


## ORIGINAL ARTICLE

# Psychotropic medication prescribing trends in a developmental–behavioural clinic during the COVID-19 pandemic

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**Aim:** Psychotropic medication prescribing among children with developmental–behavioural and mental health problems appears to be rising globally. We aim to examine the effects of the COVID-19 pandemic and rapid introduction of telehealth consultations on the prescribing trends and medication change in a large paediatric public hospital developmental–behavioural outpatient service.

**Methods:** Data for developmental–behavioural outpatient encounters from 23 March 2019 to 22 March 2021 were extracted from the electronic medical record; representing the 12 months following the conversion to telehealth consultations during the onset of COVID-19 pandemic and the 12 months prior to this change. Excel and Statistical Package for the Social Sciences were used to calculate percentages and logistic regression to compare psychotropic prescribing trends during both periods.

**Results:** During the pandemic, there were a total of 3201 encounters (92.0% telehealth), compared with 2759 encounters (1.6% telehealth) during the previous year. Despite the higher number of encounters during the pandemic, the rates of encounters with psychotropic medication prescriptions reduced compared to the previous 12 months (19.8% vs. 29.3%). Prescriptions made during COVID-19 were more likely to be provided at review visits, patients  $\geq 12$  years and during consultant led encounters. The reduction in prescriptions involved both new and follow-up psychotropic medications. The majority of follow-up medication dosages were left unchanged.

**Conclusions:** Psychotropic prescribing rates were lower during the COVID-19 pandemic. Fewer new medications were commenced and most medication dosages were unchanged.

**Key words:** COVID-19; prescribing; psychotropic medication; telehealth.

## What is already known on this topic

- 1 Patients with developmental-behavioural and mental health problems are often prescribed with psychotropic medications.
- 2 The COVID-19 pandemic has resulted in the shift to online learning and healthcare delivery.
- 3 The impact of the pandemic on psychotropic medication prescribing trend is unclear.

## What this paper adds

- 1 Despite the change to telehealth consultation, there were more patient encounters and fewer patients not brought for their appointment.
- 2 There is a reduction in psychotropic medications prescribing during encounters in the first year of the pandemic.
- 3 Less medication dosage adjustments and less new medications were commenced during the pandemic.

Developmental–behavioural and mental health (DB/MH) problems are common presenting concerns at paediatric outpatient visits. Audits from 2008 and 2013 of Australian general paediatricians conducted by the Australian Paediatric Research Network have shown that DB/MH problems comprised of more than 50% of new and review patient consultations.<sup>1</sup> During these visits, children with DB/MH problems are often prescribed with psychotropic medications, with prescribing rates of 49.8% reported

among DB/MH consultations in Australia.<sup>1</sup> The Centre for Community Child Health (CCCH) at the Royal Children's Hospital (RCH) is the largest single provider of public developmental and behavioural paediatric outpatient services in the state of Victoria, Australia. An audit of psychotropic prescribing rates at CCCH outpatient clinics conducted in 2018 was lower compared to the Australian Paediatric Research Network audits, with reported prescribing rates of 16.7%.<sup>2</sup>

The prevalence of psychotropic medication use among children and adolescents with DB/MH problems globally has significantly escalated over time.<sup>3,4</sup> In Australia, psychotropic medication dispensing from 2009 to 2012 among individuals aged 3–19 years reported similar trend, with the largest increment of 33.3% among those aged 15–19 years and antidepressant experiencing the highest rise.<sup>5</sup> The upward trend was also reported in the

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subsequent years and would likely continue; highlighting the increased recognition and growing rates of mental health illness among children and adolescents.<sup>5,6</sup>

COVID-19 lockdown in Victoria has brought about prolonged school closures which led to the rapid shift of online modes of

teaching and learning throughout most of terms 2 and 3 (April–September) of 2020.<sup>7</sup> Concurrently with the first lockdown in March 2020, majority of CCCH outpatient clinic encounters were converted to telehealth or telephone consultations to reduce the risk of community transmission. The rapid changes experienced in both learning and health-care delivery potentially disrupt psychotropic prescribing trends and medication adherence among children on regular treatment for DB/MH problems.<sup>8</sup> In a local survey, 16% of Australian parents of children with attention-deficit/hyperactivity disorder (ADHD) reported withholding ADHD medications, with ‘taking a break’ and ‘not requiring the medication during the school closure’, among the few reasons given.<sup>9</sup> Withholding and self-adjusting medication in response to disruptions to daily routine and poorer access to health services may compromise medication efficacy, with failure to achieve desired results, as well as increasing the economic burden of the health-care system.<sup>10,11</sup> Limitations of telehealth medication reviews and lack of multi-informant reports during COVID-19 further influence clinicians’ prescribing practices despite promising early reports of patient and clinicians satisfaction surveys of telehealth services.<sup>8,12</sup>

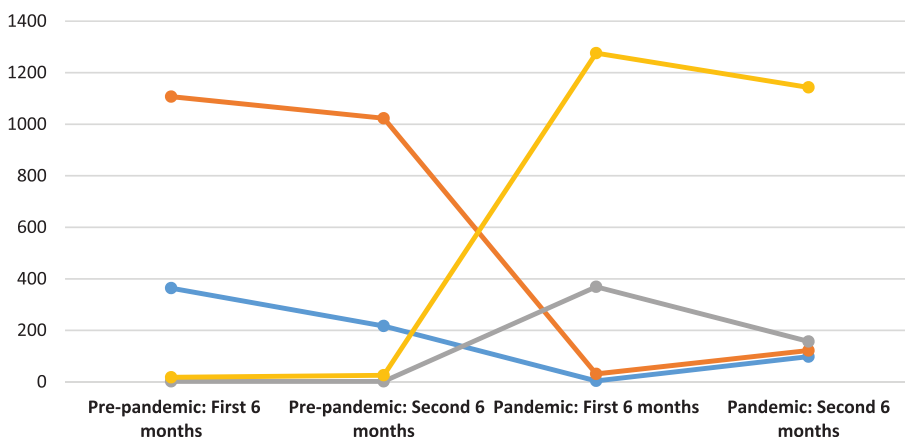
The effects of COVID-19 on the mental health and well-being of children particularly children with DB/MH problems are well reported.<sup>9,13</sup> However, data about impact of COVID-19 on psychotropic medication prescribing among children and adolescents are lacking. Examining psychotropic prescribing trends during the pandemic may provide additional knowledge into the impact of COVID-19 on health-care delivery and medication access. The European ADHD guideline group on ADHD management during COVID-19 recommends that pharmacological treatment should continue if clinically indicated, with strategies for remote monitoring established with flexibility in accessing ADHD medication considered to ensure treatment continuity.<sup>14</sup> Despite the recommendations, the social and clinical challenges during the pandemic would likely affect the initiation and optimisation of medications.

In the present study, we aimed to describe the prescribing trends of psychotropic medications during patient encounters at a developmental and behavioural paediatric outpatient service in Victoria during the first 12 months of the COVID-19 pandemic

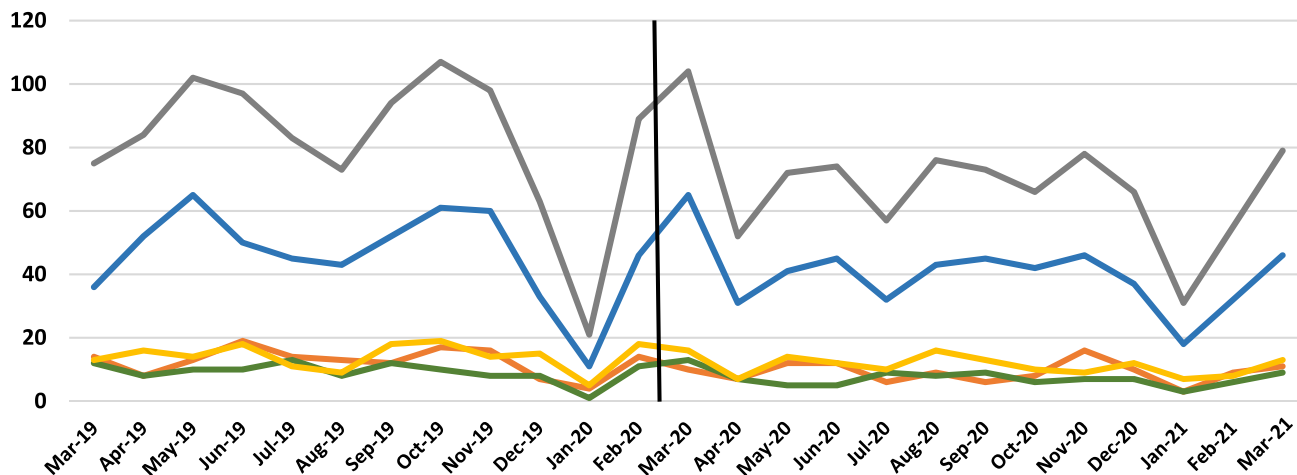
**Table 1** Characteristics of patient encounters prior and during pandemic

Characteristics	Pre-pandemic n (%)	Pandemic n (%)
Total booked appointments	3375	3740
Completed	2759 (81.7)	3201 (85.6)
Was not brought	616 (18.3)	539 (14.4)
Gender		
Male	2087 (75.6)	2334 (72.9)
Age		
≥12 years	831 (30.2)	985 (30.8)
Encounter mode		
In person		
New	581 (21.1%)	102 (3.2%)
Review	2130 (77.2%)	153 (4.8%)
Telehealth		
New	4 (0.1%)	526 (16.4%)
Review	44 (1.5%)	2420 (75.6%)
Clinicians		
Consultant paediatrician	2219 (80.4)	2425 (75.8)
Advanced trainee in paediatrics	540 (19.6)	776 (24.2)
Diagnosis†		
ASD	515 (18.7)	630 (19.7)
ADHD	829 (30.1)	881 (27.5)
Learning disorders	243 (8.8)	239 (7.5)
Intellectual disability	116 (4.2)	107 (3.3)
Developmental delay	180 (6.5)	254 (7.9)
Mood/Anxiety disorder	78 (2.8)	85 (2.7)
Encounters with prescription	809 (29.3)	634 (19.8)

† Principal diagnosis and first comorbidity were included. ADHD, attention-deficit/hyperactivity disorder.



**Fig. 1** Modes of patient encounters prior and during COVID-19 pandemic. (—●—), New (in person); (—●—), review (in person); (—●—), new (telehealth); (—●—), review (telehealth).



**Fig. 2** Psychotropic medication prescribing trend before and during COVID-19 pandemic. (—), Stimulant; (—), selective serotonin reuptake inhibitors; (—), atypical antipsychotic; (—), Other Non-Stimulant. (—), All Prescriptions.

**Table 2** Psychotropic medication prescribing trend

	Pre-pandemic n (%)	Pandemic n (%)
New medications†	250	129
Stimulant	117 (46.4%)	66 (51.4%)
SSRI	47 (19.7%)	23 (16.4%)
Atypical antipsychotic	24 (9.0%)	10 (8.9%)
Other non-stimulant	62 (24.9%)	30 (23.3%)
Follow-up medications†	781	663
Stimulant	468 (60.0)	399 (60.2)
SSRI	108 (13.8)	81 (12.2)
Atypical antipsychotic	92 (11.8)	75 (11.3)
Other non-stimulant	113 (14.4)	108 (16.3)

† The number of medications may not correspond with number of prescriptions as each encounter may have more than one medication prescribed. SSRI, selective serotonin reuptake inhibitor.

and compare these trends with prescribing practices in the 12 months prior the pandemic. Secondary objectives include investigating the rates of dosage change for current medications and new prescriptions. We hypothesised that the overall prescribing rates and medication changes would reduce during the pandemic, in keeping with recommendations to adopt a watchful waiting management approach.<sup>14</sup> Furthermore, early evidence addressing the challenges of telehealth prescribing may not be sufficient to build initial confidence among clinicians’ prescribing practices.<sup>15,16</sup>

**Methods**

The CCCH clinical services at RCH are a public developmental and behavioural outpatient service provider which receives referrals from all over Victoria.<sup>17</sup> Referrals (mainly from general

practitioners, and also paediatricians and community allied health professionals) of children and adolescents (0–18 years) are triaged and either accepted or directed to other more appropriate services. During encounters, they are seen by consultant paediatricians or supervised paediatric advanced trainees.

Data from all encounters from the CCCH clinics where psychotropic prescribing occurs (Development and Behaviour Clinic, Behaviour Clinic and Learning Difficulty Clinic) were extracted from the RCH electronic medical record (EMR) from 23 March 2019 to 22 March 2021. These dates reflect the 12 months from the start of the conversion to online consultations following the onset of the COVID-19 pandemic restrictions and the 12 months prior to this change. Exclusion criteria were off-site outreach clinic encounters, medication orders outside appointment encounters and CCCH clinics where psychotropic prescribing rarely occurs (Unsettled Babies, Encopresis, Communication, Outreach and Sleep clinics) encounters. Data collected include relevant patient demographics such as patient’s age, gender, date of visit, clinic visited, type of encounter (new vs. review, in-person vs. telehealth/Phone), provider, encounter diagnosis and encounters with psychotropic prescription. New encounters are patients seen for the first time for a new problem and review encounters are patients previously seen for the same problem. Each encounter with prescription may have one or more psychotropic medications ordered. Additional psychotropic medication details such as number of prior orders, dosages and most recent prior order dosages were also collected. The medications were grouped into four categories: stimulants (methylphenidate, dexamfetamine, lisdexamfetamine), selective serotonin reuptake inhibitors (SSRIs), second-generation atypical antipsychotics and other non-stimulants (Clonidine, Atomoxetine and Guanfacine). New medications were defined as medications with no prior prescribing orders from the same medication group. Dosage change among the remaining follow-up medications was determined based on the difference in dosages between the current and prior order.

The data were divided into two categories depending on the dates of encounters, with ‘Pandemic’ representing a 12-months’ period from 23 March 2020 to 22 March 2021 and ‘Pre-pandemic’ representing a similar period from 23 March 2019 to 22 March 2020. A total of 7151 encounters were obtained during the study period. However, a final number of 5960 patient

encounters were included for analysis, after excluding patients who were not brought to their appointments and non-physician encounters (psychologist/teacher).

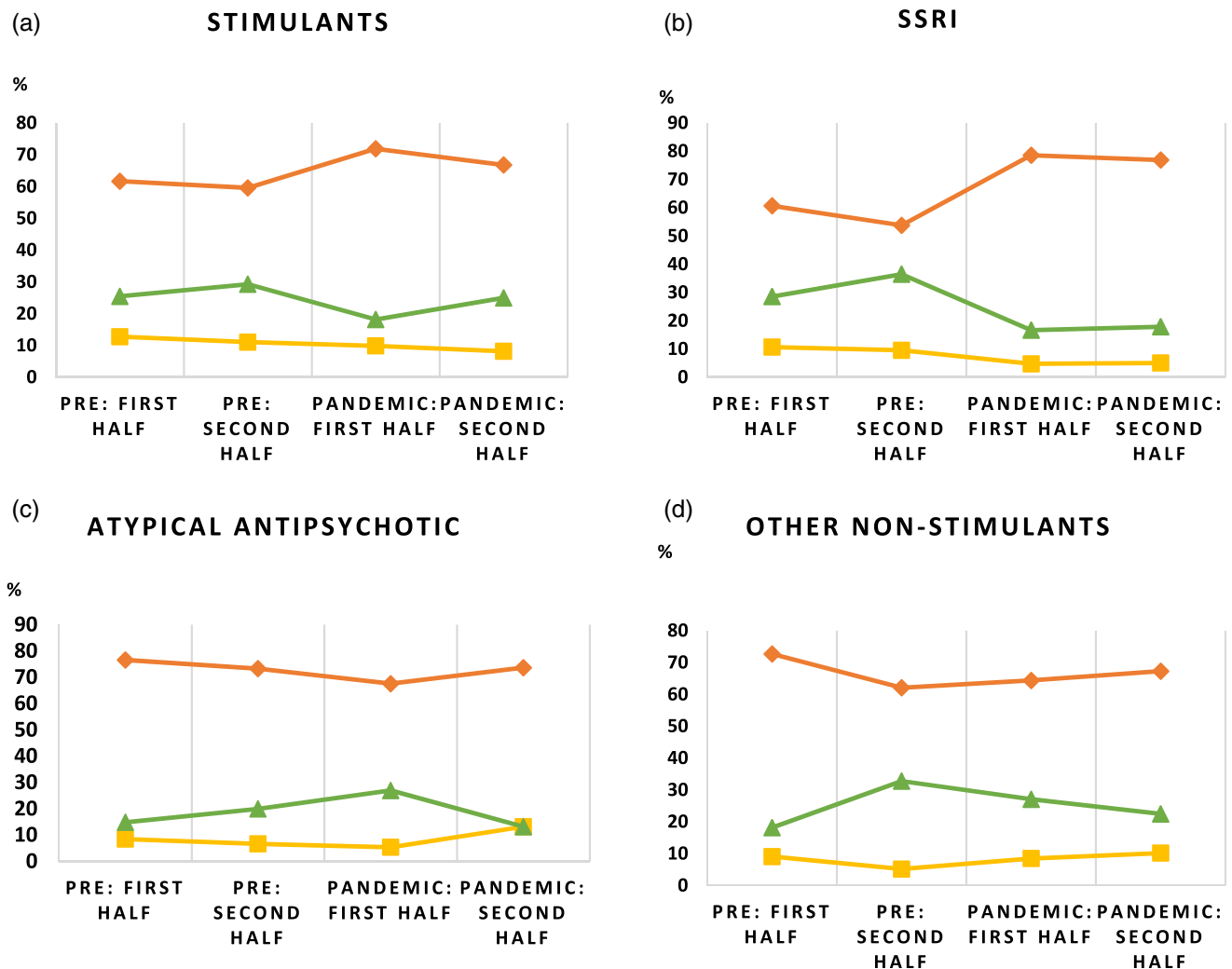
Statistical analysis was performed using Microsoft Excel (Washington, USA) and Statistical Package for the Social Sciences software version 25. Percentages and proportion change were used to describe characteristics of patient encounters and psychotropic prescribing trends during pre-pandemic and pandemic period. The predictors of encounters with psychotropic prescriptions during both periods were analysed using logistic regression.

**Table 3** Psychotropic medication dosage adjustment

	Pre-pandemic n (%)	Pandemic n (%)
Medication dosage		
Unchanged	491 (62.9)	464 (70.0)
Dose reduction	82 (10.5)	57 (8.6)
Dose increment	208 (26.6)	142 (21.4)

**Ethics**

Ethics approval was obtained from the RCH Human Research Ethics Committee, number QA/75493/RCHM-2021.



**Fig. 3** Psychotropic medication dosage adjustment trend before and during COVID-19 pandemic are shown for (a) stimulants, (b) selective serotonin reuptake inhibitors (SSRIs), (c) atypical antipsychotics and (d) other non-stimulants. (—◆—), Unchanged; (—■—), reduced; (—▲—), increased.

## Results

Across the 12-month period between 23 March 2020 and 22 March 2021, which coincided with the beginning of pandemic restriction in Victoria, 3201 patient encounters in the CCCH outpatient clinics were conducted (Table 1). The encounters consisted of 628 (19.6%) new patient consultations and 2573 (80.4%) follow-up reviews. A comparison with the prior 12-month period, before the onset of the pandemic, between 23 March 2019 and 22 February 2020, there were 2759 patient encounters, with 585 (21.2%) new consultations. Patients who were not brought reduced from 18.3% pre-pandemic to 14.4%, during pandemic period. For both years, patients were more likely male, seen by consultants and have a diagnosis of ADHD or autism spectrum disorder (ASD) (Table 1).

The mode of patient encounters changed considerably to online telehealth consultations after the implementation of lockdowns and social distancing restrictions (Fig. 1). The number of telehealth patient encounters prior to the pandemic was practically non-existent, with only 4 (0.1%) 'New Visit' and 44 (1.4%) 'Review' online encounters. An almost complete change was observed during the pandemic period, particularly during the first 6 months, with only 4 (0.2%) 'New' and 31 (1.8%) 'Review' in-person encounters. In the second half of the pandemic period, there was a modest increase of in-person encounters (220, 14.5%); with telehealth consultations remaining as the predominant mode (1301, 85.5%) (Fig. 1).

In the first 12 months of COVID-19 period, proportion of encounters with psychotropic prescription reduced by 21.6% (19.8% vs. 29.3%) (Table 1). Most prescriptions had one medication prescribed, with two or more medications prescribed in 26.3% and 26.2% of prescriptions during pre-pandemic and pandemic period, respectively. Stimulants were the commonest medication group, followed by SSRIs and atypical antipsychotics. The predictors of encounters with psychotropic prescriptions during the pandemic period were review consultations (odds ratio (OR) 4.0, 95% confidence interval (CI) 2.7–6.0), age  $\geq 12$  years (OR 2.1, 95% CI 1.7–2.5) and consultant led encounters (OR 7.6, 95% CI 4.9–11.1). Similar factors were associated with psychotropic prescriptions during the pre-pandemic period. Male patients were more likely to be prescribed with psychotropic medication pre-pandemic (OR 1.3, 95% CI 1.1–1.6,  $P < 0.01$ ), but this association was not significant during COVID-19 ( $P = 0.06$ ). For both years, there was no association of the mode of encounters (in-person or telehealth) on psychotropic prescribing.

Both years observed higher prescribing rates during the beginning of the year and a major decline during the month of December/January, coinciding with summer holidays and clinic closures (Fig. 2). However, the rise in prescriptions during COVID-19 period was observed earlier (March 2020 compared to May 2019) as COVID-19 restrictions began. The following months displayed substantial reduction in overall prescribing rates.

During the first year of COVID-19, the overall reduction of prescriptions compared to the year before consisted of new and follow-up medications, which substantially reduced by 48.4% (from 250 to 129 medications) and 15.1% (from 781 to

663 medications) respectively (Table 2). The reduction in prescribed medications involved all four medication groups. In addition to the decrease in new medications commenced, less follow-up psychotropic medication dosages were changed during COVID-19, with the number of medications with dosage increment and reduction decreased by 31.7% (from 208 to 142 medications) and 30.5% (from 82 to 57 medications), respectively (Table 3). Figure 3 further illustrates the proportion of dose adjustments of each individual psychotropic medication group. For both years, dosages of all four medication groups were mostly unchanged. However, the proportion of unchanged dosages for stimulants and SSRI increased during the pandemic.

## Discussion

Psychotropic medication prescribing rates during developmental and behavioural outpatient encounters substantially reduced during the first 12 months of COVID-19 pandemic, despite the increased number of patient encounters during that period, compared with the preceding 12 months. Newly commenced medications during the pandemic were approximately half the amount of the previous year and majority of existing medication dosages were left unchanged. These findings are consistent with our study hypotheses.

Prior to COVID-19, the rising trend of psychotropic prescribing among children and adolescents globally was likewise observed within CCCH. Psychotropic prescribing was reported in 16.7% encounters<sup>2</sup> in 2017/2018 and 29.3% encounters in 2019/2020. The decline in 2020/2021 psychotropic prescribing rates (19.8%) due to COVID-19 raises concerns of health care and medication access during this period particularly following the escalation in mental health issues among children with DB/MH problems.<sup>18</sup> Early studies of the impact of COVID-19 on psychotropic medication prescriptions rates among children and adolescents in the UK reported varying results.<sup>19,20</sup> One study described a possible reduction of antipsychotics among children and adolescents accessing mental health services, while another reported an increase in all psychotropic medications, particularly hypnotics and benzodiazepines among children with intellectual disability (ID).<sup>19,20</sup> The reduction of psychotropic prescribing in this study is in keeping with initial reports that described Australian parents of children with ADHD withholding medications due to perceived lack of need during COVID-19 remote learning and school holidays.<sup>9</sup> Furthermore, the lack of supervision during online teaching and reduced academic and behavioural expectations may contribute to parental perception of reduced symptoms.

During COVID-19 study period, substantially less new psychotropic medications were commenced and majority of follow-up medication dosages were unchanged, consistent with the European ADHD guidelines which advocate behavioural parenting strategies and avoiding escalation of medication dosages in response to stress related to COVID-19 restrictions.<sup>14</sup> Parents also reported positive changes due to increased parental involvement and family time that promotes the practice of behavioural strategies and less willingness to rely on medication.<sup>9</sup> Likewise, health-care providers are likely more hesitant to commence new medication due to concerns of clinical safety and difficulty assessing medication outcomes and side effects via telehealth

consultations.<sup>15,21</sup> However Rauf *et al.* reported modest increase in psychotropic prescriptions and medication intervention rates among children with ID.<sup>20</sup> The co-occurrence of ID among their study population is likely to have pre-existing behavioural difficulties, with poorer medication response rate and adaptive functioning compared to children with DB/MH problems without ID.<sup>22</sup> The inconsistent results among different population highlight the variable intensity of impact among children of different needs and disabilities during COVID-19 restrictions, necessitating the need for individualised treatment in clinical practice.

Trends observed in other regions may predict future psychotropic medication prescription trends in Victoria, which may rise due to the accumulated strain and challenges of prolonged restrictions, following the increase in COVID-19 new variant infections in Australia. In this study, the second half of the pandemic period observed a modest rise among prescribed stimulants with increased dosages which possibly indicate the onset of change in trends as predicted. The rise also coincided with the gradual return to onsite learning during term 4, which would likely provoke new emotions and separation anxiety after successfully adjusting to the new 'normal' during lockdown.<sup>23</sup>

During COVID-19, an increased number of encounters and a reduction of patients not brought in for consultations were a positive response to the rapid shift to online telehealth consultations. The convenience and acceptability of telehealth services among parents were reported, with approximately half of the parents rating telehealth consults to be of the same quality as face to face appointments.<sup>9,19</sup> The increase in consultations numbers also reflect the higher demand for public DB/MH services, particularly among vulnerable families with financial deprivation and mental health problems, who are most impacted by COVID-19.<sup>13</sup>

### Limitations and strengths

Although the use of RCH EMR enabled retrieval of large amount of information regarding medication prescriptions, we did not have information about medications that were provided by non-RCH medical practitioners, not dispensed by pharmacies or dispensed medications that were not taken by the children. However, these limitations are likely present equally prior and during the pandemic, and are unlikely to affect the described prescribing trends. Patients from socially disadvantaged and vulnerable populations may have experienced disproportionate difficulties in accessing health-care services or may have been lost to follow-up during the pandemic and may be underrepresented in this study. This raises further questions about the added impact of COVID-19 on the accessibility of health care and medication adherence among these groups of children.<sup>24,25</sup> The study also has several strengths. Our sample is relatively large, comprising of children with diverse range of neurodevelopmental and mental health issues, from a wide area of coverage and a large population base.

### Conclusions

Psychotropic prescribing during the first year of the COVID-19 pandemic at a large public developmental-behavioural outpatient service was lower compared with the previous year. In addition, less medication dosage adjustments were made, particularly

among stimulants and SSRI medication groups. The COVID-19 pandemic also brought about a major change to the delivery of health-care services, with telehealth consultations embedded as a standard practice with increased numbers of patients seen compared with the previous year. It would be helpful to repeat this audit following the impact of extended lockdown and prolonged social restriction during the second year of COVID-19 in Australia, as DB-MH needs may increase along with prescribing rates. Accessibility to telehealth and medication prescriptions among vulnerable population groups during the pandemic are additional areas to explore, as telehealth consultations are likely to continue following the pandemic.

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