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Trends in School-break Effects of ADHD Pharmacotherapy: a Canadian Population-Based Study

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Background

- **ADHD** → persistent **neurobiological difference**
  - Symptoms affect **daily functioning**
  - **NOT** just academic performance.
- **Overprescribing concerns**:
  - Driven by **educational and family pressures**
  - **NOT** necessarily **sustained clinical need**
- **Importance**: examining whether medication use patterns align with school calendars may help distinguish **performance-driven prescribing** vs. **clinically-indicated treatment**.

Objectives

- Evaluate the **school-break effects** on ADHD prescribing patterns and how it changes over time.
- Assess how these patterns differ by age, sex and medication type.

Methods

Design

Population-based retrospective cohort study

Data Sources

BC administrative databases
- Physician services
- Community pharmacy dispensations
- Hospital admissions
- Emergency department visits

Outcome

ADHD-specific prescribing including
- Stimulants:
  Methylphenidate,
  Lisdexamfetamine,
  Dextroamphetamine,
  Mixed amphetamine salts;
- Non-stimulants:
  Atomoxetine,
  Guanfacine.

Participants

Between 2014 and 2023, BC residents aged 3 to 29 years with active ADHD diagnosis in the past year:
- ≥1 ADHD-specific prescription, **or**
- ≥1 ADHD hospitalization with ICD-10 F90, **or**
- ≥1 ADHD physician visit with ICD-9 314 **and** another ADHD visit, ADHD prescription, or ADHD hospitalization within one year

Stratified by

Sex: male and female
Age groups:
- Preschool: 3–5 years;
- Elementary school: 6–12 years;
- High school: 13–17 years;
- Young adults: 18–29 years.

Statistical Analysis

Regression models estimating risk ratios of receiving ADHD medication:

Comparison ($\mathrm{I_{break}}$)
- **School-break month**: August **vs.**
- **Reference month**: January

Effect Modifier (t)
- **Calendar year** (excluding 2020 to account for COVID-related service disruptions)

Model

$$\log(Y_t/N) = \beta_0 + \beta_I \cdot \mathrm{I_{break}} + \beta_t \cdot t + \beta_X \cdot t \cdot \mathrm{I_{break}},$$

β_I: school-break effect in 2014 (baseline effect);
β_t: January trend estimate;
β_X: changes in school-break effect over time (trend).

Results

Table 1. ADHD Prescription Patterns by Sex over the Study Period

Diagnosed with ADHD	Male (N = 113,139)	Female (N = 79,244)	
	N (%)	N (%)	SMD
Ever filled ADHD prescription	87,886 (77.7%)	65,123 (82.2%)	0.113
Age 3-5	2,280 (35.6%)	634 (31.4%)	0.089
Age 6-12	37,688 (71.0%)	14,643 (67.8%)	0.069
Age 13-17	32,899 (80.0%)	19,520 (80.4%)	0.010
Age 18-29	42,414 (82.1%)	43,060 (86.7%)	0.129
Of those who filled an ADHD prescription			
Stimulants	85,088 (96.8%)	63,213 (97.1%)	0.015
Methylphenidate	63,139 (71.8%)	42,766 (65.7%)	0.133
Lisdexamfetamine	28,423 (32.3%)	24,003 (36.9%)	0.095
Dextroamphetamine	19,030 (21.7%)	14,740 (22.6%)	0.024
Mixed amphetamine salts	13,953 (15.9%)	9,643 (14.8%)	0.030
Non-stimulants	16,505 (18.8%)	9,151 (14.1%)	0.128
Atomoxetine	10,171 (11.6%)	6,553 (10.1%)	0.049
Guanfacine	8,525 (9.7%)	3,488 (5.4%)	0.165
	Median (Q1-Q3)	**Median (Q1-Q3)**	**SMD**
Number of ADHD prescription filled	10 (4-28)	8 (3-20)	0.154
Days of ADHD prescription dispensed	366 (120-1,013)	284 (98-703)	0.216

Figure 1. Heatmap of Monthly ADHD Prescription (%)

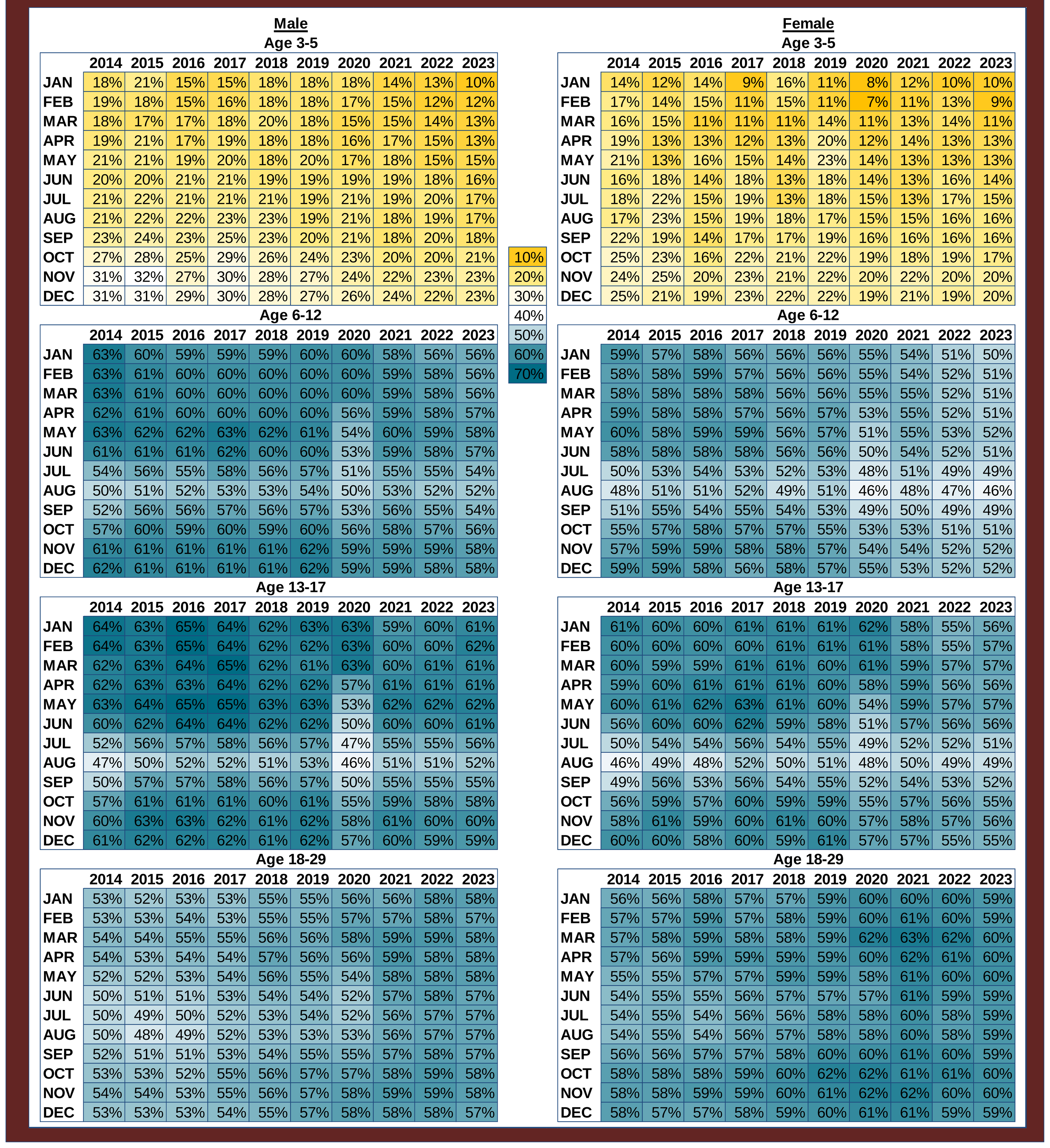
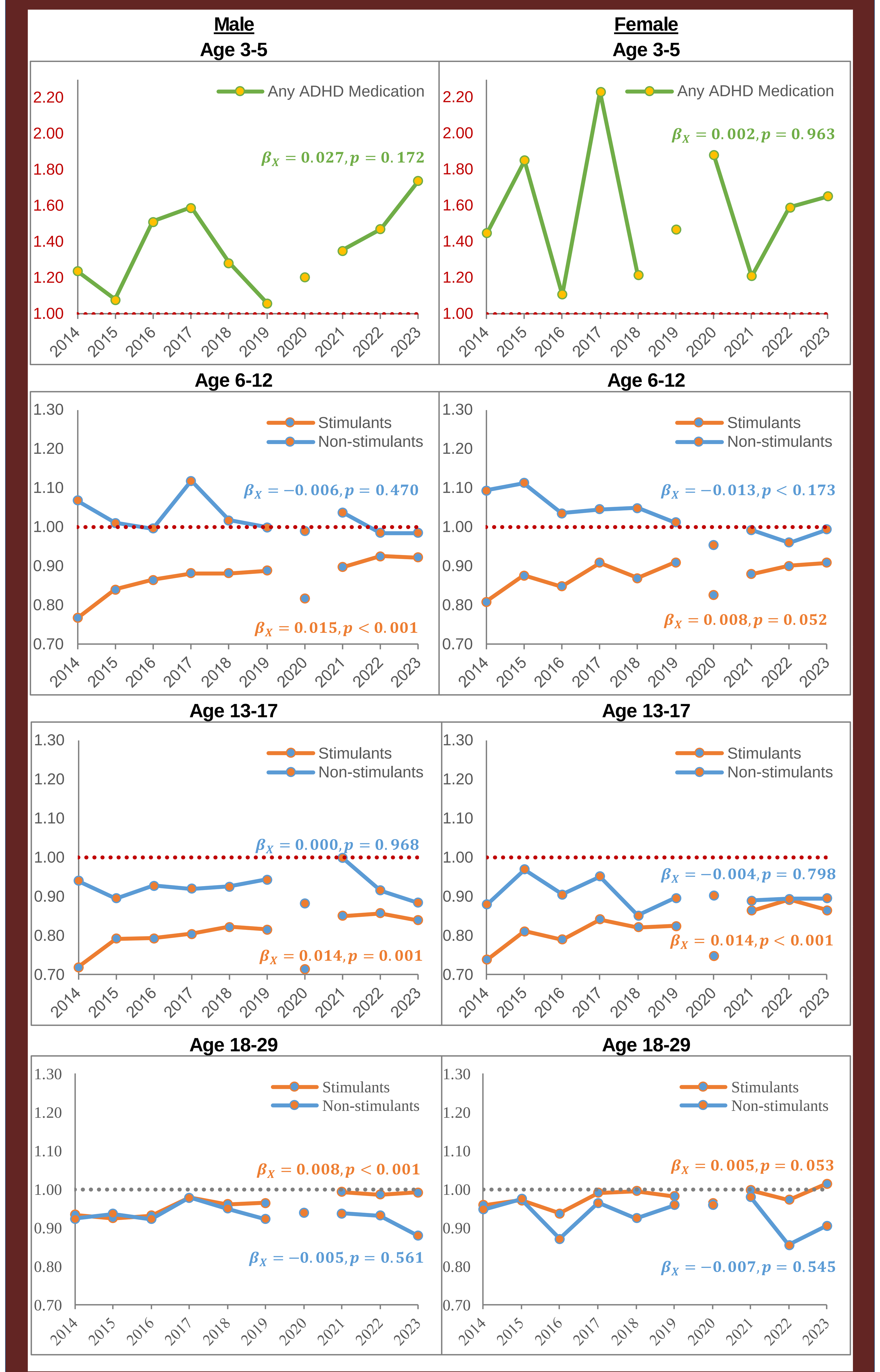


Figure 2. Trends in School-break Effects (Risk Ratios: AUG vs. JAN)



Conclusions

- **Poor pharmacotherapy persistence of those diagnosed with ADHD:**
  - > 1/2 had a cumulative ADHD medication use of < 1 year;
  - < 2/3 received ADHD medication in any given month;
  - Females < Males in number of prescriptions and duration of use.
- **ADHD medication use among preschoolers diagnosed with ADHD:**
  - One in three preschoolers received medications, despite NO approved ADHD medications for this age group;
  - Decreasing medication dispensation over calendar year;
  - Increasing medication dispensation over calendar month.
- **School-break effects among children and adolescents:**
  - Peaked in high-school age adolescents, followed by elementary-school aged children;
  - Effects decreased over time, despite longer and deeper during COVID;
  - Primarily driven by reductions in stimulant prescriptions.
- **ADHD medication use among young adults diagnosed with ADHD:**
  - School-break effect diminished;
  - Increasing prescription dispensations amid increasing diagnoses.

References

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Declarations

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