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# Variations in Dispensing Psychotropic Drugs to Adolescents Depending on School Periods: A French Nationwide Retrospective Study

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**Abstract.** Seasonality patterns are reported for various psychiatric disorders. Concerning adolescents, there is an increased frequency of general emergency department visits for mental health disorders observed between March and May, as well as in October and November. We conducted a retrospective cohort study using the French health insurance medico-administrative database. We extracted psychotropic drug deliveries occurring between 2015 and 2019 for patients aged between 12 and 18 years old. Each drug delivery was classified as occurring during a school period (Sc), the summer holidays (SumH) or other shorter holidays periods (ShH). We compared the number of distinct patients, as well as the proportion of new consumers, according to week status. Anxiolytics and hypnotics were more frequently dispensed during the school periods and short breaks than during the summer holidays. Conversely, antidepressants were more commonly dispensed during the short breaks rather than school periods and summer holidays. The stressful effects induced by schooling appear to be addressed in the first line by anxiolytics and hypnotics, while antidepressants are more frequently introduced during school holidays.

**Keywords.** Data reuse, Mental health, Seasonality, Psychotropics, School, Holidays

## 1. Introduction

Adolescence constitutes a crucial phase for the onset and emergence of psychiatric disorders [1]. Several research studies have noted seasonal patterns in presentations to emergency department for adolescents, indicating a higher frequency during the months of March to May, as well as in October and November [2]. Likewise, increased rates of emergency department consultations for suicide attempts have been documented during

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the spring and fall seasons [3,4]. In the spring of 2020, coinciding with widespread school closures due to COVID-19, the usual seasonal patterns were disrupted, and the months of April and May experienced the lowest rates [5]. Psychiatric presentations were noted to occur at a rate more than double when children were attending school as opposed to during vacation [6]. Last, frequencies of suicide among 12-18 years old adolescents sharply increased around the dates when school sessions began in April and September [7].

This aspect has not been examined concerning deliveries of psychotropic drugs. The aim of this study was to explore variations in the dispensing of psychotropic drugs to adolescents across different school and vacation periods, categorized by drug class.

## 2. Methods

We conducted a retrospective observational study using the French health insurance medico-administrative database (SNDS, in French, *Système national des données de santé*) [8]. The SNDS contains comprehensive individual-level data, including demographics (i.e., age, sex, zipcode), and medical consumption for outpatient and inpatient care, such as medications dispensed at community pharmacies. However, it does not document drugs dispensed in hospitals.

We extracted drug deliveries for patients aged between 12 and 18 years old occurring between 2015 and 2019 to avoid being influenced by the COVID-19 pandemic and its impact on psychotropic drug consumption [9]. We identified antidepressants with ATC codes N06A, anxiolytics with ATC code N05B, and hypnotics with ATC code N05C.

In France, school holiday weeks are common to all educational institutions. Summer vacations (July and August), autumn breaks (late October to early November), and Christmas holidays (late December to early January) are common across all regions. Winter holidays (February) and spring holidays (April) are scheduled separately for three sets of administrative regions. Each drug delivery was classified as occurring during a school period (Sc), the summer holidays (SumH) or other shorter holidays periods (ShH). For each dispensing we defined the patient as a new consumer when they have no dispensing during the past 365 days.

We compared the number of distinct patients according to week status (Sc, SumH, ShH) using Poisson regression. We compared the proportion of new consumers according to week status (Sc, SumH, ShH) using Kruskal-Wallis test with a 5% alpha risk.

## 3. Results

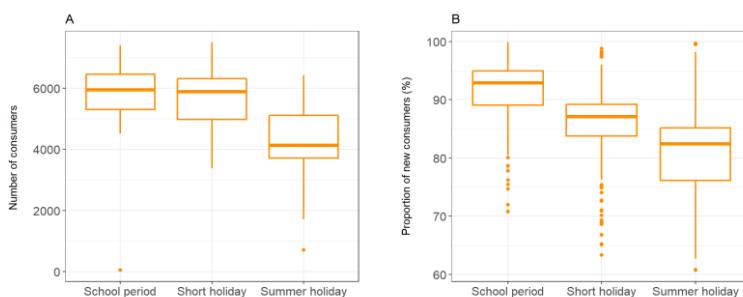
Between 2015 and 2019, the median (Q1;Q3) number of individuals receiving anxiolytics, antidepressants and hypnotics per week was respectively of 5705 (4741 ; 6211), 3349 (3035 ; 3769) and 539 (474 ; 616). In 2019, it represented respectively 1423454, 884214 and 142862 patients. The median (Q1;Q3) proportion of new consumers per week was 0.86 (0.81 ; 0.91) for anxiolytics, 0.92 (0.87 ; 0.95) for antidepressants and 0.97 (0.95 ; 0.98) for hypnotics.

There were more adolescents receiving anxiolytics during school weeks and short holidays weeks than summer holidays weeks, with a median (Q1;Q3) number of

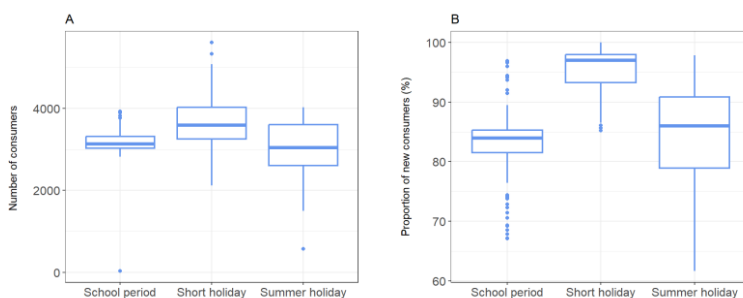
individuals of respectively 5958 (5310 ; 6462) ; 5895 (4980.5 ; 6313) and 4132 (3722 ; 5109)( $p < 0.001$ ). The median (Q1;Q3) proportion of new consumers per week was 0.93 (0.89 ; 0.95) in Sc weeks, 0.87 (0.84 ; 0.89) in ShH and 0.82 (0.76 ; 0.85) in SumH weeks ( $p < 0.001$ ). These results are illustrated in Figure 1.

The weeks in which there were more adolescents receiving antidepressants were during ShH with a median number of individuals of 3590 (3247 ; 4019). In addition, the weekly median number of people receiving antidepressants was higher during school period than SumH with 3136 (3025 ; 3314) and 3047 (2603 ; 3601) individuals ( $p < 0.001$ ), respectively (Figure 2). The median (Q1 ; Q3) proportion of new consumers per week was higher in ShH weeks (0.97 (0.93 ; 0.98)) than in Sc and SumH weeks (0.84 (0.82 ; 0.85) and 0.86 (0.79 ; 0.91),  $p < 0.001$ ).

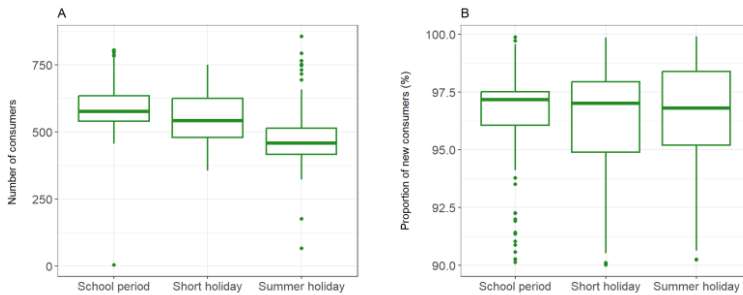
There were more adolescents receiving hypnotics during Sc and ShH weeks than during SumH weeks, with a median number of individuals per week of 576 (539 ; 635), 542 (479.5 ; 624.5), and 458 (416 ; 513), respectively ( $p < 0.001$ ). No difference was observed in the proportion of new consumers according to week status ( $p = 0.397$ ). These results are illustrated in Figure 3.



**Figure 1. A)** Weekly number of anxiolytic consumers according to school periods and holidays. **B)** Weekly proportion of new anxiolytic consumers according to school periods and holidays.



**Figure 2. A)** Weekly number of antidepressant consumers according to school periods and holidays. **B)** Weekly proportion of new antidepressant consumers according to school periods and holidays.



**Figure 3.** A) Weekly number of hypnotic consumers according to school periods and holidays. B) Weekly proportion of new hypnotic consumers according to school periods and holidays.

#### 4. Discussion

Our results highlighted a difference in psychotropic drug dispensing among adolescents, depending on school periods. There were more adolescents receiving anxiolytics and hypnotics during Sc weeks and ShH weeks than SumH weeks. This is consistent with the use of anxiolytics and hypnotics as a first-line treatment. Conversely, the weeks in which adolescents were more likely to receive antidepressants were during the ScH. The proportion of new consumers was also higher for antidepressants during the ScH. This suggests that antidepressants might be initiated during vacation periods, either as a deliberate decision when the condition has not shown improvement or to facilitate the monitoring of this new treatment.

Our results are consistent with the literature, which had already identified school as impacting the mental health of young people [6,7]. This could be partially explained by the bullying that students experience at school [10]. Besides, the school environment can play a role in identifying psychiatric disorders through the regular supervision of students or during dedicated interventions [11], leading to the introduction of treatment. The differences in the number of users, depending on the class of psychotropic drug and the school or vacation period, lead to a number of questions. Further studies will need to be conducted to ensure that adolescents do not face a disruption in care during holidays, and that access to care remains consistent for them throughout the year.

The strength of our study lies in having access to a national database with several years of historical data. Our study presents two limits. The database only includes pharmacy dispensations, without specific information regarding their indication, and whether the patient has taken the medication or not. In the database, it is not indicated whether adolescents are enrolled in school, particularly for those aged 16 to 18, as education is no longer compulsory in France for this age group.

#### 5. Conclusions

Anxiolytics and hypnotics are more frequently dispensed during school periods and short breaks than during the summer holidays. Conversely, antidepressants are more commonly dispensed during the short breaks rather than school periods and summer

holidays. The stressful effects induced by schooling appear to be addressed in the first line by anxiolytics and hypnotics, while antidepressants are more frequently introduced during school holidays.

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