

# Psychiatric Disorders and Psychoactive Substance Use in Children and Adolescents: A Population-Based Study in Lombardy, 2016–2022

Filosa A.<sup>(1)</sup>, Franchi M.<sup>(2,3)</sup>, Costantino M.A.<sup>(4)</sup>, Borgatti R.<sup>(5)</sup>, Mensi M.M.<sup>(5)</sup>, Fazzi E.<sup>(6)</sup>, Galli J.<sup>(6)</sup>, Poli V.<sup>(7)</sup>, Leoni O.<sup>(7)</sup>, Limosani I.<sup>(7)</sup>, Reale L.A.<sup>(4)</sup>, Corrao G.<sup>(3,7,8)</sup>, Montomoli C.<sup>(1)</sup>

(1) Biostatistics and Clinical Epidemiology Unit, Department of Public Health, Experimental and Forensic Medicine, University of Pavia, Pavia, Italy

(2) Biostatistics, Epidemiology and Public Health Unit, Department of Statistics and Quantitative Methods, University of Milano-Bicocca, Milan, Italy

(3) National Centre for Healthcare Research and Pharmacoepidemiology, University of Milano-Bicocca, Milan, Italy

(4) Child and Adolescent Neuropsychiatric Unit (UONPIA), Foundation IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy

(5) Child Neuropsychiatry Unit, Department of Brain and Behavioral Sciences, University of Pavia, Pavia, Italy; Welfare Department, Lombardy Region, Milan, Italy – Child Neuropsychiatry Unit, IRCCS Mondino Foundation, Pavia, Italy

(6) Department of Clinical and Experimental Sciences, University of Brescia, Brescia, Italy – Child Neurology and Psychiatry Unit, ASST Spedali Civili of Brescia, Brescia, Italy

(7) Welfare Department, Lombardy Region, Milan, Italy

(8) Professor Emeritus of Medical Statistics, University of Milano-Bicocca, Milan, Italy

CORRESPONDING AUTHOR: Filosa A., [asia.filosa@unipv.it](mailto:asia.filosa@unipv.it)

## INTRODUCTION

The World Health Organization (WHO) defines dual diagnosis (DD) as “the coexistence of psychoactive substance use and another psychiatric disorder in the same person” [1]. Clinicians, researchers, and policymakers are concerned with this issue due to the difficulties involved in managing dual diagnoses, including high relapse rates, reduced participation in treatment, and less favourable treatment results [2]. The literature indicates a higher risk of psychoactive substance use disorders in individuals who have grown up with psychiatric disorders [3]. Although psychiatric comorbidity in adults with substance abuse issues is well documented, it has been less thoroughly investigated in adolescents [4]. Nevertheless, it remains a highly relevant issue for national drug and mental health policies. Adolescents with dual diagnoses place a significant social and economic burden on the public healthcare system, as the interaction between substance use and psychiatric disorders creates a vicious cycle that further worsens later difficulties, such as family conflicts, academic problems, and criminal behavior [2]. The aim of the study is to estimate the prevalence of National Health Service users (0–18 years old) who have been diagnosed with psychiatric disorders related to substance abuse in Lombardy between 2016 and 2022.

## METHODS

### DATA SOURCES AND STUDY POPULATION

The data used for this study were drawn from the administrative healthcare utilization databases of the Lombardy Region, which are routinely employed for reimbursement purposes.

The observation period spanned from January 1, 2016, to December 31, 2022. The study population included all individuals aged 0–18 years as of December 31 of each year, residing in the Lombardy Region.

### CASE DEFINITION

An individual was classified as a case if, at least once during a given year, they either accessed the Emergency Department or were hospitalized. Case identification was based on the presence of specific ICD-9-CM codes (291–292, 303–305), which indicate psychiatric conditions associated with psychoactive substance use.

- Emergency Department visits were included if any of the above codes were recorded as a diagnosis.

- Hospitalizations were considered when any of the specified codes appeared in one of the six diagnosis fields of the hospital discharge records.

This definition allowed for the identification of adolescents

(aged 0–18 years) who had contact with healthcare services for issues related to the comorbidity of psychiatric disorders and psychoactive substance use.

## STATISTICAL ANALYSIS

Annual and monthly prevalence rates (per 1,000 individuals) were calculated by gender, by age group (0–2, 3–5, 6–10, 11–13, and 14–18 years) and observation year, using the number of identified cases as the numerator and the total population aged 0–18 in Lombardy as the denominator.

A negative binomial regression model was applied to estimate the monthly number of prevalent cases, stratified by gender and age group. The model included month as a categorical variable, year as a continuous variable, and period as a categorical variable (January 2016–December 2019, January 2020–December 2021, and January 2022–December 2022). The natural logarithm of the population count was included as an offset term.

## RESULTS

In 2022, 87 cases involving hospital admissions or Emergency Department visits for psychiatric disorders related to substance and alcohol abuse were recorded. From 2016 to 2022, prevalence showed variable trends: an increase from 2016 to 2018, a decline until 2020, followed by fluctuations in the last two years, without returning to 2016 levels.

Stratification by sex revealed fluctuating prevalence before the pandemic, with females peaking in 2018 and males in 2017 and 2019. Both sexes reached their lowest levels in 2020, with a more pronounced rebound in females during the final two years.

By age group, the highest prevalence was consistently observed among adolescents aged 14–18, peaking in 2018, dipping sharply in 2020, and partially recovering in 2021. Younger age groups (0–2 and 3–5 years) showed stable or gradually decreasing prevalence, while the 6–10 and 11–13 groups maintained very low rates throughout the period.

## CONCLUSIONS

The rise in prevalence from 2016 to 2018 may reflect increased adolescent substance use, growing attention to youth mental health, and the impact of social media and cyberbullying [5]. The 2020 decline likely relates to COVID-19, with a rebound in 2021 and slight drop in 2022 due to case re-emergence and service adjustments [6,7]. By sex, females peaked in 2018, possibly due to binge drinking and psychotropic use; males peaked in 2017 and 2019, linked to social media and cyberbullying. Post-COVID sex differences may stem from different coping strategies. Adolescents are the most affected age group, followed by infants (0–2), possibly due to prenatal exposure [8]. Children aged 6–13 show low prevalence, likely due to limited exposure. Further investigations are currently underway to assess the relationship between case distribution and socio-economic factors across Lombardy's provinces.

## REFERENCES

1. World Health Organization. *Lexicon of alcohol and drug terms*. Geneva: WHO, 1995
2. Tomáš J, Lenka Š. Prevalence of Dual Diagnoses among Children and Adolescents with Mental Health Conditions. *Children (Basel)*. 2023 Feb 2;10(2):293.
3. Saddichha S, Schütz CG, Sinha BN, Manjunatha N. Substance use and dual diagnosis disorders: future epidemiology, determinants, and policies. *Biomed Res Int*. 2015;2015:145905.
4. Couwenbergh C, van den Brink W, Zwart K, Vreugdenhil C, van Wijngaarden-Cremers P, van der Gaag RJ. Comorbid psychopathology in adolescents and young adults treated for substance use disorders: a review. *Eur Child Adolesc Psychiatry*. 2006;15(6):319-328.
5. Esser MB, Pickens CM, Guy GP Jr, Evans ME. Binge Drinking, Other Substance Use, and Concurrent Use in the U.S., 2016-2018. *Am J Prev Med*. 2021;60(2):169-178.
6. Dumas TM, Ellis W, Litt DM. What Does Adolescent Substance Use Look Like During the COVID-19 Pandemic? Examining Changes in Frequency, Social Contexts, and Pandemic-Related Predictors. *J Adolesc Health*. 2020;67(3):354-361.
7. Loades ME, Chatburn E, Higson-Sweeney N, et al. Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19. *J Am Acad Child Adolesc Psychiatry*. 2020;59(11):1218-1239.e3.
8. May PA, Chambers CD, Kalberg WO, et al. Prevalence of Fetal Alcohol Spectrum Disorders in 4 US Communities. *JAMA*. 2018;319(5):474-482.