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Medication for Attention Deficit/Hyperactivity Disorder (ADHD): an analysis by Federal Electorate (2001–03)

This Current Issues Brief updates a 2001 brief that examined the wide disparity in the number of prescriptions dispensed for dexamphetamine sulfate (a medication commonly used to treat ADHD) in different parts of Australia. The analysis in this brief examined the differences between Federal electorates in the number of prescriptions dispensed for medication to treat ADHD. Considerable variation is apparent both across and within the States and Territories, with Western Australian electorates accounting for the top 14 electorates for prescription of ADHD medication in Australia.

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Contents

Executive summary

For some time, considerable disparity has been apparent in the prescribing of medication for children with Attention Deficit/Hyperactivity Disorder (ADHD) in different jurisdictions in Australia. Despite having a smaller population than New South Wales, Victoria and Queensland, Western Australia accounts for the highest number of prescriptions dispensed for dexamphetamine sulfate, a drug prescribed to treat ADHD that is subsidised under the Pharmaceutical Benefits Scheme (PBS).

The number of prescriptions dispensed for this drug in Western Australia is around 3 and a half times higher per 1000 population than the Australian average and more than 12 times higher than the jurisdiction with the lowest number of prescriptions, the Northern Territory. It has been suggested that one of the reasons for this disparity is a better understanding of ADHD among medical practitioners in Western Australia, although this is not a view that is universally accepted. It has also been suggested that other States and Territories are 'catching up' to Western Australian in their rates of prescription of dexamphetamine sulfate, though this does not appear to be supported by the data presented in this paper.

Medication for ADHD has been controversial for three main reasons. In the main, it is children, often young children, who are being medicated, the medication being prescribed is amphetamine-based, and the number of prescriptions for such medication has been increasing at a quite dramatic rate. Between 1993 and 2003, prescriptions dispensed for dexamphetamine sulfate increased by 910 per cent. High rates of increase have also been reported in the United States. However, the level of medication in both countries still appears to be below the estimated prevalence of ADHD, which is believed to affect between 2.3 and 6 per cent of school-aged children.

Data presented in this brief illustrates another area of continuing concern, namely, the disparity in the number of prescriptions for dexamphetamine sulfate dispensed in different parts of Australia. The paper analyses data on the number of prescriptions dispensed for this drug in each Federal electorate. The data reveals that the number of prescriptions dispensed for dexamphetamine sulfate in 2003 ranged from 8573 in the Western Australian electorate of Canning to 153 in the Northern Territory electorate of Lingiari. In addition to differences between jurisdictions, considerable variation is evident within each state. It has been argued that variations such as these indicate that evidence-based treatment for ADHD is not being universally practiced in Australia. Indeed, it has been argued that decisions related to treatment of ADHD are as likely to be based on access to an appropriate range of health services and treatment options as they are to be based on evidence.

A range of socioeconomic data is utilised to examine whether particular factors can be identified that may explain the variation evident between different electorates. This analysis of socioeconomic variables such as the proportion of school-aged children, level of household income or unemployment rate reveals that none of these variables, either singly or

in combination, can provide a consistent explanation for the differences between federal electorates.

What cannot be discounted is the possibility that a small number of prescribers in each jurisdiction may account for at least some of the differences between electorates. It should be stressed also that while dexamphetamine sulfate represents the majority of prescriptions for the treatment of ADHD, it is not the only such drug. Ritalin accounts for a substantial number of prescriptions but is not subsidised under the PBS and, accordingly, comparable data is not readily available. It is therefore not possible to establish the total number of prescriptions for both drugs in each electorate.

Bearing in mind these caveats, the degree of difference between individual federal electorates and across the States and Territories is unlikely to be in the best interests of Australia's children and their families. It appears that Australia continues to have some distance to go before achieving best practice in the prescribing of medication for the treatment of ADHD.

Introduction

Attention Deficit/Hyperactivity Disorder (ADHD) is a controversial syndrome. Debate has raged in Australia and other countries over the condition itself, its prevalence and, in particular, over the use of medication to treat ADHD. Although often considered as recent phenomena, attention deficit and hyperactivity disorders have been medically recognised for some considerable time as has the use of stimulant medication to treat the symptoms of the condition. For example, as early as 1937, researchers were reporting the use of stimulants in the treatment of children at the Emma Pendleton Bradley Hospital in East Providence, USA.[1]

Ritalin (methylphenidate) is the drug most commonly associated with the treatment of ADHD. In Australia, Ritalin is not listed on the Pharmaceutical Benefits Scheme (PBS) and therefore the cost of the drug is not subsidised by the Commonwealth Government. However, another amphetamine-based drug, dexamphetamine sulfate, is listed on the PBS for the treatment of ADHD.[2] Accordingly, a far greater number of prescriptions are dispensed in Australia for dexamphetamine sulfate compared to Ritalin.

This Current Issues Brief updates a previous brief by Paul Mackey and Andrew Kopras (Current Issues Brief No.11, 2001) that examined the wide disparity in the number of prescriptions dispensed for dexamphetamine sulfate in different parts of Australia. Data made available by the Commonwealth Department of Health and Ageing on the dispensing of prescriptions for dexamphetamine sulfate, by postcode of the pharmacy dispensing the medication, has been converted into Federal electorates. Electorates have been chosen because they provide a useful base for analysis of differences at the local level. Data on the dispensing of pharmaceuticals is generally only published at the national and State and Territory level.

The analysis in this brief examines the differences between Federal electorates in the number of prescriptions dispensed for medication to treat ADHD. As was the case in the previous

brief on this topic, considerable variation is apparent both across and within the States and Territories.

In order to provide Senators and Members with a context for the discussion around the differences between electorates, some background is provided below about ADHD.

What is ADHD?

While labels used to describe the condition have changed over time, current thinking uses the term Attention Deficit/Hyperactivity Disorder (ADHD) as a label that embraces three subtypes: ADHD, Predominantly Inattentive Type; ADHD, Predominantly Hyperactive-Impulsivity Type; and ADHD, Combined Type. A recent report on the mental health of Australia's young people drew on the definitions in the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders* issued by the American Psychiatric Association to describe ADHD as follows[3]:

> ADHD is defined as a persistent pattern of inattentive behaviour and/or hyperactivity-impulsivity that is more frequent and severe than is typically observed in individuals of the same developmental level. Children and adolescents with inattentive behaviour problems make careless mistakes with school work, find it hard to persist with tasks and are easily distracted. Those with problems in the area of hyperactivity/impulsivity often fidget and talk excessively, interrupt others, and are constantly 'on the go'. There are three subtypes of ADHD based on the predominate symptom pattern for the past six months.[4]

Causes and prevalence of ADHD

A key issue in the controversial nature of ADHD is the type of symptoms and behaviour underlying the condition. The exhibition of inappropriate behaviour by children with ADHD has enabled critics to, for example, attribute ADHD to child rearing practices and poor parenting skills. Current knowledge indicates that it is rarely quite that simple and there are likely to be several causes of ADHD. For example, a report by the National Health and Medical Research Council (NHMRC) argued that 'evidence suggests that many factors, including genetic, neurophysiologic, cognitive, familial and environmental factors are involved'.[5] The relative importance of these factors is yet to be established by research. The NHMRC concludes from the available evidence that 'it is likely that a variety of contributing factors may operate in a vulnerable child to result in the behaviours of ADHD'.[6]

Many of the broad range of symptoms that comprise ADHD occur from time to time in normal children. The difference for many children diagnosed with ADHD is that these symptoms 'occur very frequently and in several settings, at home and at school, or when visiting with friends, and they interfere with the child's functioning'.[7]

The extent, or prevalence, of ADHD among school-aged children is not known with any great accuracy. The NHMRC reported in 1997 that Australian studies had found prevalence rates of between 2.3 per cent and 6 per cent of school-aged children. It noted also that 'widely

different prevalence rates of ADHD have been reported, depending on the methodology used, ranging from 1.7 per cent to 6 per cent'.[8]

A recent report on the mental health of Australia's young people surveyed 4500 children and adolescents aged 4 to 17 years of age. The report found a much higher prevalence rate of ADHD, at 11.2 per cent, than found by other studies. Disaggregated by subtype, 5.8 per cent of the sample were found to have ADHD, Predominantly Inattentive Type; 3.3 per cent ADHD, Combined Type; and 2.0 per cent ADHD, Predominantly Hyperactive-Impulsive Type.[9] The report's authors suggest, however, that 'the high prevalence be viewed with caution'. The authors state that they could not incorporate into their assessment two of the formal criteria for a diagnosis of ADHD identified in the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition.[10]

School-aged children still represent the vast bulk of diagnosed cases, although ADHD is becoming recognised as a condition that may be suffered by adults. In some cases, adult diagnosis of ADHD may occur only after their children have been diagnosed and treated for the condition. For others, childhood ADHD may continue through to the adult years. Research suggests that in about 10 per cent of cases, ADHD may persist into adulthood and it is estimated that adults have a prevalence rate of at least 0.3 per cent.[11]

Medication prescribed to treat ADHD

Although the use of medication for the treatment of ADHD continues to be controversial in the public arena, the safety and efficacy, particularly in the short term, of psycho-stimulants such as dexamphetamine sulfate and Ritalin is well established.[12] However, further research into the long-term safety and efficacy of the drugs is required and at this stage, 'convincing evidence for long-term benefit is lacking'.[13] While studies have suggested that medication alone may be effective as a treatment for ADHD, the NHMRC has recommended that a multi-pronged treatment regime of medication, behaviour management and educational strategies is likely to provide the most effective results.[14]

One of the concerns about ADHD in Australia is the growth in use of medication to treat the condition. For example, a 2002 study found that Australia's total consumption of dexamphetamine over the period 1984–2000 for all States showed an average increase of 31 per cent per year.[15] It has been argued by one commentator that 'Australia appears to be the only nation that has experienced a documented increase in psychostimulant use that parallels that which has occurred in the United States'.[16] However, the NHMRC notes that overall prescribing rates for ADHD medication in Australia are 'less than one per cent of school-aged children', which is less than the estimated prevalence of the condition.[17]

Similarly, rapid growth in the use of medication to treat ADHD has been a feature of the United States' experience. Media reports have suggested that prescriptions for Ritalin in the USA have increased by some 700 per cent over the past 10 years.[18] The US National Institute of Mental Health notes with regard to ADHD medication that 'stimulant use in the United States has increased substantially over the last 25 years'.[19] A report in 1999 by the US

Surgeon General quotes research which indicates that 'there have been major increases in the number of stimulant prescriptions since 1989'. The report notes also that 'most researchers believe that much of the increased use of stimulants reflects better diagnosis and more effective treatment of a prevalent disorder', although 'some of the increase in use may reflect inappropriate diagnosis and treatment'.[20]

Jurisdictional variations in the number of prescriptions dispensed for dexamphetamine sulfate

In 2001 Mackey and Kopras noted the wide disparity between the States and Territories in the number of prescriptions dispensed for dexamphetamine sulfate, highlighting in particular the disproportionately high number of prescriptions dispensed in Western Australia during 1999–00. An analysis of PBS data for 2003 indicates that this pattern has continued, with the number of prescriptions dispensed for dexamphetamine sulfate highest in Western Australia and lowest in the Northern Territory. Indeed, between 1999 and 2003, total prescriptions for dexamphetamine sulfate in Western Australia increased by more than 25 000, considerably higher than that the rise of 2527 prescriptions recorded in the second ranked state, New South Wales.

Table 1 indicates the number of prescriptions dispensed under the PBS for dexamphetamine sulfate in 2003. In addition, an estimate of the number of prescriptions per 1000 population is presented in order to highlight differences between the jurisdictions. Table 2 shows the number of prescriptions under the PBS for dexamphetamine sulfate for the decade 1993 to 2003. This indicates that New South Wales dispensed more prescriptions for dexamphetamine sulfate than any other state or territory until 1998. Western Australia has been the largest dispenser of dexamphetamine sulfate since 1999.

As Mackey and Kopras noted in 2001, jurisdictional differences are apparent also in the United States. In a study on the use of psycho-stimulant medication for children with ADHD in Australia, Prosser and Reid commented also on the United States experience. The authors quoted several studies and reviews, one of which found that 'rates of medication prescription varied greatly between the eastern, midwest and western regions and noted significant increases within these regions over time'.[21] Prosser and Reid concluded from these reviews of the US experience that 'as yet there is no generally accepted rationale behind the pronounced variation in medication use across region. One possible factor may be the rise in specialized ADHD clinics'.[22]

Table 1. Number of PBS prescriptions dispensed for dexamphetamine sulfate, 2003

State/Territory	Number of prescriptions	Population	Number of prescriptions per 1000 population
New South Wales	61 390	6 716 277	9.1
Victoria	32 422	4 947 985	6.6
Queensland	36 362	3 840 111	9.5
Western Australia	86 980	1 969 046	44.2
South Australia	19 585	1 531 375	12.8
Tasmania	8 790	479 958	18.3
Northern Territory	708	198 700	3.6
ACT	3 188	322 579	9.9
Australia	249 425	20 008 677	12.5

Sources: Health Insurance Commission; Australian Bureau of Statistics, *Australian Demographic Statistics*, December 2003 (ABS 3101.0).

Table 2. Number of PBS prescriptions dispensed for dexamphetamine sulfate, 1993-2003

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
1993	9 127	2 475	3 659	5 623	3 128	257	302	107	24 678
1994	17 312	5 045	6 083	11 338	5 264	813	689	238	46 782
1995	29,276	9 844	9 885	18 466	7 828	1 853	1 267	625	79 044
1996	39 800	15 001	14 988	29 009	12 397	2 760	1 688	677	116 320
1997	46 708	19 525	20 099	39 036	15 832	4 252	1 838	671	147 961
1998	52 905	25 305	23 296	49 880	18 157	5,314	2 038	663	177 558
1999	58 863	30 401	27 074	60 437	19 539	6,878	2 363	858	206 413
2000	62 788	33 207	31 298	68 869	18 236	8 303	2 886	762	226 349
2001	61 433	33 572	34 102	75 185	19 089	9 075	2 967	785	236 208
2002	62 743	32 950	35 927	81 892	19 130	9 271	3 143	735	245 791
2003	61 390	32 422	36 362	86 980	19 585	8 790	3 188	708	249 425
Total	**502 345**	**239 747**	**242 773**	**526 715**	**158 185**	**57 566**	**22 369**	**6 829**	**1 756 529**

Source: Health Insurance Commission

Towards an explanation of jurisdictional variations

The wide disparity between the States and Territories in the number of prescriptions dispensed for dexamphetamine sulfate has been regarded as a cause for concern for a variety of reasons, including:

- lack of evidence about the long-term effects of dexamphetamine sulfate on children;[23]
- general objections to the use of psychostimulant medication on children;[24]
- possible over-diagnosis of ADHD in Western Australia;[25]

- evidence of a black market trade in illicit prescription amphetamines in all jurisdictions, including particular evidence of misuse in West Australian schools;[26] and

- the possibility that variations in prescribing patterns indicated that some clinicians were not taking an evidence-based approach to treatment of ADHD. [27]

In response to these concerns, it has often been argued that the higher prescription rates in Western Australia are not a matter for concern but rather a reflection of a better understanding of ADHD among practitioners in that State.[28] For example, Professor of Psychology at Curtin University, David Hay, has suggested that rather than Western Australia 'soaring ahead' in prescribing for ADHD, it might be the case that 'the other states have been catching up'.[29]

Further, West Australian paediatrician Dr Kenneth Whiting has suggested that the higher prescription rates in his state may be the result of the efforts of a small medical group with a longstanding interest in diagnosis and treatment of ADHD in both children and adults, noting that 'we've always led Australia in numbers and they are still with us because those kids are now adults and new ones are coming on board.'[30]

At this stage, in spite of these claims, there is still insufficient evidence available to mount a credible explanation of the main causes of jurisdictional differences in prescription of dexamphetamine sulfate in Australia. It has been argued that such an analysis would require an investigation to 'locate the sources of referral, prescribing and supply, as well as the controls of prescribing in the jurisdictions.'[31] No such investigation has yet been undertaken in Australia. Further, the federal Minister for Health and Ageing, Mr Tony Abbott, has stated that the government had no plans to commission a study into treatment of ADD and ADHD with medication.[32]

Nevertheless, the West Australian Government has taken steps over the last few years to monitor more intensively and to regulate the prescription of psychostimulant medication in that state. These include a review of stimulant treatment guidelines and the introduction of a patient notification system designed to allow monitoring of diagnostic and prescribing patterns and the collection of relevant demographic data.

In addition, the Education and Health Committee of the West Australian Parliament is currently conducting an inquiry into ADHD in Western Australia. Due to report in late 2004, the Committee has heard evidence from a wide variety of clinicians, educators and academics on a broad variety of issues associated with the diagnosis and treatment of ADD and ADHD in Western Australia.

Evidence collected by the Committee appears to support the conclusion that there is no simple explanation for differences evident in the tables below. Broadly speaking, some witnesses have argued that higher prescription rates for dexamphetamine sulfate in Western Australia are a result of misdiagnosis and/or over-prescription, while others have argued that there is no evidence to suggest that the rates are anything other than appropriate.

Nevertheless, a variety of witnesses did indicate their belief in a potential relationship between over-prescription of psychostimulant medication and lack of access to an appropriate range of alternative health services and treatment options. As noted previously, the NHMRC has recommended a multimodal approach to treatment of ADHD in children, involving consideration of simultaneous medication use, behaviour management, family counselling and support, educational management, and specific development issues relevant to each child. Such an approach clearly implies that extensive time and resources be utilised in the diagnosis and treatment of ADHD.

However, a number of witnesses indicated that, for a variety of reasons, the tools for appropriate diagnosis and treatment of ADHD are not readily available to a sufficient number of children with the condition. As Dr Whiting noted in his evidence to the Committee:

> An improvement in the availability of child and adolescent mental health services in Western Australia will probably be the single most important factor that would lead to a decrease in the number of children taking stimulant medication….I have no doubt about that. Equity of access is the problem. …[I]f you have money, you get a better diagnosis'.[33]

The question of equity of access to appropriate services was also raised in evidence by Associate Professor Heather Jenkins, an educational psychologist from Curtin University, who noted the relative ease of access to psychostimulant medication through the PBS compared with the financial barriers associated with accessing psychological services:

> One of the main reasons [that alternative treatments are not always considered] is that medication is managed by the pharmaceutical benefits scheme and by Medicare and so on. However, for many years psychologists - I am a registered psychologist - have not been able to access health benefits and so on. The cost of psychological supervision is very high, and the APA hourly rate is about $160 an hour at the moment. That is way out of the level of the average family. The education department downsized its school psychology service. You can wait - again, this is only anecdotal evidence - about three to six months to see all of that.
>
> **…**The fundamental issue to me is that paediatricians may have a desperate family in front of them. We know the statistics for families with ADHD. The parents are more likely to be divorced. The children are more likely ultimately, if they are undiagnosed and untreated, to engage in the kind of impulsive behaviour that in adolescence gets them into a range of problems. We do know that medication in the very first instance improves their behavioural and social functioning in about 85 per cent of cases. Therefore, in the absence of any other services, it is an important first-step response. A paediatrician or any other professional would be irresponsible to deny that.[34]

Western Australia's chief psychiatrist, Dr Rowan Davidson, has also expressed the belief that a multi-disciplinary approach to the treatment of ADHD is more difficult in his state than in other states due to a lack of specialist mental health clinicians such as child and adolescent psychiatrists, clinical psychologists and mental health nurses.[35]

Evidence such as this would appear to indicate the higher rates of prescription of dexamphetamine sulfate in Western Australia may not simply be a result of the (often-

claimed) better understanding of ADHD among practitioners in that State. It may be the case that decisions related to treatment of ADHD are as likely to be based on access to an appropriate range of health services and treatment options as they are to be based on evidence.

The need to address the possible relationship between lack of access to appropriate resources and over-prescription of ADHD medication has also been noted by several members of federal parliament. For example, Senator Lyn Allison has called for the federal government to develop a coordinated national strategy on ADHD, which among other things, would have the objective of facilitating compliance with national diagnosis and treatment standards recommended by the NHMRC and broader access to an appropriate range of health services and treatment options.[36] To date, the federal government has not developed a strategy of this type.

Variations between federal electorates in the number of prescriptions dispensed for dexamphetamine sulfate

It is to be expected that differences will be apparent between federal electorates with regard to the dispensing of prescriptions for medication to treat ADHD. Electorates differ substantially, for example, in their proportion of school-aged children. Differences may also be influenced by the location of medical practitioners and specialists, and to a lesser extent by the location of pharmacies. In addition, the differences between the states and territories evident in the data presented in Tables 1 and 2 could be expected to be reflected to some extent in data on the number of prescriptions by federal electorate.

Appendix 1 provides a ranking of each Federal electorate by the number of prescriptions dispensed for dexamphetamine sulfate under the PBS between 2001 and 2003. This data has been derived from statistics on the number of prescriptions dispensed for dexamphetamine sulfate, by postcode, provided by the Commonwealth Department of Health and Ageing. Similar data is not readily available for Ritalin. It should be noted that the Department of Health and Ageing collects data by the postcode of the pharmacy dispensing each prescription.

As could be expected, Appendix 1 reveals that in 2003, the top ranked federal electorates in terms of the number of prescriptions dispensed for dexamphetamine sulfate were all in Western Australia. In 2003 Western Australia provided each of the top fourteen electorates in terms of prescriptions for dexamphetamine sulfate (compared with 1999–00, when it provided the top ten). Differences in terms of prescriptions within this group were relatively high (though not as considerable as 1999–00), with, for example, the number of prescriptions in the top ranked electorate (Canning), almost double that of the fourteenth ranked electorate (Forrest).

Considerable differences are apparent in the rankings of electorates within and between each of the other jurisdictions. Examples include:

- New South Wales provides 15 of the top 50 federal electorates but also 20 of the bottom 50 federal electorates;
- Queensland has 22 federal electorates in the top 100 but none in the bottom 50, while Victoria has 22 federal electorates in the bottom 50 and only four in the top 50;
- Each of South Australia's 12 federal electorates is in the top 100, with a proportionately high number of these (five) in the top 50;
- All but one of Tasmania's federal electorates is in the top 50, although the spread of rankings is relatively considerable (20th, 42nd, 46th, 49th and 87th);
- The ACT electorates are ranked relatively closely (40th and 54th), although Eden-Monaro, the NSW rural electorate that abuts the ACT, is ranked 77th;
- The two Northern Territory federal electorates are ranked in the bottom 30 (130th and 150th), between them dispensing three times fewer prescriptions for dexamphetamine sulfate than the large Western Australian electorate of Kalgoorlie (the lowest ranked of the Western Australian electorates).

It is also notable that federal electorates in a number of states changed their ranking considerably between 2001 and 2003. For example:

- In New South Wales, the Sydney seats of Wentworth (109th to 41st), Sydney (100th to 67th) and Cook (80th to 57th) increased their rankings, while the Sydney seats of Greenway (50th to 70th) and Hughes (77th to 97th), and regional seats of Eden-Monaro (59th to 77th), Hume (62nd to 78th) and Throsby (84th to 100th) decreased their rankings;
- In Victoria, the Melbourne seats of Jagajaga (134th to 116th) and Melbourne (125th to 103rd) and the regional seat of Wannon (99th to 81st) increased their rankings, while the regional seats of Indi (81st to 105th) and McMillan (31st to 47th), and the Melbourne seat of Aston (82nd to 99th) decreased their rankings;
- Elsewhere, the Adelaide seat of Hindmarsh (89th to 67th), Brisbane seats of Fadden (91st to 73rd) and Groom (85th to 73rd) and Queensland regional seat of Maranoa (105th to 89th) increased their rankings, while the northern Tasmanian seat of Braddon (75th to 87th), Brisbane seat of Petrie (46th to 56th) and Queensland regional seat of Wide bay (64th to 53rd) decreased their rankings.

Numbers of prescriptions and socioeconomic factors

The tables at Appendices 1 to 6 present, for each state, the electorates with the highest, second highest and lowest number of prescriptions for dexamphetamine sulfate, together with data on a range of socioeconomic variables gleaned from the most recent Census.[37] These comparisons are provided in order to ascertain whether there are any factors that might help

to explain why some electorates have a much higher number of prescriptions for this medication to treat ADHD.

Mackey and Kopras found in the original version of this brief in 2001 that socioeconomic factors could not adequately explain the reasons for such wide disparities in rates of prescription of dexamphetamine sulfate throughout Australia. The data for 2003 suggests the same conclusion. As was the case in 2001, some interesting, yet inconclusive, observations can be drawn from the data presented in Appendices 1 to 6. Electorates covering outer metropolitan areas account for the highest or second highest number of prescriptions in each state except, Victoria and Tasmania.[38] Electorates covering inner metropolitan areas account for the lowest number of prescriptions in New South Wales, Victoria and South Australia, but rural electorates account for the lowest number of prescriptions in Western Australia, Queensland and Tasmania. Rural electorates account for the highest or second highest number of prescriptions in New South Wales, Victoria, Queensland and Tasmania, while provincial electorates account for the highest or second highest number of prescriptions in Victoria and Tasmania.

In Western Australia, New South Wales, Victoria, Queensland and South Australia, the electorate with the lowest number of prescriptions also has a lower proportion of children in the 5–14 years age range and a lower proportion of persons attending school. In Tasmania, the electorate of Braddon has a higher proportion of children aged 5–14 and a higher proportion of persons attending school but has around only one-third the number of prescriptions for dexamphetamine sulfate than does the electorate of Bass.

Examining income, only in Victoria do electorates with the highest number of prescriptions also have a significantly higher proportion of families with a weekly income below $500 than the electorate with the lowest number of prescriptions. The electorate with the lowest number of prescriptions in Queensland also had a lower rate of unemployment, a situation similar to that in New South Wales, Victoria and Western Australia.

Two caveats need to be placed upon the foregoing discussion. It is possible that the prescribing practices of a small number of practitioners in each jurisdiction could be responsible for some of the variation evident in the figures in table 3 and the appendices. For example, a study on medication for ADHD in Adelaide found that five prescribers accounted for 61 per cent of patients in 1996.[39] It has also been suggested that while there may be a variety of reasons that contribute to the regional differences:

> often it comes down to small numbers of high profile, often academic individuals at a teaching hospital who maybe believe strongly in the benefits of medication, and teaching the trainees for a generation in that particular town that stimulants are good and therefore you get lots of children being prescribed. Whereas you might have in another town more psychologically based clinicians who are less inclined to use medication.[40]

In addition, it was noted earlier that around 96 000 prescriptions for Ritalin were dispensed in Australia in 1999–2000. Because this drug is not subsidised under the PBS, national data

similar to that for dexamphetamine sulfate is not readily available. It is likely, however, that a different pattern would be apparent between electorates for prescriptions dispensed for Ritalin than is evident for dexamphetamine sulfate.

Conclusion

It is clear that socioeconomic data alone do not explain why such wide differences exist between electorates in the number of prescriptions dispensed for dexamphetamine sulfate. None of the socioeconomic factors examined in this paper can explain consistently the reasons why such differences exist. Particular factors such as a higher unemployment rate and lower levels of family income appear to be significant in some jurisdictions, but this is not consistent across all states. The picture is similar for the proportion of school-aged children in different electorates.

Outer metropolitan electorates have the highest or second highest numbers of prescriptions in each state except Victoria and Tasmania. This is intriguing, but there do not appear to be any other factors present that help to explain consistently why this should be the case. While the location of particular prescribers cannot conclusively be ruled-out as an important factor, the mix of electorates with high and low numbers of prescriptions would seem to indicate that it does not consistently explain the variations evident in the data.

If it is accepted that practitioners in Western Australia are more highly skilled in recognising and treating ADHD than their counterparts in other states, it might be expected that greater consistency would be evident in the number of prescriptions dispensed in WA electorates. While this is true to an extent, there is still considerable variation; from in excess of 8000 prescriptions in the electorate of Canning to just over 2000 in Kalgoorlie.

It appears from the data discussed in this paper that decisions on the treatment of ADHD with dexamphetamine sulfate may not always be evidence-based. Indeed, there is evidence to indicate that it may be the case that decisions related to treatment of ADHD are just as likely to be based on access to an appropriate range of health services and treatment options. If this is the case, the one conclusion that does appear to be sustainable is that the interests of Australia's children and their families are unlikely to be well served by such variation between and within jurisdictions. Australia still appears to be some way from best practice in the prescribing of such medication for the treatment of ADHD.

Appendix 1. Electoral Divisions ranked by the number of prescriptions for dexamphetamine sulfate 2001–2003[41]

Rank	Electoral Division	Party	2003 number	2002 number (& rank)	2001 number (& rank)
1	Canning (WA)	LIB	8573	8308 (1)	7986 (1)
2	Brand (WA)	ALP	7641	7323 (2)	7117 (2)
3	Curtin (WA)	LIB	7498	6473 (4)	5516 (4)
4	Perth (WA)	ALP	7109	6104 (5)	4906 (7)
5	Swan (WA)	ALP	6913	6017 (6)	4590 (10)
6	Hasluck (WA)	LIB	6697	6720 (3)	6404 (3)
7	Fremantle (WA)	ALP	5758	4963 (9)	4615 (9)
8	Tangney (WA)	LIB	5673	5429 (7)	5001 (5)
9	Cowan (WA)	ALP	5419	5300 (8)	4923 (6)
10	Stirling (WA)	LIB	5274	4676 (12)	4342 (13)
11	Pearce (WA)	LIB	4934	4739 (11)	4466 (11)
12	O'Connor (WA)	LIB	4618	4911 (10)	4888 (8)
13	Moore (WA)	LIB	4492	4617 (13)	4436 (12)
14	Forrest (WA)	LIB	4338	4153 (14)	3769 (14)
15	Oxley (Qld)	ALP	3380	3283 (16)	3108 (18)
16	Wakefield (SA)	LIB	3356	3275 (17)	3453 (15)
17	Hunter (NSW)	ALP	3352	3421 (15)	3200 (16)
18	Kingston (SA)	LIB	3122	3018 (20)	3096 (19)
19	Blair (Qld)	LIB	3099	2998 (21)	2787 (21)
20	Bass (Tas)	LIB	3015	3147 (18)	3144 (17)
21	Chifley (NSW)	ALP	2995	3057 (19)	2931 (20)
22	Gippsland (Vic)	NP	2574	2600 (22)	2634 (22)
23	Cowper (NSW)	NP	2446	2301 (25)	2550 (23)
24	Lyne (NSW)	NP	2359	2250 (26)	2203 (29)
25	Paterson (NSW)	LIB	2356	2343 (24)	2320 (26)
26	Grey (SA)	LIB	2287	2232 (29)	2210 (28)
27	Corio (Vic)	ALP	2215	2497 (23)	2475 (24)
28	Rankin (Qld)	ALP	2183	2250 (27)	2284 (27)
29	Calare (NSW)	IND	2175	2185 (30)	2085 (32)
30	Kalgoorlie (WA)	LIB	2166	2005 (33)	1972 (35)
31	Parkes (NSW)	NP	2165	2234 (28)	2373 (25)
32	Forde (Qld)	LIB	2052	2037 (32)	1956 (36)
33	Lindsay (NSW)	LIB	2008	2148 (31)	2197 (30)
34	Gwydir (NSW)	NP	1974	1987 (34)	1989 (34)
35	Longman (Qld)	LIB	1924	1869 (37)	1838 (37)
36	Port Adelaide (SA)	ALP	1904	1955 (35)	2047 (33)
37	Shortland (NSW)	ALP	1892	1944 (36)	1719 (40)
38	Adelaide (SA)	ALP	1870	1766 (40)	1610 (42)
39	Riverina (NSW)	NP	1732	1824 (39)	1783 (38)
40	Canberra (ACT)	ALP	1705	1682 (43)	1566 (45)
41	Wentworth (NSW)	LIB	1672	1381 (56)	780 (109)

Rank	Electoral Division	Party	2003 number	2002 number (& rank)	2001 number (& rank)
42	Lyons (Tas)	ALP	1633	1633 (45)	1478 (49)
43	Charlton (NSW)	ALP	1633	1724 (41)	1775 (39)
44	New England (NSW)	IND	1597	1636 (44)	1436 (51)
45	Page (NSW)	NP	1565	1329 (60)	1291 (58)
46	Denison (Tas)	ALP	1562	1692 (42)	1687 (41)
47	McMillan (Vic)	LIB	1546	1861 (38)	2131 (31)
48	Lalor (Vic)	ALP	1542	1591 (46)	1582 (44)
49	Franklin (Tas)	ALP	1515	1591 (47)	1663 (42)
50	Capricornia (Qld)	ALP	1513	1540 (49)	1435 (52)
51	Macquarie (NSW)	LIB	1506	1525 (50)	1496 (47)
52	Hinkler (Qld)	NP	1496	1378 (57)	1417 (55)
53	Wide Bay (Qld)	NP	1494	1402 (55)	1239 (64)
54	Fraser (ACT)	ALP	1481	1472 (52)	1418 (54)
55	Newcastle (ALP)	ALP	1468	1541 (48)	1432 (53)
56	Petrie (Qld)	LIB	1429	1487 (51)	1510 (46)
57	Cook (NSW)	LIB	1421	1311 (62)	1047 (80)
58	Dunkley (Vic)	LIB	1419	1358 (58)	1272 (60)
59	Dobell (NSW)	LIB	1415	1432 (53)	1478 (48)
60	Makin (SA)	LIB	1331	1252 (65)	1244 (63)
61	Dickson (Qld)	LIB	1265	1403 (54)	1318 (57)
62	Hindmarsh (SA)	ALP	1236	1074 (79)	982 (89)
63	Murray (Vic)	LIB	1214	1075 (78)	1200 (66)
64	Macarthur (NSW)	LIB	1213	1322 (61)	1396 (56)
65	Corangamite (Vic)	LIB	1205	1273 (63)	1215 (65)
66	Bendigo (Vic)	ALP	1194	1178 (69)	1157 (70)
67	Sydney (NSW)	ALP	1178	928 (97)	851 (100)
68	Boothby (SA)	LIB	1174	1163 (70)	1158 (69)
69	Barker (SA)	LIB	1163	1157 (71)	1070 (78)
70	Greenway (NSW)	LIB	1148	1335 (59)	1451 (50)
71	Mallee (Vic)	NP	1136	1151 (73)	1254 (61)
72	Groom (Qld)	LIB	1116	1030 (85)	993 (85)
73	Fadden (Qld)	LIB	1101	1069 (80)	975 (91)
	Dawson (Qld)	NP	1100	1109 (76)	1022 (83)
75	McEwen (Vic)	LIB	1098	1089 (77)	1185 (68)
76	Werriwa (NSW)	ALP	1092	1002 (89)	1092 (76)
77	Eden-Monaro (NSW)	LIB	1081	1202 (66)	1280 (59)
78	Hume (NSW)	LIB	1074	1200 (67)	1252 (62)
79	Gilmore (NSW)	LIB	1070	1268 (64)	1197 (67)
80	Mayo (SA)	LIB	1060	1153 (72)	1143 (72)
81	Wannon (Vic)	LIB	1058	973 (93)	853 (99)
82	Richmond (NSW)	ALP	1052	1148 (74)	1146 (71)
83	Robertson (NSW)	LIB	1050	1064 (81)	1133 (73)
84	Calwell (Vic)	ALP	1048	1056 (82)	1129 (74)
85	Sturt (SA)	LIB	1042	1001 (90)	993 (86)
86	Moncrieff (Qld)	LIB	1040	922 (98)	880 (96)

Rank	Electoral Division	Party	2003 number	2002 number (& rank)	2001 number (& rank)
87	Braddon (Tas)	LIB	1034	1191 (68)	1096 (75)
88	Fairfax (Qld)	LIB	1029	956 (95)	980 (90)
89	Maranoa (Qld)	NP	1014	877 (104)	800 (105)
90	Holt (Vic)	ALP	998	1036 (83)	1047 (79)
91	Bowman (Qld)	LIB	986	957 (94)	834 (101)
92	Fisher (Qld)	LIB	978	1004 (88)	912 (95)
93	Ballarat (Vic)	ALP	977	998 (91)	984 (88)
94	Herbert (Qld)	LIB	963	1004 (87)	938 (93)
95	McPherson (Qld)	LIB	938	1027 (86)	984 (87)
96	Brisbane (Qld)	ALP	927	910 (99)	812 (103)
97	Hughes (NSW)	LIB	887	1112 (75)	1075 (77)
98	Bonner (Qld)	LIB	884	898 (101)	860 (98)
99	Aston (Vic)	LIB	881	1034 (84)	1034 (82)
100	Throsby (NSW)	ALP	866	979 (92)	1000 (84)
101	Berowra (NSW)	LIB	864	950 (96)	943 (92)
102	Moreton (Qld)	LIB	845	788 (111)	697 (115)
103	Melbourne (Vic)	ALP	837	794 (110)	625 (125)
104	Parramatta (NSW)	ALP	834	877 (103)	771 (110)
105	Indi (Vic)	LIB	832	884 (102)	1035 (81)
106	Casey (Vic)	LIB	825	829 (105)	870 (97)
107	Flinders (Vic)	LIB	822	905 (100)	919 (94)
108	Lilley (Qld)	ALP	804	817 (106)	770 (111)
109	La Trobe (Vic)	LIB	792	744 (114)	791 (106)
110	Ryan (Qld)	LIB	781	811 (107)	823 (102)
111	Reid (NSW)	ALP	774	805 (109)	707 (112)
112	Mitchell (NSW)	LIB	735	702 (118)	703 (114)
113	Fowler (NSW)	ALP	732	766 (113)	790 (107)
114	Griffith (Qld)	ALP	717	689 (120)	650 (121)
115	Prospect (NSW)	ALP	716	777 (112)	807 (104)
116	Jagajaga (Vic)	ALP	712	483 (133)	511 (134)
117	Scullin (Vic)	ALP	678	736 (115)	676 (118)
118	Farrer (NSW)	LIB	666	805 (108)	705 (113)
119	Bennelong (NSW)	LIB	661	608 (128)	555 (130)
120	Maribyrnong (Vic)	ALP	660	680 (121)	608 (127)
121	Bradfield (NSW)	LIB	642	637 (123)	692 (117)
122	Kennedy (Qld)	IND	631	703 (117)	633 (124)
123	Gellibrand (Vic)	ALP	626	696 (119)	692 (116)
124	Deakin (Vic)	LIB	603	582 (130)	648 (122)
125	Gorton (Vic)	ALP	602	584 (129)	555 (129)
126	Mackellar (NSW)	LIB	600	673 (122)	664 (119)
127	Cunningham (NSW)	ALP	593	735 (116)	652 (120)
128	Leichhardt (Qld)	LIB	565	630 (124)	525 (133)
129	Isaacs (Vic)	ALP	553	612 (127)	608 (126)
130	Solomon (NT)	CLP	551	621 (125)	644 (123)

Rank	Electoral Division	Party	2003 number	2002 number (& rank)	2001 number (& rank)
131	Kingsford Smith (NSW)	ALP	525	445 (135)	425 (141)
132	Banks (NSW)	ALP	522	619 (126)	788 (108)
133	Bruce (Vic)	ALP	516	469 (134)	586(128)
134	Warringah (NSW)	LIB	502	545 (131)	529 (132)
135	North Sydney (NSW)	LIB	491	529 (132)	539 (131)
136	Grayndler (NSW)	ALP	455	434 (137)	474 (135)
137	Barton (NSW)	ALP	446	428 (139)	428 (140)
138	Blaxland (NSW)	ALP	428	435 (136)	438 (138)
139	Wills (Vic)	ALP	423	397 (141)	436 (139)
140	Chisholm (Vic)	ALP	417	417 (140)	473 (136)
141	Batman (Vic)	ALP	405	432 (138)	472 (137)
142	Lowe (NSW)	ALP	384	380 (142)	401 (142)
143	Hotham (Vic)	ALP	343	348 (144)	328 (145)
144	Higgins (Vic)	LIB	340	302 (146)	231 (149)
145	Melbourne Ports (Vic)	ALP	336	334 (145)	285 (147)
146	Menzies (Vic)	LIB	333	288 (148)	297 (146)
147	Watson (NSW)	ALP	328	349 (143)	353 (144)
148	Goldstein (Vic)	LIB	293	297 (147)	355 (143)
149	Kooyong (Vic)	LIB	263	233 (149)	285 (148)
150	Lingiari (NT)	ALP	153	125 (150)	141 (150)

Source: Department of Health and Ageing.

Appendix 2: Western Australia

Variable	Canning	Brand	Kalgoorlie
Demographic rating	Outer metropolitan	Outer metropolitan	Rural
Number of prescriptions	8573	7641	2166
Prop. children aged 5–14 years	17.3 %	16.9%	14.9%
Proportion persons attending school*	19.0%	18.3%	14.4%
Proportion couple families with dependent children	40.7%	36.9%	44.3%
Prop. one parent families with dependent children	10.5%	13.3%	11.7%
Prop. families weekly income below $500	27.3%	31.6%	21.6%
Prop. families weekly income $1500 and above	20.7%	14.6%	31.0%
Unemployment rate (Census 2001)	8.1%	11.6%	5.3%

*infants, primary and secondary school

Sources: A Kopras, Electoral Rankings: Census 2001 (2003 Boundaries); Health Insurance Commission.

Appendix 3: New South Wales

Variable	Hunter	Chifley	Watson
Demographic rating	Rural	Outer metropolitan	Inner metropolitan
Number of prescriptions	3352	2995	328
Prop. children aged 5–14 years	15.8%	18.0%	12.7%
Proportion persons attending school*	17.9%	19.5%	12.3%
Proportion couple families with dependent children	39.5%	43.3%	41.3%
Prop. one parent families with dependent children	12.1%	16.0%	9.3%
Prop. families weekly income below $500	27.3%	25.1%	26.6%
Prop. families weekly income $1500 and above	22.5%	19.7%	23.2%
Unemployment rate (Census 2001)	9.3%	9.6%	8.1.%

*infants, primary and secondary school

Sources: A Kopras, *Electoral Rankings: Census 2001 (2003 Boundarie*s); Health Insurance Commission.

Appendix 4: Victoria

Variable	Gippsland	Corio	Kooyong
Demographic rating	Rural	Provincial	Inner Metropolitan
Number of prescriptions	2574	2215	263
Prop. children aged 5–14 years	15.8%	14.3%	12.5%
Proportion persons attending school*	18.8%	16.7%	15.6%
Proportion couple families with dependent children	37.3%	36.%	43.4%
Prop. one parent families with dependent children	11.6%	12.3%	7.5%
Prop. families weekly income below $500	31.0%	28.5%	11.9%
Prop. families weekly income $1500 and above	15.5%	17.8%	53.8%
Unemployment rate (Census 2001)	9.5%	9.5%	4.5%

*infants, primary and secondary school

Sources: A Kopras, *Electoral Rankings: Census 2001 (2003 Boundarie*s); Health Insurance Commission.

Appendix 5: Queensland

Variable	Oxley	Blair	Leichardt
Demographic rating	Outer metropolitan	Rural	Rural
Number of prescriptions	3380	3099	565
Prop. children aged 5–14 years	16.1%	16.5%	14.7%
Proportion persons attending school*	17.0%	18.1%	14.7%
Proportion couple families with dependent children	39.8%	38.9%	37.1%
Prop. one parent families with dependent children	14.8%	11.5%	15.5%
Prop. families weekly income below $500	26.0%	29.0%	23.8%
Prop. families weekly income $1500 and above	17.1%	14.3%	19.0%
Unemployment rate (Census 2001)	9.5%	7.9%	7.4%

*infants, primary and secondary school

Sources: A Kopras, *Electoral Rankings: Census 2001 (2003 Boundarie*s); Health Insurance Commission.

Appendix 6: South Australia

Variable	Wakefield	Kingston	Sturt
Demographic rating	Outer metropolitan	Outer metropolitan	Inner metropolitan
Number of prescriptions	3556	3122	1042
Prop. children aged 5–14 years	16.3%	15.7%	11.5%
Proportion persons attending school*	18.9%	18.9%	14.5%
Proportion couple families with dependent children	36.6%	38.2%	34.3%
Prop. one parent families with dependent children	14.6%	13.4%	9.5%
Prop. families weekly income below $500	32.8%	26.0%	22.6%
Prop. families weekly income $1500 and above	11.5%	14.2%	26.1%
Unemployment rate (Census 2001)	11.2%	8.4%	6.4%

*infants, primary and secondary school

Sources: A Kopras, *Electoral Rankings: Census 2001 (2003 Boundarie*s); Health Insurance Commission.

Appendix 7: Tasmania

Variable	Bass	Lyons	Braddon
Demographic rating	Provincial	Rural	Rural
Number of prescriptions	3015	1663	1034
Prop. children aged 5–14 years	14.4%	15.9%	15.4%
Proportion persons attending school*	16.4%	17.1%	17.1%
Proportion couple families with dependent children	35.3%	38.2%	35.8%
Prop. one parent families with dependent children	13.2%	9.6%	11.7%
Prop. families weekly income below $500	29.6%	33.4%	33.7%
Prop. families weekly income $1500 and above	14.9%	10.5%	11.1%
Unemployment rate (Census 2001)	9.7%	10.9%	11.7%

*infants, primary and secondary school

Sources: A Kopras, *Electoral Rankings: Census 2001 (2003 Boundarie*s); Health Insurance Commission.

Endnotes

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38. Electorates are classified by the Australian Electoral Commission into four socio-demographic categories: inner metropolitan (comprising well established built-up suburbs); outer metropolitan (containing areas of more recent suburban expansion); provincial (majority of enrolment in major provincial cities, or in non-metropolitan urban conglomerates); and rural (without a majority of enrolment in major provincial cities). Australian Electoral Commission, *National Electoral Division Profiles*, Australian Electoral Commission, Canberra December 1998, p. v.
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41. Electorates are based on the 2001 electoral redistribution.

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