Supporting Information

Supplementary methods and results

This appendix was part of the submitted manuscript and has been peer reviewed. It is posted as supplied by the authors.

Supplementary methods

Study data (medications and patient datasets) were extracted from general practice electronic health records and provided to the investigators by Outcome Health. The medications dataset included information about prescriptions to patients: generic medication name, Anatomical Therapeutic Chemical (ATC) category, number of repeats on prescriptions, and a patient identifier. The practice-specific patient identifier was used to link the medications and patient datasets, which provided the age group of people prescribed medications; we included patients aged 0–4 (later excluded because of low numbers), 5–9, 10–14, or 15–19 years.

For each month from January 2018 to November 2021 (the latest data extraction date), the number of prescriptions for each of the five psychotropic medication categories was determined. The number of unique patients with general practitioner encounters during the month was derived from all available datasets (Medicare claims, visits, pathology requests, medications, radiology requests, specialist referrals). The monthly number of prescriptions per 1000 patients was then calculated.

A seasonally adjusted autoregressive integrated moving average (SARIMA) model was fitted based on prescribing patterns during the pre-pandemic period, and used to forecast prescribing during the pandemic period. The predictive model was selected according to a combination of criteria. Initially, the trend, seasonal trend, and residual variation were plotted to determine trend patterns, a repeating seasonal trend within twelve months, and non-uniform residual variation. An augmented Dickey–Fuller test (ADFT) was used to determine whether the trend was stationary ($P < 0.05$, critical value of 5%). All trends met the criteria. Autocorrelation and partial-autocorrelation graphs were fitted to assess for the trend autoregression order (p) trend difference order (d) trend moving average order (q) for the ARIMA and the seasonal autoregressive order (P) seasonal difference order (D) seasonal moving average order (Q) for the SARIMA, with number of time steps for a single seasonal period (s) for the SARIMA defined as 12. The graphs were assessed to determine whether the assumption that the pdq and PDQ values fell between 0 and 2 was satisfied. All combinations of the models ([0.2],[0.2],[0.2])x([0.2],[0.2],[0.2],12) were fitted and goodness of fit assessed with the Akaike information criteria (AIC). The root mean square error (MSE) of the difference between the fitted values and the observed values as a proportion of the predicted values was also determined (observed-fitted/observed). The models in the lowest quartile of AIC scores were selected, and the model with lowest MSE then used for forecasts. Residual variation, histogram and density plots, Q-Q plots, and correlogram plots were fitted to test the model. All analyses were conducted in Python 3.4 using the *statsmodels* package.

Table 1. Socio-demographic characteristics of children and adolescents prescribed psychotropic medications at 272 New South Wales and 388 Victorian general practices, 1 January 2018 – 30 November 2021

Characteristic	Antidepressants	Antipsychotics	Hypnotics and sedatives	Anxiolytics	Psychostimulants	All children and adolescents
Total	22,479	5,247	6,582	3,321	7,450	1,423,518
State						
Victoria	15,367 (68.8%)	3,011 (57.8%)	4,351 (66.4%)	2,467 (74.9%)	4,622 (62.6%)	839,223 (59.4%)
New South Wales	6,980 (31.2%)	2,202 (42.2%)	2,202 (33.6%)	826 (25.1%)	2,765 (37.4%)	572,571 (40.6%)
Missing data	132	34	29	28	63	11,724
Year*						
2018	3,718 (11.0%)	1,081 (15.3%)	1,269 (15.4%)	541 (13.4%)	1,822 (18.1%)	655,895
2019	6,242 (18.5%)	1,565 (22.1%)	1,742 (21.1%)	865 (21.4%)	2,400 (24.0%)	764,338
2020	9,837 (29.2%)	1,987 (28.1%)	2,581 (31.3%)	1,085 (27.0%)	2,813 (28.0%)	720,797
2021	13,948 (41.3%)	2,439 (34.5%)	2,651 (32.2%)	1,552 (38.4%)	3,029 (30.0%)	777,000
Region†						
Metropolitan	17,849 (79.6%)	4,247 (81.3%)	5,380 (81.9%)	2,768 (84.0%)	5,986 (81.0%)	1,260,880 (88.9%)
Regional/remote	4,573 (20.4%)	979 (18.7%)	1,190 (18.1%)	544 (16.4%)	1,441 (19.4%)	157,377 (11.1%)
Missing data	57	21	12	9	23	5,261
Age group (years)						
0–4	94 (0.4%)	24 (0.5%)	147 (2.0%)	58 (1.8%)	4 (<0.1%)	365,416 (25.7%)
5–9	550 (2.4%)	447 (8.5%)	657 (10.0%)	221 (6.6%)	1,482 (19.9%)	396,170 (27.8%)
10–14	3,442 (15.3%)	1,049 (20.0%)	1,526 (23.0%)	472 (14.2%)	3,430 (46.0%)	332,004 (23.3%)
15–19	18,393 (81.8%)	3,727 (71.0%)	4,252 (64.6%)	2,570 (77.4%)	2,534 (34.0%)	329,928 (23.2%)
Missing data	0	0	0	0	0	0
Gender						
Girls	14,404 (64.5%)	2,742 (52.5%)	3,812 (58.2%)	2,015 (61.0%)	2,013 (27.0%)	690,778 (48.9%)
Boys	7,937 (35.5%)	2,478 (47.5%)	2,742 (41.8%)	1,289 (39.0%)	5,399 (73.0%)	720,980 (51.1%)
Missing data	138	27	28	17	38	11,760
Socio-economic status‡						
Low	1,806 (8.1%)	549 (10.5%)	508 (7.7%)	238 (7.2%)	781 (10.5%)	144,575 (10.2%)
Low-mid	2,681 (12.0%)	798 (15.3%)	844 (12.8%)	354 (10.7%)	1,006 (13.6%)	179,881 (12.7%)
Mid	3,749 (16.7%)	855 (16.4%)	962 (14.6%)	611 (18.4%)	1,203 (16.2%)	196,030 (13.8%)
High-mid	5,207 (23.2%)	1,116 (21.4%)	1,321 (20.1%)	766 (23.1%)	1,702 (22.9%)	333,840 (23.5%)
High	8,976 (40.0%)	1,906 (36.5%)	2,935 (44.7%)	1,343 (40.6%)	2,727 (36.8%)	563,590 (39.8%)
Missing data	60	23	12	9	31	5,602

* Totals by year exceed overall total because of prescribing for individual children in more than one year.

† Region (remoteness) was determining by linking patients' residence postcode with the Australian Bureau of Statistics Remoteness Areas dataset, based on the Australian Statistical Geography Standard.[1] Major cities of Australia were classed as "metropolitan"; all other categories were classed as "regional/remote".

‡ Patient socio-economic status was determined by linking patients' residence postcode with the Australian Bureau of Statistics Socio-Economic Indexes for Areas Index of Relative Socio-economic Advantage and Disadvantage,[2] by quintile.

References

1. Australian Bureau of Statistics. Remoteness areas. Australian Statistical Geography Standard (ASGS) edition 3: reference period: July 2021 – June 2026. 21 Mar 2023. https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/remoteness-structure/remoteness-areas (viewed Mar 2023).
2. Australian Bureau of Statistics. 2033.0.55.001. Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016. 27 Mar 2018. https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2033.0.55.001~2016~Main%20Features~IRSAD~20 (viewed Mar 2023).

Table 2. Medications (generic) from the five Anatomical Therapeutic Chemical (ATC) categories prescribed at the participating general practices to children and adolescents (5–19 years of age), 1 January 2018 – 30 November 2021

Medication (generic name)	Prescriptions	Medication (generic name)	Prescriptions
Antidepressants (N06A)	**65,766**	**Hypnotics and sedatives (N05C)**	**12,403**
Fluoxetine	28,805 (43.8%)	Melatonin	10,439 (84.17%)
Sertraline	14,382 (21.87%)	Temazepam	1,041 (8.39%)
Escitalopram	9,149 (13.91%)	Midazolam	387 (3.12%)
Mirtazapine	1,839 (2.8%)	Zopiclone	220 (1.77%)
Desvenlafaxine	1,431 (2.18%)	Zolpidem	139 (1.12%)
Amitriptyline	2,470 (3.76%)	Nitrazepam	79 (0.64%)
Venlafaxine	1931 (2.94%)	Suvorexant	44 (0.35%)
Duloxetine	881 (1.34%)	Chloral hydrate	43 (0.35%)
Fluvoxamine	1,898 (2.89%)	Valerian	11 (0.09%)
Citalopram	1402 (2.13%)	**Anxiolytics (N05B)**	**6,805**
Paroxetine	562 (0.85%)	Diazepam	4,490 (65.98%)
Agomelatine	252 (0.38%)	Clobazam	1,338 (19.66%)
Lithium carbonate	133 (0.2%)	Lorazepam	381 (5.6%)
Imipramine	161 (0.24%)	Oxazepam	331 (4.86%)
Clomipramine	110 (0.17%)	Alprazolam	257 (3.78%)
Nortriptyline	109 (0.17%)	Bromazepam	8 (0.12%)
Moclobemide	45 (0.07%)	**Psychostimulants (N06B)**	**15,101**
Vortioxetine	40 (0.06%)	Dexamfetamine	197 (1.3%)
Dosulepin	64 (0.1%)	Lisdexamfetamine	3,008 (19.92%)
Doxepin	56 (0.09%)	Methylphenidate	11,896 (78.78%)
Reboxetine	26 (0.04%)		
Other	20 (0.03%)		
Antipsychotics (N05A)	**12,307**		
Risperidone	4,355 (35.39%)		
Quetiapine	4,460 (36.24%)		
Prochlorperazine	1,313 (10.67%)		
Olanzapine	1,115 (9.06%)		
Aripiprazole	592 (4.81%)		
Haloperidol	130 (1.06%)		
Lithium	76 (0.62%)		
Paliperidone	53 (0.43%)		
Lurasidone	42 (0.34%)		
Periciazine	33 (0.27%)		
Chlorpromazine	47 (0.38%)		
Ziprasidone	20 (0.16%)		
Amisulpride	15 (0.12%)		
Periciazine	13 (0.11%)		
Clozapine	12 (0.1%)		
Other	31 (0.25%)		

Figure 1. Proportions of prescriptions with repeats (all psychotropic medication types)