F25) diagnosis (hazard ratio [HR], 95% confidence interval [CI]) during follow-up among minors in specialized psychiatric care in the 2010s, according to sex, age, diagnosis at first contact and year of first contact

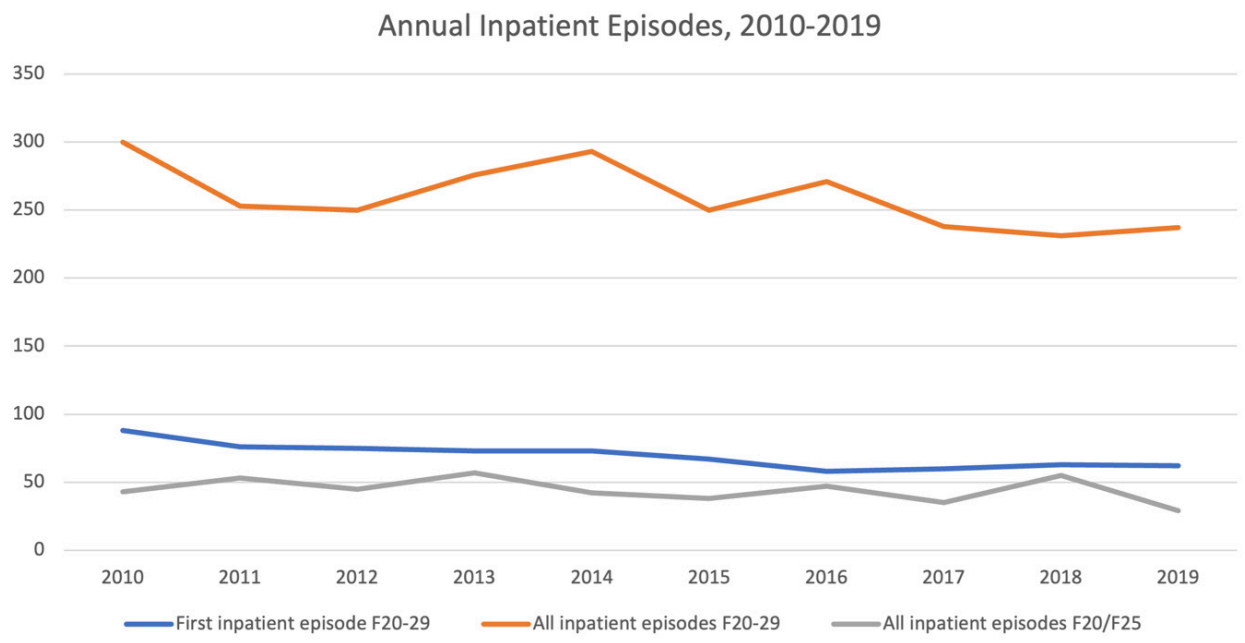
	HR (95% confidence interval)	p
Sex		
Female	reference	
Male	2.1 (1.8–2.4)	<0.001
Age group at first contact		
Child (<13 years)	reference	
Adolescent (13–17 years)	9.4 (7.6–11.7)	<0.001
Year of first contact (continuous variable)	1.0 (1.0–1.1)	0.12
Diagnosis at first contact		
No psychiatric diagnosis	reference	
Externalizing disorders (F10-19, F60-69, F90-92)	1.2 (0.9–1.5)	0.2
Schizophrenia spectrum disorders (F20-29, excl. F25/F20)	14.6 (11.6–18.3)	<0.001
Mood disorders (F30-39)	1.3 (1.1–1.6)	0.003
Anxiety, behavioural syndromes associated with physiological disturbances and physical factors and childhood emotional disorders (F40-48, F50-59, F39-99)	1.2 (1.0–1.4)	0.044
Organic, intellectual and developmental disorders (F00-09, F70-79, F80-89)	0.9 (0.5–1.4)	0.57

Table 5. Number of individuals receiving an F20–29 diagnosis and an F20/F25 diagnosis as the primary diagnosis at their first inpatient episode between 2010 and 2019, compared with corresponding figures reported for previous decades (Holttinen 2023)

	1980–1989 *	1990–1999*	2000–2009*	2010–2019
F20–29				
All	569	474	800	695
Boys	280	235	388	352
Girls	289	239	412	343
F20/25				
All	192	41	75	26
Boys	92	20	30	14
Girls	100	21	45	12

* Holttinen T. Finnish Adolescents Treated in Psychiatric Inpatient Care from 1980 to 2010 and Their Long-term Life Situations, 2023

Figure 2. Annual number of initial inpatient episodes and all inpatient episodes among adolescents with F20–29 group diagnoses, and all inpatient episodes with F20/F25 diagnoses



DISCUSSION

This register-based study examined the absolute numbers and incidence proportions of schizophrenia spectrum disorders and schizophrenia among children and adolescents during the past decade. Among all children and adolescents who had contact with specialized psychiatric services, both schizophrenia spectrum disorders and schizophrenia were rare, and the number of individuals receiving these diagnoses remained stable throughout the 2010s. Among adolescents aged 13–17 years admitted for their first psychiatric inpatient episode, comparison with corresponding data from previous decades (19) suggested a decrease in schizophrenia spectrum diagnoses compared to the previous decade and a decline in schizophrenia diagnoses since the 1980s.

Referrals of children and adolescents to specialized psychiatric services have been increasing for a prolonged period (19,25). Awareness of mental health disorders has improved, leading an increasing number of individuals to seek care (26). This has also been suggested to potentially increase the number of diagnosed schizophrenia spectrum disorders (8,9,10). However, the widely recognized mental health crisis among children and adolescents does not appear, based on this study, to be reflected in the number of schizophrenia spectrum disorder diagnoses. These disorders are inherently severe and may be less sensitive to environmental factors and societal trends than conditions such as depressive and anxiety disorders.

Among adolescents aged 13–17 years admitted for their first inpatient episode, comparisons across decades were possible (19). The absolute number of schizophrenia spectrum disorder diagnoses has varied across decades but has stabilized at a higher level since the 2000s compared to earlier periods. This may reflect improved recognition of these disorders. The observed variation across decades, as well as the particularly high numbers in the 2000s, may be explained by evolving diagnostic practices over time. This variability could be reduced through the systematic use of structured diagnostic methods. Alternatively, it is also possible that the true incidence of schizophrenia spectrum disorders among adolescents has increased since the 1980s. Substance use, particularly cannabis use, has been shown to contribute to and accelerate the onset of schizophrenia (27). In Finland, cannabis use among adolescents increased up until the 2010s and has remained relatively stable thereafter (28). The consistent decline in diagnoses of schizophrenia itself since the 1980s is most likely a result of more refined diagnostic

processes. Previous research does not allow for a similar long-term comparison of these diagnoses among children in Finland.

The incidence of schizophrenia spectrum disorders and schizophrenia was markedly higher among adolescents at their first contact with specialized psychiatric services compared to those who required specialized care already during childhood. Psychiatric symptoms requiring specialized care in childhood are more likely to be associated with environmental factors and living conditions and may be more modifiable, whereas disorders emerging in adolescence are more strongly linked to genetically influenced psychiatric processes that play a greater role in the need for treatment. Most psychiatric disorders begin during adolescence and frequently co-occur (29,30). Among children under 13 years of age, schizophrenia spectrum disorders are considerably rarer than in adolescence (31,32).

Boys in our dataset had a higher risk of developing schizophrenia spectrum disorders compared with girls. This finding is consistent with previous evidence indicating that schizophrenia is more common in males than in females (33) and has an earlier onset in males (6,7). Since the majority of the study population had reached at most young adulthood by the end of follow-up, the prevalence of schizophrenia spectrum disorders in this cohort can be expected to increase further over time. Previous research on sex differences in schizophrenia has mainly focused on the general population rather than specifically on children and adolescents.

The risk of developing a schizophrenia spectrum disorder was relatively similar regardless of the initial diagnostic classification assigned at first contact, and the risk of developing schizophrenia itself was likewise comparable across most diagnostic groups, with the exception of those already diagnosed with an F20-29 disorder at first contact, for whom the risk was markedly elevated. Prodromal symptoms in children and adolescents are typically non-specific, and comorbidity with other psychiatric disorders is common in psychotic disorders (11,12,30). Prodromal symptoms may be difficult to recognize as such before the emergence of overt psychotic symptoms. Furthermore, during developmental stages, non-specific and transient psychotic symptoms are more common than in adults and do not necessarily indicate an F20-29 spectrum psychotic disorder (34). On the other hand, the process of establishing a diagnosis may be delayed in these age groups due to the requirement for thorough assessment and prolonged follow-up (35). Among children, conversion to an F20-29 diagnosis occurred most frequently in those initially diagnosed with mood disorders (F30–F39), whereas among adolescents, conversion was slightly more common in those with organic, intellectual and developmental disorders (F00–F09, F70–F79, F80–F89). Severe mood disorders may represent prodromal manifestations, whereas genetically determined conditions within the F00–F09, F70–F79 and F80–F89 categories may reflect underlying structural vulnerability (36,37). The strongest predictor of later schizophrenia was a prior non-F20/F25 diagnosis within the F20-29 category. Schizophrenia is thought to develop in stages, and studies suggest that a substantial proportion—up to 36%—of other psychotic disorders eventually convert to schizophrenia (38). In contrast, progression to a schizophrenia diagnosis from other initial diagnostic categories was considerably less common.

METHODOLOGICAL CONSIDERATIONS

The dataset comprised all minors who had contact with specialized psychiatric services during the study decade. National register data are extensive and comprehensive and are not affected by attrition, as service providers are obliged to report data to the register in a standardized manner. Because the dataset includes all children and adolescents who accessed specialized psychiatric care, it is not subject to selection bias. Register-based data are particularly suitable for the analysis of psychotic disorders, as the validity of psychosis diagnoses in Finnish registers has been shown to be high (39,40). Furthermore, individuals with these disorders are less likely to participate in surveys and interviews (9). The Finnish Care Register for Health Care (HILMO), from which the patient data were obtained, is a reliable and standardized database, and the use of ICD-10 diagnoses ensures consistency across classifications. Register-based data are particularly valuable for studying incidence and causal relationships (41,42).

However, register-based data also have limitations. Diagnostic practices may vary between clinicians and across regions. It is also possible that some patients received another psychiatric diagnosis or a schizophrenia spectrum diagnosis (F20–F29 excluding F20/F25) instead of a diagnosis of schizophrenia (F20/F25). This naturally affects the number of cases in both diagnostic groups. In particular, clinicians may exercise caution when diagnosing schizophrenia during developmental years, which may delay the assignment of this diagnosis (43). Nevertheless, schizophrenia spectrum diagnoses made in adolescence have been shown to be highly stable over time (24).

A considerable share of children and adolescents did not receive a formal diagnosis at their first visit to specialist level psychiatric care. In such cases most likely a formal diagnosis will follow in due time. An option would have been to use the first recorded psychiatric diagnosis. However, we wanted to

treat all cases systematically in the same way and therefore categorized diagnoses at first contact including the no/Z group. Further, obviously no formal psychiatric diagnosis at first contact finally was meaningful, indicating milder disturbance (and may be rather social problems), as almost all other categories deviated from it in prognosis.

Our comparison over decades focused on numbers of adolescents admitted to their first ever psychiatric inpatient care due to F20-29 and due to schizophrenia. While this cannot be considered actual epidemiological exploration of incidence in the adolescent population, these numbers likely represent total new onset cases very well, since adolescents with first episodes of these disorders most likely come to psychiatric care and are also admitted to inpatient treatment. In this analysis we did not report developments in proportion of those with these diagnoses of all patients admitted, because vast increases in admissions due to internalizing disorders over the decades (Niemi et al. 2023) would then create a biased impression that F20-29 diagnoses had decreased.

CONCLUSIONS

Among children and adolescents who had contact with psychiatric services, the likelihood of receiving a diagnosis of a schizophrenia spectrum disorder or schizophrenia did not increase during the 2010s. This finding most likely reflects the situation in the general population, as the severity of these disorders makes it highly likely that affected individuals will come into contact with specialized care. Among adolescents admitted for their first psychiatric inpatient episode, schizophrenia spectrum diagnoses have been more common in the 2000s than in earlier decades, but their frequency decreased in the 2010s compared to the previous decade. Diagnoses of schizophrenia itself have declined since the 1980s. This likely reflects improved diagnostic precision. It is also possible that earlier and more effective treatment has prevented or delayed the onset of schizophrenia as a full-blown disorder until adulthood. Even if schizophrenia is diagnosed later, a delayed onset allows for better development of functioning during adolescence, which is beneficial in itself. Further research is needed to clarify the impact of evolving diagnostic practices, early identification of psychosis and their role in guiding interventions on long-term outcomes and functional capacity among children and adolescents with psychiatric disorders.

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