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Trends and diagnostic challenges in pediatric schizophrenia spectrum disorders in Poland (2014–2019): A nationwide register-based study in an international context

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Summary

Aim. Schizophrenia spectrum disorders (SSDs) in children and adolescents are rare but clinically severe conditions. In Poland, evidence regarding diagnostic practices and system-level determinants of pediatric SSD diagnoses remains limited. This study aimed to analyze nationwide trends in first-time inpatient diagnoses of SSDs in youth between 2014 and 2019, with a focus on age distribution, diagnostic coding patterns (F20, F21, F25), and selected indicators of service utilization and reimbursement.

Material and Methods. A retrospective register-based analysis was conducted using national inpatient data from the Polish National Health Fund (NFZ) for the years 2014–2019. The study included 9,034 patients aged 0–17 years who received a first-time diagnosis of SSDs coded as F20, F21, or F25 according to ICD-10. Trends in age at diagnosis, diagnostic category distribution, hospitalization volume, and reimbursement indicators were analyzed descriptively over time.

Results. Between 2014 and 2019, 9,034 inpatients aged 0–17 years received first-time SSD diagnoses. Schizophrenia (F20) overwhelmingly predominated across all age groups, while F21 and F25 were rarely used. A shift toward younger adolescents was observed, with a growing proportion of diagnoses in the 13–14-year-old age group and a gradual decline

among patients aged 15–17 years. Hospitalization numbers remained relatively stable, while the volume of reimbursed services declined and total refunds increased, suggesting rising per-case costs despite lower service utilization.

Conclusions. The findings indicate a shift toward earlier diagnostic labeling of schizophrenia spectrum disorders in Polish youth and a marked overreliance on the F20 code, suggesting diagnostic oversimplification. These patterns are likely influenced by systemic and reimbursement-related factors and by the limited developmental sensitivity of the ICD-10 classification, particularly in pediatric psychiatry. Comparable coding tendencies and age-distribution shifts have been reported in U.S., German, and Scandinavian register-based studies, indicating that the Polish findings reflect administrative and structural influences on diagnostic practice rather than true epidemiological differences. Adoption of developmentally informed classification principles, such as those embodied in DSM-5, may improve diagnostic accuracy, care planning, and resource allocation in child and adolescent psychiatry.

Key words: schizophrenia spectrum disorders (SSDs), child, adolescent

Introduction

Schizophrenia spectrum disorders (SSDs), encompassing schizophrenia (ICD-10: F20), schizotypal disorder (F21), and schizoaffective disorder (F25), are chronic psychiatric conditions that, although rare in childhood, may emerge during adolescence and cause severe functional impairments [1–8]. Pediatric onset of SSDs is associated with atypical symptomatology, diagnostic complexity, and increased developmental vulnerability, requiring careful differentiation from other neurodevelopmental and affective disorders [9].

Despite global efforts to standardize diagnostic criteria in systems such as the ICD-11 and DSM-5-TR [10–12], clinical practice in many countries, including Poland, continues to rely on ICD-10 – a classification system with recognized limitations in capturing the developmental specificity of early-onset psychosis [13].

During the study period (2014–2019), ICD-10 was officially in use in Poland. It requires a minimum symptom duration of one month for schizophrenia, with less clearly defined temporal thresholds for schizotypal and schizoaffective disorders. While broadly applicable in adult populations, these criteria may not adequately accommodate the fluid and developmentally modulated presentation of SSDs in youth. In contrast, newer classifications such as the ICD-11 and DSM-5-TR provide more nuanced criteria for pediatric populations, particularly regarding negative symptoms, longitudinal course, and overlap with other neurodevelopmental conditions [14–16].

Early-onset schizophrenia frequently presents with disorganized behavior and developmental regression, while schizotypal traits in adolescents may overlap with normative developmental phenomena or autism spectrum features. Schizoaffective disorder presents additional diagnostic challenges due to the required co-occurrence of affective and psychotic symptoms, which may be less clearly demarcated in younger patients [17, 18]. These complexities underscore the need for diagnostic frameworks that are developmentally sensitive and longitudinally informed.

In Poland, data on trends in SSD diagnoses among children and adolescents remain scarce. National evidence suggests a mismatch between evolving international

classification systems and local diagnostic practices. Systemic issues – such as limited access to specialized youth services, regional disparities, and continued use of ICD-10 for reimbursement – may further impede accurate diagnosis and treatment planning.

This study analyzes diagnostic and age-related patterns of SSDs in a national cohort of 9,034 psychiatric inpatients aged 0–17, treated between 2014 and 2019. We examined the frequency and age distribution of ICD-10 diagnoses (F20, F21, F25) and assessed longitudinal trends. The findings aim to clarify current diagnostic practices, highlight potential misalignments, and support efforts toward developmentally appropriate diagnostic frameworks.

Material and methods

Study design and methods

This retrospective cohort study analyzed national inpatient data for pediatric patients (0–17 years) diagnosed with schizophrenia spectrum disorders (SSDs) in Poland between 2014 and 2019. The dataset included 9,034 cases coded according to ICD-10 (F20, F21, F25). Annual aggregates covered diagnosis counts, hospitalizations, benefits, refund amounts (PLN), and first-time diagnoses. Data were stratified by age group (0–12, 13–14, 15–17) and diagnosis code.

Temporal trends were visualized using standardized line and area charts, with linear trends and proportional distributions annotated to enhance interpretability. Statistical analyses were conducted in R, with a significance threshold of $\alpha = 0.05$ [19]. Temporal changes were assessed using Poisson and linear regression models, while interactions between time and subgroup variables were evaluated using generalized linear models. Odds ratios with 95% confidence intervals were calculated via multinomial logistic regression to examine shifts in diagnosis and age group distribution. Additional tests included STL decomposition, Shapiro–Wilk normality tests, and Pearson correlations. Diagnostic validity was limited by reliance on administrative codes without clinical verification.

Results

Overall trends in pediatric schizophrenia diagnoses (2014–2019)

Between 2014 and 2019, the number of pediatric schizophrenia (ICD-10 F20) diagnoses declined steadily, from 1,597 to 1,431 cases – an average annual decrease of 33 cases (−2.14%). This trend, illustrated in Figure 1, showed moderate variability and weak year-to-year correlation. The decline may indicate stabilization in incidence, possibly due to earlier interventions or shifts in referral patterns away from inpatient care. These changes set the stage for further age – and diagnosis-specific trends, with decreases in older age groups partially offset by increases in younger cohorts, affecting both clinical priorities and healthcare resource allocation.

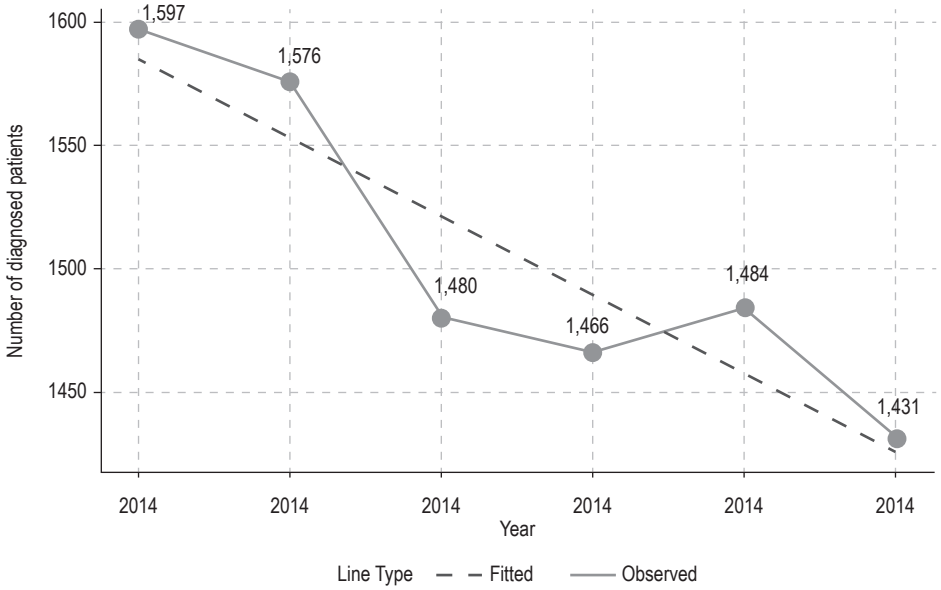

Figure 1. **Annual pediatric schizophrenia (F20) diagnoses in Poland, 2014–2019, showing a steady decline with moderate variability and low year-to-year correlation**

The trends observed in Poland – namely the overall stability of incidence, gradual shifts in diagnoses toward younger age groups, and the persistent predominance of the F20 code – closely parallel findings from large Scandinavian registry studies [20]. In Nordic countries, similar age-related diagnostic redistributions have been attributed primarily to system-level factors, such as earlier detection pathways and changing referral practices, rather than to true epidemiological shifts. Moreover, the preferential use of the F20 category in child and adolescent populations has historically contributed to inflated schizophrenia classifications in several Scandinavian regions, underscoring the extent to which coding conventions can shape apparent diagnostic patterns [21].

Comparable patterns have also been reported in large U.S. Medicaid datasets, where the majority of pediatric schizophrenia diagnoses cluster in late adolescence, even though prodromal symptoms often emerge many years earlier [22]. The low prevalence of childhood-onset schizophrenia in the U.S. (0.2%) and the shift in diagnoses toward older age groups mirror the Polish age distribution, suggesting that diagnostic timing may be driven more by systemic factors than by underlying biological differences. This conclusion is further supported by evidence from a large U.S. population-based cohort of approximately 1.3 million children and adolescents, in which schizophrenia spectrum disorders accounted for only a minute proportion of all psychiatric diagnoses; most diagnoses involved anxiety disorders, ADHD, or developmental conditions, reinforcing the expectation that schizophrenia before age 18 is exceedingly rare [23].

Age-specific trends

Age-stratified analysis revealed a notable redistribution of diagnoses across pediatric cohorts. The 15–17 age group experienced a proportional decrease from 72.8% in 2014 to 68.1% in 2019, driven by an annual log-count reduction of 1.7% ($\beta = -0.017$, SE = 0.004, $p < 0.001$; STL $\beta = -27.8$ patients/year, $p < 0.001$), while maintaining a baseline log-count 6.36 times higher than the 0–12 group ($\beta = 1.85$, SE = 0.02, $p < 0.001$).

In contrast, the 13–14 group increased from 16.9% to 20.0%, with odds of diagnosis relative to 0–12 rising annually (OR = 1.09, 95% CI 1.03–1.16, $p = 0.002$; STL $\beta = 3.2$ patients/year, $p = 0.120$). The 0–12 group remained stable at 10–12% ($p = 0.580$) (Figure 2).

These temporal changes suggest that diagnostic focus is gradually shifting toward mid-adolescence, potentially reflecting enhanced screening protocols. Such shifts could improve long-term outcomes by enabling earlier therapeutic engagement and may also intersect with diagnosis-specific patterns, where F20's dominance could mask similar age-related reallocations. However, because ICD-10 does not capture prodromal or developmental symptomatology, shifts toward earlier ages at diagnosis should be interpreted cautiously, as they may reflect earlier referral rather than true clinical onset. This limitation has also been highlighted in Danish national registry analyses, where early diagnoses were shown to depend strongly on referral timing rather than on true onset patterns, particularly in younger age groups [24, 25].

Similar methodological constraints have been documented in German claims-based studies, which – despite combining diagnostic codes with antipsychotic treatment data – cannot reliably distinguish first episodes from relapses or capture outpatient-only cases [21, 26]. Scandinavian registers show a comparable underrepresentation of prodromal or mild presentations, suggesting that such limitations are inherent to administrative datasets rather than country-specific [20].

This limitation is consistent with findings from U.S. Medicaid analyses, where early-onset cases frequently present with neurodevelopmental comorbidities such as ADHD, speech and language disorders, or learning difficulties, which can delay recognition of emerging psychotic processes by several years [22]. These overlaps contribute to diagnostic delays that average nearly a decade in childhood-onset cases.

Findings from U.S. cohorts further indicate that ADHD, ASD, and disruptive behavior disorders are often diagnosed years before psychotic symptoms emerge, masking early warning signs and delaying recognition [23]. This developmental overlap is likely to influence diagnostic timing in Poland as well.

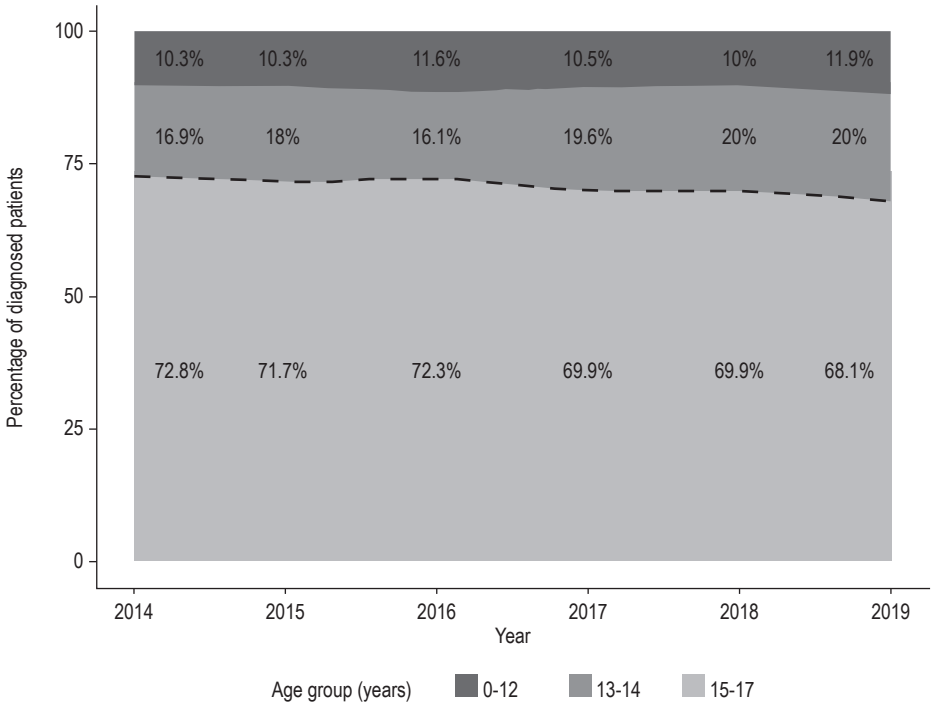

Figure 2. **Annual distribution of pediatric schizophrenia diagnoses by age group (2014–2019)**

Comparable age shifts have been reported in Scandinavian inpatient cohorts, where earlier diagnoses were associated with increased awareness and expanded early-intervention services [21]. The Polish data show a similar directional pattern, although absolute rates differ due to healthcare organization and diagnostic thresholds.

Diagnostic code distribution and trends (ICD-10: F20, F21, F25)

Between 2014 and 2019, diagnosis-specific trends under ICD-10 (Figure 3) showed the consistent predominance of F20 (schizophrenia), comprising 79.5–83.2% of cases. Use of F21 (schizotypal disorder) remained limited (12.7–15.6%), and F25 (schizoaffective disorders) was rare (3.1–5.3%). Gradual shifts occurred toward F21 and F25, supported by strong inverse correlations between F20 and F21 ($r = -0.93$, $p = 0.007$), and F20 and F25 ($r = -0.88$, $p = 0.020$), with a positive correlation between F21 and F25 ($r = 0.91$, $p = 0.010$). F20 declined slightly from 80.3% to 78.2% (−0.35%/year), F21 peaked at 20.6% in 2017 before stabilizing at 16.8% (+0.22%/year), and F25 peaked at 6.8% in 2018 (+0.30%/year). The persistence of F20 suggests coding preferences that may underrepresent the broader spectrum, including potential underdiagnosis of F21 and F25 presentations.

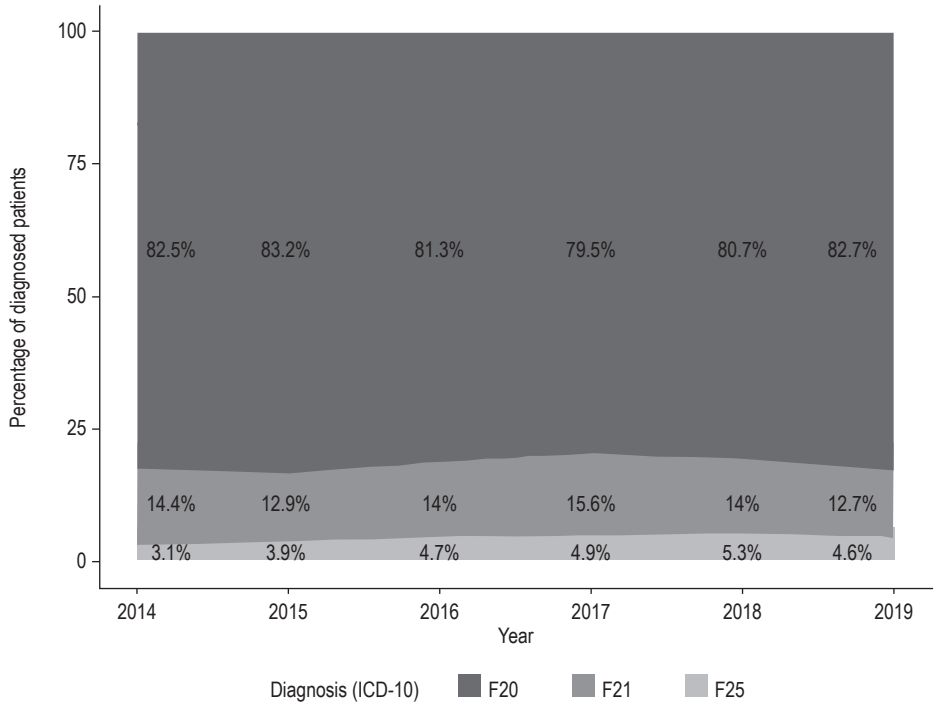

Figure 3. **Annual distribution of pediatric schizophrenia (ICD-10: F20) diagnoses, 2014–2019. Dashed line indicates the temporal trend in F20 percentage**

The coding imbalance – dominance of F20 with limited use of F21 and F25 – mirrors Scandinavian findings, where schizophrenia codes were historically overused, resulting in 9–16% false-positive classifications depending on the region [21]. The inverse relationship between F20 and F21/F25 in Polish data may similarly reflect clinicians' preference for familiar categories when diagnostic criteria are developmentally ambiguous.

Similarly, U.S. claims-based studies report a tendency toward simplified coding patterns, with schizophrenia diagnoses disproportionately represented relative to schizoaffective or schizotypal categories. This phenomenon has been partly attributed to reimbursement-driven coding practices, echoing the patterns observed in the present dataset [22].

Temporal trends in pediatric schizophrenia: benefits, hospitalizations, and refunds (2014–2019)

Total number of benefits

In parallel with the observed diagnostic shifts, the total number of psychiatric benefits allocated for pediatric schizophrenia showed a fluctuating but overall downward

trend between 2014 and 2019, decreasing from 6,061 to 5,329 – an average annual reduction of 146 benefits (Figure 4). Although the decline was not uniform across years, it reflects a broader pattern of reduced utilization, which may be influenced by changes in outpatient care models or policy adjustments affecting eligibility. This trend may also signal a shift toward more community-based interventions for young patients. When examined by age and diagnosis, the overall reduction revealed divergent per-patient patterns, highlighting age-dependent resource demands and underscoring the need for targeted allocation strategies.

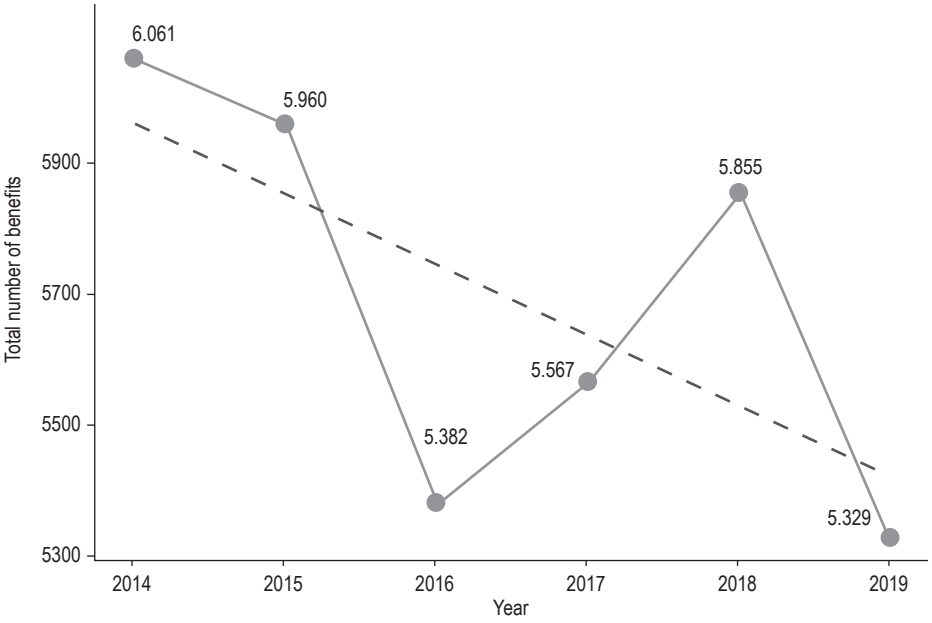

Figure 4. **Annual trends in psychiatric benefits for pediatric schizophrenia diagnoses (2014–2019)**

Age-specific patterns in benefits per patient

Age-stratified analysis of per-patient benefits, measured in PLN, further illustrates these dynamics (Figure 5). In the 0–12 group, benefits declined steadily from approximately 3.8 in 2014 to 2.3 in 2019, accompanied by higher variability. This variability may reflect inconsistent treatment needs or cost-saving measures that disproportionately affect early-onset cases, where long-term developmental support is crucial.

The 13–14 group maintained relative stability, fluctuating between 3.4 and 3.8, with moderate variations and a peak near 3.8 in 2016. This pattern aligns with the observed increase in diagnostic rates for this cohort and suggests a stabilization in resource provision amid rising case identification.

In contrast, the 15–17 group experienced a gradual increase from 3.8 to 4.4, with low variability and a notable peak of 4.4 in 2018. This rise likely reflects sustained or escalating needs in late adolescence, possibly due to more complex symptom profiles requiring intensive interventions.

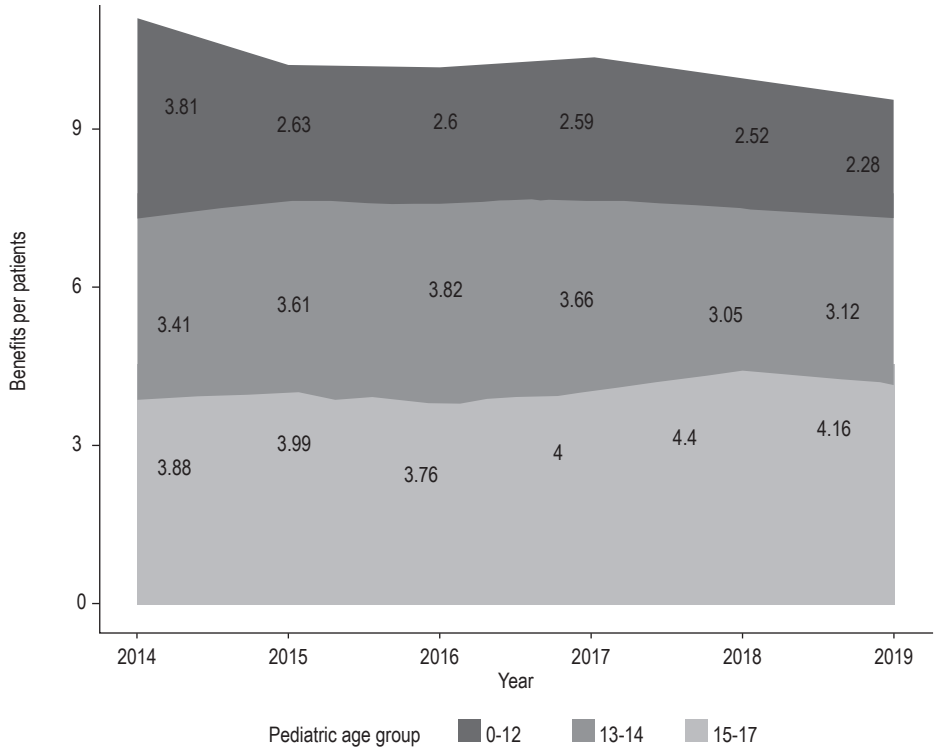

Figure 5. **Annual distribution of psychiatric benefits per patient for pediatric schizophrenia by age group (2014–2019)**

Diagnosis-specific patterns in benefits

Diagnosis-stratified patterns in per-patient benefits mirrored these age-related variations while highlighting code-specific disparities. F20 (paranoid schizophrenia) remained stable, ranging from 3.77 in 2014 to 3.92 in 2019, with a modest positive slope of +0.06 per year and a standard deviation (SD) of 0.45, indicating consistent funding for the most common diagnosis.

F21 (schizotypal disorder) showed a slight increase from 0.85 to 0.87 (+0.013 per year, SD 0.125), with fluctuations that may correspond to evolving recognition of subtler spectrum presentations. F25 (schizoaffective disorders) exhibited a fluctuating net decrease from 1.04 to 0.62 (−0.08 per year, SD 0.18), despite occasional spikes.

This trend suggests potential underfunding for disorders characterized by overlapping affective and psychotic features.

These trends indicate an increasingly age-dependent allocation of resources, with declining total benefits but rising per-patient costs in older groups – potentially widening care disparities for younger patients. Parallel hospitalization patterns highlight the need for integrated strategies that combine early prevention with intensified adolescent support to reduce long-term healthcare burdens.

Hospitalization trends by age group

Between 2014 and 2019, pediatric schizophrenia hospitalizations in Poland remained stable (502 in 2014 vs. 494 in 2019), with minor U-shaped fluctuations and a peak in 2018. Age-stratified data showed increasing hospitalization rates with age: low and stable in children aged 0–12, moderate and variable in the 13–14 group, and highest in adolescents aged 15–17. This gradient suggests greater symptom severity or delayed diagnosis in older youth and highlights the need for early, community-based interventions to reduce inpatient care reliance.

Refundation trends

Between 2014 and 2019, total refund amounts for pediatric schizophrenia rose from 5.11M PLN to 6.64M PLN, despite declining service volumes. Per-patient costs also increased, especially for F25 (schizoaffective disorder), which showed the steepest annual rise, likely reflecting greater clinical complexity. F21 (schizotypal disorder) also saw rising costs, while F20 remained the most prevalent but showed more modest cost increases. These patterns suggest an economic shift toward managing more complex diagnostic categories, highlighting the need for targeted, cost-effective care strategies.

The divergence between decreasing service numbers and rising refund costs parallels observations in Nordic systems, where more complex SSD subtypes (e.g., schizoaffective presentations) generate higher per-patient costs despite their low prevalence [24]. This pattern may indicate increasing clinical complexity in older adolescents or reimbursement-driven coding practices.

Temporal patterns of initial diagnoses

Between 2014 and 2019, the number of first-time pediatric SSD diagnoses declined from 757 to 618, marking a steady downward trend. Age-stratified analysis revealed a shift toward earlier identification: the share of diagnoses in the 0–12 group increased from 12.4% to 18.0%, and in the 13–14 group from 18.6% to 24.4%. In contrast, the 15–17 group, though still dominant, declined from 69.0% to 57.6%. These trends suggest growing clinical attention to early-onset cases and a narrowing of age-related diagnostic disparities, potentially reflecting improved awareness and earlier intervention.

Scandinavian studies have also documented regional variation in early diagnoses, with urban centers showing both higher detection rates and higher proportions of

false-positive schizophrenia diagnoses [20, 24]. Although the Polish dataset cannot assess such variation due to its structure, the parallel shift toward younger age groups resembles these Scandinavian urban patterns.

Diagnosis-specific trends (ICD-10)

Diagnosis-specific trends complemented the age convergence while reinforcing F20's predominance (Figure 6). F20 (paranoid schizophrenia) consistently accounted for 78.2–80.3% of initial diagnoses, showing minimal fluctuation and underscoring a preference for this code in pediatric settings, where symptom clarity may favor its application over other spectrum categories. F21 (schizotypal disorder) peaked at 20.6% in 2017 before stabilizing at 16.8% in 2019, indicating transient increases possibly linked to heightened awareness of subtler traits. F25 (schizoaffective disorders) remained infrequent, peaking at 6.8% in 2018 and ending at 5.0% in 2019, suggesting underutilization despite its relevance for cases with affective components. This F20 dominance, stable across the period, integrates with declining benefits and hospitalizations – where resources concentrated on older, F20-coded cases – while contrasting with rising refunds, where spectrum reallocations (F21 and F25) drove cost surges.

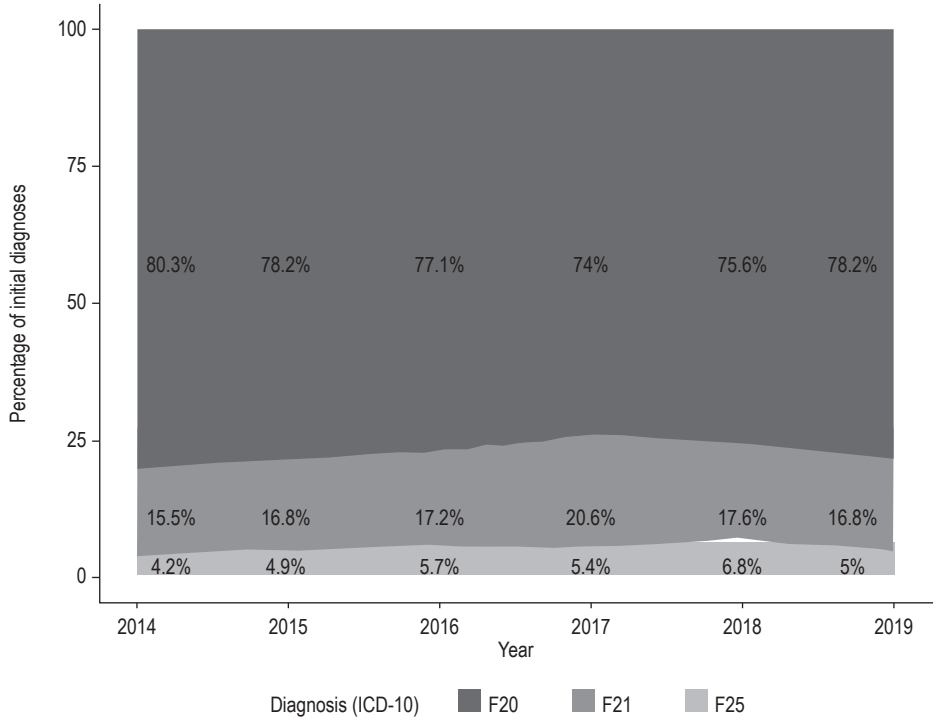

Figure 6. **Annual distribution of initial pediatric schizophrenia diagnoses by ICD-10 code (2014–2019)**

Discussion

This study presents a comprehensive analysis of first-time diagnoses of SSDs in the pediatric population in Poland between 2014 and 2019. The findings reveal important age-specific and diagnosis-specific trends, which may reflect both evolving epidemiological patterns and systemic diagnostic practices.

To contextualize these findings, it is important to consider the methodological characteristics of the dataset. The present approach aligns more closely with German claims-based studies [26], which similarly integrate inpatient and reimbursed service data, than with Scandinavian national register systems that combine inpatient, outpatient, and day-clinic diagnoses. These structural differences partly explain disparities in absolute rates and coding distributions across countries and underscore the need for cautious cross-national comparison.

A broader international perspective supports these observations. U.S. Medicaid datasets, German insurance-claims studies, and Scandinavian national registers face similar limitations – most notably incomplete coverage of outpatient care, overrepresentation of severe cases, and limited visibility of prodromal or developmentally atypical presentations – highlighting that such constraints are characteristic of register-based research globally [22].

Importantly, the observed diagnostic patterns align with findings from Scandinavian register-validation studies, which have repeatedly shown that ICD-based schizophrenia diagnoses in youth have moderate to high validity (75–86%) but are prone to misclassification, particularly in younger patients and in regions with constrained staffing or high caseloads [21, 27].

The most prominent trend was a gradual decline in diagnoses among adolescents aged 15–17, accompanied by a steady increase in the proportion of cases in the 13–14 age group, particularly between 2017 and 2019. This shift suggests that diagnostic procedures are being initiated earlier in adolescence, potentially due to greater awareness among parents, educators, and primary care providers.

U.S. data reveal a nearly identical developmental pattern: although childhood-onset schizophrenia does occur, more than 75% of cases are diagnosed in mid – to late adolescence [22]. Furthermore, U.S. population studies confirm that schizophrenia spectrum disorders represent only a negligible proportion of all psychiatric diagnoses before age 18, reinforcing the plausibility of the low case numbers identified in the present Polish cohort [23].

Thus, the age shift observed in Poland reflects a broader international trend and does not necessarily indicate a true epidemiological increase among younger patients.

Similarly to Scandinavian systems in the 1980s–1990s, reimbursement structures in Poland may encourage the use of F20 to ensure access to pharmacological treatment or specialized services, indirectly shaping diagnostic patterns [21].

Although the present study does not include pharmacotherapy data, available Polish evidence suggests broader systemic trends that may indirectly contextualize the diagnostic patterns observed. A population-based analysis of National Health

Fund prescription records from the Pomeranian region (2008–2012) documented a steady increase in the proportion of children and adolescents receiving at least one antipsychotic prescription per year, rising from approximately 0.26% to 0.31% of the 0–17-year-old population. The study also reported an increasing number of very young children (0–4 years) receiving antipsychotics, as well as a gradual rise in the use of second-generation antipsychotics, although first-generation agents remained predominant. The most frequently prescribed medications were risperidone (26.7%) and chlorprothixene (21.7%) [28]. These findings highlight a broader national trend toward expanding antipsychotic use in pediatric populations, which may intersect with patterns of early diagnostic labeling and service utilization. However, because prescription datasets do not include diagnostic codes, the relationship between antipsychotic exposure and specific schizophrenia-spectrum diagnoses in Polish youth remains unknown and warrants further study.

The expanding role of psychological–pedagogical counseling centers and early-intervention services likely contributes to this earlier detection. These results support the hypothesis that diagnostic thresholds have been lowered, leading to earlier referrals and assessments in younger adolescents.

The growing proportion of younger patients should also be interpreted in the context of the inherent limitations of the ICD-10 classification system, particularly in its application to pediatric populations. ICD-10 lacks developmental specificity, making it challenging to accurately identify and differentiate psychiatric disorders in children and adolescents. Temporal criteria required for diagnosis are often difficult to assess in younger individuals, especially in disorders with evolving or fluctuating symptoms. Furthermore, certain diagnostic categories – such as schizoaffective disorder (F25) and schizotypal disorder (F21) – are imprecisely defined and rarely utilized, which may contribute to diagnostic uncertainty and clinical misclassification. Importantly, ICD-10 does not account for developmental trajectories or age-specific symptom presentations, limiting its usefulness in child and adolescent mental health contexts.

An additional consideration is that inpatient datasets inherently exclude youth who receive only outpatient or community-based care. Scandinavian population linkage studies demonstrate that a substantial proportion of early psychosis cases initially present in outpatient settings and may never require hospitalization [21, 26]. Consequently, the declining inpatient counts observed in Poland may partly reflect a shift toward earlier, community-level interventions rather than a genuine decrease in incidence.

This limitation is particularly relevant in pediatric populations, where prodromal symptoms frequently overlap with neurodevelopmental or behavioral conditions such as ASD, ADHD, or emerging affective disorders [22, 23].

These limitations complicate differentiation between transient, stress-related, affective, or neurodevelopmental phenomena and persistent psychotic symptoms in youth. Polish inpatient data show analogous vulnerabilities.

The predominance of F20 (schizophrenia) across all age groups may, at least in part, reflect the default use of this code in clinically ambiguous cases where alternative

diagnoses – such as F21 or F25 – might be equally or more appropriate. This practice may be reinforced by systemic factors, including reimbursement policies that prioritize F20-coded diagnoses to secure access to pharmacological treatment. As a result, the prevalence of schizophrenia diagnoses in national datasets may be artificially inflated, obscuring the true distribution of SSDs in the pediatric population.

The overwhelming predominance of F20 in Polish inpatient data parallels documentation from Sweden and Finland, where schizophrenia was historically overcoded, leading to 9–16% false-positive rates and underdiagnosis of borderline, schizoaffective, and schizotypal presentations [21]. The Polish pattern may similarly reflect systemic coding preference rather than true epidemiological distribution.

These findings align with previous research indicating that psychiatric diagnoses in youth are shaped not only by clinical symptomatology but also by structural limitations and financial incentives within healthcare systems. Despite noticeable shifts in age distribution, the overall stability in the number of first-time diagnoses raises questions about the consistency and accuracy of diagnostic practices. In the absence of clear developmental criteria – such as those outlined in more modern systems like DSM-5 – clinicians may face pressure to fit complex presentations into rigid diagnostic categories.

Several methodological limitations must be considered when interpreting these results. The NFZ dataset includes only inpatient data from the public sector and excludes private or outpatient psychiatric care, which is increasingly used in child and adolescent mental health. Additionally, the dataset lacks information on the duration of symptoms prior to hospitalization and does not distinguish between first-episode and recurrent cases, making it difficult to estimate true incidence rates. The absence of clinical detail also prevents analysis of comorbidities or treatment outcomes, which are essential for understanding the broader clinical context.

Unlike Nordic countries, where repeated validation audits have been conducted since the 1970s to confirm diagnostic accuracy in national registers [21], Poland lacks systematic validation studies of SSD diagnoses.

The absence of such audits in Poland means that the validity of schizophrenia-spectrum diagnoses remains unknown, limiting the interpretability of observed patterns – particularly the marked predominance of F20 over other spectrum categories.

The rare use of the F25 code (schizoaffective disorder) may reflect broader conceptual and practical challenges in applying this diagnosis to younger populations. The classification of schizoaffective disorder in DSM-5 was specifically designed to improve diagnostic reliability and incorporate symptom dimensions to guide future conceptualizations of chronic psychotic disorders [29, 30]. The DSM-5 framework enables simultaneous consideration of both dichotomous models (e.g., schizophrenia vs. mood disorder) and unitary models of psychosis, offering a more nuanced and flexible approach to diagnosis.

Importantly, DSM-5 defines schizoaffective disorder as a lifetime diagnosis, encompassing the full course of illness – from the onset of psychosis to the present – rather than limiting it to isolated episodes with concurrent mood and psychotic symptoms. This reconceptualization acknowledges the evolving nature of psychiatric presenta-

tions, particularly in youth. For example, effective treatment of mood symptoms may unmask persistent psychotic features resembling schizophrenia, whereas untreated anxiety, stress, or substance use may exacerbate psychosis. Conversely, comorbid conditions such as traumatic brain injury or PTSD may increase the prominence of affective episodes. Consequently, the clinical picture may shift substantially over time, regardless of baseline vulnerability.

DSM-5 promotes treatment tailored to specific symptom domains, best captured by dimensional models like the eight symptom dimensions in its Section III, rather than fixed categories [20]. Such flexible, developmentally informed frameworks are particularly valuable in pediatric psychiatry, where symptoms and illness courses vary with neurodevelopment.

In conclusion, the findings of this study underscore the urgent need to reform the national diagnostic framework in Poland to align more closely with contemporary classification systems such as DSM-5. The current overreliance on F20 and the underutilization of more nuanced codes such as F21 and F25 illustrate a diagnostic inertia that may obscure the true clinical picture in young patients. To improve diagnostic accuracy, optimize treatment outcomes, and ensure effective resource allocation, it is essential to adopt age-specific and stage-specific diagnostic criteria and to provide equitable access to developmentally appropriate mental health services nationwide.

Conclusions

This study reveals a shift toward earlier diagnoses of schizophrenia spectrum disorders (SSDs) in Polish youth, with a growing proportion of younger adolescents receiving diagnoses. The predominant use of the F20 code suggests diagnostic oversimplification, likely influenced by systemic and financial factors. Comparable coding patterns have been reported in U.S. Medicaid datasets, where schizophrenia codes dominate despite heterogeneous symptom presentations, suggesting that coding conventions rather than clinical phenomenology may drive diagnostic assignment in administrative systems. Similar coding distributions have been observed in German and Scandinavian health systems, indicating that the diagnostic patterns found in Poland align with broader international trends driven by administrative and reimbursement structures rather than genuine epidemiological differences.

The findings highlight limitations of the ICD-10 system in pediatric psychiatry and underscore the need for developmentally informed classification frameworks, such as DSM-5, to enhance diagnostic accuracy, care planning, and treatment outcomes.

Limitations

While this study offers important insights into diagnostic trends of F20, F21, and F25 disorders in Polish youth (2014–2019), several limitations must be acknowledged. First, the use of clinical data introduces selection bias, as public psychiatric services primarily capture more severe cases. Second, reliance on ICD-10-coded administrative

data – lacking developmental and psychosocial context – limits diagnostic precision, particularly in differentiating early-onset psychosis from overlapping conditions. Third, the absence of information on cognitive and neurodevelopmental factors restricts broader interpretability. Comparable gaps in developmental and psychosocial information are evident in U.S. claims-based analyses and German insurance datasets, which often underestimate prodromal or subthreshold cases and provide limited insight into early developmental trajectories. Systemic issues, including clinician shortages and high caseloads, may further contribute to diagnostic oversimplification, especially for F21 and F25, which require nuanced, longitudinal assessment. Additionally, the retrospective, cross-sectional design precludes tracking individual diagnostic trajectories, making it difficult to distinguish true epidemiological shifts from evolving diagnostic practices or policy influences.

Similar constraints have been well documented in Nordic claims-based and register studies, where the absence of symptom-level and episode-level information limits the ability to distinguish first-episode psychosis from relapse presentations [21]. German studies linking claims with antipsychotic prescription data and U.S. Medicaid analyses show identical limitations, as they lack the temporal detail necessary to estimate duration of untreated symptoms or differentiate between new-onset and recurrent psychosis. Comparable limitations have also been identified in U.S. Medicaid research, where information on the duration of prodromal symptoms, first-episode status, and clinical validation of diagnoses is unavailable [22]. These gaps can lead to underestimation of early cases and complicate differentiation between true onset and delayed recognition.

The implications of these findings extend beyond diagnostic accuracy and directly concern the structural organization of the national payer system. Evidence from a large European multi-country study involving 171 psychiatric facilities and 1,429 service users demonstrates unequivocally that countries allocating higher proportions of their health budgets to mental health achieve measurably superior care quality across key QuIRC domains – including therapeutic environment, access to interventions, human rights protection, patient autonomy, and recovery-oriented practices. Importantly, users in higher-spending systems consistently report better subjective experiences of care, indicating that increased investment leads not only to improved structural indicators but also to greater satisfaction among the very citizens who finance the system through compulsory health contributions [31, 32].

These findings are particularly relevant for Poland, where longstanding underfunding of child and adolescent psychiatry intersects with the systemic diagnostic uncertainties described in this study. If greater national expenditure is reliably associated with improved patient experience, then patient-reported satisfaction should become a central and transparent metric within the National Health Fund (NFZ) reimbursement model. Establishing a standardized, publicly accessible satisfaction index – applied equally across inpatient, outpatient, community, and private providers operating within the publicly funded sphere – would enable evidence-based allocation of resources and reduce incentives for diagnostic oversimplification driven by reimbursement practices. A financing system tied directly to patient-evaluated quality would not only align Po-

land with European best practices but also create structural incentives for providers to offer developmentally appropriate, patient-centered care rather than maximizing billable diagnostic categories.

Given that European data show the strongest positive effects among populations with the most severe and resource-intensive mental disorders, the implementation of such a patient-satisfaction-based reimbursement framework is likely to have its greatest impact precisely in child and adolescent psychiatry – where early, high-quality intervention has lifelong consequences for functional outcomes. Therefore, from both public health and economic perspectives, integrating patient satisfaction as a mandatory determinant of NFZ financing should be recognized as a necessary systemic reform. This approach would allow policymakers to adjust national mental health budgets not on the basis of historical expenditure or administrative coding patterns but in response to publicly verifiable indicators of service quality, autonomy support, and recovery orientation.

In light of the present findings and broader European evidence, we call upon national health authorities to embed patient satisfaction metrics at the core of resource allocation strategies, ensuring that future increases or decreases in psychiatric funding – across public and contract-based private sectors – reflect the actual experiences and needs of patients. Without such a transparent, citizen-anchored mechanism, Poland risks perpetuating diagnostic distortions and treatment inequities that stem not from clinical realities but from structural deficiencies in the current financing model.

These studies demonstrate that episode misclassification can distort both incidence estimates and the apparent age distribution of first diagnoses, indicating that Polish inpatient data should be interpreted primarily as reflecting service utilization rather than true epidemiological patterns.

Furthermore, as in Scandinavian and German register analyses, the dataset does not capture the duration of prodromal or psychotic symptoms prior to hospitalization [21, 26]. International evidence indicates that pre-hospital help-seeking pathways in youth vary widely and critically influence the timing of diagnosis. Without access to these data, early-detection trends in Poland cannot be fully disentangled from changes in referral dynamics.

Finally, as all data derive from a single national system, generalizability to other healthcare contexts is limited.

Additionally, the absence of formal diagnostic validation, which is routinely performed in Scandinavian national registers (e.g., Sweden, Finland, Denmark), limits the ability to determine the accuracy of ICD-coded diagnoses in this dataset. Without re-examination of medical records, misclassification cannot be quantified [21, 27].

Scandinavian analyses show that diagnostic distributions differ significantly between inpatient and outpatient registers; therefore, Polish inpatient data likely overrepresent more severe or diagnostically complex presentations, potentially skewing the apparent spectrum profile.

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References

1. World Health Organization. *The ICD-10 classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines*. 1997.Geneva: WHO.
2. Feinstein A. *ICD-10*. Int J Soc Psychiatry. 1993;39:157–158. doi:10.1177/002076409303900301.
3. Valle R. *Schizophrenia in ICD-11: comparison of ICD-10 and DSM-5*. Rev Psiquiatr Salud Ment. 2020; 13: 95–104. doi:10.1016/j.rpsm.2020.01.001.
4. Francois Z, Torrico TJ. *Schizotypal personality disorder*. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. Available from: https://www.ncbi.nlm.nih.gov/books/NBK564426/
5. Nakajima T. [*Schizotypal disorder (ICD-10)*]. Ryoikibetsu Shokogun Shirizu. 2003; (38): 84–88. Japanese.
6. Handest P, Parnas J. *Clinical characteristics of first-admitted patients with ICD-10 schizotypal disorder*. Br J Psychiatry Suppl. 2005; (48): 49–54. doi:10.1192/bjp.187.48.s49.
7. Pagel T, Franklin J, Baethge C. *Schizoaffective disorder diagnosed according to different diagnostic criteria – systematic literature search and meta-analysis of key clinical characteristics and heterogeneity*. J Affect Disord. 2014; 156: 111–118. doi:10.1016/j.jad.2013.12.001.
8. Jäger M, Haack S, Becker T, Frasch K. *Schizoaffective disorder – an ongoing challenge for psychiatric nosology*. Eur Psychiatry. 2011; 26(3): 159–165. doi:10.1016/j.eurpsy.2010.03.010.
9. Correll CU, Arango C, Fagerlund B et al. *Identification and treatment of individuals with childhood-onset and early-onset schizophrenia*. Eur Neuropsychopharmacol. 2024; 82: 57–71. doi:10.1016/j.euroneuro.2024.02.005.
10. World Health Organization. *International classification of diseases for mortality and morbidity statistics (11th Revision)*. 2019. https://icd.who.int. (retrieved:1. 08. 2025)
11. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders: DSM-5-TR*. 5th ed., text rev. 2022. American Psychiatric Publishing, Washington, DC
12. Pavlichenko AV, Kulygina MA, Kostyuk GP. *Shizofreniya i drugie psikhoticheskie rasstroistva v MKB-11 i DSM-5: razvitie kontseptsii i sovremennoe sostoyanie* [*Schizophrenia and other psychotic disorders in ICD-11 and DSM-5: evolution of the concepts and current status*]. Zh Nevrol Psikhiatr Im S S Korsakova. 2020; 120: 5–12. Russian. doi:10.17116/jnevro20201200625.
13. Bressan RA, Chaves AC, Pilowsky LS et al. *Depressive episodes in stable schizophrenia: critical evaluation of the DSM-IV and ICD-10 diagnostic criteria*. Psychiatry Res. 2003; 117(1): 47–56. doi:10.1016/s0165-1781(02)00298-6.
14. Zielasek J, Gaebel W. *Schizophrenie und andere primäre psychotische Störungen in ICD-11* [*Schizophrenia and other primary psychotic disorders in ICD-11*]. Fortschr Neurol Psychiatr. 2018; 86(3): 178–183. German. doi:10.1055/s-0044-101832.

15. Dalsgaard S, Thorsteinsson E, Trabjerg BB et al. *Incidence rates and cumulative incidences of the full spectrum of diagnosed mental disorders in childhood and adolescence*. JAMA Psychiatry. 2020; 77: 155–164. doi:10.1001/jamapsychiatry.2019.3523.

16. Schultze-Lutter F, Meisenzahl E, Michel C. *Psychotische Störungen in der ICD-11: die Revisionen* [*Psychotic disorders in ICD-11: the revisions*]. Z Kinder Jugendpsychiatr Psychother. 2021; 49(6): 453–462. German. doi:10.1024/1422-4917/a000777.

17. Malhi GS, Green M, Fagiolini A et al. *Schizoaffective disorder: diagnostic issues and future recommendations*. Bipolar Disord 2008; 10: 215–30.

18. Wilson JE, Nian H, Heckers S. *The schizoaffective disorder diagnosis: A conundrum in the clinical setting*. Eur Arch Psychiatry Clin Neurosci 2013; 264: 29–34.

19. R Core Team. R. *A language and environment for statistical computing. Vienna: R Foundation for Statistical Computing*; 2024. Available from: https://www.R-project.org/

20. Dalman Ch, Broms J, Cullberg J, Allebeck P. *Young cases of schizophrenia identified in a national inpatient register—are the diagnoses valid?* Soc Psychiatry Psychiatr Epidemiol. 2002; 37: 527-31. doi: 10.1007/s00127-002-0582-3. PMID: 12395142.

21. Ramin T, Peter JU, Schneider M, Heinze M, Riedel O, Langbein SH, Haug U, Zolk O. *Age and sex differences in outpatient antipsychotic prescriptions for schizophrenia: a claims data study*. Eur Arch Psychiatry Clin Neurosci. 2025; 275: 1403-1417. doi: 10.1007/s00406-024-01867-z. Epub 2024 Sep 30. PMID: 39347833; PMCID: PMC12271300.

22. Jerrell JM, McIntyre RS. *Factors Differentiating Childhood-Onset and Adolescent-Onset Schizophrenia: A Claims Database Study. Prim Care Companion CNS Disord*. 2016; 18: 10.4088/PCC.15m01901. doi: 10.4088/PCC.15m01901. PMID: 27486543; PMCID: PMC4956428.

23. Dalsgaard S, Thorsteinsson E, Trabjerg BB, Schullehner J, Plana-Ripoll O, Brikell I et al. *Incidence Rates and Cumulative Incidences of the Full Spectrum of Diagnosed Mental Disorders in Childhood and Adolescence*. JAMA Psychiatry. 2020; 77: 155-164. doi: 10.1001/jamapsychiatry.2019.3523. PMID: 31746968; PMCID: PMC6902162.

24. Baandrup L, Cerqueira C, Haller L, Korshøj L, Voldsgaard I, Nordentoft M. *The Danish Schizophrenia Registry*. Clin Epidemiol. 2016; 8: 691-695. doi: 10.2147/CLEP.S99488. PMID: 27843348; PMCID: PMC5098605.

25. Plana-Ripoll O, Liu X, Köhler-Forsberg O, Sørensen HT, Momen NC. *Mental Disorders in Danish Hospital Registers: A Review of Content and Possibilities for Epidemiological Research*. Clin Epidemiol. 2025; 17: 387-407. doi: 10.2147/CLEP.S509147. PMID: 40260425; PMCID: PMC12010038.

26. Riedel O, Bachmann CJ, Bittner RA, Dörks M, Kollhorst B, Qubad M, Scholle OHF. *Prevalence and incidence of treated schizophrenia: temporal and regional trends in Germany*. Schizophrenia (Heidelb). 2025; 11: 131. doi: 10.1038/s41537-025-00689-9. PMID: 41193478; PMCID: PMC12589479.

27. Højlund M, Rohde C, Gasse C, Hallas J, Fink-Jensen A, Correll CU, Köhler-Forsberg O. *Antipsychotic polypharmacy in patients with schizophrenia between 1999 and 2024 in Denmark: Prevalence, time trends, and combinations*. Eur Neuropsychopharmacol. 2025; 100: 4-12. doi: 10.1016/j.euroneuro.2025.08.580. Epub 2025 Aug 28. PMID: 40882582.

28. Waszak PM, Zagożdżon P, Pierucka M, Kubanek A. *Antipsychotic Medication Prescribing Trends in a Pediatric Population in Northern Poland 2008-2012*. J Child Adolesc Psychopharmacol. 2018; 28: 631-636. doi: 10.1089/cap.2017.0154. Epub 2018 Jul 26. PMID: 30048153.

29. Barch DM, Bustillo J, Gaebel W et al. *Logic and justification for dimensional assessment of symptoms and related clinical phenomena in psychosis: relevance to DSM-5*. Schizophr Res. 2013; 150: 15–20.

30. Malaspina D, Owen MJ, Heckers S et al. *Schizoaffective disorder in the DSM-5*. Schizophr Res. 2013; 150: 21–25. doi:10.1016/j.schres.2013.04.026.

31. Taylor Salisbury T, Killaspy H, King M. *The relationship between deinstitutionalization and quality of care in longer-term psychiatric and social care facilities in Europe: A cross-sectional study*. Eur Psychiatry. 2017; 42: 95-102. doi: 10.1016/j.eurpsy.2016.11.011. Epub 2016 Dec 22. PMID: 28364688.

32. Salisbury TT, Killaspy H, King M. *Relationship between national mental health expenditure and quality of care in longer-term psychiatric and social care facilities in Europe: cross-sectional study*. Br J Psychiatry. 2017; 211: 45-49. doi: 10.1192/bjp.bp.116.186213. Epub 2017 Mar 16. PMID: 28302698.

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