Master of Public Health

Master de Santé Publique

Evolving Patterns of Antidepressant Use in French Children and Adolescents: A 15-Year Repeated Cross-Sectional Study (2010–2024)

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Acknowledgements

I would like to thank Erasmus Mundus Joint Masters Program and the Europubhealth+ program for a journey of a lifetime. I would also like to extend gratitude to EHESP and the University of Sheffield for strengthening my commitment to public health. The faculty and colleagues I have worked alongside and learn from have constantly inspired me to remain humble and hungry.

I would like to also thank my academic supervisor, Professor Olivier Grimaud for your gentle and collaborative guidance, as well as my professional supervisor Florentia Kaguelidou for welcoming me to the pharmacoepidemiology team at APHP Robert Debre. Thank you to my incredible colleagues, biostatisticians Lucie Noel and Zaba Valtuille for their patience and daily guidance in the project. Your kindness and commitment to performing at the highest quality with grace is a fortitude I hope to embody in the remaining months of my internship and beyond.

I would not be here without the support of my friends and family from every step of my life journey, from Chicago to Los Angeles, Sheffield to Paris. Thank you for constantly standing in my corner with words of encouragement and space to express every win and setback in this 2-year journey. A special thank you to my mom and brother whose belief in my capabilities have lit up my heart and spirit more times than I can count.

Lastly, I would like to dedicate this project, and the entirety of my masters to my late father and grandfathers. Your legacies are what led me to public health. My strength to excel and continue to strive beyond the scope of my imagination I owe to you.

“The world is before you, and you need not take it or leave it as it was when you came in.” – James Baldwin

List of Acronyms

AD - Antidepressants

DU90% - Drug utilization 90%, signifying the proportion of drugs out of the total number (N) of drugs that contribute to the coverage of 90% of all drugs dispensed.

APC – Annual Percent Change

AAPC – Average Annual Percent Change

SSRI – Selective Serotonin Reuptake Inhibitors

SNRI – Serotonin-Nonadrenaline Reuptake Inhibitors

TCA – Tryciclic Antidepressants

MAI – Monoamine-oxidase Inhibitors

FDA – Food and Drug Administration (U.S. Drug Regulatory Body)

RCT – Randomized Control Trial

EMA – European Medicines Agency

OCD – Obsessive Compulsive Disorder

BD – Bipolar Depression

GAD – Generalized Anxiety Disorder

SNDS - Système National des Données de Santé

C2S - Complémentaire santé solidaire

Abstract (English)

Background:
Antidepressant (AD) use in children and adolescents have increased in drug utilization in France and worldwide. Despite the increasing utilization of AD in children and adolescents, their efficacy, safety, prescribing patterns and increasing prevalence remain areas of continued investigation. Previous French pharmacoepidemiological studies have demonstrated relative stability in pediatric AD use prior to the COVID-19 pandemic. Understanding patterns of AD prescribing and the profile of AD users will help to better inform diagnosis and clinical treatment practices within pediatric populations in France and globally in the future.

Objectives:
This study aimed to analyze the incidence, prevalence, and trends of AD use among children and adolescents aged 3–17 years in France between 2010 and 2024, with attention to demographic characteristics, 90% drug utilization, and concomitant psychotropic medication use.

Methods:
Using nationwide reimbursement claims data from the French SNDS, we conducted a repeated cross-sectional study examining annual prevalence and incidence rates, drug utilization (DU90%), and concomitant psychotropic use. Trends were assessed using Joinpoint regression to detect significant inflection points.

Results:
From 2010 to 2024, AD prevalence nearly doubled, from 4.29 to 8.30 users per 1,000 children. The increase was primarily driven by females aged 12–17, who accounted for 73.79% of users by 2024. Incidence also rose after 2019, particularly post-COVID, suggesting shifts in diagnosis or treatment access. Concomitant use of psychotropics and melatonin increased across all age groups, with concomitant psychotropic use rising from 18.04% to 35.28%, and melatonin introduced in 2020, signaling new prescribing practices. While SSRIs were the most commonly dispensed class in the overall population, off-label prescribing persisted. Sex, age category and C2S (complementary health insurance indicating lower-income status) variance in prevalence and incidence

were evident, with higher C2S coverage among younger users and higher prevalence of AD use among adolescent girls.

Conclusion:

These findings illustrate evolving patterns in pediatric AD prescribing in France, particularly after the onset of the COVID-19 pandemic. The rise in adolescent female users, increased concomitant psychotropic use, and continued off-label practices underscore the need for updated clinical guidelines tailored to sex and age differences, as well as further research into long-term treatment trajectories, polypharmacy, and equity in care access.

Résumé (French Abstract)

Contexte :
L'utilisation des antidépresseurs (AD) chez les enfants et les adolescents a augmenté en France comme dans le monde. Malgré cette hausse, leur efficacité, leur sécurité, les modalités de prescription ainsi que la prévalence croissante des AD demeurent des sujets d'étude importants. Les études pharmacoépidémiologiques françaises antérieures avaient montré une relative stabilité de l'utilisation des AD chez les jeunes avant la pandémie de COVID-19. Mieux comprendre les schémas de prescription et le profil des utilisateurs d'AD contribuera à améliorer les pratiques cliniques et le diagnostic dans les populations pédiatriques, tant en France qu'à l'international.

Objectifs :
Cette étude visait à analyser l'incidence, la prévalence et les tendances de l'utilisation des AD chez les enfants et adolescents âgés de 3 à 17 ans en France entre 2010 et 2024, en tenant compte des caractéristiques démographiques, de l'utilisation médicamenteuse (DU90%) et de la prescription concomitante de psychotropes.

Méthodes :
À partir des données de remboursement nationales issues du SNDS, une étude transversale répétée a été réalisée pour évaluer les taux annuels d'incidence et de prévalence, l'utilisation médicamenteuse (DU90%) ainsi que l'utilisation concomitante de psychotropes. Les tendances ont été analysées à l'aide de la régression de Joinpoint afin de détecter des points d'inflexion significatifs.

Résultats :
Entre 2010 et 2024, la prévalence des AD a presque doublé, passant de 4,29 à 8,30 pour 1 000 enfants. Cette augmentation est principalement portée par les adolescentes âgées de 12 à 17 ans, représentant 73,79 % des utilisateurs en 2024. L'incidence a également augmenté après 2019, notamment après la pandémie de COVID-19, suggérant une évolution dans l'accès au diagnostic et au traitement. L'utilisation concomitante de psychotropes et de mélatonine a progressé dans toutes les tranches d'âge, avec une hausse de la prescription concomitante de psychotropes de 18,04 % à 35,28 %, et une introduction de la mélatonine à partir de 2020, signalant de nouvelles pratiques de prescription. Bien que les ISRS soient restés la classe d'AD la plus

prescrite, la prescription hors AMM a persisté. Des différences marquées selon le sexe, l'âge et le statut C2S (indicateur de situation socio-économique précaire) ont été observées, avec une couverture C2S plus élevée chez les plus jeunes et une prévalence plus importante chez les adolescentes.

Conclusion :

Ces résultats mettent en lumière l'évolution des schémas de prescription des AD chez les enfants et les adolescents en France, en particulier après la pandémie de COVID-19. L'augmentation du recours aux AD chez les adolescentes, la progression de la polypharmacie et la persistance des prescriptions hors AMM soulignent la nécessité de mettre à jour les recommandations cliniques en fonction du sexe et de l'âge, ainsi que de poursuivre les recherches sur les trajectoires de traitement à long terme, la polypharmacie et l'équité dans l'accès aux soins.

1. Introduction

Antidepressants (ADs) have become a critical component of pharmacological treatment in pediatric populations, prescribed for a range of psychiatric conditions, including major depressive disorder (MDD), anxiety disorders, obsessive-compulsive disorder (OCD), and eating disorders [1][2]. Additionally, ADs are indicated for childhood enuresis and neuropathic chronic pain, further highlighting their broad therapeutic applications in young patients [1].

Despite the increasing utilization of ADs in children and adolescents, their efficacy, safety, and prescribing patterns remain areas of continued investigation. The current guidelines for pediatric treatment emphasize psychotherapy as the first-line approach for mild and moderate cases, with pharmacotherapy recommended primarily for severe cases or those unresponsive to psychotherapy [3][4]. However, real-world prescribing patterns often deviate from these recommendations, leading to widespread off-label use in pediatric populations [5]. Most severe mental disorders have their onset prior to age 18, and early identification and treatment in modern pediatric psychiatry has demonstrated superior outcomes in psychotic disorders and bipolar disorder [6]. In addition to psychotherapeutic and psychosocial interventions, psychotropic medications are often necessary to treat severe mental disorders that result in subjective distress and/or significant dysfunction in youth. [6]

1.1 Challenges in Pediatric Antidepressant Prescribing

Prescribing ADs to children and adolescents present several unique challenges, including concerns about developmental safety, tolerability, and long-term effects [7]. Compared to adult psychiatry, the evidence base for pediatric psychopharmacology remains relatively limited, affecting both regulatory approval and clinical decision-making [8]. In particular, the 2004 FDA "black box" warning regarding the risk of emergent suicidality in pediatric patients introduced additional complexities, influencing clinician prescribing behaviors and requiring closer monitoring at treatment initiation and dosage adjustments [7].

Despite these concerns, randomized controlled trials (RCTs) have demonstrated a positive risk-benefit ratio for AD use in children and adolescents, underscoring the importance of balancing clinical need with safety considerations [7]. While selective serotonin reuptake inhibitors (SSRIs) remain the most commonly prescribed AD class, the lack of FDA and European Medicines Agency (EMA) approval for many ADs in pediatric populations often results in considerable off-label prescribing, raising concerns about dose optimization and adverse effects [9].

1.2 Regulatory Framework and Marketing Authorization

In France, fluoxetine is the only antidepressant with formal approval for treating major depressive disorder in children aged 8 years and older [5]. However, AD prescribing often extends beyond officially authorized medications, with general practitioners (GPs) frequently initiating treatment due to limited availability of child psychiatrists [1]. This trend raises concerns regarding adherence to evidence-based pediatric psychopharmacology guidelines, particularly as prescribing patterns may mirror adult treatment approaches rather than tailored pediatric considerations [1].

Antidepressants have 3 main indications in pediatrics in France:

- Depression: fluoxetine is the only SSRI with a marketing authorization for use in children over the age of 8 years in Europe. In the US, escitalopram is also labeled for use in children aged over 12 years.
- Obsessive-compulsive disorder: fluvoxamine and sertraline are marketed in EU and US. Clomipramine and fluoxetine are also marketed in the US in this indication but not in EU[17]
- Childhood enuresis: tricyclic antidepressants are authorized for use in this indication: imipramine in many EU countries and in addition, amitriptyline and clomipramine in France over the age of 6 years

The current approved lists of antidepressants in France can be viewed in Table 1.

Table 1: France-approved antidepressants for children and teenagers [18].

Drug class	Indications	Age
Selective serotonin reuptake inhibitors (SSRIs)		
Fluoxetine	Moderate - severe major depressive episode, Bipolar depression (BD)	8 years
Fluvoxamine	Obsessive-compulsive disorder (OCD)	8 years
Sertraline	Obsessive-compulsive disorder	6 years
Tryciclic antidepressants (TCAs)		
Amitriptyline	Nocturnal eneuresis	6 years
Clomipramine	Obsessive-compulsive disorder (OCD)	6 years; 10 years
Imipramine	Nocturnal eneuresis	6 years
Serotonin-nonadrenaline reuptake inhibitors (SNRIs)		
Venlaxafine	N/A	not recommended <18 years
Duloxetine	N/A	not recommended <18 years
Atypical antidepressants	N/A	not recommended <18 years

1.3 COVID impact of AD use

The COVID-19 pandemic and its socioeconomic consequences have substantially affected young people's health and lifestyles. Several studies and specifically one from our research team has described recent increases in the use of psychotropic medications, including antidepressants, in children and adolescents [10]. It is evident that the COVID 19 pandemic has a profound effect on societies [11], and that it therefore may lead to an increase in stress, and thereby potentially the risk of anxiety and depression in the child and adolescent population [12]. Utilization of antidepressant and anxiolytic drugs can be seen as a proxy for the prevalence of depressive symptoms and anxiety in a population. [13] The antidepressant drug utilization during late 2020 could reflect increases in depressive and anxiety symptoms in children and adolescents, previously demonstrated in a meta-analysis of the global mental health impact of the COVID-19 pandemic in Denmark and Norway [13]. Increased depressive symptoms

after school closing related to COVID-19 has been observed in Chinese primary school children [14].

1.4 Polypharmacy and concomitant use in antidepressant treatment

The rates of a polypharmacy approach in treating pediatric patients with antidepressants have been increasing [15]. “Given the severity of paediatric mood and anxiety disorders and their psychosocial and functional consequences, clinical practice demands the development of complementary approaches for difficult cases, such as combining antidepressants with other psychotropic drugs [15]. One reason for this recent increase could be the growing interest in the diagnosis and management of paediatric mood and behavioural disorders [15]. Adherence to guidelines is often poor, and physicians’ prescription choices are influenced by a multitude of other factors besides guidelines and continuing medical education [16]. Differential AD use between women and men have been reported in adults but not fully explored in children and adolescents [5].

1.5 Study objectives and Design

Primary objective:

The aim of this study was to describe trends and patterns of antidepressant medication use in children over a period of 15 years (2010-2024). Prescribing patterns were evaluated overall and stratified by age and sex due to previous studies indicating differences in AD drug utilization by sex and age in pediatric populations due to variations in mental health in development [19].

Secondary objectives:

Secondary study aims included describing trends in concomitant psychotropic and melatonin medication use and the drugs that contributed to 90% drug utilization in the pediatric population stratified by age and sex.

2. Methods

2.1 Study Setting and Data Sources

This is a nationwide, cross-sectional study evaluating the use of antidepressants (AD) in the pediatric population (3 to 17 years of age) in France for January 1, 2010 to December 31, 2024.

Data on AD prescriptions dispensed were extracted from the DCIR (*Datamart de Consommation Inter-Régime*) database of the SNDS (*Système National des Données de Santé*) [20]. The latter includes all expenditure and reimbursements of outpatient consumption, drug prescriptions, medical devices, long-term affections (ALD), generic information on patients, information on healthcare professionals, and hospital stays and diagnoses. It contains information regarding all medical care acts provided in ambulatory care setting and submitted for reimbursement by the '*Assurance Maladie'* [21]. The SNDS French national health data system, includes health care claims covering approximately 98.8% of the French population [21]. The DCIR can also be used to assess the medical care provided by outpatient healthcare professionals and to carry out studies on pathologies. The DCIR can also be linked to the PMSI database (*Programme de médicalisation des 13ystems d'information*, national hospital discharge database) which comprises exhaustive administrative information, medical procedures, and discharge diagnoses for every hospital stay [20]. Finally, the number of inhabitants per age and sex group were extracted from the INSEE (*Institut national de la statistique et des études économiques*), which provides annual, age- and sex-specific estimates of the resident French population [22] to calculate rates of prevalent and incident users.

2.2 Study Population and Data Collection

Children aged 3 to 17 years who filled at least one antidepressant (AD) prescription during the period from January 1, 2010, to December 31, 2024, were included. ADs were identified using Anatomical Therapeutic Chemical (ATC) classification code N06A. The 5 drug classes included were: Tryciclic antidepressants (TCAs, ATC:N06AA), selective serotonin reuptake inhibitors (SSRIs, ATC: N06AB), monoamine-oxidase inhibitors (MAIs, ATC: N06AF), serotonin-nonadrenaline reuptake inhibitors (SNRIs, ATC:N06AX) and a fifth category dedicated to atypical antidepressants (ATC: N06AX). We excluded the epilepsy treatment drug Oxitriptan (ATC: N06AX01) and the tobacco cessation drug

Bupropion (ATC: N06AX12). from the category of atypical antidepressants. Patients that did not have a recorded drug dispensing within the defined drug classes were excluded from the study. To define incident users, we used a 12-month washout period by examining prescription data from January 1, 2009, to December 31, 2009. A full list of drugs and their corresponding ATC codes are included in Appendix 1.

In the extraction of AD users, we also extracted their corresponding sex, date of birth, and socioeconomic status. Low economic status was defined as eligibility for supplementary universal health coverage (Complémentaire santé solidaire, C2S)[20]. Age at the time of prescription was categorized into three groups: 3–5 years, 6–11 years, and 12–17 years. These age categories were identified based on other pediatric AD studies that identified variations in treatment needs between younger children (typically eneuresis), children above 6 years (to treat OCD, depression and generalized anxiety disorder (GAD), and the population above 12 years where MDD, OCD, and GAD are more prevalent [8].

As one child may have multiple AD prescriptions fills during the study period, we retrieved for every prescription fill the following information:

- Date of prescription dispensing
- Age of child at prescription dispensing
- Type of prescriber (general practitioner, private practice or hospital medical specialists),
- Type(s) of AD prescribed = 5 drug classes (ATC 4th level codes) and specific drugs (ATC 5th level codes):
    - Tryciclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs), monoamine-oxidase inhibitors (MAIs), serotonin-nonadrenaline reuptake inhibitors (SNRIs) and a fifth category dedicated to atypical antidepressants (N06AX)

Concomitant psychotropic use was defined as at least one additional psychotropic medication dispensed in the same calendar year as an AD prescription. Psychotropic medications included antipsychotics (ATC N05A, excluding N05AN01), lithium (N05AN01), anxiolytics (N05B), hypnotics and sedatives (N05C, excluding N05CH01), melatonin (N05CH01), and psychostimulants (N06B), based on previously established classifications [23].

2.3 Study Measures

Use of AD medications was assessed using the following measures:

- *Annual period prevalence of AD us e(per 1,000 children)* defined as the number of children who filled at least one AD prescription during a given calendar year divided by the appropriate age- and sex-specific population estimates of the same year.

- *Annual incidence of AD use (per 1,000 children)* defined as the number of children who filled at least one AD prescription during a given calendar year and without no prescription fills during the previous 1 year divided by the appropriate age- and sex-specific population estimates of the same year.

- *Drug utilization 90% (DU90%):* The number and type of AD that covered 90% of AD prescriptions (DU90%) was estimated by age group and calendar year. 100% total was initially calculated, and 90% thresholds were identified.

- *Annual concomitant use of psychotropic medication.* We estimated the proportion of prevalent AD users within a given calendar year who filled prescriptions of at least one other psychotropic medication concomitantly to the AD prescription fills of the same year.

- *Annual concomitant use of melatonin medication.* We estimated the proportion of prevalent AD users within a given calendar year who filled prescriptions of at least one other melatonin medication concomitantly to the AD prescription fills of the same calendar year.

2.4 Data Analysis

Descriptive statistics summarized the characteristics of AD users by age group, sex, and income status across the full study period and by calendar year. Annual prevalence and incidence were expressed per 1,000 individuals, based on INSEE population estimates. Sex strata was calculated annually.

To evaluate trends over time, joinpoint regression analysis was implemented. Joinpoint regression, also known as change point regression or segmented regression, assumes that data can be divided into subsets--each with their own unique linear trend [24]. This regression model was selected due to the assumption that when $t < t*$, the model has a particular intercept and slope, and when $t \geq t*$, the model would have a different intercept and slope, with, $t*$representing the joinpoint; a point in time when the population parameters change [24].The program fit the simplest joinpoint model that the trend data allowed, identifying significant points where trends changed, and included the model statistics with corresponding 95% confidence intervals, and the estimated regression coefficients [25].

The dependent variables of prevalence and incidence (both per 1,000 children) were input to the Joinpoint software as crude rates after prevalence and incidence were calculated in Excel. The independent variable was time, expressed in calendar years 2010-2024. Rates were log-transformed (ln(y) = xb) to account for exponential trends [26]. Analyses were stratified by age group and sex.

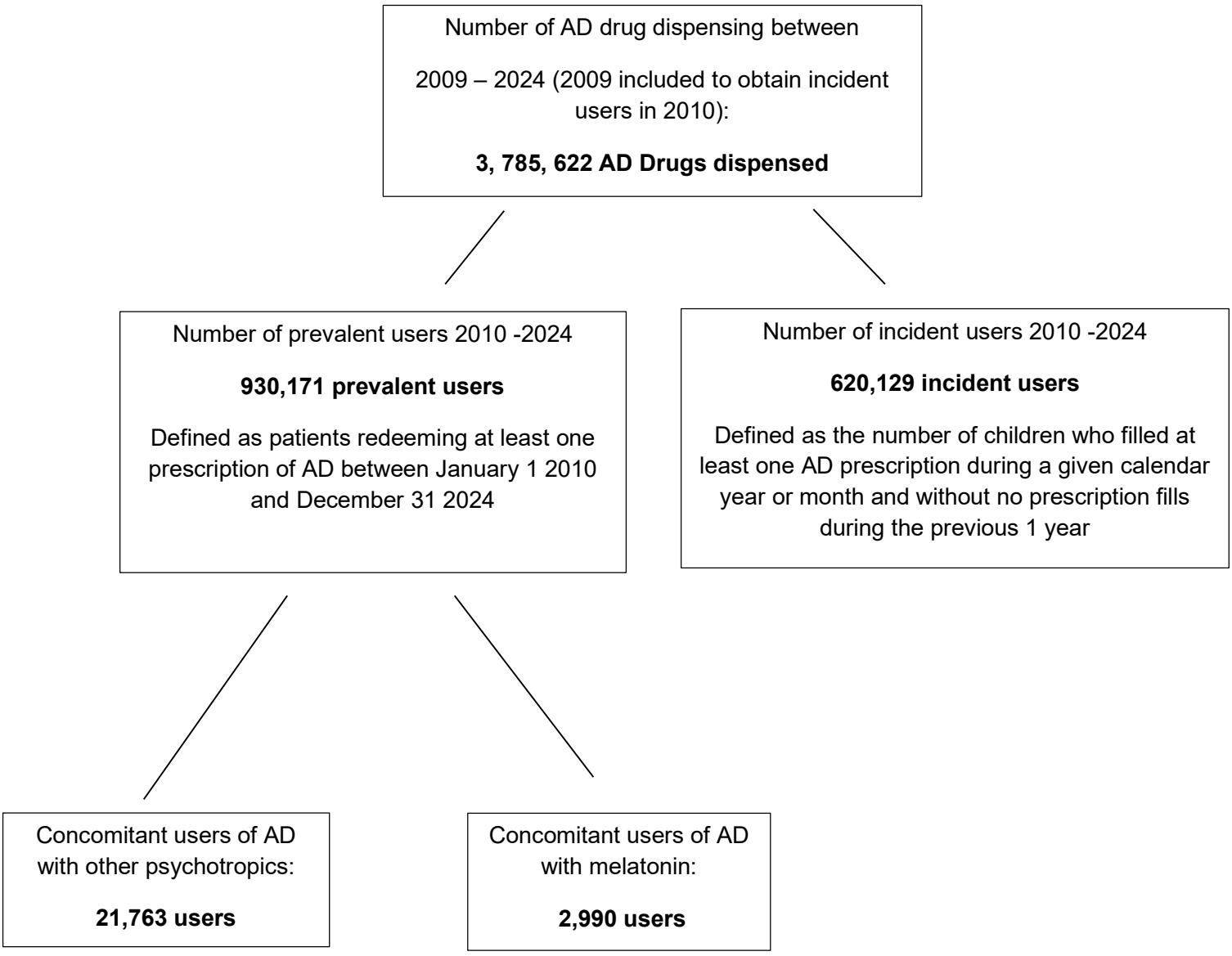
The Joinpoint model assumed constant variance with uncorrelated errors. A grid search algorithm determined the number and position of joinpoints, with a minimum of two observations between and at either end of joinpoints. The number of joinpoints tested ranged from 0 to 3. Model selection was based on the Bayesian Information Criterion (BIC) and selected by the Joinpoint software [26]. Time segments between identified joinpoints had distinct trends of AD use corresponding to an annual percentage change (APC). In addition, an average annual percentage change (AAPC) in prevalence and incidence of AD use was calculated for the entire study period (from 2010 to 2024). We calculated 95% confidence intervals for APC and AAPC estimates using empirical quantiles, which derive interval bounds from the distribution of estimates generated by the model, rather than assuming a standard parametric form. The AAPC was computed to summarize changes across the entire study period (2010–2024), including all detected joinpoint segments.

Initial data extraction was conducted by our two lab biostatisticians in SAS 9.4 to obtain patient demographic data as well as the dates and type of drug dispensing throughout the time period of the study. All subsequent data management, analysis, and visualization were performed in R Studio 3.6.0+. Prevalence and incidence calculation

and Joinpoint input preparation were analyzed using Microsoft Excel. Analyses were repeated by sex and age groups.

3. Results

Figure 1: Flow chart illustrating the number of dispensings extracted from the SNDS database that determined the number of prevalent and incident users. Drug dispensings were determined by creating a variable with one line per drug dispensing name and date, associated with anonymized identifier variable BEN_IDT_ANO.



3.1 Population Description

Between 2010 and 2024, a total of 3,642,602 antidepressant (AD) prescriptions were dispensed to 930,171 pediatric patients aged 3 to 17 years in France. The number of annual prevalent users nearly doubled during this period, increasing from 51,368 pediatric AD users in 2010 to 100,023 users in 2024. The 12 to 17 age group represented the largest proportion of antidepressant users throughout the fifteen-year time period, accounting for 82.4% of users in 2010 and rising to 93.8% by 2024 (Table 2). Among adolescents aged 12-17, females comprised the majority of antidepressant users (increasing from 60.1% in 2010 to 73.8% in 2024).Children aged 6 to 11 years comprised the second largest group, although their proportion decreased from 15.8% to 5.8% over the study period. In the 6-11 age group, males accounted for over 60% of antidepressant users, peaking at 65.6% in 2014. The smallest user group was the age category for children aged 3 to 5 years which began at 1.8% of pediatric AD users in 2010, and by 2024 accounted for 0.4% of pediatric AD users. Within this age group, males made up 61.2% of AD users in 2010, and by 2024 accounted for 54.2% of the AD users within children aged 6 to 11 years(Table 2).

The median age of antidepressant users in the total population remained stable at 15 years throughout the study period. Within the age category of 3 to 5 years, the median age was 4 [3,5], in the 6 to 11 age category the median was 9 [8,11] until 2013 where the age increased to median age 10 years [8,11], and in the 12 to 17 year category median age was 16 years [14,17].Female children accounted for a majority of users across all years, increasing from 55.7% of pediatric AD users in 2010, reaching a peak of 72.7% in 2022, and slightly decreasing by the end of the study time period to 71.6% by 2024. Approximately 13–15% of all antidepressant users aged 3-17 years were recipients of the Complémentaire santé solidaire (C2S) status, indicative of lower socioeconomic status, with minimal variation during the study period. Higher C2S status was observed within the age 3-5 year population (ranging between 18% to 21%) and the age 6-11 year population (falling between 17% and 23%), whereas the aged 12-17 year population C2S status ranged between 12% and 14% of the AD users within the given age category strata (Appendix 6).

Table 2: Population description summarized by all age groups between the years 2010 and 2024. 5 years were selected to display annual population description. C2s yes represents individuals with low-income indication.

Overall population 2010-2024	Measures	Calendar Year	2010	2014	2018	2022	2024
Median age [Q1, Q3]	15 [13,17]	Median age [Q1, Q3]	15 [12,17]	15 [13,17]	15 [13,17]	15 [14,16]	15 [13,16]
SD age	14.88 (2.48)						
Number of drug dispensings by age categories		Number of drug dispensings by age categories					
3-5 years	29481 (0.81%)	3-5 years	2692 (1.83%)	2132 (1.31%)	1853 (0.95%)	1719 (0.40%)	1710 (0.35%)
6-11 years	321, 249 (8.82%)	6-11 years	23202 (15.77%)	19224 (11.81%)	18422 (9.41%)	24929 (5.81%)	28749 (5.83%)
12-17 years	3, 291,872 (90.37%)	12-17 years	121204 (82.40%)	141371 (86.88%)	175547 (89.65%)	402377 (93.79%)	462958 (93.83%)
Girls	2371490 (65.1%)	Girls	81920 (55.69%)	94054 (57.80%)	118317 (60.42%)	311770 (72.67%)	353357 (71.61%)
Boys	1, 271, 112 (34.9%)	Boys	65178 (44.31%)	68673 (42.20%)	77505 (39.58%)	117255 (27.33%)	140060 (28.39%)
Deaths	25						
c2s yes	509941 (14%)	c2s yes	19586 (13.31%)	22990 (14.13%)	28154 (14.38%)	55281 (12.89%)	69842 (14.15%)
Number of prevalent users	930171	Number of prevalent users	51368	49803	53690	90873	100023
Period prevalence (per 1000 children)	76.65	Annual prevalence (users/1000 children)	4.29	4.09	4.39	7.50	8.30
Number of incident users	620129	Number of incident users	38321	35724	36866	56874	57209
Cumulative incidence per 1000 children	51.76	Annual incidence (users/1000 children)	3.20	2.93	3.02	4.69	4.74
Number of prescriptions	3596761	Number of prescriptions	145607	161112	193390	422297	486255
Number of AD dispense	3642602	Number of AD dispense	147005	162629	195758	428981	493391

3.2 Joinpoint Regression Analysis

Joinpoint regression analysis identified key inflection points or changepoints over the 2010–2024 period that indicate changes in trends of antidepressant use across the overall population as demonstrated this change additionally by age and sex strata(Figure 2, Figure 3).

Among the overall population, joinpoint regression for prevalent AD use identified three significant shifts in the annual percent change (APC). The first occurred in 2013, marking a modest increase of 1.68% (p=0.109), followed by a substantial increase in 2019 (APC: +19.09%, p=0.007), and another notable rise in 2022 (APC: +12.04%, p=0.054). Incident use showed a single significant joinpoint in 2019, with an APC increase of 19.79% (p=0.004) (Figure 2).

Within the joinpoint software, an average annual percent change (AAPC) was also generated across the entire population between 2010 and 2024 for prevalence and incidence. The AAPC in prevalence of AD users was +4.82%, 95% CI: 4.00, +5.58%, p=<0.000001. In incidence of AD users between 2010 and 2024, the AAPC reported was +2.72%, 95% CI: +1.82%, +3.58%, p=<0.000001 (Appendix 10).

Children Age 3-5 Years

Age-stratified analyses revealed nuanced trends. Among children aged 3–5 years, three joinpoints were observed for prevalence: where there was a significant decrease between the years 2010–2014 (APC: –7.31%, 95% CI: –13.27, –4.08, p=0.01), another decline between 2017–2020 (APC: –7.19%, CI: –10.28, –2.39, p=0.009), and an increase between 2020–2024 (APC: +5.36%, CI: 2.13, 13.95). In this group, girls experienced a significant decline from 2010–2020 (APC: –3.91%, CI: –8.19, –2.48, p=0.003), followed by a non-significant increase from 2020–2024 (APC: +5.87%, CI: –0.07, 17.41). Boys exhibited significant decreases from 2010–2013 (APC: –9.15%, p<0.0001), 2017–2020 (APC: –7.06%, p=0.001), and a significant increase from 2020–2024 (APC: +4.02%, CI: 2.19, 7.45, p<0.0001)(Appendix 10).

For incident use in the same age group, a significant decline was seen between 2010–2020 (APC: –4.91%, p=0.001), with a non-significant rise thereafter (2020–2024, APC: +5.43%, p=0.07). Among girls, a significant decline occurred between 2010–2020 (APC: –4.67%, p=0.009). For boys, significant declines were seen between 2010–2013 (APC: –8.24%, p<0.0001) and 2017–2020 (APC: –8.95%, p=0.003), followed by a significant increase from 2020–2024 (APC: +3.61%, p=0.01). In both sexes, there was a decrease in the overall AAPC, with girls demonstrating an AAPC decrease of 1.29% and boys decreasing by 3.05% on average annually(Figure 3, Appendix 11).

Children Age 6-11 Years

Children aged 6–11 years also showed significant temporal variation. Prevalence decreased significantly from 2010–2014 (APC: –7.54%, p<0.000001), then moderately declined through 2020 (APC: –2.92%, p=0.03), followed by a sharp rise from 2020–2024 (APC: +7.47%, p<0.000001). For girls, decreases occurred from 2010–2014 (APC: –7.43%, p<0.001), followed by an increase from 2020–2024 (APC: +7.71%, p<0.001). Similarly, boys saw declines from 2010–2015 (APC: –7.03%, p<0.001) and an increase from 2020–2024 (APC: +7.04%, p<0.001) (Figure 2, Appendix 10).

Incidence in this group declined significantly from 2010–2013 (APC: –8.94%, p<0.0001) and 2013–2020 (APC: –3.80%, p=0.005), followed by an increase from 2020–2024 (APC: +6.80%, p<0.001). Among girls, significant changes were seen in 2010–2013 (APC: –8.12%, p<0.001), 2013–2020 (APC: –2.32%, p=0.03), and 2020–2024 (APC: +6.05%, p<0.001). Boys showed similar patterns with significant declines from 2010–2013 (APC: –8.20%, p<0.000001) and an increase from 2020–2024 (APC: +4.99%, p=0.002)(Figure 3, Appendix 11).

Adolescents Age 12-17 Years

Adolescents aged 12–17 years showed significant increases in prevalence, with APC rising between 2013–2019 (APC: +2.53%, p=0.05), and sharply increasing from 2019–2022 (APC: +20.31%, p=0.002). Among girls, there were significant increases from 2013–2019 (APC: +3.20%, p=0.01) and 2019–2022 (APC: +26.59%, p<0.000001). Boys exhibited a slight increase from 2013–2020 (APC: +1.91%, p=0.005) and a larger rise from 2020–2024 (APC: +9.42%, p<0.000001). A significant AAPC increase of 7.18%

(95% CI: +5.78%, +8.21%, p<0.000001) was observed within girls within this population(Figure 2, Appendix 10).

Figure 2: Joinpoint regression of prevalence among AD users from 2010-2024, stratified by age categories. Vertical dashed lines represent joinpoints selected by the model. Solid trend lines represent trend based on joinpoint regression, where dashed trend line represents calculated prevalence rates.

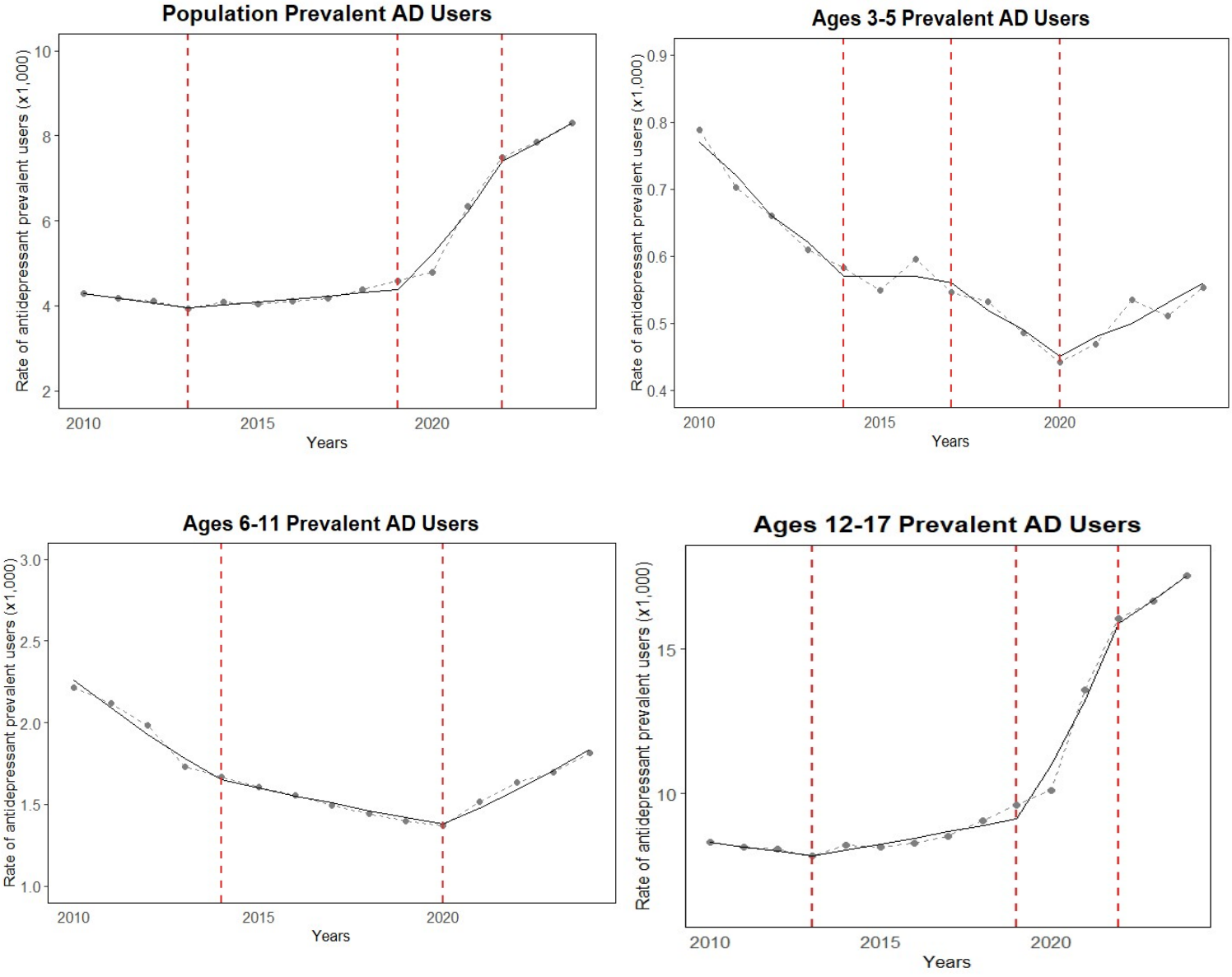
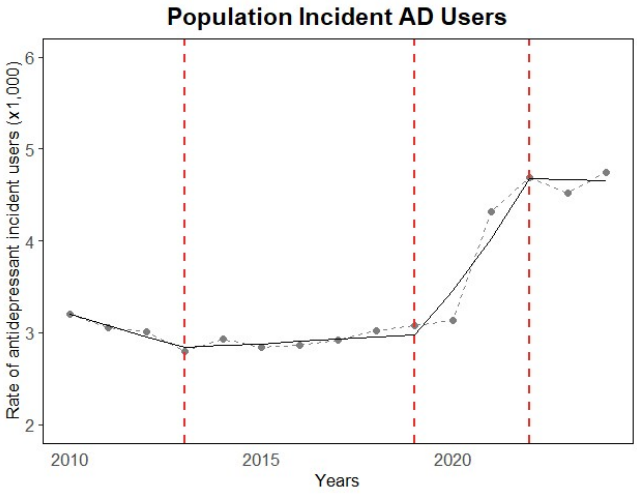
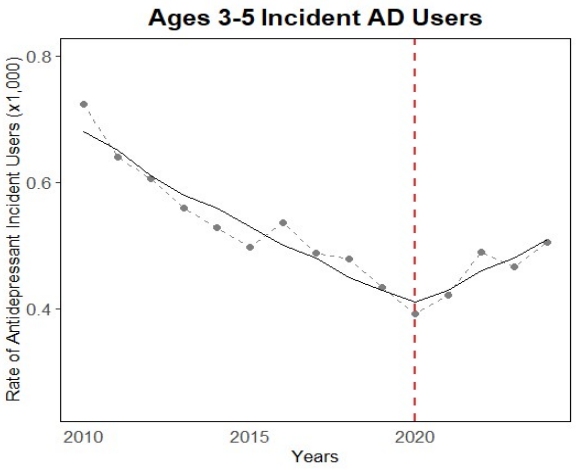
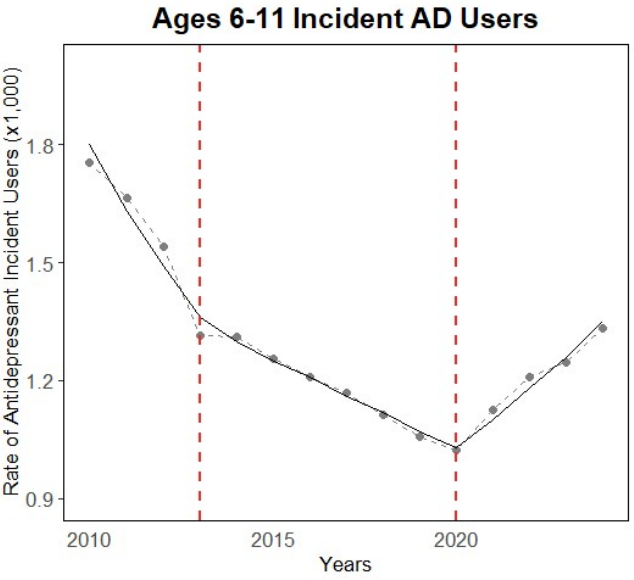
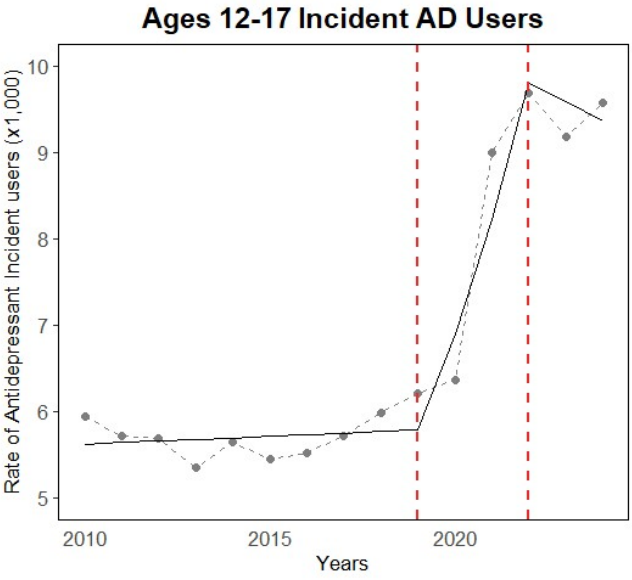


Figure 3: Joinpoint regression of incidence among AD users from 2010-2024, stratified by age categories. Vertical dashed lines represent joinpoints selected by the model. Solid trend lines represent trend based on joinpoint regression, where dashed trend line represents calculated incident rates.









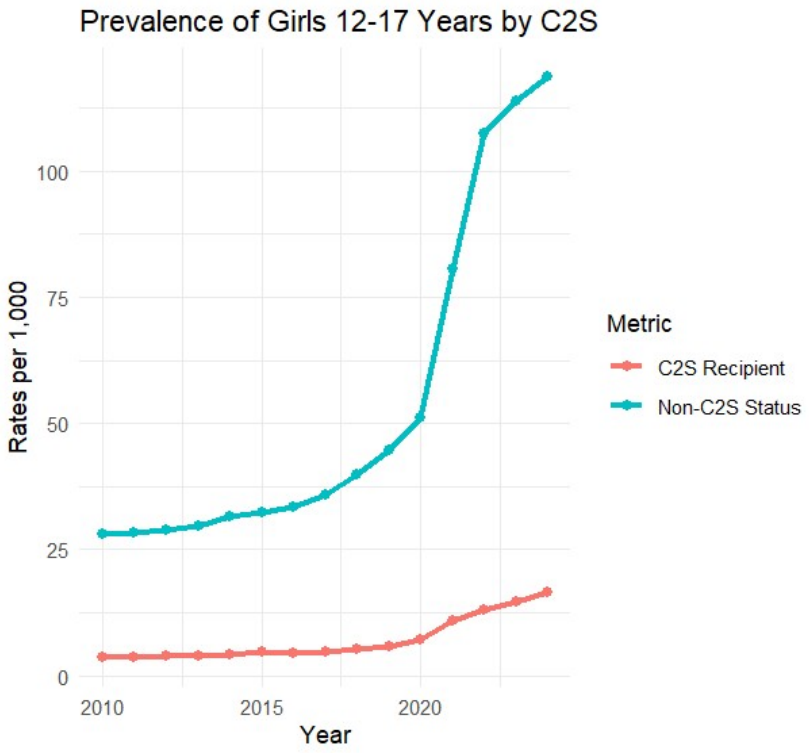
3.2 Annual prevalence of AD use

Annual prevalence of AD use increased across all age groups with an estimated period prevalence of 76.65 per 1,000 children (Table 2) for the 2010-2024 time period. The annual prevalence in 2010 for the overall population was 4.29 per 1,000 children, and the annual prevalence in 2024 was estimated at 8.30 per 1,000 children (Table 2).

The most pronounced increase in prevalence was observed in adolescents aged 12 to 17 years. In this group, prevalence more than doubled, from 8.32 per 1,000 children in 2010 to 17.55 per 1,000 in 2024 (Table 2). Within each age category, sex was stratified to further investigate prevalence per 1,000 children. In the 12 to 17 years age category, prevalence of AD users varied between male and female children, where female children aged 12-17 years had a prevalence of AD use of 10.44/1,000 children in 2010 and a prevalence of 25.06/1,000 children by 2024. For this same age group, male children aged 12-17 years had a prevalence of 6.31/1,000 children in 2010 and a prevalence of 9.51/1,000 children by 2024 (Table 2).

Significant prevalence ratios were found in girls 12-17, boys 3-5 years, and boys 6-11 years. Differences in prevalence ratio in AD use within girls 12-17 years age group can be observed in Figure 2. The prevalence ratio between girls age 12-17 years with C2S status to those without C2S, was lowest in 2022 at 0.12/1,000 children [95% CI: 0.07, 0.22] and highest in 2015 at 0.15 per 1,000 children [CI: 0.06, 0.38]. Prevalence ratio in in boys aged 3 to 5 years ranged from the lowest in 2024 of 0.21/1,000 children [95% CI: 0.18, 0.26] and highest of 0.31/1,000 children [95% CI: 0.27, 0.36]. In boys in age category 6 to 11 years, the lowest prevalence ratio was 0.22/1,000 children [95% CI: 0.21, 0.23] and the highest was 0.32/1,000 children [95% CI: 0.31, 0.33] (Figure 4).

Figure 4: Prevalence of AD users within the strata of girls aged 12 to 17 years. The top line represents girls that were not recipients of C2S, the complementary insurance benefit for low income status. The bottom line represents girls that were low-income with C2S status.



3.3 Annual incidence of AD use

Annual incidence use of antidepressants also increased overall between 2010 and 2024, with a cumulative incidence of 51.76 per 1,000 children. In the overall 3-17 year population, the incidence of AD use in 2010 was 3.20 per 1,000 children, and in 2024 the incidence of AD use was 4.74 per 1,000 children. Incidence varied by age groups. For children aged 3-5 years, incidence of AD users remained less than 1/1,000 children, with an incidence beginning at 0.79/1,000 children at 2010, decreasing annually to 0.44/1,000 children in 2020, and increasing to 0.55/1,000 children by the end of the study period in 2024 (Table 2, Appendix 16).

Annual incidence of AD users the 6-11 year age category declined from 1.75 per 1,000 in 2010 to a low of 1.02 in 2019, and later gradually increased to 1.33 per 1,000 in 2024. Within the 6-11 year age category, males had a moderately higher incidence than females throughout the entire 15-year period. Male children aged 6-11 years reported an

incidence of 2.05/1,000 children in 2010 and an incidence of 1.46/1,000 children in 2024, where females of the same age category reported a 1.44/1,000 children incidence in 2010 and 1.20/1,000 children in 2024(Table 2, Appendix 16).

The highest incidence of AD use was seen among children in the 12-17 age category. In 2010, females aged 12-17 years had an incidence of 7.57/1,000 children in 2010 where males of the same category had an incidence of 4.40/1,000 children in 2010. By 2024, females aged 12 to 17 years, had an incidence of 13.95 per 1,000, compared to 5.43 per 1,000 among males in the same age group. The lowest incidence was found in girls aged 3 to 5 years (0.48 per 1,000), closely followed by boys of the same age (0.52 per 1,000)(Table 2, Appendix 16).

3.4 DU90%

The DU90% analysis revealed that selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCAs) consistently accounted for 90% of all antidepressants dispensed across the study period for all age groups. The five most frequently prescribed antidepressants between 2010 and 2024 were sertraline (N06AB06), fluoxetine (N06AB03), amitriptyline (N06AA09), escitalopram (N06AB10), paroxetine (N06AB05), and venlafaxine (N06AX16).

Age-stratified analysis showed distinct patterns: in children aged 3 to 5 years, TCAs represented the highest proportion of AD dispensed, comprising 86.5% of dispensed drugs. Though TCAs dominated as the most dispensed, the proportion of SSRIs increased steadily for this age group, comprising 26.9% of dispensings in 2010 and reaching 38.4% of AD dispensings for users aged 3-5 years by 2024 (Table 6, Figure 5). In the 6-11 year group, TCAs were initially predominant (90.8% overall), but SSRIs overtook TCAs by 2020, representing 72.2% of dispensed antidepressants by 2024. Adolescents aged 12 to 17 years were prescribed primarily SSRIs (86.1%), followed by serotonin-norepinephrine reuptake inhibitors (SNRIs), with SSRIs increasing from 67.7% in 2010 to 87.7% in 2024. A 90% drug utilization table with drug class and corresponding ATC code for the overall population Appendix 7.

Figure 5: Drug utilization of AD for children aged 3 to 17 in France from 2010-2024. Proportions were calculated by dividing drug count by each year total N count of drugs.

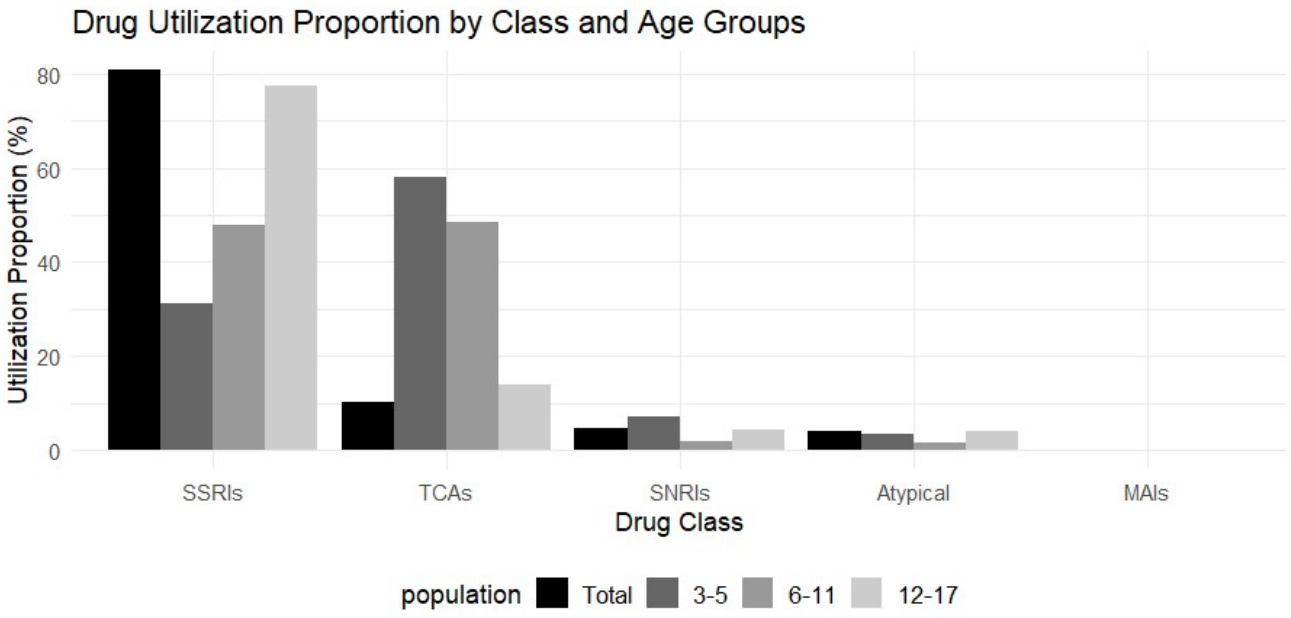


Table 6: Overall drug utilization proportion of each drug class of antidepressants across age categories for the entire study period 2010-2024. Proportions shown are representative of the complete 100% distribution of drug classes.

Drug Class	Drug Class Proportion (%)	Ages 3-5	Ages 6-11	Ages 12-17
SSRIs	77.6	58.0	48.5	80.8
TCAs	13.9	31.3	47.9	10.2
SNRIS	4.5	7.1	1.9	4.8
Atypical AD	3.9	3.6	1.6	4.1
MAIs	0.01	0.01	0.01	0.01
Total	100	100	100	100

3.5 Concomitant psychotropic use

The proportion of antidepressant users concurrently prescribed at least one other psychotropic medication increased steadily from 18.0% of all AD users aged 3 to 17 years in 2010 to 33.5% in 2024 (Figure 6). Notably, concomitant use of melatonin was absent prior to 2020 but rose sharply thereafter, from 2.6% in 2020 to 14.2% in 2024 in the total population(Figure 7).

Sex- and age-specific analyses revealed important differences. Among children aged 3-5 years, males slightly predominated as concomitant psychotropic AD users, with 9.4% of males reported in 2010 and 5.62% in females in the same year. By 2024, concomitant use of psychotropics were similar between sexes, with 35.4% of males aged 3 to 5 years reporting concomitant psychotropic use and 32.41% of females within the same age group with concomitant psychotropic use. Among children aged 3 to 5 years, males had a higher presence of concomitant melatonin use (18.9% compared to 11.9% in females by 2024) (Appendix 8).

In children aged 6 to 11 years, concomitant use of psychotropics were similar across sexes and both increased between 2010 and 2024, with males having a slightly larger presence of concomitant use. Concomitant melatonin use in this group did not greatly differ between sexes, and increased markedly from 3.5% of AD users in 2020 to 17.2% of AD users by 2024 (Figure 7).

Concomitant use of psychotropics in the 12 to 17 years age group rose from 18.7% to a peak of 35.4% in 2023, with a slight decrease to 34.7% in 2024. In 2010, the proportion of AD users with concomitant use of psychotropics was higher in males, with 26.2% of males AD users having at least one additional psychotropic dispensing where 14.5% of females had psychotropic concomitant use in the same year. By 2024, concomitant psychotropic use increased in females, making the proportion of AD users with concomitant psychotropic use similar across sexes (35.1% of females and 33.8% of males) (Figure 6).

Figure 6: Psychotropic concomitant AD use estimated from prevalent AD users within a given calendar year who filled prescriptions of at least one other psychotropic medication concomitantly to the AD prescription fills of the same year.

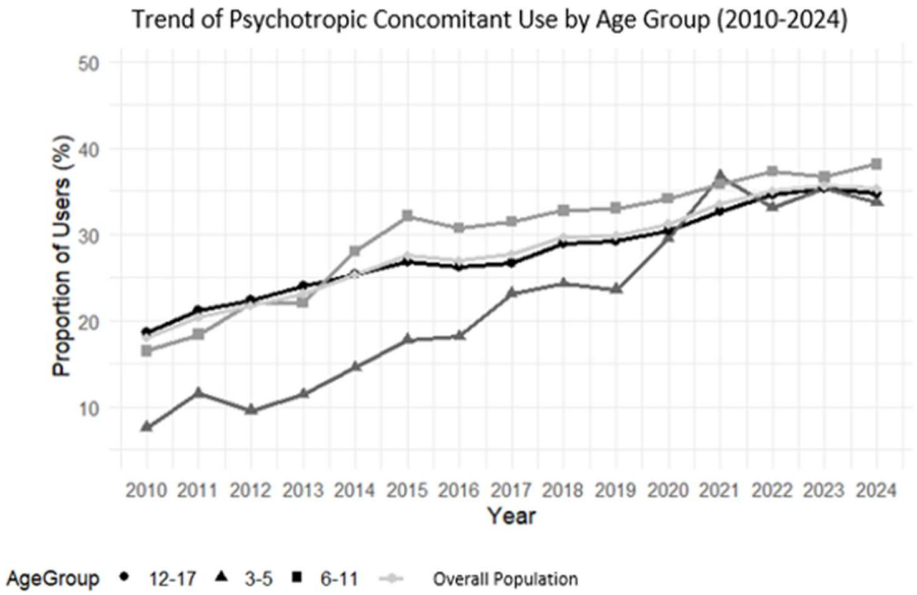
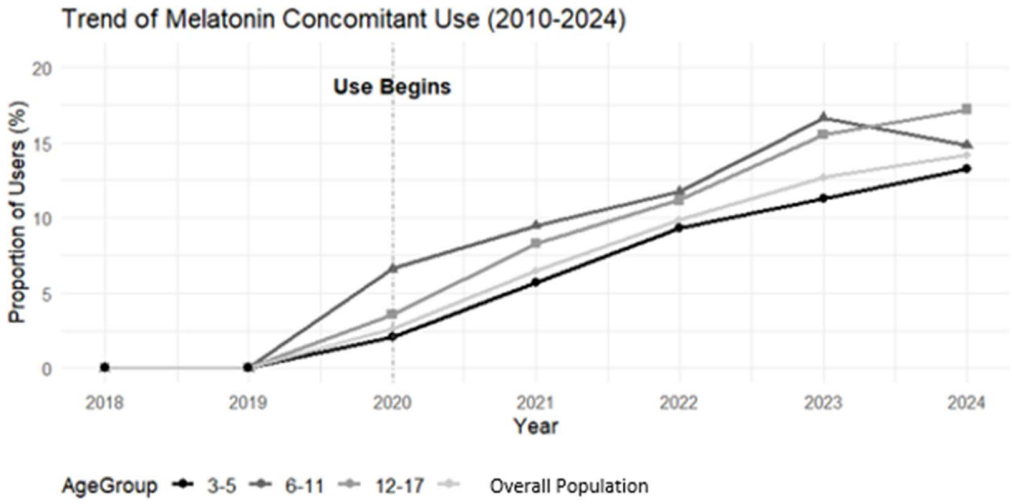


Figure 7: Trend of melatonin concomitant use by age group from 2010-2024. From bottom-most line to the top most line, the graph can be read as follows: age group 3 to 5 years (black line), then total population (lightest line), followed be the 12 to 17 age group (square-marked line), and the top-most line representing the 6 to 11 year age group (triangle-marked line).



4. Discussion

In this study, we found that both the incidence and prevalence of AD use has increased for the population of children and adolescents aged 3 to 17 years in France between the years 2010 and 2024. In previous drug utilization studies conducted in pediatric populations in France, the COVID-19 pandemic was not included in the study period, possibly explaining why in this cross-sectional study, both incidence and prevalence of AD users showed increases overall in between 2010 and 2024. In the Revet et al 2018 study that observed French children between 2009 and 2016, there was a stable incidence and prevalence observed [1].This aligns with findings in our study that prior to 2020, the annual percent change within our joinpoint regressions of prevalence and incidence saw minimal changes. The patterns observed in AD usage between 2010 and 2024 highlight the shifts in prescribing behaviors and potential influences of societal events, which include the timing of the COVID-19 pandemic. Our joinpoint regression AAPC results found that incidence in AD users per 1,000 children decreased between 2010 to 2019. The annual percent change increase of 16.26% between 2019 to 2024 suggest a significant shift that warrants further investigation.

Prevalence ratio calculations demonstrated the widest difference in boys in the age categories 3 to 5 years (from 0.22/1,000 children, CI: 0.18, 0.26 to 0.31/1,000 children, CI: 0.27, 0.36) and 6 to 11 years (from 0.21/1,000 children, CI: 0.21, 0.23 to 34/1,000 children, CI: 0.33, 0.36). This finding suggests that C2S status could possibly be associated with reduced likelihood of AD use, but it is more likely that differences in behavior, demographics, or healthcare access for example may contribute to decrease in AD prevalence [13]. In other pediatric drug utilization studies, early discontinuation of AD were more frequent among patients of low socioeconomic status [27].

A possible explanation found in other studies is that COVID-19 infection and lockdowns have had biological and societal impacts on the mental health of the youth [28]. Previous studies within our team found that after the onset of COVID-19, there an increase in prescription dispensing of both antidepressants and antipsychotics [10]. Though in the following portion of our study we will further investigate ICD-10 diagnoses for a further examination of the profile of new AD users, the experience of epidemics, as a stress, may trigger or exacerbate an individuals' mental health problems and result in the higher risk for all psychological symptoms [28]. In x study, an observed increase of

antidepressant fills during the COVID-19 lockdown period were also attributed to stockpiling prescriptions that may be the cause of the initial spike within all age and sex strata [29][13].

Interestingly, prevalence was declining across all age groups until 2013, after which the 12-17 age group became the primary age category for shifting the overall population use of increased AD drug dispensing. This age category, accounting for the majority of AD use, pushed the overall increase across strata, reinforcing the need to examine treatment trends in adolescents further. In a Spanish AD utilization study for users under 18 years from 2013 to 2018, females were also found to have the highest prevalence in antidepressant prescriptions, specifically those within early to late adolescents [30]. Within the female 12-17 year old population, the highest increase in annual percent change was observed, aligning with other pediatric drug utilization studies that found that girls had a higher risk ratio of receiving an antidepressant prescription [5].

4.1 Polypharmeceutical Approaches and Concomitant Use

Our study found that there is an increasing trend of polypharmaceutical approaches, which could be a result of the growing interest in the diagnosis and management of paediatric mood and behavioural disorders [15]. This suggests that treatment may be growing in diagnostic and treatment complexity in the overall pediatric population and within variation of age groups and sex [31]. This finding could be related to the increasing number of practicioners with specialization in pharmacotherapy interested in pharmacological approaches that offer rapid symptom improvement [15]. One notable shift is the introduction of melatonin use, which was not prescribed to children that were users of AD until 2020 (concomitant use table). In a time-series analysis of sedatives prescribed to children in France aged 6-17, a 155.3% increase (95% CI: 115.4%, 202.6%) was found after the year 2020 [10]. This study's data also found that in the year 2020 and continuing to 2024 that concomitant use of melatonin spread across all age groups, signaling a major adjustment in prescribing patterns.

Furthermore, while France approves the use of fluoxetine, fluvoxamine, sertraline, amitriptyline, clomipramine, and imipramine, pediatric prescribing data reveals that

unapproved antidepressants continue to be dispensed for children aged 3-17 years. (Appendix 7). This suggests further investigation towards understanding why prescribers may have recommended off-label prescriptions. In other studies, Revet et al., found that off-label use was decreasing in adolescents but increasing in younger children between 2009 and 2016 [1]. In the continuation of this study, we will investigate patterns of AD users within the first year of receiving their first AD prescription. Further exploration of patterns of AD use within the first year may lend greater understanding to whether off-label prescribing patterns are more likely to happen to AD users based duration of treatment.

4.2 Differences in Sexes Across Age Categories

Our study found that females made up the largest proportion of AD users within the 12-17 year age category, however both sexes demonstrated significant annual percentage changes of increased incidence in AD dispensed. In a meta-analysis study investigating prevalence of AD prescription in newly diagnosed adolescents diagnosed with depression in Germany, being female sex was found to increase the probability of AD prescription [19]. In other antidepressants and psychotropics drug utilization study, they found that for males, mental health care utilization (eg, outpatient consultations, psychiatric hospitalizations, and hospitalizations for suicide attempt) and almost all classes of psychotropic medication prescriptions increased between 2016 and 2023, with a marked increase in the trend from 2020 to 2023 [5].

4.3 France in International Context

In contrast to other Western countries, France has shown relatively stable AD prevalence rates from 2009 to 2016, whereas international studies indicate sharp increases:

- US: +25% (2005–2012)
- UK: +54% (2005–2012)
- Denmark: +60% (2005–2012)
- Netherlands: +18% (2005–2012)
- Norway: +30% (2004-2013)

- Germany: +49.2% (2005–2012) [32, 33]

Given the additional post-COVID timeframe within our study, further research examining French prevalence rates with other European and Western nations could reveal new insights into diagnosis and treatment accessibility.

In antidepressant drug utilization studies in the UK, children in more deprived areas were found to have higher frequency of antispsychotic prescribing, which can be further investigated in the coming months of this study to determine if French children with C2S status have a higher odds of being prescribed concomitant psychotropics, specifically antispychotics [34].

4.3 Concomitant Users and Prescriber Trends

Prior research of concomitant drug presence within children receiving antidepressants in Nordic countries found that boys may experience higher rates of concomitant AD use than girls [32]. Our study found this trend in boys of the 3 to 5 year and 6 to 11 year age group with a higher prorportion of concomitant use than girls, however within the 12 to 17 year age category, girls surpassed boys in comcomitant use of other psychotropics in 2023 (concomitant use table). Future research may investigate concomitant psychotropic prescribing patterns in patients receiving antidepressants to understand possible causes for this shift in dispensing pattern.

4.4 Ongoing Research and Future Direction

Over the final three months of this study, we aim to investigate patterns of AD use at treatment initiation, specifically:

1. New users – those with an AD prescription for the first time during the study period.
2. Treatment trajectory – assessing usage in the first year after initiation:
    - Short-term users: ≤1 AD prescription
    - Occasional users: 2–5 prescriptions
    - Regular users: >5 prescriptions

Additionally, we will refine definitions for AD discontinuation, switching behaviors, and concomitant use, ensuring that analyses account for age, sex, and socioeconomic factors.

Limitations of the Study

4.5 Limitations

In the short time of this internship project, data on hospitalizations and ICD-10 diagnoses for the identified AD users was not extracted and analyzed. In future work in this project, these elements will be observed to create a more complete analysis of the profile of AD users in this population during this time period.

- ER_PRS_F, which is the table which the data of drug use was extracted using, does not include self-medication, failure to send a care sheet, non-reimbursed drugs (prescribed or not) or prescriptions prescribed but not filled.

- Medications dispensed/used during hospital stays cannot be assessed.

- Some variables in the SNDS, such as ALD, should not be considered exhaustive, as not all morbidities that would allow a patient to be declared as ALD are always declared.

- It is not possible to ensure that the drug dispensed and reimbursed is actually administered to the patient, even if methods exist for approximating a patient's adherence to a treatment in the SNDS.

- Neither the actual daily dose nor the duration of treatment is recorded.

Several methodological constraints must be acknowledged:

The ER_PRS_F table excludes self-medication and non-reimbursed drugs, meaning some usage data may be missing.

AD use during hospital stays cannot be assessed.

The SNDS database (ALD) is not exhaustive, limiting identification of psychiatric and medical comorbidities.

Actual daily dosages and adherence rates are unknown, requiring approximation methods.

Despite these limitations, this study provides important insights into changing patterns of AD prescribing, raising critical questions about off-label use, access disparities, and evolving pharmaceutical practices in pediatric psychiatry

5. Conclusion

This study provides substantial insights within the evolving patterns of antidepressant use in children and adolescents in France between 2010 and 2024. While incidence within the overall population showed an initial decline, a marked increase in both incidence and prevalence was observed following after the year 2019 across all age groups and sexes—likely reflecting changes in diagnosis, treatment access, and prescribing behaviors coinciding with the COVID-19 pandemic.

Our data highlight trends in sex and age group differences, where 12-17-year-olds account for the overall increase in AD dispensing.

The study also highlights a probable complexity in diagnosis and treatment of psychiatric disorders in pediatrics, with an expanding polypharmaceutical landscape that may reflect a need to increase pharmacological management of additional symptoms in AD users. Additionally, the introduction of melatonin in the market from the years 2020 to 2024 suggest a shift in clinical practices, though its impact remains an area for further exploration.

Though France has historically reported stable AD use when compared to steep increases in other Western nations such as US, UK, Denmark, Netherlands, and Germany, our results indicate a potential shift in that trajectory. Continued cross-country

comparisons may assist in situating France within the context of broader trends in pediatric mental health care and prescribing practices.

Future research will focus on treatment initiation, continuation, and switching, with attention to off-label use, and potential disparities based on sex and socioeconomic status. The upcoming months of this study will further analyze treatment these elements, to capture a more comprehensive understanding of prescribing patterns in antidepressant users in the French pediatric population.

Despite methodological limitations, this study provides a robust foundation for ongoing research into AD prevalence, incidence, drug utilization, concomitant psychotropic and melatonin prescribing behaviors, and treatment trajectories, contributing to a deeper understanding of mental health care in children and adolescents.

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7. Appendices

Appendix 1: This table demonstrates the physician specialties that prescribe more than 10,000 dispensings of antidepressants.

Prescriber	(>10 000)
General practitioner	2232534
General Psychiatry	1008167
Children and Adolescent Psychiatry	85692
Pediatrics	68455
Neurology	43384
Neuropsychiatry	21478
Internal Medicine	10977

Appendix 3: List of FDA-approved antidepressants within children and teenagers that is used in addition to French-approved and EMA approved medications in the prescribing patterns of AD in children and adolescents in France.

FDA-approved antidepressants for children and teenagers

Medication*	Age (in years)	Diagnosis
*Many of these drugs are also available in generic form. Recommended initial dose and maximum dose vary by age.		
Clomipramine (Anafranil)	10 and older	Obsessive-compulsive disorder (OCD)
Duloxetine (Cymbalta, Drizalma Sprinkle)	7 and older	Generalized anxiety disorder
Escitalopram (Lexapro)	12 and older	Major depressive disorder
Fluoxetine (Prozac)	8 and older	Major depressive disorder
	7 and older	OCD
Fluvoxamine	8 and older	OCD
Lurasidone (Latuda)	10 and older	Bipolar depression
Olanzapine and fluoxetine, combination drug (Symbyax)	10 and older	Bipolar depression
Sertraline (Zoloft)	6 and older	OCD
Duloxetine (Cymbalta, Drizalma Sprinkle)	7 and older	Generalized anxiety disorder

Appendix 4: age category frequency distribution annually between the years 2010 and 2024 in France

CALENDAR YEARS	3-5 years	6-11 years	12-17 years
2010	2692 (1.83%)	23202 (15.77%)	121204 (82.40%)
2011	2339 (1.59%)	22324 (15.19%)	122273 (83.22%)
2012	2306 (1.54%)	21882 (14.60%)	125643 (83.86%)
2013	2154 (1.41%)	19634 (12.87%)	130752 (85.72%)
2014	2132 (1.31%)	19224 (11.81%)	141371 (86.88%)
2015	2008 (1.20%)	18575 (11.13%)	146252 (87.66%)
2016	2109 (1.24%)	18355 (10.79%)	149691 (87.97%)
2017	1962 (1.10%)	18194 (10.20%)	158285 (88.70%)
2018	1853 (0.95%)	18422 (9.41%)	175547 (89.65%)
2019	1698 (0.79%)	18769 (8.76%)	193833 (90.45%)
2020	1562 (0.66%)	19801 (8.33%)	216306 (91.01%)
2021	1563 (0.46%)	23598 (6.98%)	312992 (92.56%)
2022	1719 (0.40%)	24929 (5.81%)	402377 (93.79%)
2023	1679 (0.36%)	25859 (5.61%)	433229 (94.02%)
2024	1710 (0.35%)	28749 (5.83%)	462958 (93.83%)

Appendix 5: Distribution of sex by age categories of AD users in France between 2010-2024.

Age Category	3 - 5 years		6-11 years		12 - 17 years	
Calendar Years	female	male	female	male	female	male
2010	1044 (38.78%)	1648 (61.22%)	8089 (34.86%)	15113 (65.14%)	72787 (60.05%)	48417 (39.95%)
2011	966 (41.3%)	1373 (58.7%)	7909 (35.43%)	14415 (64.57%)	73648 (60.23%)	48625 (39.77%)
2012	909 (39.42%)	1397 (60.58%)	7607 (34.76%)	14275 (65.24%)	76423 (60.83%)	49220 (39.17%)
2013	898 (41.69%)	1256 (58.31%)	6919 (35.24%)	12715 (64.76%)	79655 (60.92%)	51097 (39.08%)
2014	890 (41.74%)	1242 (58.26%)	6619 (34.43%)	12605 (65.57%)	86545 (61.22%)	54826 (38.78%)
2015	863 (42.98%)	1145 (57.02%)	6601 (35.54%)	11974 (64.46%)	89891 (61.46%)	56361 (38.54%)
2016	906 (42.96%)	1203 (57.04%)	6621 (36.07%)	11734 (63.93%)	92256 (61.63%)	57435 (38.37%)
2017	834 (42.51%)	1128 (57.49%)	6655 (36.58%)	11539 (63.42%)	99039 (62.57%)	59246 (37.43%)
2018	797 (43.01%)	1056 (56.99%)	6822 (37.03%)	11600 (62.97%)	110698 (63.06%)	64849 (36.94%)
2019	721 (42.46%)	977 (57.54%)	7020 (37.4%)	11749 (62.6%)	123502 (63.72%)	70331 (36.28%)
2020	667 (42.7%)	895 (57.3%)	7439 (37.57%)	12362 (62.43%)	143258 (66.23%)	73048 (33.77%)
2021	652 (41.71%)	911 (58.29%)	9165 (38.84%)	14433 (61.16%)	226668 (72.42%)	86324 (27.58%)
2022	838 (48.75%)	881 (51.25%)	9600 (38.51%)	15329 (61.49%)	301332 (74.89%)	101045 (25.11%)

2023	800 (47.65%)	879 (52.35%)	10221 (39.53%)	15638 (60.47%)	323928 (74.77%)	109301 (25.23%)
2024	784 (45.85%)	926 (54.15%)	10963 (38.13%)	17786 (61.87%)	341610 (73.79%)	121348 (26.21%)

Appendix 6: C2S supplementary insurance frequency in overall population 3 to 17 years and stratified by age category.

CALENDAR YEARS	Overall population C2S Recipients	Age 3 to 5	Age 6 to 11	Age 12 to 17
2010	19586 (13.31%)	551 (20.47%)	4032 (17.38%)	15003 (12.38%)
2011	20054 (13.65%)	444 (18.98%)	4178 (18.72%)	15432 (12.62%)
2012	21240 (14.18%)	457 (19.82%)	4207 (19.23%)	16576 (13.19%)
2013	21261 (13.94%)	437 (20.29%)	3822 (19.47%)	17002 (13%)
2014	22990 (14.13%)	440 (20.64%)	3920 (20.39%)	18630 (13.18%)
2015	24779 (14.85%)	430 (21.41%)	4123 (22.2%)	20226 (13.83%)
2016	24686 (14.51%)	450 (21.34%)	3855 (21%)	20381 (13.62%)
2017	25744 (14.43%)	358 (18.25%)	3453 (18.98%)	21933 (13.86%)

2018	28154 (14.38%)	330 (17.81%)	3789 (20.57%)	24035 (13.69%)
2019	30427 (14.2%)	311 (18.32%)	3974 (21.17%)	26142 (13.49%)
2020	35178 (14.8%)	301 (19.27%)	4221 (21.32%)	30656 (14.17%)
2021	47909 (14.17%)	329 (21.05%)	4982 (21.11%)	42598 (13.61%)
2022	55281 (12.89%)	305 (17.74%)	5533 (22.2%)	49443 (12.29%)
2023	62915 (13.65%)	336 (20.01%)	6008 (23.23%)	56571 (13.06%)
2024	69842 (14.15%)	323 (18.89%)	6355 (22.11%)	63164 (13.64%)

Appendix 7: 90% Drug utilization by ATC code, including drug name for the overall

2010 -2024	N06AB06	SERTRALINE	1496882	41.09	2014	N06AB06	SERTRALINE	53045	32.62	2019	N06AB06	SERTRALINE	86692	40.47	2024	N06AB06	SERTRALINE	249964	50.66
	N06AB03	FLUOXETINE	685019	59.9		N06AA09	AMITRIPTYLINE	24435	47.64		N06AB03	FLUOXETINE	41474	59.83		N06AB03	FLUOXETINE	123995	75.79
	N06AA09	AMITRIPTYLINE	375061	70.2		N06AB10	ESCITALOPRAM	23870	62.32		N06AA09	AMITRIPTYLINE	26225	72.07		N06AB05	AMITRIPTYLINE	29111	81.69
	N06AB10	ESCITALOPRAM	310861	78.73		N06AB03	FLUOXETINE	18341	73.6		N06AB05	PAROXETINE	16496	79.77		N06AA09	PAROXETINE	27522	87.27
	N06AB05	PAROXETINE	275189	86.28		N06AB05	PAROXETINE	13851	82.12		N06AB10	ESCITALOPRAM	15768	87.13		N06AB10	ESCITALOPRAM	20247	91.37
	N06AX16	VENLAFAXINE	136740	90.03		N06AA04	CLOMIPRAMINE	8285	87.21		N06AX16	VENLAFAXINE	8021	90.87					
						N06AX16	VENLAFAXINE	6165	91										
2010	N06AB06	SERTRALINE	36185	24.61															
	N06AA09	AMITRIPTYLINE	21852	39.47	2015	N06AB06	SERTRALINE	58212	34.91	2020	N06AB06	SERTRALINE	102722	43.24					
	N06AB10	ESCITALOPRAM	20929	53.71		N06AA09	AMITRIPTYLINE	24195	49.42		N06AB03	FLUOXETINE	47818	63.37					
	N06AB05	PAROXETINE	13893	63.16		N06AB10	ESCITALOPRAM	21305	62.2		N06AA09	AMITRIPTYLINE	25103	73.94					
	N06AB03	FLUOXETINE	12516	71.67		N06AB03	FLUOXETINE	21144	74.88		N06AB05	PAROXETINE	17900	81.47					
	N06AA04	CLOMIPRAMINE	9436	78.09		N06AB05	PAROXETINE	13846	83.18		N06AB10	ESCITALOPRAM	16798	88.54					
	N06AA02	IMIPRAMINE	6194	82.3		N06AA04	CLOMIPRAMINE	6693	87.19		N06AX16	VENLAFAXINE	8552	92.14					
	N06AX16	VENLAFAXINE	5932	86.34		N06AX16	VENLAFAXINE	6551	91.12										
	N06AB04	CITALOPRAM	4766	89.58															
	N06AX03	MIANSERINE	4358	92.54															
2011	N06AB06	SERTRALINE	37993	25.87	2016	N06AB06	SERTRALINE	62392	36.68	2021	N06AB06	SERTRALINE	153288	45.34					
	N06AB10	ESCITALOPRAM	23064	41.57		N06AA09	AMITRIPTYLINE	24734	51.22		N06AB03	FLUOXETINE	74946	67.51					
	N06AA09	AMITRIPTYLINE	21981	56.54		N06AB03	FLUOXETINE	23751	65.18		N06AA09	AMITRIPTYLINE	27432	75.62					
	N06AB03	FLUOXETINE	13514	65.74		N06AB10	ESCITALOPRAM	19030	76.37		N06AB05	PAROXETINE	25124	83.05					
	N06AB05	PAROXETINE	12251	74.08		N06AB05	PAROXETINE	14173	84.7		N06AB10	ESCITALOPRAM	22013	89.56					
	N06AA04	CLOMIPRAMINE	8689	80		N06AX16	VENLAFAXINE	6515	88.53		N06AX16	VENLAFAXINE	11973	93.1					
	N06AX16	VENLAFAXINE	5948	84.05		N06AA04	CLOMIPRAMINE	5761	91.92										
	N06AA02	IMIPRAMINE	5457	87.77															
	N06AB04	CLOMIPRAMINE	4419	90.78															
2012	N06AB06	SERTRALINE	41806	27.92	2017	N06AB06	SERTRALINE	66785	37.44	2022	N06AB06	SERTRALINE	202310	47.16					
	N06AB10	ESCITALOPRAM	23515	43.63		N06AB03	FLUOXETINE	29141	53.78		N06AB03	FLUOXETINE	100967	70.7					
	N06AA09	AMITRIPTYLINE	22449	58.62		N06AA09	AMITRIPTYLINE	25520	68.09		N06AB05	AMITRIPTYLINE	31230	77.98					
	N06AB03	FLUOXETINE	14416	68.25		N06AB10	ESCITALOPRAM	17376	77.83		N06AA09	PAROXETINE	27197	84.32					
	N06AB05	PAROXETINE	13101	77		N06AB05	PAROXETINE	14098	85.73		N06AB10	ESCITALOPRAM	24585	90.05					
	N06AA04	CLOMIPRAMINE	8072	82.39		N06AX16	VENLAFAXINE	6770	89.53		N06AX16	VENLAFAXINE	16214	93.83					
	N06AX16	VENLAFAXINE	6031	86.42		N06AA04	CLOMIPRAMINE	5237	92.47										
	N06AA02	IMIPRAMINE	4846	89.66															
	N06AB04	CLOMIPRAMINE	3574	92.05															
2013	N06AB06	SERTRALINE	46819	30.71	2018	N06AB06	SERTRALINE	75023	38.32	2023	N06AB06	SERTRALINE	223646	48.54					
	N06AA09	AMITRIPTYLINE	23281	45.98		N06AB03	FLUOXETINE	34859	56.13		N06AB03	FLUOXETINE	112175	72.89					
	N06AB10	ESCITALOPRAM	23252	61.23		N06AA09	AMITRIPTYLINE	26895	69.87		N06AB05	AMITRIPTYLINE	31921	79.82					
	N06AB03	FLUOXETINE	15962	71.7		N06AB10	ESCITALOPRAM	16812	78.46		N06AA09	PAROXETINE	26240	85.52					
	N06AB05	PAROXETINE	12969	80.21		N06AB05	PAROXETINE	15225	86.24		N06AB10	ESCITALOPRAM	22297	90.36					
	N06AA04	CLOMIPRAMINE	8710	85.92		N06AX16	VENLAFAXINE	7692	90.17										
	N06AX16	VENLAFAXINE	5940	89.82															
	N06AB04	CLOMIPRAMINE	3620	92.19															

population annually years 2010-2024. In some thresholds, the cumulative proportion exceeds 90% due to drugs that surpassed the threshold of 90%.

Appendix 8: Concomitant psychotropic use by age category. Values reported in percentages of AD users per strata with concomitant use of a psychotropic medication.

Years	Overall Population	3 to 5 years	6 to 11 years	12 to 17 years
2010	18.04	7.62	16.48	18.7
2011	20.42	11.55	18.39	21.22
2012	21.74	9.6	22.07	22.34
2013	23.18	11.45	22.08	23.97
2014	25.33	14.61	27.99	25.32
2015	27.53	17.79	32.12	26.82
2016	26.93	18.15	30.7	26.25
2017	27.71	23.17	31.51	26.71
2018	29.64	24.3	32.76	28.89
2019	29.89	23.62	33.02	29.22
2020	31.23	29.6	34.12	30.38
2021	33.54	36.75	35.85	32.59
2022	35.07	33.1	37.3	34.62
2023	35.63	35.33	36.62	35.38
2024	35.28	33.68	38.12	34.68

Appendix 9: Joinpoint Summary by Age and Sex of prevalence per 1,000 children of AD users

strat	Joinpoint	Segment Start	Segment End	APC	APC 95% LCL	APC 95% UCL	P-Value
Girls 3-5 years	0	2010	2020	-3.905	-8.1926	-2.4792	0.003199
Girls 3-5 years	1	2020	2024	5.8655	-0.0692	17.4142	0.05239
Boys 3-5	0	2010	2013	-9.1469	-13.1279	-6.7379	< 0.000001
Boys 3-5	1	2013	2017	-2.434	-3.8794	0.2664	0.086383
Boys 3-5	2	2017	2020	-7.0644	-8.9185	-4.7864	0.0012
Boys 3-5	3	2020	2024	4.0164	2.1866	7.4472	< 0.000001
Girls 6-11 years	0	2010	2014	-7.4254	-12.2704	-5.0181	< 0.000001
Girls 6-11 years	1	2014	2020	-1.4542	-3.5739	2.0207	0.228354
Girls 6-11 years	2	2020	2024	7.7092	5.1131	13.7866	< 0.000001
Boys 6-11 years	0	2010	2015	-7.0259	-10.4558	-5.6619	< 0.000001
Boys 6-11 years	1	2015	2020	-3.4911	-5.278	2.1296	0.107978
Boys 6-11 years	2	2020	2024	7.038	4.8272	11.5801	< 0.000001
Girls 12-17 years	0	2010	2013	-1.8729	-6.6147	1.5847	0.279944

Girls 12-17 years	1	2013	2019	3.199	1.4879	6.0424	0.010798
Girls 12-17 years	2	2019	2022	26.5888	22.2615	29.8281	< 0.000001
Girls 12-17 years	3	2022	2024	3.7283	-1.7778	9.083	0.169566
Boys 12-17 years	0	2010	2013	-2.3661	-5.8907	0.344	0.095581
Boys 12-17 years	1	2013	2020	1.9131	0.7142	4.6695	0.005199
Boys 12-17 years	2	2020	2024	9.422	7.3213	13.8985	< 0.000001

Apendix 10: Annual average percent change of prevalence per 1,000 children by strata

strat	Start Obs	End Obs	AAPC	AAPC C.I. Low	AAPC C.I. High	P-Value
girls 3-5 years	2010	2024	-1.2093	-2.635	-0.0994	0.033593
boys 3-5 years	2010	2024	-3.2269	-4.1203	-2.1156	< 0.000001
girls 6-11 years	2010	2024	-0.7079	-1.2495	-0.1524	0.015997
boys 6-11 years	2010	2024	-1.9092	-2.3825	-1.465	< 0.000001
girls 12-17 years	2010	2024	7.1809	5.7837	8.2082	< 0.000001
boys 12-17 years	2010	2024	3.0527	2.5932	3.5497	< 0.000001

Appendix 11: Incidence with annual percent change by age and sex strata

strat	Joinpoint	Segment Start	Segment End	APC	APC 95% LCL	APC 95% UCL	P-Value
Girls 3-5 years	0	2010	2020	-4.6655	-9.71	-3.202	0.009998
Girls 3-5 years	1	2020	2024	3.8417	-1.7726	14.9019	0.215957
Boys 3-5	0	2010	2013	-8.2421	-13.4369	-4.2124	< 0.000001
Boys 3-5	1	2013	2017	-3.5669	-5.817	0.36	0.073585
Boys 3-5	2	2017	2020	-8.9515	-11.7047	-5.1793	0.003199
Boys 3-5	3	2020	2024	3.6102	0.8374	10.432	0.013197
Girls 6-11 years	0	2010	2013	-8.1152	-11.7641	-5.2384	< 0.000001
Girls 6-11 years	1	2013	2020	-2.3223	-3.4956	-0.4629	0.034393
Girls 6-11 years	2	2020	2024	6.045	3.9736	9.6775	< 0.000001
Boys 6-11 years	0	2010	2013	-8.2049	-11.8169	-5.4108	< 0.000001
Boys 6-11 years	1	2013	2020	-4.4307	-5.6949	0.2992	0.056789
Boys 6-11 years	2	2020	2024	4.992	2.594	10.0213	0.0016

Girls 12-17 years	0	2010	2019	1.6436	-2.0797	3.9944	0.207558

Appendix 12: Incidence average annual percent change (AAPC) between the total time period of 2010 to 2024 for AD users by age and sex strata.

strat	Start Obs	End Obs	AAPC	AAPC C.I. Low	AAPC C.I. High	P-Value
girls 3-5 years	2010	2024	-1.2856	-2.8534	-0.0871	0.037992
boys 3-5 years	2010	2024	-3.0511	-3.4945	-2.5957	< 0.000001
girls 6-11 years	2010	2024	-1.2392	-1.7327	-0.6892	0.0004
boys 6-11 years	2010	2024	-2.6217	-3.2207	-1.9549	< 0.000001
girls 12-17 years	2010	2024	4.3957	3.4511	5.2331	< 0.000001
boys 12-17 years	2010	2024	2.0991	0.8265	3.0169	0.0012

Appendix 13: Annual Prevalence of AD Uses within the entire pediatric population aged 3-17 years between the years 2010 and 2024 in France.

Years	Number of prevalent users	Annual prevalence (users/1000 children)
2010	51368	4.29
2011	50090	4.17
2012	49559	4.11
2013	47784	3.94
2014	49803	4.09
2015	49461	4.05
2016	50245	4.11
2017	51142	4.18
2018	53690	4.39
2019	55957	4.59
2020	58327	4.79
2021	77039	6.34
2022	90873	7.50
2023	94810	7.84
2024	100023	8.30

Appendix 14: Annual Incidence of AD Use for the overall population age 3 to 17 years in France. Incidence was calculated by dividing number of incident users by INSEE annual population totals.

Years	Number of incident users	Annual incidence (users/1000 children)

2010	38321	3.20
2011	36747	3.06
2012	36304	3.01
2013	33943	2.80
2014	35724	2.93
2015	34638	2.84
2016	34999	2.86
2017	35767	2.93
2018	36866	3.02
2019	37565	3.08
2020	38164	3.14
2021	52401	4.31
2022	56874	4.69
2023	54607	4.52
2024	57209	4.74

Appendix 15: ATC code and drug names included in the selection of patients extracted as AD users.

1) N06AA -> Tricyclic antidepressants (TCAs)

N06AA01	desipramine
N06AA02	imipramine
N06AA04	clomipramine
N06AA06	trimipramine
N06AA09	amitriptyline
N06AA10	nortriptyline
N06AA11	protriptyline
N06AA12	doxepin

N06AA16	dosulepin
N06AA17	amoxapine
N06AA21	maprotiline
Other N06AA	

2) N06AB Selective serotonin reuptake inhibitors -> SSRIs

N06AB03	fluoxetine
N06AB04	citalopram
N06AB05	paroxetine
N06AB06	sertraline
N06AB08	fluvoxamine
N06AB10	escitalopram
Other N06AB	

3) Monoamine-oxidase inhibitors

N06AF Monoamine oxidase inhibitors, non-selective

N06AF01	isocarboxazid
N06AF03	phenelzine
N06AF04	tranylcypromine
N06AF05	iproniazide
Other N06AF	

N06AG Monoamine oxidase A inhibitors

N06AG02	moclobemide
N06AG03	toloxatone

4) Serotonin-noradrenaline reuptake inhibitors -> SNRIs

N06AX16	venlafaxine

N06AX17	milnacipran
N06AX21	duloxetine
N06AX23	desvenlafaxine
No ATC code	levomilnacipran

5) Other antidepressants -> Atypical antidepressants

N06AX03	mianserin
N06AX05	trazodone
N06AX06	nefazodone
N06AX11	mirtazapine
N06AX14	tianeptine
N06AX22	agomelatine
N06AX26	vortioxétine

Appendix 16: INSEE Population estimates based on age group and sex.

years	Girls 3-	Girls 6-11	Girls 12-1	Boys 3-5	Boys 6-1	Boys 12-1	Total Population 3-17 yea
2010	1179381	2367471	2302909.5	1234500.5	2481605.5	2417088	11982955
2011	1188238	2381401.5	2310131.5	1243077.5	2494783	2424719.5	12012965
2012	1193025	2391767.5	2338635.5	1248845.5	2506048.5	2454421.5	12056621.5
2013	1201929	2407615	2380205	1258481.5	2522229	2499627.5	12122943
2014	1209697	2431081.5	2410359	1263977.5	2543755	2532100.5	12184331
2015	1204316	2445301	2427806.5	1256928.5	2558604	2549319.5	12210617
2016	1191774	2455558	2438035.5	1244233.5	2569943.5	2561467	12218561.5
2017	1179047	2465233	2446555	1230121	2576680	2573142.5	12224028.5
2018	1166893	2464335	2455577	1215341	2577207.5	2581255.5	12219999
2019	1149068	2454089.5	2456731	1196596	2571294.5	2580923	12193082.5
2020	1126492	2446067.5	2462734	1172987.5	2560799.5	2592421.5	12168487.5
2021	1102094	2434161	2479367.5	1150835.5	2547245	2617123	12148816.5
2022	1082634	2405842.5	2501723	1135341.5	2521223.5	2642799.5	12123393.5
2023	1069038	2372155.5	2520159	1120814.5	2488778	2662540	12094546
2024	1057808	2340384	2526336.5	1108397.5	2458304.5	2669104	12057722

Appendix 17: Annual incidence and annual prevalence stratified by sex and age group for the study period 2010 to 2024.

Age and Sex Strata	Girls 3-5 years		Boys 3-5 years		Girls 6-11 years		Boys 6-11 years		Girls 12-17 years		Boys 12-17 years	
Year	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence
2010	0.680865929	0.635079	0.891858691	0.80923418	1.744055154	1.4407779	2.667627872	2.053509311	10.44113978	7.568686	6.31007229	4.400336
2011	0.621087695	0.576484	0.779516965	0.69907146	1.658687122	1.3416469	2.558138323	1.970912901	10.20850978	7.310839	6.19783031	4.203373
2012	0.57836197	0.538128	0.739082617	0.67182049	1.548227409	1.2442681	2.401390077	1.824785115	10.1807229	7.26663	6.10897517	4.18836
2013	0.555773261	0.519997	0.662703425	0.59834014	1.36317476	1.0811529	2.081492204	1.533960636	9.865956924	6.809077	5.92008209	3.954989
2014	0.506738674	0.459619	0.655074952	0.59415615	1.297364979	1.0645468	2.026531643	1.546532587	10.43205597	7.307625	6.10007383	4.060265
2015	0.499038666	0.455861	0.597488242	0.53702339	1.295546029	1.0587654	1.901427497	1.440629343	10.39662757	7.049161	6.03062896	3.932422
2016	0.556313529	0.50429	0.634929055	0.5658102	1.271808689	1.0323519	1.829223094	1.375905735	10.55152806	7.099158	6.16873065	4.026989
2017	0.498708066	0.459693	0.590185844	0.51620938	1.227470182	0.991387	1.753419128	1.335827499	10.97952018	7.466417	6.21341414	4.05613
2018	0.503902243	0.459339	0.55951375	0.49780267	1.229134838	0.9848499	1.653339904	1.237773831	11.78623191	7.843778	6.50497403	4.202219
2019	0.442967692	0.398584	0.52732919	0.46882991	1.186590791	0.9209118	1.605028129	1.185395139	12.54634716	8.197479	6.80880445	4.3004
2020	0.409235041	0.367513	0.474003346	0.41517919	1.16309137	0.9014469	1.57528928	1.138316373	13.92436211	9.065534	6.47965618	3.786807
2021	0.430997719	0.401055	0.504850606	0.44141843	1.319140353	1.0130801	1.711653178	1.232311772	19.94984608	13.50022	7.55256822	4.728093
2022	0.550509221	0.509868	0.518786638	0.47034306	1.413641999	1.084859	1.846325802	1.328719965	24.17853615	14.58795	8.34758747	5.045029
2023	0.495773067	0.452744	0.524618481	0.47822365	1.491892079	1.1504305	1.896513068	1.336398827	25.05516517	13.53764	8.73639457	5.038422
2024	0.530342241	0.48402	0.57470357	0.52418018	1.565127774	1.2006577	2.056702089	1.459135758	26.05551557	13.94747	9.50768498	5.426165

Appendix 17: Drug utilization of AD for children aged 3 to 17 in France from 2010-2024. Proportions were calculated by dividing drug count by each year total N count of drugs.

Years	N (total count of AD) = 3,642,602 AD drugs dispensed	TCAs	proportion (%)	SSRIs	Prop. (%)	SNRIs	Prop.(%)	Atypical ADs	Prop. (%)	MAIs	Prop. (%)
2010	147,003	39,346	26.77	89,330	60.77	8,290	5.64	10,016	6.81	23	0.01
2011	146,859	37,700	25.67	92,161	62.75	7,895	6.19	9,092	5.38	13	0.01
2012	149,720	36,982	24.7	97,199	64.92	7,726	5.2	7,791	5.16	28	0.01
2013	152,433	34,670	22.74	103,502	67.9	7,666	5.03	6,565	4.31	30	0.02
2014	162,618	34,661	21.31	113,369	69.71	7,903	4.86	6,641	4.08	55	0.03
2015	166,760	33,579	20.14	118,204	70.88	8,330	5	6,621	3.97	27	0.02
2016	170,081	32,975	19.39	122,465	72	8,209	4.83	6,420	3.77	12	0.01
2017	178,357	32,899	18.45	130,155	72.97	8,389	4.7	6,905	3.87	9	0.01
2018	195,758	33,295	17.01	144,717	73.93	9,276	4.74	8,460	4.32	10	0.01
2019	214,212	32,135	15	163,070	76.13	9,576	4.47	9,409	4.39	22	0.01
2020	237,587	30,448	12.82	188,074	79.16	10,045	4.23	9,018	3.8	2	0
2021	338,092	33,049	9.78	278,851	82.48	13,955	4.13	12,233	3.62	4	0
2022	428,981	32,492	7.57	362,744	84.56	18,359	4.28	15,349	3.58	37	0.01
2023	460,728	31,468	6.83	393,949	85.51	20,012	4.34	15,262	3.31	37	0.01
2024	493,391	32,430	6.57	427,305	86.61	19,623	3.98	13,998	2.84	35	0.01