

Psychotropic Medication Use and Psychiatric Disorders During the COVID-19 Pandemic Among Danish Children, Adolescents, and Young Adults

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IMPORTANCE The direct and indirect implications of the COVID-19 pandemic have been associated with the mental health of children and adolescents, but it is uncertain whether these implications have been associated with changes in prescribing and diagnosis patterns.

OBJECTIVE To examine psychotropic medication use and rates of psychiatric disorders in Danish children, adolescents, and young adults during the COVID-19 pandemic.

DESIGN, SETTING, AND PARTICIPANTS This population-based, descriptive register-based cohort study included all Danish individuals aged 5 to 24 years from January 1, 2017, until June 30, 2022.

MAIN OUTCOMES AND MEASURES Rates of filled prescriptions of psychotropic medications, including antipsychotics, anxiolytics, hypnotics, sedatives, antidepressants, and psychostimulants, and all inpatient and outpatient contacts with mental and behavioral disorders. Rates of new (incident) and total (prevalent) psychotropic medication use and psychiatric diagnoses were estimated. Rate ratios (RRs) were assessed between observed and expected numbers of incident psychotropic medication use or psychiatric diagnoses from March 2020 to June 30, 2022, comparing observed numbers with expected numbers predicted from the modeled prepandemic trend.

RESULTS The study identified 108 840 (58 856 female individuals [54%]; median [IQR] age, 18 [14-22] years) incident psychotropic medication users. From March 2020 (first national lockdown) to June 2022, the rate of incident users of any psychotropic medication showed a relative increase of 18% (RR, 1.18; CI, 1.17-1.20) compared with expected numbers, which was primarily associated with an increase among those aged 12 to 17 years of 37% (RR, 1.37; 95% CI, 1.34-1.41). Similarly, there was an overall relative increase of incident psychiatric disorders of 5% (incidence rate, 1.05; CI, 1.04-1.07) (incident cases, 114 048 [58 708 female individuals (51%)]), which was associated with an increase in hyperkinetic disorders (RR, 1.13; CI, 1.09-1.18) and anxiety disorders (RR, 1.04; CI, 1.02-1.06). Prevalence patterns showed similar trends of an overall increase in psychotropic medication use and psychiatric disorders. One of 3 new users of an individual drug group had filled a prescription for a drug from another psychotropic medication group within the prior 6 months.

CONCLUSIONS AND RELEVANCE The results of this cohort study suggest that Danish youths experienced an increase in rates of psychotropic treatment and psychiatric disorder diagnoses during the COVID-19 pandemic, which was most pronounced among those aged 12 to 17 years. The increase was observed for children and adolescents with and without a psychiatric history within the last 5 years.

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During the COVID-19 pandemic, young people have experienced a worsening of their mental well-being.^{1,2} This might be accompanied by an increasing use of psychotropic medications,³ particularly among youths.⁴⁻⁶ However, results are conflicting regarding use of psychotropic medications, and it is unclear whether the rise in overall mental health problems is associated with a subsequent rise in clinical psychiatric disorders. We aimed to examine the rates of psychotropic medication use and psychiatric disorders in Danish children, adolescents, and young adults during the pandemic.

Methods

We conducted a descriptive cohort study of all Danish individuals aged 5 to 24 years between January 1, 2017, and June 30, 2022, using individual-level data from the nationwide Danish health care registries.⁷ The study was registered at the University of Southern Denmark and followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines. According to Danish law, purely registry-based studies are exempt from ethical approval as well as informed consent. Information on filled psychotropic prescriptions included antipsychotics (Anatomical Therapeutic Chemical code N05A), anxiolytics (N05B), hypnotics and sedatives (N05C), antidepressants (N06A), and psychostimulants (N06B). Inpatient and outpatient hospital psychiatric disorder diagnoses included any mental disorder (*International Statistical Classification of Diseases and Related Health Problems, Tenth Revision [ICD-10]* F00-99), psychotic disorders (F20-29), mood disorders (F30-39), anxiety disorders (F40-48), autism spectrum disorders (F84 disregarding F84.2-84.4), and hyperkinetic disorders (F90.0 and 98.8C).

We calculated overall incidence rates (IRs) of psychotropic medication use and diagnoses per month by age group. Incidence was defined as no record of the given drug or diagnosis during the previous 5 years. Further, we calculated the proportion of new (incident) users within specific drug groups who were naive to all other psychotropic medication classes 180 days before their incident prescription.

Prevalence of psychotropic medication use and diagnoses was calculated by age group per quarter or month, respectively, using the number of individuals who filled at least 1 prescription of any psychotropic within the given quarter or received a psychiatric diagnosis within the 5 years before the given month as numerator. The denominator (ie, quarterly population counts by age) was obtained from Statistics Denmark.

We calculated the total dispensed drug quantity (defined daily dose) per month overall and by drug group. We determined the prescriber of incident prescriptions, separating general practitioners (GPs) from non-GPs.

We used a Poisson regression to model the prepandemic (January 2017 through February 2020) monthly number of incident cases of psychotropic medication use or psychiatric diagnosis as stratified by age, drug, or diagnosis groups. We used

Key Points

Question Is the COVID-19 pandemic associated with changes in psychotropic medication use or rates of diagnosed psychiatric disorders in youths?

Findings In this register-based cohort study of all Danish individuals aged 5 to 24 years, there was an increase in psychotropic medication use and some psychiatric disorders from March 2020 to June 2022. Increases were seen for new (incident) and total (prevalent) cases.

Meaning The study results suggest that in the aftermath of the pandemic, the number of youths experiencing psychopathology and requiring psychotropic treatment has increased, which warrants attention for policy makers and stakeholders.

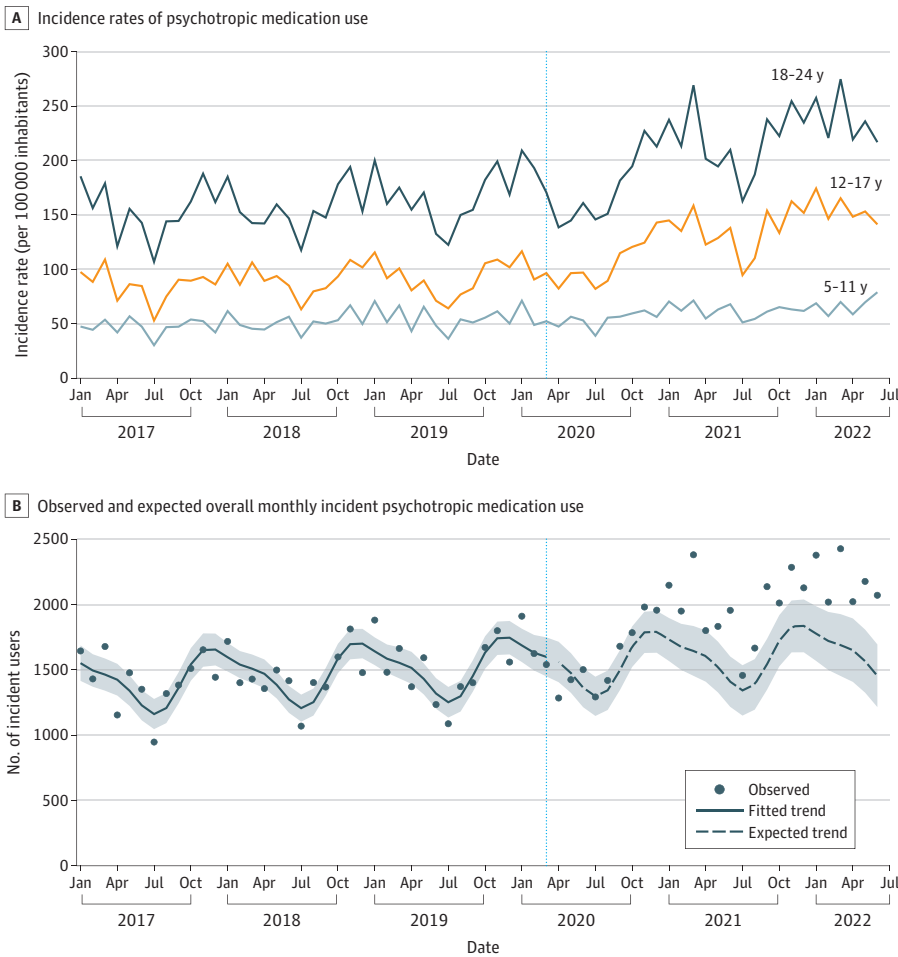
Fourier terms in the model to account for seasonality.⁸ The total number of postpandemic (March 1, 2020, to June 30, 2022) incident cases predicted from the model was then compared with the number of observed cases during the same period by calculating rate ratios (RRs) with 95% CIs. We treated March 1, 2020, as the start of the COVID-19 period, as Denmark had its first national lockdown on March 13, 2020.

Results

Incident use of any psychotropic increased among all age groups from March 2020 through June 2022 (**Figure 1A**), most prominently among those aged 12 to 17 years (IR from 97 to 142/100 000 inhabitants) and 18 to 24 years (IR from 171 to 218/100 000). Compared with expected numbers derived from the prepandemic trend, this corresponded with a relative increase of 37% (RR, 1.37; 95% CI, 1.34-1.41) and 16% (RR, 1.16; 95% CI, 1.14-1.18), respectively. No relative increase was found among those aged 5 to 11 years (RR, 1.00; 95% CI, 0.96-1.03). The incidence of psychotropic medication use increased from 112 to 153/100 000, which corresponded with a relative increase of 18% (RR, 1.18; 95% CI, 1.17-1.20) (**Figure 1B**). The increase exceeded expected numbers for all drug groups except anxiolytics, with RRs of 1.39 (95% CI, 1.36-1.41) for hypnotics and sedatives, 1.19 (95% CI, 1.17-1.22) for psychostimulants, 1.13 (95% CI, 1.11-1.15) for antidepressants, and 1.08 (95% CI, 1.06-1.11) for antipsychotics. One of 3 (34%) of these incident users filled a prescription for a medication from another psychotropic medication group within the previous 180 days.

Prevalent use of any psychotropic medication also increased during the study period from 757 to 891/100 000 among those aged 5 to 11 years, 1705 to 2259/100 000 among those aged 12 to 17 years, and 2535 to 3215/100 000 among those aged 18 to 24 years. This increase was associated with hypnotics and sedatives (0.50 to 1.03 million defined daily doses per month), antidepressants (0.93 to 1.25), and psychostimulants (0.90 to 1.22), whereas use of antipsychotics (0.127 to 0.132) and anxiolytics (0.023 to 0.025) remained stable. The profile of prescribers remained

Figure 1. Incident Users of Psychotropic Medication by Age Group and Observed and Expected Overall Incident Psychotropic Drug Use



A, Incidence rates of psychotropic medication use (antipsychotics [Anatomical Therapeutic Chemical code N05A], anxiolytics [N05B], hypnotics and sedatives [N05C], antidepressants [N06A] and psychostimulants [N06B]) by age group in Danish children, adolescents, and young adults from January 1, 2017, to June 30, 2022. B, Observed and expected overall monthly incident psychotropic medication use from January 1, 2017, to June 30, 2022. The broken vertical line marks the first lockdown in Denmark (March 2020).

largely unchanged during the pandemic, with 38% of all incident prescriptions issued by GPs in March 2020 to 41% in June 2022.

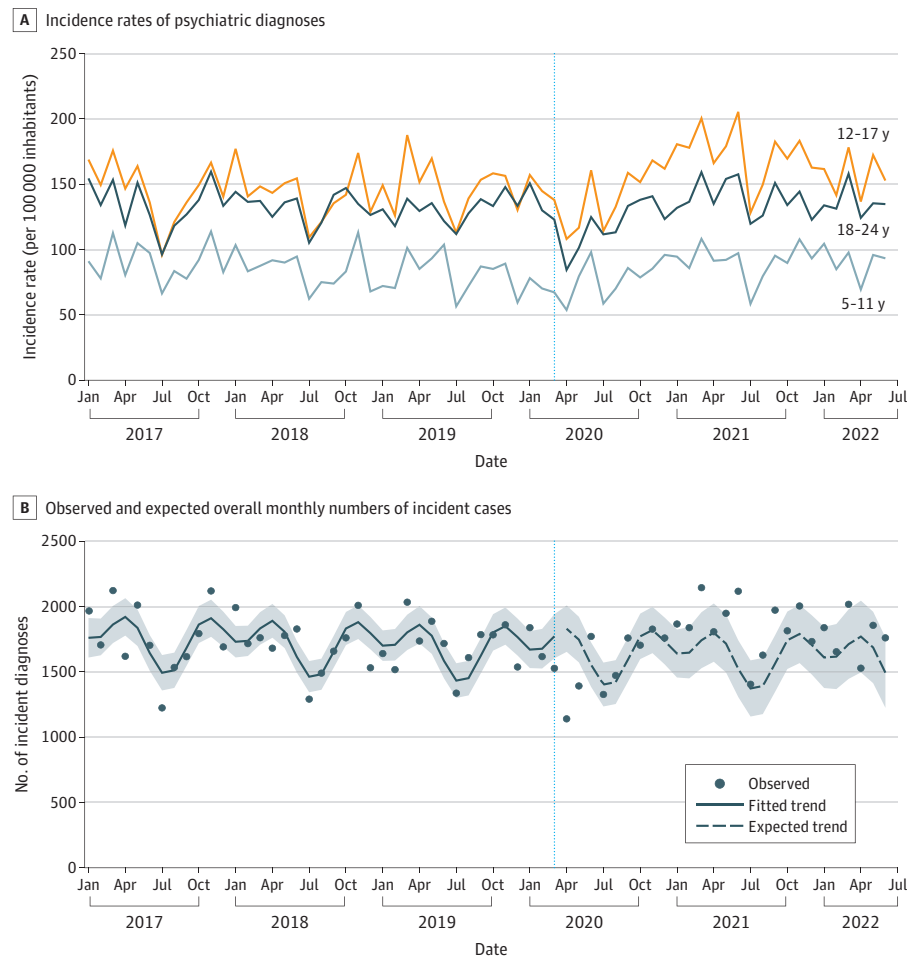
The number of individuals with an incident psychiatric disorder increased for all age groups from the first lockdown through June 2022, with IRs increasing from 67 to 93/100 000 among those aged 5 to 11 years, 138 to 153/100 000 among those aged 12 to 17 years, and 123 to 135/100 000 among those aged 18 to 24 years (Figure 2A). There was an overall relative increase of incident psychiatric disorders of 5% (IR, 1.05; CI, 1.04-1.07) from expected numbers from March 2020 to June 2022 (Figure 2B). This was associated with an increase in hyperkinetic disorders of 13% (RR, 1.13; CI, 1.09-1.18) and to a lesser extent anxiety disorders (RR, 1.04; CI, 1.02-1.06), whereas incident rates of mood, psychotic, and autism spectrum disorders were unchanged. During the same period, the overall prevalence of psychiatric disorders increased for individuals aged 12 to 17 years from 8879 to 9664/100 000, but not for other age groups. The prevalence proportion increased for hyperkinetic disorders from 675 to 792/100 000 individuals and for autism spectrum disorders from 1799 to 2066/100 000.

Discussion

Self-reported mental problems have increased among children and adolescents during the COVID-19 pandemic,^{2,9} but the association with psychopathology has been questioned. The results of this cohort study suggest a nationwide rise, mainly among those aged 12 to 17 years, in treatment with hypnotics, antidepressants, and psychostimulants, and of youths assigned psychiatric disorders, which were primarily hyperkinetic disorders. The increase was observed for youths with and without a psychiatric history within the previous 5 years. One of 3 new users of a specific psychotropic medication group had been treated within the previous 6 months with another psychotropic medication group, indicating deterioration requiring intensified treatment or additional comorbid psychopathology.

Strengths and Limitations

The strengths of this study include the population-based cohort and completeness of Danish health registers, as well as the recent update of data. As a limitation, data on diagnoses were not available from private specialist practices, and there

Figure 2. Incidence of Psychiatric Diagnoses by Age Groups and Observed and Expected Overall Incident Psychiatric Diagnoses

A, Incidence rates of psychiatric diagnoses (*International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* codes F00-99) in Danish children, adolescents, and young adults from January 1, 2017, to June 30, 2022. B, Observed and expected overall monthly numbers of incident cases with psychiatric diagnoses from January 1, 2017, to June 30, 2022. The broken vertical line marks the first lockdown in Denmark (March 2020).

has been a delay in registration of psychiatric disorder diagnoses to the national patient register during the pandemic. Both matters would lead to underestimation of rates of psychiatric disorders, while analyses of medication use were unaffected. Finally, while filled prescriptions are only proxies for consumption, the resulting misclassification is not expected to change during the pandemic.

Conclusions

The results of this cohort study suggest that Danish children, adolescents, and young adults experienced an increase in

psychopathology during the COVID-19 pandemic that was mainly associated with changes among those aged 12 to 17 years. The underlying causal factors are largely unknown, but school lockdowns, abrupt changes of family routines, social isolation, and even direct effects of COVID-19 are just some of the factors of potential importance. The limited change among those aged 5 to 11 years potentially suggests that the short-term effect of the pandemic has been less severe in this age group. Regardless of underlying cause, these findings suggest that the effects of the pandemic on youths will potentially be considerable in future years, which may carry future strain on mental health care systems.

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Acquisition, analysis, or interpretation of data: All authors.

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Statistical analysis: Andersen, Jensen, Kildegaard.

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