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## **Trends in the prescribing of stimulant medication for the treatment of Attention Deficit Hyperactivity Disorder in adults in NSW**

NSW DEPARTMENT OF HEALTH

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# Executive Summary

- Attention deficit hyperactivity disorder (ADHD) is a chronic condition characterised by the symptoms of inattention, hyperactivity, and impulsivity. Historically regarded as a disorder of childhood only, it is now recognised that ADHD persists into adulthood in a significant proportion of children with the disorder.
- ADHD manifests somewhat differently in adults than it does in children, with physical hyperactivity much less evident in adults than in children. Adults with ADHD experience a range of impairments as a result of their disorder, including poor social relations, academic failure, and poor employment history.
- Stimulant medication is the most common form of treatment for adult ADHD. The stimulant drugs used in Australia to treat adult ADHD are dexamphetamine and methylphenidate.
- In NSW, the prescribing of stimulant medication for the treatment of ADHD in adults is mainly restricted to psychiatrists, and is monitored by the Pharmaceutical Services Branch of the NSW Department of Health.
- This study presents recent trends in the prescribing of stimulant medication for the treatment of ADHD in adults in NSW.
- Over the period 1990 to 2002, there was an increase in the number of adults with ADHD who were commenced on stimulant medication for the first time. Most of this increase occurred after 1993. In 2002, the number of adults who commenced treatment for the first time was 12.5 times greater than the number who commenced in 1993.
- On average, the age of adults with ADHD first commenced on stimulant medication increased over the period 1990 to 2002. In 1990, the average age was about 23 years, while in 2002 it was almost 34 years.
- There was also an increase in the rate of adults (that is, number per 10,000 people aged 18 years or over) treated with stimulant medication over this period. It went from less than one per 10,000 in June 1993 to seven per 10,000 in June 2003. The increase in the rate for females was greater than the increase in the rate for males.
- Since 2001, there has been little increase in the rate of adults with ADHD on stimulant medication.
- The increase in prescribing of stimulant medication for adults with ADHD is likely to be due to a number of factors, including an increase in public and clinician awareness and acceptance of ADHD as a disorder, an increase in the availability of specialised services for assessing and treating ADHD, and an increase in the prescribing of stimulants for children with ADHD. Also, a broadening of the diagnostic criteria for ADHD and a greater emphasis on the inattentive aspects of ADHD over time may have contributed to the upward trend in stimulant treatment, particularly for women with ADHD among whom inattentive features tend to predominate.
- As at June 2003, there were about 3,500 adults on stimulant medication for the treatment of ADHD, representing a rate of seven per 10,000 people (or about 0.1 per cent) aged 18 years or over.
- On average, for every adult female with ADHD on stimulant medication as at June 2003 there were 1.7 adult males with ADHD on stimulants.

- A higher proportion of adults with ADHD are treated with dexamphetamine than methylphenidate. This apparent preference among adults for dexamphetamine over methylphenidate is likely to be related to economic reasons but may also be related to drug effectiveness or tolerance, or prescriber differences.
- Differences in rates of stimulant treatment occur according to area health service. As at June 2003, the Wentworth Area Health Service had the highest rate (14.4 per 10,000 people aged 18 years or over) followed by the Northern Sydney Area Health Service (13.8 per 10,000 people aged 18 years or over). The lowest rate was observed in the Far West Area Health Service (0.8 per 10,000 people aged 18 years or over). More than half of the area health services in NSW had a rate ranging between five and 10 per 10,000 population aged 18 years or over. Regional differences in prescribing may be due to different rates of disorder persistence from childhood to adulthood, differences in treatment retention rates, availability of assessment and treatment services, socioeconomic factors, and variations in prescriber practices.
- About one-third of the adults with ADHD on stimulant treatment as at June 2003 were initially treated with stimulants as children. Thus, for the majority, the first time they were treated with stimulants was as an adult. This is consistent with the observation that many adults who have ADHD are not diagnosed until adulthood.
- The chronic nature of ADHD means that sufferers will typically require ongoing treatment. Long-term use of stimulants is fairly common. About one-fifth of adults on medication as at June 2003 had been on stimulants for more than five years.
- Early attrition from treatment is quite common. Follow-up of adults who commenced stimulant treatment in 1998 indicated that about one-quarter discontinued treatment after the initial episode of treatment. This is consistent with reports that stimulant medication is not effective for at least 25 per cent of adults.
- Despite recent increases in the prescribing of stimulant medication, treatment rates for adults with ADHD in NSW remain relatively low when compared with the number of adults likely to have the disorder. Comprehensive and judicious assessment procedures are essential for ensuring that patients with ADHD are properly identified and receive the most appropriate treatment, whether this be medication, psychosocial intervention, or a combination of both. Because of its demonstrated effectiveness in reducing ADHD symptoms, treatment will include the use of stimulant medication for many adults with ADHD.

# 1. Introduction

Attention deficit hyperactivity disorder (ADHD) is generally thought of as a disorder that only affects children. The reality is that a significant number of adults experience ADHD. Adults who have ADHD don't suddenly develop the symptoms of ADHD in their adult years, they have experienced the symptoms most of their lives. Although adult ADHD has gained acceptance among experts as a valid disorder, it remains a controversial diagnosis.

ADHD manifests somewhat differently in adults than it does in children.<sup>1</sup> The symptoms of inattention, impulsivity and hyperactivity, in particular, generally decrease in intensity with age. While the hyperactive child squirms, fidgets and is constantly 'on the go', the hyperactive adult typically experiences intense feelings of restlessness. They may have trouble relaxing and they may overwork. Impulsive children blurt out answers, interrupt others, and talk excessively. Adults with impulsivity display similar behaviour by incessantly talking, being impatient in lines or in traffic, often interrupting conversations, and impulsively spending or quitting a job. Inattentive children have difficulty listening, following through, and have problems with forgetfulness. Adults with inattention find it difficult to focus, plan, organise, and complete tasks at work and at home. They often complain of losing personal items, such as keys and wallets, are late for appointments, don't listen during conversations, and lack concentration when reading.<sup>2,3</sup>

Unlike children with ADHD—who have their parents, teachers and other carers to support them in their daily activities—adults with ADHD often lack the benefit of any support. Unlike children, adults are generally expected to self-regulate their behaviour and activities. It is thought that self-regulation in people who have ADHD is impaired due to a vulnerability in the way the brain controls its thinking and learning and behaviour; in particular, the cognitive processes of executive functioning, working memory, and speed and flexibility of processing.<sup>4,5</sup> Thus, for adults with ADHD who have this impairment, self-regulation is extraordinarily difficult. As a result, normal daily activities can be particularly challenging for adults with ADHD.<sup>3</sup>

Some adults with ADHD fare relatively well. They use their strengths—energy, enthusiasm, motivation, and creativity—to pursue careers that are suited to their strengths, such as entertainment, sports, and sales. Others fare poorly and experience academic failure, employment failure, poor driving records, substance abuse, and even imprisonment.<sup>6–10</sup> The majority of adult sufferers fare somewhere in between: they manage but function below their potential in many or all areas of their lives.<sup>11</sup>

Research into adult ADHD has steadily grown in recent years. Although the body of information on adult ADHD lags substantially behind that on child ADHD, strong evidence has accumulated to support the use of stimulant medication in the treatment of adult ADHD. As is the case for children with ADHD, stimulants are the mainstay of treatment for adults with ADHD.

This study, published as a supplement of the *NSW Public Health Bulletin*, aims to present information on the prescribing of stimulant medication for the treatment of ADHD in adults. The study firstly examines the controversy surrounding adult ADHD. The prevalence of the disorder among adults and the persistence of ADHD

symptoms from childhood to adulthood are considered next. The study also looks at the diagnosis of adult ADHD and the treatment options available, paying particular attention to the use of stimulant medication. The restrictions that are in place in New South Wales (NSW) for the prescribing of stimulant medication for adults with ADHD are described. The study then presents trends in the prescribing of stimulant medication in NSW over the last decade or so, and the characteristics of adults recently treated with stimulant medication. The study concludes with a discussion of these trends.



## 2. Background

### 2.1 Adult ADHD and the controversy

Adult ADHD is a relatively recent concept, being first described in the literature in the 1970s.<sup>12</sup> While authors have demonstrated the validity of the disorder in adults,<sup>13,14</sup> and research into the disorder forges ahead, ADHD in adults continues to be controversial. In a study published as recently as 2000, one in eight psychiatrists surveyed in a region of the United Kingdom indicated that adult ADHD does not exist.<sup>15</sup>

Adult ADHD is controversial for several reasons:

- High rate of self-diagnosis.

Adults who present to doctors for assessment are often self-referrals. They commonly seek help because they have difficulty persevering with organised tasks, they frequently change jobs or have difficulties at work, they complain of losing things, they complain of being impolite because they frequently interrupt others, and they complain of a lack of concentration when reading. They may have had a child recently diagnosed and treated and, noting similar problems to their children in themselves, they seek evaluation. Sometimes publicity about ADHD leads an individual to seek assessment.<sup>3,16</sup> It has been reported that as many as one-third of adults who request an evaluation for ADHD are not formally diagnosed with the disorder.<sup>17</sup>

- Difficulties in establishing childhood onset of the disorder.

As discussed later (see Part 2.2), a diagnosis of ADHD in an adult requires that the symptoms date from childhood, specifically prior to the age of seven years. It can be difficult to obtain an accurate history from an adult patient to establish childhood onset. Ideally, information from the patient and informants, such as parents and teachers should be obtained. However, this is not always possible or practical, leaving clinicians to rely on patients' own accounts of their symptoms. Investigations into just how accurately adults are able to recall childhood behaviour have produced somewhat inconsistent findings.<sup>18-20</sup>

- Problems with differential diagnosis.

The symptom of disturbed attention is associated with many psychiatric disorders, such as antisocial personality disorder, bipolar disorder, depression, and substance abuse disorders. In addition to this, many ADHD patients present as depressed, anxious, and irritable. It is difficult for clinicians to decide whether symptoms are due to ADHD or another disorder.<sup>16,21</sup>

- Stimulants, the main mode of treatment, are restricted substances that may be abused.

Reports from time to time of stimulants being used illegally, and the potential for stimulants to be abused, cause alarm among the community and clinicians alike. Certain clinicians are reluctant to prescribe stimulants because of their potential for abuse.<sup>22</sup> Some surveys have shown that less than half of psychiatrists prescribe stimulants to their adult patients.<sup>15,23</sup>

## 2.2 Diagnosis and assessment

Many experts agree that ADHD is a neurodevelopmental disorder caused by a complex combination of genetic, biological and environmental factors. For example, studies of twins and families indicate that ADHD is highly heritable.<sup>24–27</sup> Support for a strong genetic component also comes from gene studies. These studies have identified a number of genes, particularly of the dopaminergic pathway, that may increase the risk of developing ADHD.<sup>28</sup> Despite these advances in research, there is no single diagnostic test available for ADHD.

Establishing whether an adult has ADHD requires comprehensive assessment. The key components include:<sup>2,29,30</sup>

- review of the patient's current concerns;
- review of the patient's history, especially their childhood history;
- review of any retrospective rating scales, school reports, academic records, or other relevant historical records;
- completion of standardised ADHD rating scales (for example: Wender Utah Rating Scale, the Connors Adult ADHD Rating Scale, and the Brown Attention-Deficit Disorder Scales);<sup>31–33</sup>
- assessment of coexisting or comorbid conditions;
- urine screening, if indicated, due to comorbid substance abuse;
- screening for physical disorder, if indicated.

Brain imaging, electrophysiological assessment and neuropsychological assessment are not integral to diagnosis but may be useful in some circumstances.<sup>34–36</sup>

The diagnostic criteria for ADHD recommended for use in Australia are the criteria of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*.<sup>37,38</sup>

The original DSM criteria for ADHD were developed around the notion of ADHD as a childhood disorder. Although the DSM has evolved over time to acknowledge that symptoms persist into adulthood, the current version, DSM-IV, does not specifically define the adult syndrome.

The DSM-IV criteria for ADHD include a list of 18 symptoms, organised into two categories: one with nine inattentive symptoms and a second with nine hyperactive–impulsive symptoms. The symptom descriptions are less child-oriented than previous versions of the DSM, but still tend to reflect presentations in children. An adult can be diagnosed with ADHD-inattentive subtype if they report at least six of the nine inattentive symptoms. If they report six or more of the nine hyperactive–impulsive symptoms they can be diagnosed ADHD-hyperactive–impulsive subtype. An adult who meets both categories is classified as having ADHD-combined subtype. The DSM-IV also includes a category called 'Partial Remission', for individuals who have symptoms that no longer meet full criteria.

It has been suggested that the diagnostic thresholds set for the symptoms lists may be inappropriate for older adolescents and adults, and that the number of symptoms required for diagnosis may be too high. With respect to adults aged 50 years or over, for example, lowering the cut-off to as few as three items on each symptom list is reported to be still valid.<sup>39</sup>

The DSM-IV criteria require that some of the symptoms were present prior to the age of seven years and were significant enough to cause impairment. As discussed earlier, this often means relying on adults' recall of their childhood behaviour. Where possible, information from other sources, such as parents, should be collected.

Under the DSM-IV criteria, the symptoms must not be transient and must be present in more than one setting (for example, at home and at work). In addition to asking patients about their functioning in different settings, information from other relevant individuals (such as a spouse, parent, or employer) or sources (such as a job appraisal), can be considered.

In addition to a set of symptoms, the patient must have associated impairment to qualify for a diagnosis of ADHD. The DSM-IV stipulates that clinically significant impairment must occur in social, academic or occupational functioning. Examples might include an inability to hold a job, marital problems, frequent problems with friends, failing coursework, or poor money management.

Finally, DSM-IV criteria require that the patient's symptoms are not better accounted for by another mental disorder such as mood disorder, anxiety disorder, or do not occur exclusively during the course of pervasive developmental disorder, schizophrenia, or other psychotic disorder. As mentioned earlier, determining whether a patient's symptoms are due to ADHD or some other disorder can be difficult.

Comorbidity in adults with ADHD, like children with ADHD, is fairly common. Research findings indicate that adults with ADHD have higher rates of antisocial behaviour and substance use disorders than adults without ADHD. Mood disorders (major depression, bipolar disorder, dysthymia) and anxiety are also relatively common among adults with ADHD.<sup>10,40,41</sup>

## 2.3 Prevalence of ADHD among adults

Epidemiological data on the prevalence of adult ADHD in the community are not available. The prevalence can only be estimated using information on the prevalence of the disorder in children and information about the degree to which the disorder persists into adulthood.

A number of studies have reported that a proportion of children with ADHD go on to experience symptoms of ADHD as adults. Symptoms of inattention are more persistent than those of hyperactivity and impulsivity, which tend to decline at a higher rate and at an earlier age than inattention symptoms.<sup>42</sup>

The reported rates of persistence vary considerably, ranging from four per cent to 66 per cent.<sup>43-45</sup> Variation in these rates may be due to differences in selection criteria used in the studies, differences in the duration of follow-up, the age of the samples, the definitions of symptom persistence (or symptom remission) used in the studies, and reporter effects (for example, whether symptoms were based on self-reports or the reports of others). It should be noted that reported rates of persistence to date have mostly been obtained from samples of hyperactive males. The rate of persistence for other children with ADHD, including those with the inattentive subtype, and females, may be different.

The proportion of children who go on to experience symptoms to a degree sufficient to warrant diagnosis as adults based on DSM-IV criteria may be quite low. This does not mean that only a small proportion will experience any

impairment. To use Barkley's words 'a child may outgrow the DSM criteria but not necessarily outgrow the disorder'.<sup>9</sup>

On the available evidence, it can be argued that about 50 per cent of children experience continuation of mild or severe disabling symptoms into adulthood.<sup>44,46</sup> If the rate of prevalence of ADHD among children is conservatively taken as four per cent and symptoms abate in about 50 per cent of cases, the prevalence rate for adult ADHD approximates two per cent.

Overall, there is relatively little published about sex differences in adults with ADHD. In the absence of epidemiological data, information about differences between adult males and females with ADHD have largely relied on clinical populations.

As is the case for children and adolescents with ADHD, males outnumber females among adults with the disorder. However, the ratio of males to females is somewhat smaller among adults than that seen for children and adolescents. The difference in gender representation between ADHD populations of children and adults that have been studied may be due to referral bias (boys are more likely to be noticed and referred for assessment and treatment because of elevated rates of disruptive and defiant behaviour compared with girls), social factors (for example, women may be more willing to recognise a problem and seek treatment than men),<sup>47</sup> biological factors (such as distinct brain mechanisms),<sup>48,49</sup> or a combination of these factors.

For women, the experience of ADHD is reportedly somewhat different to that of their male counterparts. They appear to experience more psychological distress than men with ADHD and have a lower self-image compared to men with ADHD.<sup>50</sup> Although women and men have a similar rate of mood and anxiety disorders, women with ADHD have lower rates of antisocial disorders than men with ADHD.<sup>51</sup>

## **2.4 Treatment of adult ADHD**

Because ADHD is a chronic disorder, most patients need long-term treatment. Treatment should be tailored to meet the individual needs of the patient. It is standard practice to provide psychoeducational treatment to patients. This includes educating the patient about how their symptoms influence their behaviour, the aetiology of their disorder, providing appropriate reading material on ADHD and information about treatment options and their respective benefits and disadvantages. The choice of intervention strategy will be influenced by comorbidity, target symptoms, and strengths and weaknesses of the patient.<sup>29</sup>

There is little published literature on the relative effectiveness of different treatment strategies for adult ADHD. Medication is mainly used to treat ADHD because it benefits a large proportion of sufferers and it does so in a relatively short period of time.

### **2.4.1 Stimulants**

Stimulant treatment is regarded as first-line pharmacological treatment for ADHD. The stimulant drugs available for this purpose in Australia are methylphenidate and dexamphetamine. In Australia, as well as overseas, the last two decades have seen a marked increase in the prescription of stimulants.<sup>52-54</sup> From 1990 to 2000 in NSW, the rate of stimulant treatment for children with ADHD increased about

nine-fold. About one per cent of children were being treated with stimulant medication for ADHD at the end of 2000.<sup>55</sup> Rates of stimulant treatment have been shown to vary according to the patient's age and sex, region, socioeconomic factors, and prescriber factors.<sup>55-62</sup>

While published literature clearly demonstrates that stimulants are highly effective in the treatment of ADHD in children, findings on their effectiveness in treating adult ADHD are less consistent. Response rates to stimulant treatment in adults have been highly variable, ranging from 25 per cent to 75 per cent, and on average poorer than those typically seen for children. These inconsistencies may be due to a variety of factors, including different rates in psychiatric comorbidity, insufficient dosing, and differences in methodology and use of diagnostic criteria.<sup>63,64</sup>

Most of the research on the effectiveness of stimulant treatment for adult ADHD is for methylphenidate, and other stimulants not available in Australia, such as mixed amphetamines and pemoline. Few studies have examined the use of dexamphetamine for adult ADHD.

Faraone et al. (2004) recently published a review examining the efficacy of methylphenidate for treating adult ADHD.<sup>65</sup> From their meta-analysis of double-blind randomised studies they concluded that methylphenidate is effective at treating adult ADHD, particularly when higher doses are used.<sup>a</sup>

In a randomised, double-blind, placebo-controlled trial, Paterson et al. (1999) examined the short-term efficacy of dexamphetamine in treating adult ADHD.<sup>66</sup> At the completion of the six-week trial, adults in the dexamphetamine group experienced significant improvement on a variety of measures compared with the placebo group. Taylor and Russo (2001) also reported significant improvement in ADHD symptoms for a short course of dextroamphetamine<sup>b</sup> in 17 adults with ADHD.<sup>67</sup> These patients also reported that dextroamphetamine had a positive effect on their motivation.

Side effects experienced by adults with ADHD who take stimulants are mild, with common ones including insomnia, edginess, reduced appetite, weight loss, dysphoria, obsessiveness, tics, and headaches.<sup>64</sup> Cases of psychosis associated with prescribed dexamphetamine, although rare, have been reported.<sup>68</sup> Stimulants should not be used in patients who have the following conditions: psychosis, glaucoma, symptomatic cardiovascular disease, hyperthyroidism, and hypertension.<sup>69</sup>

Although stimulants are drugs of potential abuse, they are unlikely to encourage abuse or dependence when taken orally and in modest doses, as typically prescribed in clinical settings.<sup>70</sup> Recent research indicates that stimulant treatment for children with ADHD may be protective against later substance abuse.<sup>71,72</sup> Abuse by adults will occur in a small number of cases, particularly among individuals who have substance abuse problems.<sup>73</sup> Medical practitioners need to be vigilant for patient behaviour that may suggest abuse and carefully monitor their patients' use.<sup>74,75</sup>

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<sup>a</sup> The authors defined high-dose studies as those having a mean dose of 0.9 mg/kg/day or greater. The mean daily doses were 70 mg (1.05mg/kg) for the high-dose group and 44 mg (0.63 mg/kg) for the low-dose group.

<sup>b</sup> Dextroamphetamine is the name given to dexamphetamine in the United States.

Until recently, a major limitation of stimulant treatment has been the short-acting nature of the drugs themselves. Typically, patients have had to take two to three doses a day to gain day-long relief from their symptoms. Long-duration or extended release preparations are now available in Australia, providing patients with the potential for once-daily dosing. These preparations have different profiles of action that clinicians need to take into account when making a drug selection. Dosing, in particular, needs to be carefully managed to ensure that adults are not under-dosed.<sup>76</sup> The potential benefits of extended release stimulant medications for individuals with ADHD are not likely to be fully realised until there is greater clinical experience in their use.

Medication alternatives to stimulants are needed for certain patients, including those who do not respond adequately to stimulants, who develop adverse reactions to stimulants, who may develop possible tolerance, who may be at risk of stimulant abuse, or who have comorbid depression. The most common alternative medication treatment for ADHD is antidepressants.

### **2.4.2 Antidepressants**

The published literature on the effectiveness of antidepressants includes some medications that are not available in Australia. Some of the more commonly researched antidepressants are venlafaxine, desipramine, and bupropion. At least half of the adult subjects with ADHD who have participated in the research have responded positively to antidepressant medication.<sup>12,77</sup>

Kuperman et al. (2001) directly compared slow release bupropion (an atypical dopaminergic and noradrenergic antidepressant) with methylphenidate and a placebo in a study of 30 adults with ADHD.<sup>78</sup> The response rate was higher for bupropion (64 per cent) than it was for methylphenidate (50 per cent) but these rates were not significantly higher than the response rate for the placebo (27 per cent).<sup>c</sup> The authors noted that this result may have been due to the relatively high placebo response rate.<sup>d</sup>

### **2.4.3 Other medications**

Atomoxetine is a selective norepinephrine reuptake inhibitor. It has just recently been approved by the Therapeutic Goods Administration (TGA) in Australia for the treatment of ADHD in persons aged six years or older. It is the only non-stimulant drug specifically indicated for the treatment of ADHD in Australia.

Research with samples of adults and children indicates that atomoxetine could be a useful alternative to stimulant treatment.<sup>80-83</sup> Whether it will become a main line of treatment for ADHD will be determined after further research is conducted and clinical experience is gained.<sup>84</sup>

Very few other medications are used to treat ADHD. They include the antihypertensive agents clonidine and guanfacine, amino acids, cholinergic agents, nicotine, and antinarcotics. Minimal published findings are available on their effectiveness in treating adult ADHD.<sup>12</sup>

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<sup>c</sup> Response rates were based on improvement ratings obtained using the Clinical Global Impression Scale.<sup>79</sup>

<sup>d</sup> The authors state that the response rate for placebo in other published studies is around 10 per cent.



#### 2.4.4 Psychosocial interventions

Although it is universally recommended that treatment for ADHD include psychosocial or behavioural components, there is limited scientific evidence to support their effectiveness, particularly in adult populations.

Psychological treatments are considered useful for modifying inappropriate beliefs held about ADHD, to teach specific skills (for example: vocational, organisational, time management, and financial skills), to improve daily functioning, and to address comorbid conditions that may have arisen.<sup>2</sup> Even among adults whose symptoms have been stabilised by medication, these treatments may provide benefit. Some adults may require therapy to address negative feelings and perceptions about themselves and others. These might include a sense of anger, frustration and sadness about opportunities missed because of their disorder, resentment at others who did not appreciate that their behaviour was not controllable, and low self-regard brought on by years of criticism and perceived failure.<sup>11</sup>

Stevenson et al. (2002) reported on the efficacy of a cognitive remediation programme (CRP) for adults with ADHD using a randomised controlled trial.<sup>85</sup> The CRP involved eight weekly group sessions (designed to teach strategies to improve motivation, concentration, listening, impulsivity, organisation, anger management, and self-esteem), the use of support people who acted as coaches, and the use of participant workbooks and homework exercises. Twenty-two adults with ADHD who participated in the CRP were compared with a waiting list control group. About half of the participants in the treatment and control groups were on medication (mainly stimulants) for their ADHD. At the end of the trial, participants in the CRP reported significant improvement in their ADHD symptoms, their organisational abilities, and their self-esteem and anger management. These improvements were maintained one year after treatment and were comparable to responses reported for studies examining the efficacy of stimulant medication in the treatment of ADHD in adults. Participants in the study who were not on medication responded to the treatment as well as those who were on medication.

#### 2.4.5 Alternative treatments

Alternative treatments can be defined as any treatment other than prescription psychoactive drugs or standard behavioural treatments. Arnold (2001) reviewed evidence on alternative treatments for ADHD and examined their applicability to adults.<sup>86</sup> According to his analysis, most treatment alternatives for ADHD have not undergone enough research to support their clinical recommendation. Further, a few alternatives are probably ineffective for most patients, and some are possibly dangerous. He concluded, however, that there are a group of alternatives that have evidence or features suggesting they should be implemented, providing it is appropriate and practical to do so. Included in this group are relaxation training combined with electromyographic (EMG) biofeedback, meditation, and massage. Before deciding to undergo an alternative treatment, an individual should ensure they are adequately informed about the science behind the intervention and consult their medical practitioner.<sup>87</sup>

### 2.5 Restrictions on prescribing in NSW

The prescribing of the stimulants dexamphetamine and methylphenidate in NSW is subject to the *Poisons and Therapeutic Goods Act 1966* and its regulations.

To prescribe stimulants for the treatment of ADHD in adults in NSW, a medical practitioner requires authorisation from the NSW Department of Health.<sup>88</sup> The assessment of ADHD in adults and initial prescribing of stimulant medication is limited to psychiatrists. In some circumstances, neurologists and general practitioners may be approved to prescribe stimulants for adults, but only after initial assessment, diagnosis and treatment by a psychiatrist. A paediatrician who has diagnosed and treated a patient for ADHD prior to the patient reaching 18 years may continue prescribing for the patient until the age of 25 years.

For a diagnosis of ADHD, DSM-IV criteria must be fulfilled. In addition, the patient must have a childhood history of hyperactivity and/or inattention problems with at least one of the following symptoms: behaviour and/or attention problems at school, impulsivity, over excitability, and temper outbursts. In adulthood, there must be the continuing presence of hyperactivity and/or inattentiveness together with at least two of the following characteristics: affective lability, disorganisation and inability to complete tasks, hot temper, impulsivity, easily distracted, and major problems with short-term memory. Further, there must be evidence that the condition is long standing and clinically severe in terms of dysfunction. The symptoms must be continuous and not related to stress or crises. While comorbidity may exist, ADHD should be the most prominent disorder.

Until recently, all medical practitioners who wished to prescribe stimulants for the treatment of ADHD in adults were required to apply for authority on an individual patient basis, prior to commencing treatment. In September 2003, the NSW Department of Health introduced a new approval system allowing authorised medical practitioners to prescribe stimulants to certain patients without the need for prior individual patient authority by the Department. Under this new system, psychiatrists and neurologists may apply to the Department for a general authority, granting them approval to prescribe stimulants to most patients without prior individual patient authority. Certain types of patients are excluded and require individual approval prior to commencing treatment.

The new approval system requires that medical practitioners notify the Department of prescriptions they have written for patients where prior individual patient authority is not required. A similar notification system has been in place since 1996 for the prescribing of stimulant medication for the treatment of ADHD in children.<sup>89</sup>

When a medical practitioner applies to the Department to treat an individual patient, the application must be accompanied by a clinical report and management plan, including details about the patient's history, assessment and diagnosis, the severity of their disorder and the presence of comorbidity. For certain types of patients (such as the elderly, and those with significant comorbid conditions, or a history of substance abuse or dependency) or where a high dose is proposed, a second opinion from another psychiatrist must be submitted in support of the application. When the Department grants approval to prescribe, an authority is issued. Authorities are issued for various lengths of time, but usually for 12 months. They are not issued for longer than three years.

## **2.6 Aim of this study**

The aim of this study is to describe NSW trends in the prescribing of stimulant medication for the treatment of ADHD in adults. There are five corresponding sections in Methods (Part 3) and Results (Part 4).



- Section 1 presents trends in the number of adults with ADHD who were treated with stimulant medication for the first time, for the period 1990 to 2002.
- Section 2 examines the characteristics of adults with ADHD who commenced stimulant treatment for the first time, for the period November 2002 to December 2002.
- Section 3 shows trends in the rate (per 10,000 population) of adults with ADHD who were treated with stimulant medication, for the period 1993 to 2003.
- Section 4 presents characteristics of adults who were treated with stimulant medication as at 30 June 2003.
- Section 5 examines attrition from stimulant treatment using a cohort of adults with ADHD who commenced stimulant medication in 1998.

## 3. Methods

### 3.1 Trends in the number of adults treated with stimulant medication for the first time

The number of adults with ADHD who were treated with stimulant medication for the first time was determined and analysed by various characteristics of the adult and the treatment for the period 1990 to 2002.

Data on authorities issued and prescriptions written for stimulant medication for the treatment of ADHD to 31 December 2002 were extracted from the NSW Department of Health *Pharmaceutical Drugs of Addiction System*. A person was considered to have been treated with stimulant medication if an authority had been issued or a prescription written.

Persons aged 18 years or over ('adults') treated with stimulant medication for ADHD for the first time were identified. The date on which treatment was deemed to have started was either the date on which the first relevant authority was issued or the date on which the first prescription was written. It should be noted that most of the data in the present study concerned individual patient authorities. A small number of records involved prescriptions notified in respect of children or young adults as part of Departmental requirements concerning the prescribing of stimulants for children with ADHD (see Part 2.5).

Some adults who may have undergone stimulant treatment previously (that is, prior to the 'first time'), namely those who were previously treated for a non-ADHD diagnosis (such as narcolepsy or brain damage), and those whose previous treatment was not recorded in the *Pharmaceutical Drugs of Addiction System* (such as persons from overseas or interstate), were included in the analysis.

For each year in the period 1990 to 2002 the number of adults commenced on stimulant medication for the first time was determined according to the following characteristics: sex, age at commencement of stimulant treatment, and drug used.

Adults residing outside NSW were excluded from analysis. Whether a person resided outside NSW was determined according to his or her address as at the time of data extraction (June 2003). It was necessary to use the address as at the time of the data extraction because historical information on address was not available.

### 3.2 Characteristics of adults who commenced treatment for the first time (November to December 2002)

Adults for whom an individual patient authority was issued for the first time for the treatment of ADHD in the two-month period 1 November 2002 to 31 December 2002 were identified using the NSW Department of Health *Pharmaceutical Drugs of Addiction System*. A total of 106 adults were identified and Departmental files containing individual patient details including application forms, clinical reports, and other supporting evidence, were examined. From this examination, eight adults were identified for whom it was likely stimulant medication had been

previously used to treat ADHD (e.g. persons treated outside NSW, persons treated as a child), leaving 98 adults for analysis.

Information was collated on these 98 adults based on the following variables: age, sex, experience of non-ADHD mental health problems, presence of familial ADHD, substance abuse, use of non-stimulant medication, use of non-medication treatments, assessments undergone (including use of rating scales and electrophysiological assessment), and effectiveness of stimulant medication.

### **3.3 Trends in the rate of adults treated with stimulant medication**

The prevalence of adults with ADHD who were treated with stimulant medication as at 30 June of each year in the period 1993 to 2003 was determined and analysed by various characteristics of the adult and the treatment.

Data concerning authorities issued and prescriptions written for stimulant medication for the treatment of ADHD were extracted from the NSW Department of Health *Pharmaceutical Drugs of Addiction System* for the period 1993 to 2003.

Authorities and prescriptions that were valid as at 30 June for each year in the period 1993 to 2003 were determined. An authority was deemed to be valid on 30 June of a given year if it was issued on or before this date and expired on or after this date. A prescription was deemed to be valid if it was written in the six-month period to 30 June of a given year. An adult, defined as a person aged 18 years or over as at 30 June of a given year, was considered to have been treated with stimulant medication if he or she had a valid authority or prescription.

As at 30 June each year in the period 1993 to 2003, the number of adults treated with stimulant medication per 10,000 resident population of NSW aged 18 years or over was calculated using population estimates (as at 30 June) from the Australian Bureau of Statistics.<sup>90</sup> Preliminary estimates were used for 2003. The rate of adults treated with stimulant medication was determined according to the following characteristics: sex, age, and drug used.

Adults residing outside NSW were excluded from analysis. Whether a person resided outside NSW was determined according to his or her address as at the time of data extraction (January 2004). It was necessary to use the address as at the time of the data extraction because historical information on address was not available.

### **3.4 Characteristics of adults treated with stimulant medication**

The prevalence of adults treated with stimulant medication as at 30 June 2003 was determined and analysed by various characteristics of the adult and the treatment.

Data concerning adults on stimulant medication for the treatment of ADHD as at 30 June 2003 were extracted using the method described in Part 3.3. These data were analysed according to the following characteristics: age and sex, drug used, area health service of residence, age status at initiation of treatment, and duration of treatment.

Age-specific rates per 10,000 resident population were calculated using preliminary population estimates as at 30 June 2003 from the Australian Bureau of Statistics.<sup>90</sup>

Rates per 10,000 resident population for individual area health services were calculated using Australian Bureau of Statistics population data as at 30 June 2001.<sup>91</sup>

Duration of treatment was calculated as the number of days an adult had continuously received stimulant treatment up until 30 June 2003. Where there was a break of no more than 182 days (six months) between consecutive valid authorities or prescriptions preceding 30 June 2003, an adult was deemed to be continuously receiving treatment. (As described earlier, a prescription was defined as being valid for a period of six months from the date it was written.) Treatment duration (in days) was calculated from the date of the first authority or prescription in the sequence of continuous treatment to 30 June 2003.

Adults residing outside NSW were excluded from analysis. Whether a person resided outside NSW was determined according to his or her address as at the time of data extraction (January 2004). It was necessary to use the address as at the time of the data extraction because historical information on address was not available.

### **3.5 Attrition from stimulant treatment**

Adults who were treated with stimulant medication for ADHD for the first time in the year 1998 were identified using the method described in Part 3.1. For each adult, the date of the last prescription or authority was determined by examining all records in the *Pharmaceutical Drugs of Addiction System*. All authorities issued and all prescriptions notified to the Department as recorded in the *Pharmaceutical Drugs of Addiction System* as at 9 January 2004 were considered. For administrative reasons, not all records from September 2003 onwards were available for analysis.

The time between the first authority or prescription and last authority or prescription for each adult was calculated to represent a measure of attrition from treatment.

### **3.6 Caveats**

For the purposes of this study, it is assumed that an adult is being treated with stimulant medication if an authority for stimulant medication has been issued with respect to the adult, or if a prescription for stimulant medication has been written for the adult. It is also assumed that an adult is on stimulant medication for the period over which an authority or prescription is valid. The extent to which these assumptions are valid is unknown.

An authority indicates a doctor's intention to prescribe stimulant medication for a particular adult. When a doctor is issued with an individual patient authority, however, he or she may not necessarily proceed with writing a prescription for stimulant medication.

When a prescription has been written for an adult, the prescription may not be filled. If the medication is dispensed, the adult may take the medication for only a short period of time, less than the period over which the authority or prescription is valid. For example, an adult may discontinue use following an unsuccessful short-term trial. Some adults may choose not to take the medication at all after it has been dispensed.

Thus, a number of adults may be counted as being on stimulant medication when in fact they are not. On the other hand, a number of adults may not be included in the figures when they should be. An example of this is the person who continues to take medication beyond the period over which the authority or prescription is valid. The person may have surplus supplies of medication because he or she spent some time off medication during the period over which the medication was prescribed.

The primary source of data for this study, the *Pharmaceutical Drugs of Addiction System*, was implemented during 1985. Details of approvals to prescribe stimulant medication for the treatment of ADHD prior to this time are not recorded and, therefore, are not included in this study.

These issues should be taken into consideration when interpreting the data presented in this report.

## 4. Results

### 4.1 Trends in the number of adults treated with stimulant medication for the first time

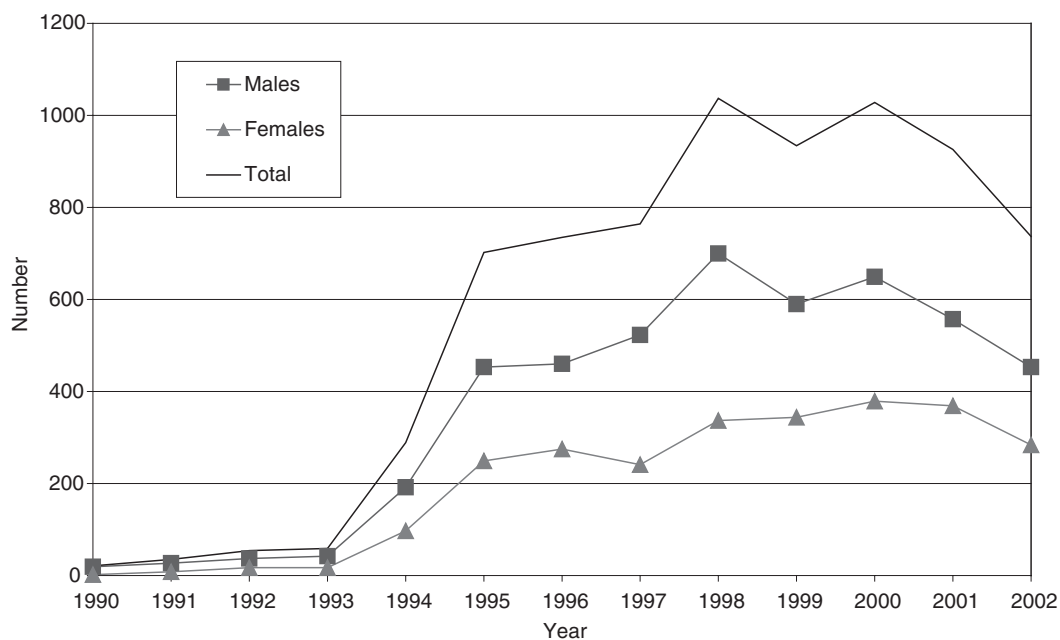
#### 4.1.1 Sex

Figure 1 shows the annual number of adults who were commenced on stimulant medication for the treatment of ADHD for the first time in the period 1990 to 2002 by sex. It can be seen that a steep increase occurred from 1990 to 1998 in the overall number of adults who commenced treatment. In 1990, just 21 adults started treatment for the first time, while in 1998 the figure was 1,037. From 2000 to 2002 there was a downward trend in the number of adults with ADHD who were started on stimulant medication for the first time.

For both males and females with ADHD, there was an upward trend in the numbers starting stimulant treatment for the first time, with the increase for females being greater than the increase for males. For example, from 1992 to 2002 there was almost a 17-fold increase in the number of adult females with ADHD commenced on stimulant medication. The increase for adult males for this period was 12-fold. Accordingly, the percentage of adult males commenced on stimulant medication for the first time fell. Whereas from 1990 to 1993 the proportion who were male was about 70 per cent or more, the proportion in 2001 and 2002 was less than 62 per cent.

**Figure 1**

**Number of adults with ADHD commenced on stimulant medication for the first time by year of commencement and sex, 1990 to 2002**



Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

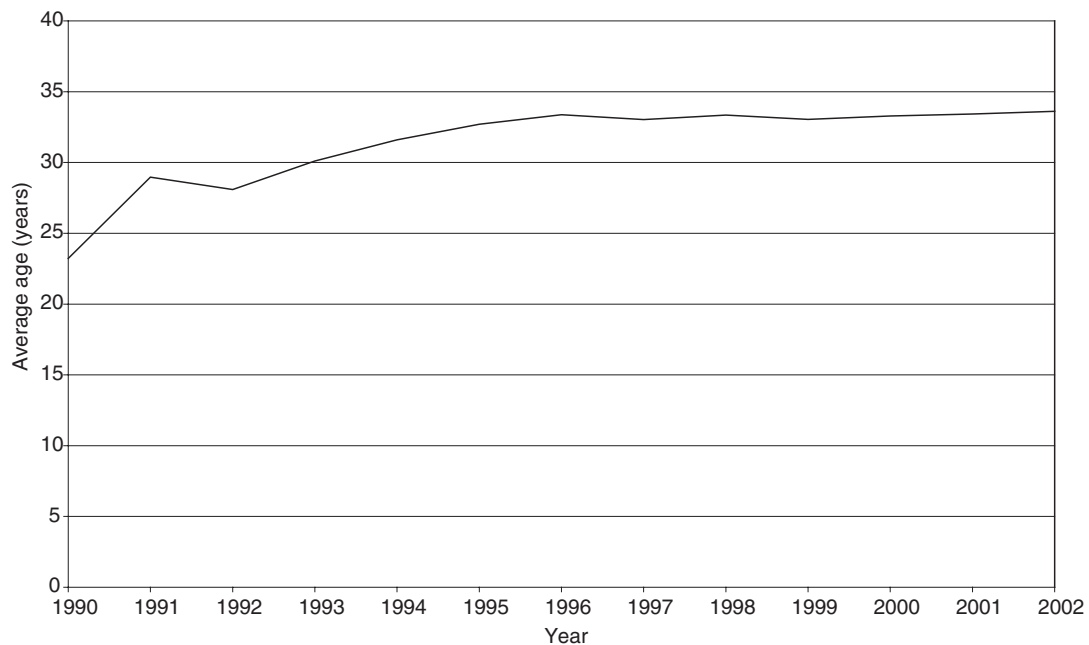
### 4.1.2 Age at commencement

Over the period 1990 to 2002, the population of adults commenced on stimulant medication for the treatment of ADHD for the first time generally aged. In 1990 the average age was 23.2 years (SD=7.7 years) compared with 33.6 years (SD=10.8 years) in 2002. Figure 2 shows the average age of adults commenced on stimulant medication for each year in the period 1990 to 2002.

Figure 3 shows the relative frequency distribution of age for adults commenced on stimulant medication for the first time in the years 1992 and 2002. Whereas in 1992 two-thirds of adults commenced on stimulants were aged less than 30 years, in 2002 60 per cent were aged 30 years or older.

**Figure 2**

**Average age of adults with ADHD commenced on stimulant medication for the first time by year of commencement, 1990 to 2002**



Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

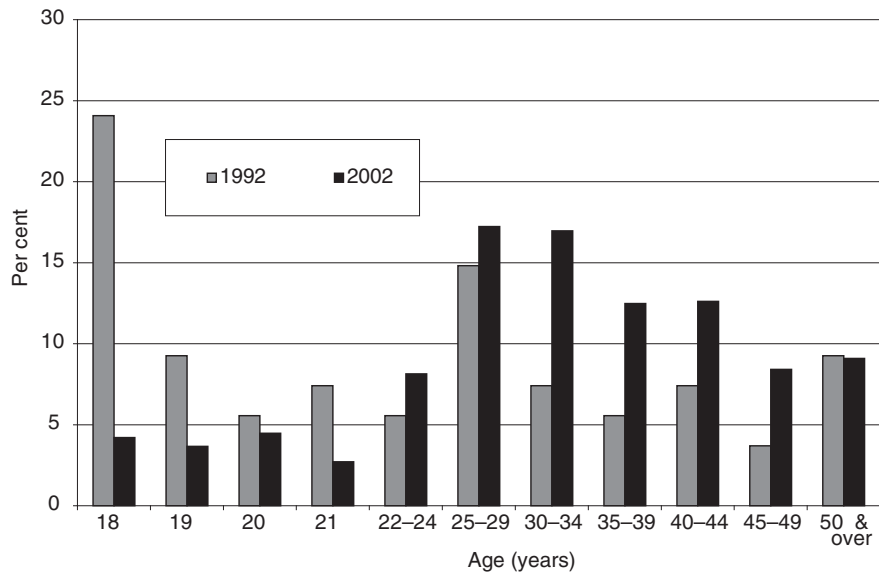
### 4.1.3 Drug

Figure 4 shows the number of adults with ADHD commenced on stimulant medication for the first time in the period 1990 to 2002, according to the drug initially used for treatment. With the minor exception of 1990, more adults were initially treated with dexamphetamine than were treated with methylphenidate. However, it is apparent from Figure 4 that the relative popularity of dexamphetamine in recent years has waned. In 1998 the proportion of adults who were initially treated with dexamphetamine was 87.3 per cent. In 2002, the proportion had declined to 82.0 per cent.

This pattern of more adults starting on dexamphetamine than methylphenidate generally occurred across all age groups.

**Figure 3**

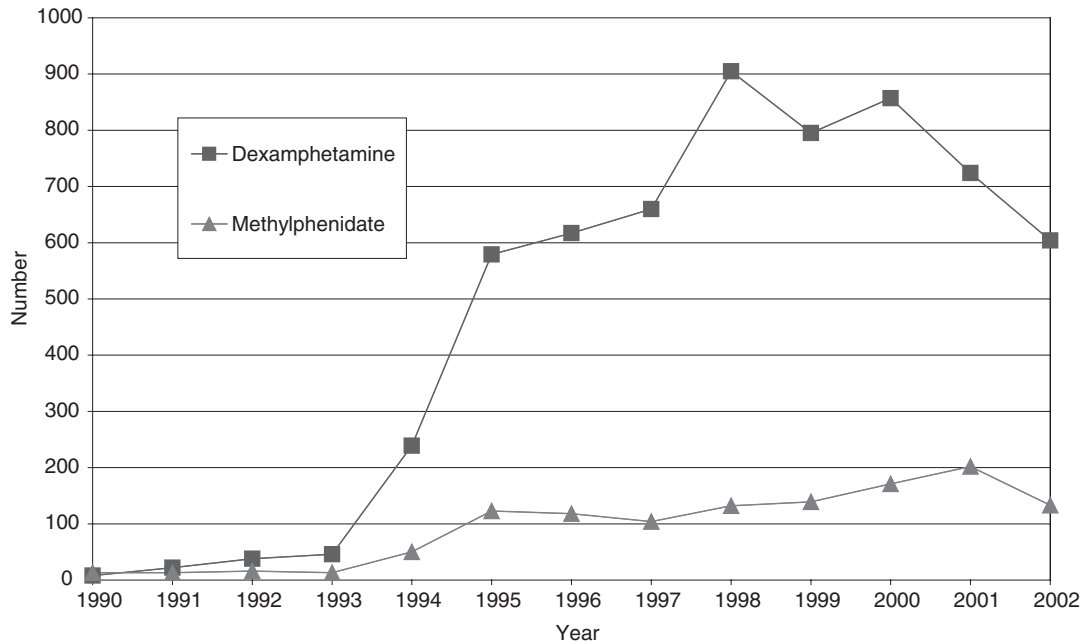
**Relative frequency distribution of age for adults with ADHD commenced on stimulant medication for the first time, 1992 and 2002**



Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

**Figure 4**

**Number of adults with ADHD commenced on stimulant medication for the first time by year of commencement and drug, 1990 to 2002**



Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health



## 4.2 Characteristics of adults who commenced treatment for the first time (November to December 2002)

In the period 1 November to 31 December 2002, 98 adults were commenced on stimulants for the treatment of ADHD for the first time. The characteristics of these adults are shown in Table 1. It should be noted that the characteristics presented in Table 1 are based on information supplied in medical reports by doctors treating the adults. Thus, a person's failure to be included in the prevalence rate may be due to non-reporting rather than an absence of the characteristic. Accordingly, the actual prevalence of some characteristics may be higher than that indicated in Table 1. The prevalence of a characteristic, where applicable (for example: depression), is based on the adult's lifetime experience of that characteristic; the characteristic may have been present at the time of initial treatment or may have occurred some time in the past.

Of those adults who were treated with stimulant medication for ADHD for the first time in the period November to December 2002, 54 (55.1 per cent) had some type of current or previous mental health problem other than ADHD. Forty-four adults (44.9 per cent) had current or previous depression, while 19 (19.4 per cent) had current or previous anxiety. Fourteen (14.3 per cent) had experienced depression and anxiety at some stage. Other types of mental problems experienced included mood disorder, social phobia, and eating disorder.

**Table 1**

**Characteristics of adults treated with stimulant medication for ADHD for the first time, 1 November to 31 December 2002 (N=98)**

| Characteristics                 | Number | Per cent |
|---------------------------------|--------|----------|
| Male                            | 54     | 55.1     |
| Age                             |        |          |
| less than 20 yrs                | 5      | 5.1      |
| 20–29 yrs                       | 37     | 37.8     |
| 30–39 yrs                       | 29     | 29.6     |
| 40–49 yrs                       | 21     | 21.4     |
| 50 yrs or over                  | 6      | 6.1      |
| Depression                      | 44     | 44.9     |
| Anxiety                         | 19     | 19.4     |
| Other mental health problem     | 8      | 8.2      |
| Familial ADHD                   | 16     | 16.3     |
| Substance abuse                 | 13     | 13.3     |
| Non-stimulant medication        | 31     | 31.6     |
| Non-medication treatment        | 24     | 24.5     |
| Electrophysiological assessment | 35     | 35.7     |
| Follow-up                       |        |          |
| improvement                     | 53     | 54.1     |
| mixed                           | 5      | 5.1      |
| no information available        | 40     | 40.8     |

According to medical reports, about 16 per cent of adults who were treated with stimulants for ADHD for the first time in November to December 2002 had a relative (such as a child, sibling, or nephew) with ADHD.

In 13.3 per cent of cases, the person's history included substance abuse or use that was regular or problematic. In these cases, the use of cannabis was particularly common. Other substances used included: alcohol, ecstasy, amphetamines, cocaine, heroin, LSD, and therapeutic narcotics. In some cases the person's pattern of illicit drug use was described by the treating doctor as 'self-medicating'.

Almost one-third (31.6 per cent) of adults who commenced stimulant treatment in the period November to December 2002 were taking or had taken a prescribed non-stimulant medication for their mental health, such as: antidepressants, antipsychotics, anticonvulsants, benzodiazepines, or clonidine.

About one-quarter (24.5 per cent) were reported to have undergone some type of non-medication treatment. These treatments included psychotherapy, cognitive behaviour therapy (CBT), counselling, supportive therapy, participation in a social phobic program, attendance at an anxiety clinic, and self-hypnosis.

In more than one-third of cases (35.7 per cent), electrophysiological assessment had been conducted or referred for the patient. The Wender Utah Rating Scale (WURS) was the next most commonly mentioned assessment tool. Often patients who had undergone electrophysiological assessment had been assessed using the WURS, as well as the Symptom Checklist-90-R (SCL-90-R)<sup>92</sup> and the Beck Depression Inventory (BDI).<sup>93</sup>

In 58 cases, follow-up information on the effects of stimulant treatment were available. About 91 per cent of these adults reported an improvement in their ADHD symptoms. In the remaining cases, the treatment produced mixed results.

Some individual cases are described below.

#### **Case 1: 'Graham', age 51 years**

Graham is a 51 year old married man who has suffered ADHD since childhood. As a child he was extremely impulsive. He suffered from behavioural problems at school and daydreamed in class.

Although he runs his own business, he finds it very difficult to make decisions. He procrastinates and has great difficulty starting and finishing tasks. He says he is easily distracted, very forgetful, and has poor attention and concentration. He also says he is a poor judge of time.

Graham underwent electrophysiological assessment, which his doctor provides to support the application to prescribe dexamphetamine.

A follow-up report eight months after Graham commenced treatment with dexamphetamine indicates that he has benefited from the treatment. Graham's doctor reports he is less likely to procrastinate, and finds it much easier to initiate and finish tasks, as well as stay focused on his work. Treatment with dexamphetamine is to continue.

#### **Case 2: 'Jan', age 32 years**

Jan is a 32 year old married woman with two children under 10 years. She is seeing the doctor for assessment and management of her longstanding difficulties with distractibility, restlessness, and difficulties staying on task. In recent times these problems have led to difficulties in her marriage.

In primary school Jan was an inattentive student who daydreamed in class. As her schooling progressed, she struggled with restlessness and minor discipline problems related to being over talkative or disruptive in class. She recalled having difficulty with spelling and leaving homework until the last minute.

In her adult life, Jan is easily distracted and forgetful. She often starts things with great interest only to find herself getting quickly bored. As a result she jumps from one activity to another without finishing things. Jan's father provided information to support Jan's assertions of herself. He described himself as a dreamer who did not apply himself at school.

Jan feels she is a poor time manager and would like to concentrate better.

Following a five-month period on dexamphetamine, Jan's doctor reports that Jan feels calmer and less physically restless. As a consequence she is better able to stay on task and organise her daily life. She describes herself as being able to think more clearly, and feels more in control of her circumstances.

She experienced mild headaches on dexamphetamine as well as some mood lowering effects. She said she was sleeping and eating well and did not believe her mood disturbance affected her work or interaction with her children. In light of the mood effects, Jan agreed to her doctor's suggestion to trial methylphenidate.

**Case 3: 'Jeremy', age 26 years**

Jeremy is a 26 year old married man who has recently undergone successful treatment (a combination of CBT and antidepressant medication) for depression.

He continues to have symptoms of poor concentration, attention, and disorganisation, which have persisted since childhood. These symptoms are particularly evident at work. He describes himself as feeling increasingly fidgety, although he tries to suppress this behaviour as he feels it is socially unacceptable.

Dexamphetamine is prescribed for Jeremy. According to a four-month progress report, Jeremy is doing extremely well. His ADHD symptoms have markedly improved. There have been no significant side effects from the dexamphetamine treatment and no depressive symptoms have reappeared. The doctor has also been treating Jeremy with an antidepressant and there have been no adverse interactions. The doctor recommends Jeremy continue with his current treatment regimen, including CBT.

**Case 4: 'Richard', age 55 years**

Richard presents to the doctor because of a proneness to depression. He has symptoms of ADHD. He has difficulty getting started on tasks and tends to procrastinate excessively. He is highly distractible and tends to sidetrack a lot. He often daydreams and finds it difficult to stop. He fails to complete tasks and finds that his mind wanders if he is not particularly interested in the task. He has difficulty with focusing and the quality of his work is inconsistent. The doctor describes him as being moderately irritable and markedly oversensitive to criticism. He has difficulties with short-term memory, tending to lose track of personal possessions.

He has a lot of mental hyperactivity; he needs to be busy constantly and is more comfortable moving around than he is sitting quietly.

An electrophysiological assessment has been undertaken which the doctor provides to support the application to prescribe dexamphetamine.

In his progress report at six months after commencing treatment with dexamphetamine, Richard's doctor reports that he is doing well. The initial dose was reduced, and no side effects of any significance have occurred.

Richard reports being more patient, more tolerant, and less irritable. There has been a dramatic increase in his ability to focus and stay on task. His ability to prioritise has also improved. He is acting in a more senior role at work which has been extended for a longer period.

**Case 5: 'Robyn', age 29 years**

Robyn has a history characterised by significant symptoms of anxiety and depression. More prominently she has a lifelong history of ADHD. In class as a child she was quite disruptive and could only pay attention when she was very interested in what was going on.

As an adult she has problems organising herself. She has difficulty sustaining attention as well as energy and effort. Other symptoms include irritability, short-term memory difficulty, impulsiveness, and mental hyperactivity.

She has tried two different antidepressants without improvement. Her doctor prescribes dexamphetamine.

Reporting on her progress five months later, Robyn's doctor reports that her improvement is quite impressive. Robyn is less easily distracted, less easily sidetracked and more likely to complete things she starts. Her focus has improved quite significantly, as has her ability to keep her mind on what she is reading. She is able to focus on conversations and her effort fades less quickly. Her irritability has improved quite markedly and there has been a marked decrease in mental hyperactivity.

**Case 6: 'James', age 33 years**

James is a married man with four children aged under 10 years. He is experiencing marital difficulties. James' work involves operating machinery.

James has always thought there was something wrong with his abilities to learn, concentrate and to remember. As a child he was slow to speak clearly, and had serious problems with comprehension of the written word and difficulties with memory. In class he was distractible and disruptive. He was impulsive and often reckless as a child.

As an adult, he has difficulty putting his ideas into practice. He has had countless jobs in his life. Despite the fact that he works hard, he has had a lot of difficulty with being consistent and organised in his work. He doesn't give much thought to the consequences of his actions.

He has a history of amphetamine abuse (intravenous 'speed'). He found it calms him and allows him to focus. Recently, he has reduced his usage to once or twice weekly and does not experience significant withdrawal symptoms or craving. He has occasionally used marijuana.

He has been treated with antidepressants for depression in the past but he did not tolerate them well.

Dexamphetamine is prescribed for James. A progress report after three months treatment indicates that James has been able to make some major improvements in his life. He has started his own business, and is able to manage the tasks required of this, such as bookwork. He is able to cope with daily tasks and decisions, cope with frustrations, and choose a more stable life than he has had

in many years. He has separated from his wife but one of their children is living with him. He has ceased using illicit amphetamines and is relieved to be away from those who use and sell them.

**Case 7: 'Fiona', age 36 years**

Fiona is a married woman with two children aged under 15 years. Her visit to the doctor appears to have been precipitated by the recent diagnosis of ADHD in one of her children. Fiona works with her husband in his business.

In primary school Fiona recalls being easily bored in class. She was frequently chastised by her teachers for failing to complete homework and not living up to her potential. Her academic problems were compounded by her poor spelling ability.

She has difficulty retaining to memory the written word. She is disorganised, has poor short-term memory, and is impulsive. She often attempts to do several things at once but she fails to finish tasks because of her propensity to get distracted. She budgets poorly, spending her money as soon as she earns it. She is prone to butting into conversations or saying things she later regrets. Her husband has expressed unhappiness at the impact her symptoms have had on her family life and business.

Fiona experienced post natal depression after the birth of her second child, which resolved itself without treatment. She suspects her father had ADHD.

Fiona is prescribed dexamphetamine. Her response to the medication was initially disappointing. After an increase in dose Fiona reported experiencing noticeable changes in her ability to concentrate and stay on task. A six-month progress report indicates that Fiona is able to read and retain to memory the written word. She is able to organise herself and plan ahead. She is using diaries and weekly planners to assist with this. Fiona reports she is less likely to act impulsively out of boredom or frustration, and she believes she is happier on medication. She reports being more productive at work. Her sleep and appetite are unaffected.

**Case 8: 'David', age 30 years**

David is a 30 year old married man with no children. He is employed in a professional position and is undergoing tertiary studies.

He recalls a history of distractibility and underachievement at school. He abandoned his education at the year 10 level despite having a good potential for academic achievement.

As an adult, he has problems with inattention and distractibility, and has difficulties organising himself. These problems have become of such significance at work that he has been threatened with dismissal.

He has been treated with antidepressants for symptoms of anxiety and social phobia, and has participated in a social phobia program. He continues to take an antidepressant which helps him to control his anxiety symptoms but the medication does not alleviate his ADHD symptoms.

After four months treatment on methylphenidate, the doctor reports that there has been a very noticeable improvement in David's symptoms. He has been much better organised at work and has been able to step up to a new position that requires more organisation and responsibility.

### **Case 9: 'Maria', age 47 years**

Maria is a 47 year old married woman with two children aged under 15 years. She works as a manager.

She has had ADHD symptoms throughout her life. Her natural ability and intelligence have allowed her to conceal her deficits, and she has succeeded in a difficult work environment by utilising the skills of others.

One of her children has been diagnosed with ADHD and she has been heartened by the child's response to stimulant treatment. She now wants to obtain relief from her symptoms. She does not have symptoms or signs of any other psychiatric problem.

Maria's doctor prescribes dexamphetamine. He reports that Maria is doing extremely well after eight months of treatment. She has had no side effects or complications from the medication. She is coping better in her workplace. Maria reports that she would have liked her short-term memory to have improved, but an increase in dose had adverse effects (insomnia and feelings of overstimulation). The doctor considers that these effects may have been due to an increase in stress Maria is experiencing at her workplace, and will review her medication once her stress levels have lowered.

## 4.3 Trends in the rate of adults treated with stimulant medication

### 4.3.1 Sex

Figure 5 shows the rate (per 10,000 NSW resident population aged 18 years or over) of adults treated with stimulant medication for ADHD as at 30 June for each year in the period 1993 to 2003 according to sex. Over this period, the rate of adults on stimulants for the treatment of ADHD increased markedly, going from less than 0.3 per 10,000 resident population in 1993, when there were fewer than 120 adults on stimulants, to seven per 10,000 resident population in 2003, when there were more than 3,500 adults on stimulants. This represents about a 27-fold increase in the overall rate from 1993 to 2003.

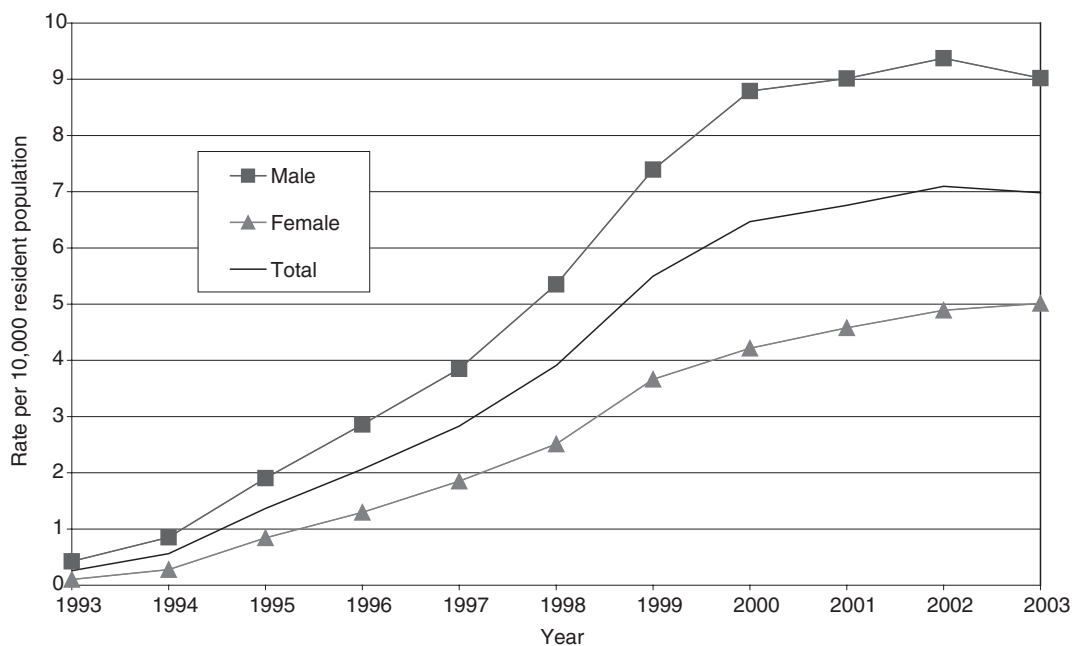
The rate for both sexes increased, but the increase in the rate for adult females was greater than that for adult males. From 1993 to 2003 the increase in the rate of women on stimulant medication was almost twice the average increase. Although the increase in the rate of men on stimulants from 1993 to 2003 was substantial, it was less than the average increase.

A comparison of the sex ratios in 1993 and 2003 also illustrates the increase. Whereas in 1993 the rate for men was 4.2 times the rate for women, the rate for men in 2003 was 1.8 times the rate for women.

It is apparent from Figure 5 that the rate of adults on stimulant medication has slowed in recent years.

**Figure 5**

**Rate per 10,000 NSW resident population of adults treated with stimulant medication for ADHD by year and sex, as at 30 June, 1993 to 2003**



Note: NSW resident population based on Australian Bureau of Statistics estimates as at 30 June.<sup>90</sup>  
Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health



### 4.3.2 Age

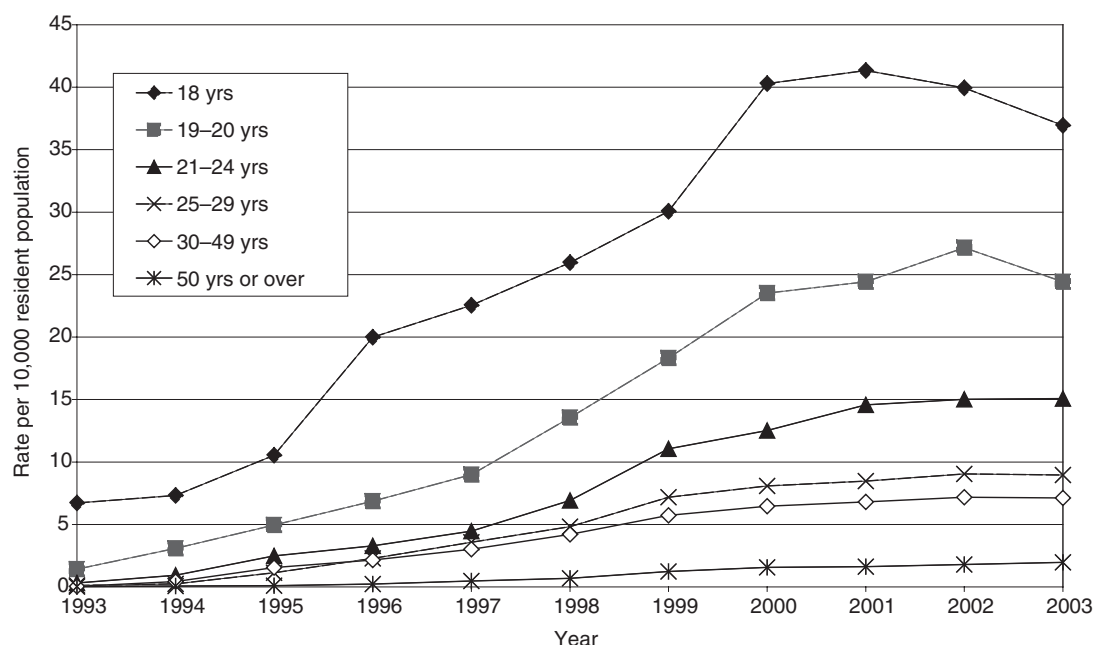
Figure 6 shows the rate (per 10,000 NSW resident population) of adults treated with stimulant medication for ADHD as at 30 June for each year in the period 1993 to 2003 according to age. Over this period, the rate of adults on stimulant medication for the treatment of ADHD generally increased for all groups, particularly during the 1990s. For some age groups the increase was much greater than others, largely because very few adults were on stimulant treatment in 1993 at the start of the trend period.

The rate for all adults on stimulant medication is not shown in Figure 6 but closely follows the trend line for the 30–49 year old age group. It should be noted that although the trend in the rate of stimulant treatment for 30–49 year olds over the period 1993 to 2003 was similar to the trend for all adults, the rate for adults aged 30–49 years in 1993 (less than 0.1 per 10,000 resident population) was much smaller than the average rate in 1993 (0.3 per 10,000 resident population).

Of all age groups, the 30–49 year olds had the largest increase in the rate of treatment from 1993 to 2003, being 5.3 times the average increase. The increase in treatment rate for adults aged 25–29 years was next at 3.1 times the average increase. For those aged 50 years or over the increase was 2.3 times the average increase, and for those aged 21–24 years it was 1.8 times the average increase. Adults aged less than 21 years experienced the smallest increases in rate of treatment, which were less than the average increase.

**Figure 6**

**Rate per 10,000 NSW resident population of adults treated with stimulant medication for ADHD by year and age, as at 30 June, 1993 to 2003**



Note: NSW resident population based on Australian Bureau of Statistics estimates as at 30 June.<sup>90</sup>  
 Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

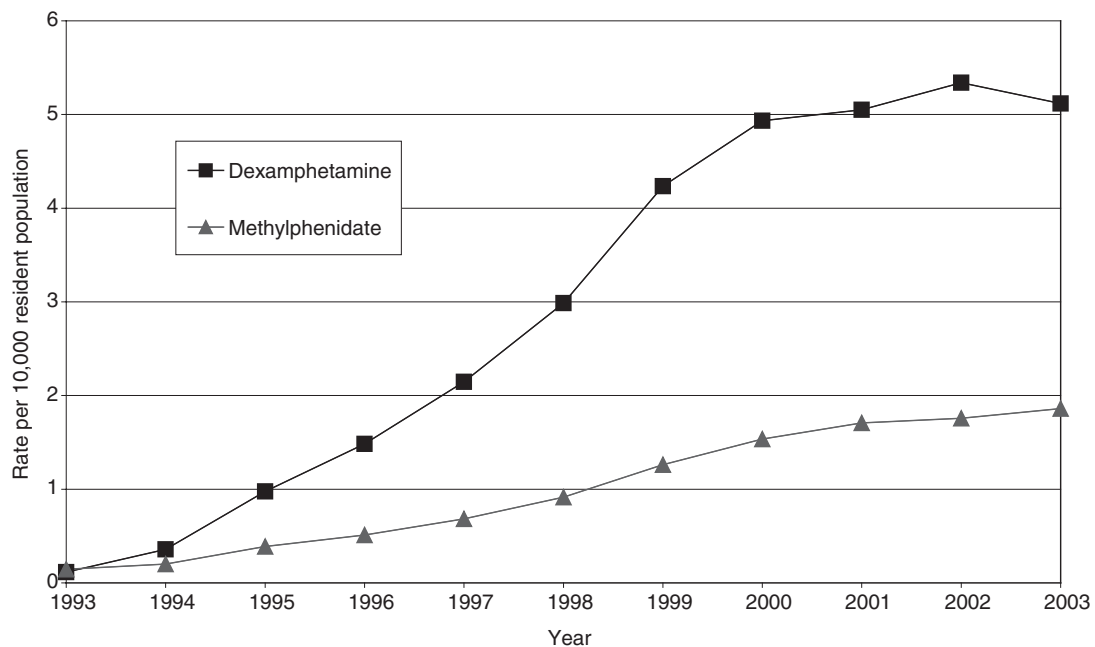


### 4.3.3 Drug

Figure 7 shows the rate (per 10,000 NSW resident population aged 18 years or over) of adults treated with stimulant medication for ADHD as at 30 June for each year in the period 1993 to 2003, according to the drug used for treatment. For almost the entire period the rate of adults on dexamphetamine was higher than the rate of adults on methylphenidate. Further, the rate of increase for dexamphetamine was greater than that for methylphenidate. The increase in the rate of dexamphetamine from 1993 to 2003 was 3.5 times greater than the comparable increase in the rate for methylphenidate.

**Figure 7**

**Rate per 10,000 NSW resident population of adults treated with stimulant medication for ADHD by year and drug, as at 30 June, 1993 to 2003**



Note: Rates for the years 1996 to 1998 and 2003 exclude a small number of adults for whom the drug used could not be determined. NSW resident population based on Australian Bureau of Statistics estimates as at 30 June.<sup>90</sup>

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

## 4.4 Characteristics of adults treated with stimulant medication

### 4.4.1 Age and Sex

Table 2 shows the number of adults with ADHD who were treated with stimulant medication as at 30 June 2003, according to their age and sex. It also shows the ratio of males to females.

As at 30 June 2003 there were 3,549 adults on stimulant medication for the treatment of ADHD. As seen in Table 2, the frequency distribution of age for males and females on stimulant medication was similar.

Men outnumbered women in each age group, ranging from 1.3 times as many men as women in the age group 40–44 years, to three times as many men as women among 21 year olds.

The average age of adults on stimulants as at 30 June 2003 was 32.3 years (SD = 12.3 years). On average, adult females on stimulant medication were slightly older than their male counterparts (33.7 years, SD = 12.2 years versus 31.6 years; SD = 12.2 years, respectively). The oldest person on stimulant medication as at 30 June 2003 was aged 82 years.

**Table 2**

**Number and per cent of adults treated with stimulant medication for ADHD as at 30 June 2003 by age and sex**

| Age (Years) | Males |      | Females |      | Total |      | Ratio M/F |
|-------------|-------|------|---------|------|-------|------|-----------|
|             | N     | %    | N       | %    | N     | %    |           |
| 18          | 233   | 10.3 | 106     | 8.2  | 339   | 9.6  | 2.2       |
| 19          | 164   | 7.3  | 70      | 5.4  | 234   | 6.6  | 2.3       |
| 20          | 152   | 6.7  | 60      | 4.6  | 212   | 6.0  | 2.5       |
| 21          | 127   | 5.6  | 42      | 3.2  | 169   | 4.8  | 3.0       |
| 22–24       | 244   | 10.8 | 130     | 10.0 | 374   | 10.5 | 1.9       |
| 25–29       | 253   | 11.2 | 161     | 12.4 | 414   | 11.7 | 1.6       |
| 30–34       | 253   | 11.2 | 148     | 11.4 | 401   | 11.3 | 1.7       |
| 35–39       | 211   | 9.4  | 137     | 10.6 | 348   | 9.8  | 1.5       |
| 40–44       | 202   | 9.0  | 153     | 11.8 | 355   | 10.0 | 1.3       |
| 45–49       | 179   | 7.9  | 129     | 10.0 | 308   | 8.7  | 1.4       |
| 50–54       | 137   | 6.1  | 84      | 6.5  | 221   | 6.2  | 1.6       |
| 55 or over  | 99    | 4.4  | 75      | 5.8  | 174   | 4.9  | 1.3       |
| Total       | 2,254 | 100  | 1,295   | 100  | 3,549 | 100  | 1.7       |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

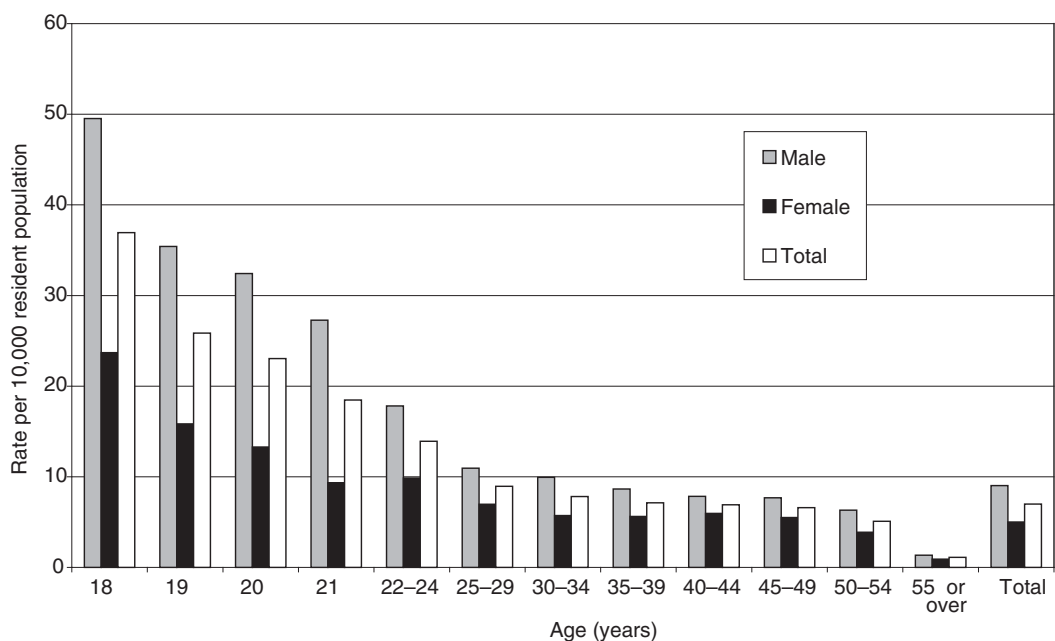
Figure 8 shows the rate (per 10,000 NSW resident population aged 18 years or over) of adults treated with stimulant medication for ADHD as at 30 June 2003 by age and sex.

The rate of adults on stimulant medication for the treatment of ADHD as at 30 June 2003 was seven per 10,000 resident population or about one in every 1,429 adults. The youngest adults had the highest rate, with 18 years olds (36.9 per 10,000 resident population) having a rate about five times the average.

As shown previously in Table 2, the ratio of males to females varied somewhat by age.

**Figure 8**

**Rate per 10,000 NSW resident population of adults treated with stimulant medication for ADHD as at 30 June 2003 by age and sex**



Note: NSW resident population based on Australian Bureau of Statistics preliminary estimates as at 30 June 2003.<sup>90</sup>

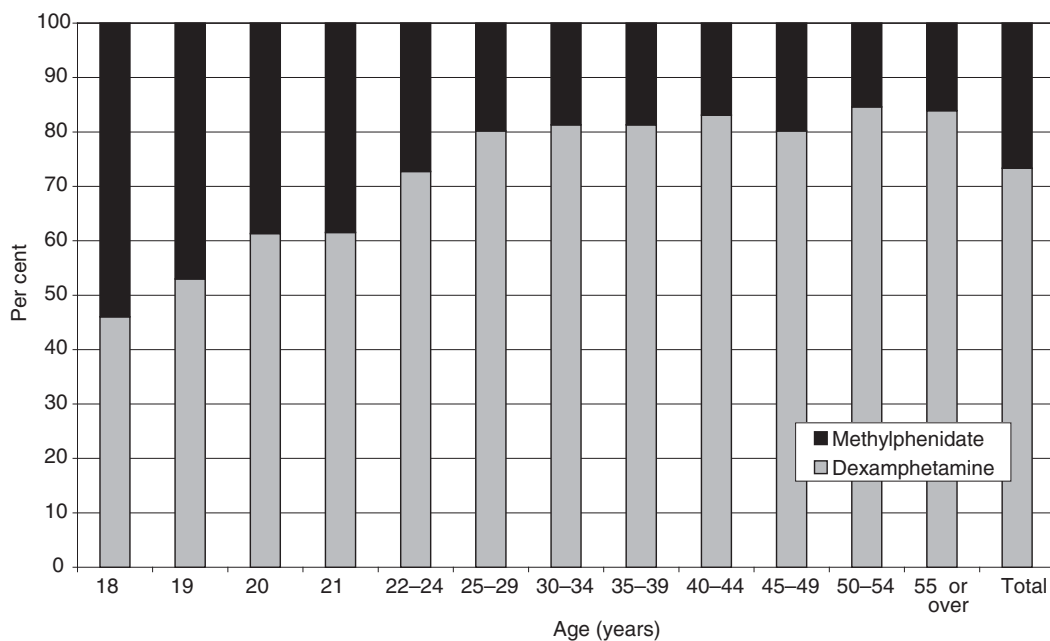
Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

#### 4.4.2 Age and drug

Figure 9 shows the percentage of adults who were being treated with stimulant medication for ADHD as at 30 June 2003 according to the drug used for treatment and age. With the exception of 18 year olds, a greater proportion of adults were treated with dexamphetamine than methylphenidate for all age groups. Overall, 73.3 per cent of adults were treated with dexamphetamine compared with 26.7 per cent for methylphenidate.

**Figure 9**

**Per cent of adults treated with stimulant medication for ADHD as at 30 June 2003 by age and drug**



Note: Excludes two persons aged 18 years for whom the drug used could not be determined.

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

#### 4.4.3 Area health service of residence and sex

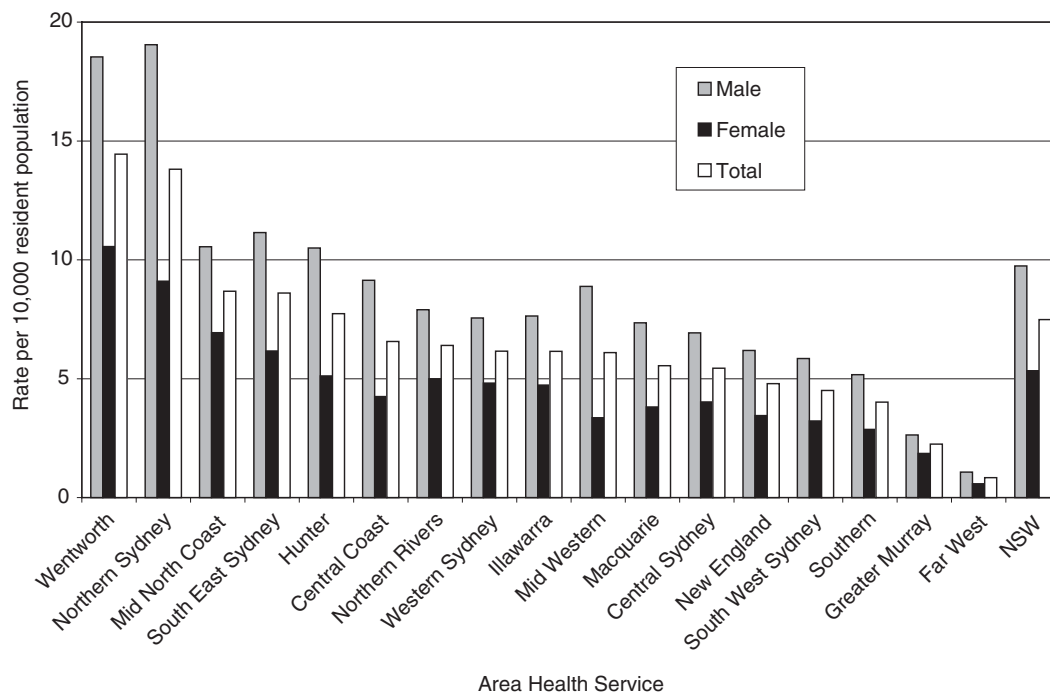
Figure 10 shows the rate (per 10,000 resident population aged 18 years or over) of adults treated with stimulant medication for ADHD as at 30 June 2003 for each area health service in NSW by sex.

The Wentworth Area Health Service had the highest overall rate (14.4 per 10,000 resident population) closely followed by the Northern Sydney Area Health Service (13.8 per 10,000 resident population). These rates were about 1.9 times the State average. The Far West Area Health Service had the lowest rate (0.8 per 10,000 resident population) followed by the Greater Murray Area Health Service (2.2 per 10,000 resident population).

In each area health service, the rate for males was higher than the rate for females, although the male to female ratio varied across areas. In the Greater Murray Area Health Service, for example, the rate for men was 1.4 times the rate for women. In contrast, the rate for men was 2.6 times the rate for women in the Mid Western Area Health Service.

**Figure 10**

**Rate per 10,000 resident population of adults treated with stimulant medication for ADHD as at 30 June 2003 by area health service and sex**



Note: Excludes seven people who were in a correctional facility. Resident population based on Australian Bureau of Statistics population data as at 30 June 2001.<sup>91</sup>

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

#### 4.4.4 Age status at initiation of treatment

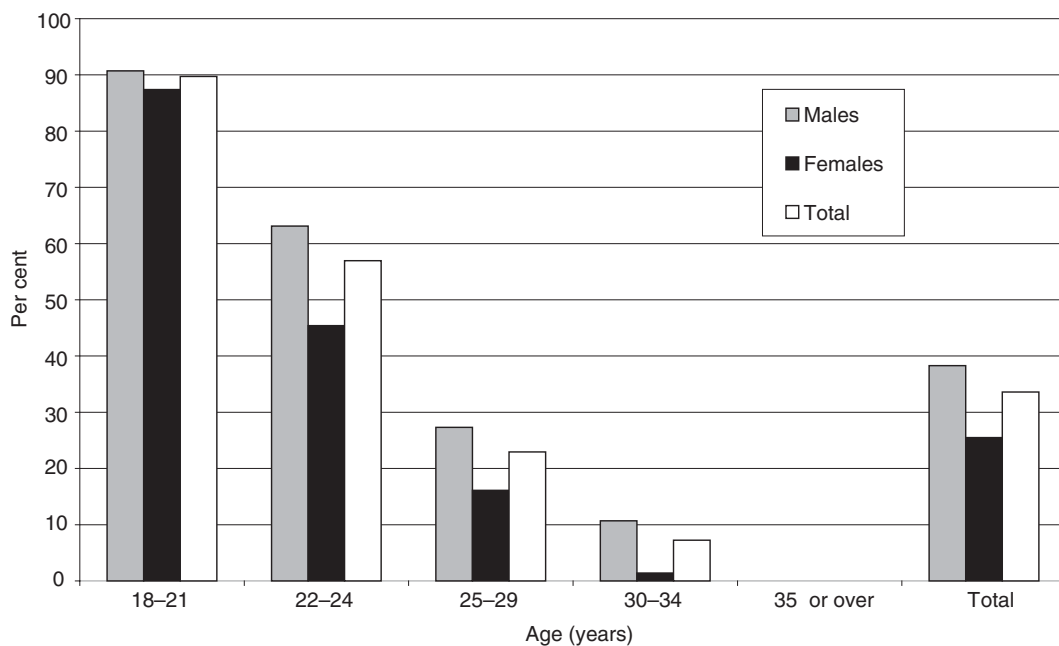
Figure 11 shows the proportion of adults on stimulants as at 30 June 2003 who were started on stimulant medication as a child according to age group and sex.

About one-third (33.6 per cent) of adults on stimulant medication as at 30 June 2003 were first started on stimulants when they were a child, while two-thirds were adults when initiated on stimulants. These proportions varied markedly according to age group. Almost 90 per cent of adults aged 18 to 21 years as at 30 June 2003 were first treated with stimulants when they were a child. This proportion fell to 57 per cent for adults aged 22–24 years, to 23 per cent for adults aged 25–29 years, and to 7.2 per cent for adults aged 30–34 years. No adult aged 35 years or over as at 30 June 2003 had been treated with stimulants as a child.

It can be seen in Figure 11 that proportionally fewer women were first commenced on stimulant medication as a child than were men. Overall, 25.5 per cent of women were first treated with stimulants as a child while the figure for men was 38.3 per cent.

**Figure 11**

**Per cent of adults treated with stimulant medication for ADHD as at 30 June 2003 who were first treated with stimulants as a child, by age and sex**



Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

#### 4.4.5 Duration of stimulant treatment

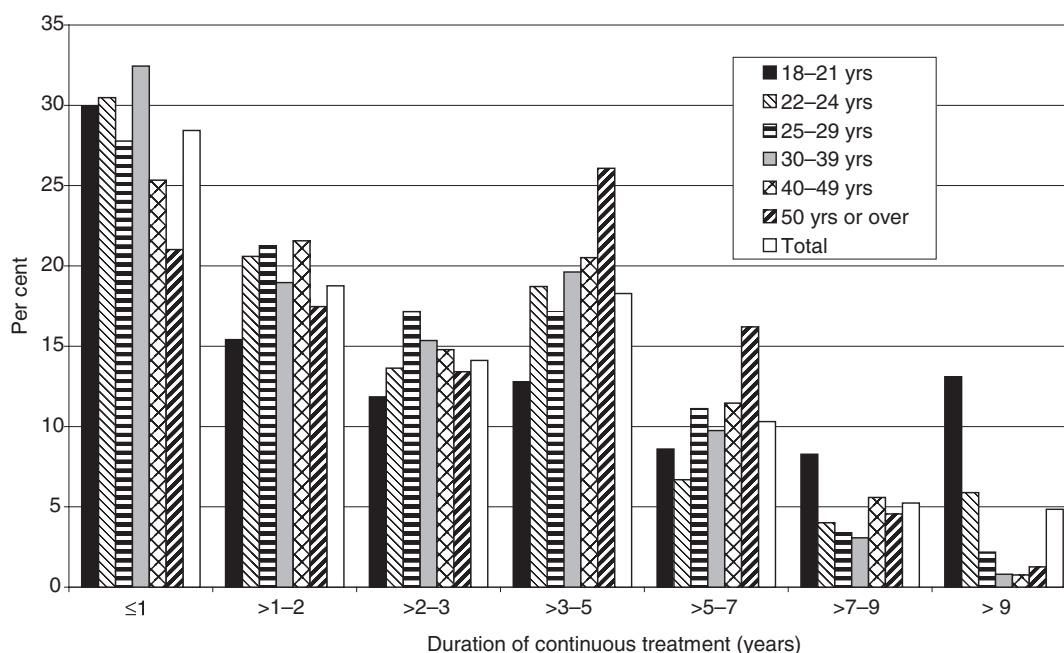
Figure 12 presents data on the length of time spent continuously on stimulant medication by adults with ADHD as at 30 June 2003 according to age. The time on medication includes any relevant periods as a child and as an adult.

Most adults on stimulant medication as at 30 June 2003 had been on stimulants for a relatively short period of time. However, a notable proportion were on medication for a long period. Overall, 20.4 per cent had been on medication continuously for more than five years. The proportion in continuous treatment for more than nine years was almost five per cent. The longest period an adult had been continuously on stimulant medication was about 17 years.

It can be seen in Figure 12 that the duration of treatment varied somewhat according to age. A higher proportion of younger adults were on medication for relatively long periods compared with older adults. Just over 13 per cent of adults aged 18–21 years had been on stimulant medication for more than nine years. The figure for adults aged 22–24 years was 5.9 per cent. Less than one per cent of adults aged 30 years or over had been on medication continuously for more than nine years.

**Figure 12**

**Per cent of adults treated with stimulant medication for ADHD as at 30 June 2003 by duration of continuous treatment and age**



Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

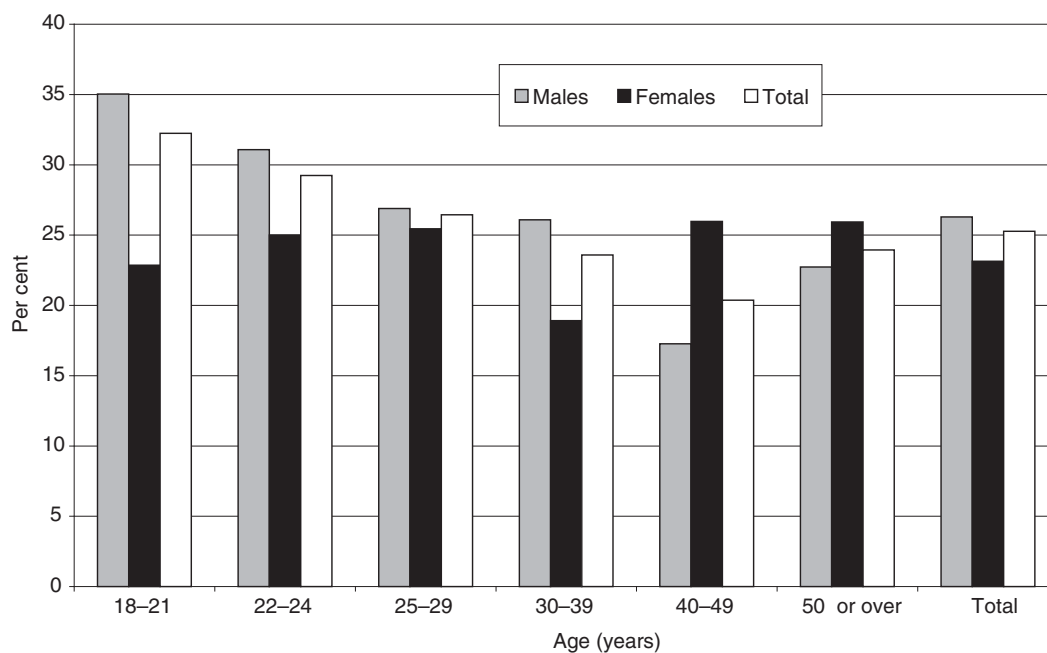
## 4.5 Attrition from stimulant treatment

Figure 13 examines attrition from treatment for adults who started stimulant treatment for ADHD for the first time in 1998. The percentage of adults who discontinued after the initial treatment episode (that is, the first authority or first prescription) by age and sex is presented in Figure 13.

Overall, about one-quarter of adults who started stimulants for the treatment of ADHD for the first time in 1998, discontinued treatment after the initial treatment episode. This percentage varied according to age and sex. Generally, males who were older when they started were less likely to discontinue after initial treatment than their younger counterparts. For example, 17.3 per cent of men aged 40–49 years discontinued treatment, while the proportion of men aged 18–21 years who discontinued treatment was 35.0 per cent. This pattern was not apparent for women.

**Figure 13**

**Per cent of adults treated with stimulant medication for ADHD for the first time in 1998 who discontinued after the initial treatment episode by age and sex**



Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health



## 5. Discussion

This study has presented trends in the prescribing of stimulant medication for the treatment of ADHD in adults in NSW. Although there is very little available data with which to compare these trends, they are generally consistent with reported patterns of stimulant prescribing in Australia and overseas.

Over the 1990s and into the early 2000s in NSW, there was a significant increase in the prescribing of stimulant medication for the treatment of ADHD in adults. A similar upward trend in the overall use of stimulants has been reported for Australia, the United States, Canada, New Zealand, and several European countries.<sup>54</sup> Salmelainen (2002) also showed that prescribing of stimulants for children with ADHD in NSW increased markedly during the decade leading up to 2000.<sup>55</sup>

These increases are likely to be caused by a number of factors. In recent years, ADHD as a disorder afflicting adults has gained greater acceptance, with a variety of scientific evidence supporting the validity of the adult form of ADHD.<sup>14</sup> It is now well understood that ADHD does not disappear as adulthood is attained, but rather persists in a significant proportion of child sufferers.<sup>43-45</sup> This raised awareness and understanding of the disorder has increased the likelihood of people seeking and receiving treatment. Another factor likely to have played a role in the upward trend in stimulant prescribing is the increased availability of specialised services for assessing and treating adult patients.

The trends in the present study indicate that prescribing of stimulant medication for adults with ADHD has changed somewhat with respect to the age and sex of the patient involved. Over the 1990s to the early 2000s, the age profile of patients has generally matured. Whereas in the early 1990s adults first commenced on stimulants were dominated by young adults aged less than 30 years, and particularly in their teens, by 2002 adults aged 30 years and older formed the majority. Similarly, the increases in rates of stimulant treatment over the trend period were greatest for adults aged 30 years and over. As at June 2003 young adults still had the greatest rate of treatment. This is to be expected given that symptoms of ADHD decline with age.<sup>42</sup>

The results of this study suggest a very small proportion of adults with ADHD are receiving stimulant treatment. The rate of stimulant treatment for adults with ADHD in NSW was less than 0.1 per cent as at June 2003. This represents only a fraction of the two per cent of adults estimated to be affected by ADHD. Added to this, two-thirds of the adults on stimulant treatment as at June 2003 commenced stimulants for the first time when they were an adult, while only one-third had been treated as children. Thus, for many adults the treatment they do receive is a long time coming.

Over time, the sex distribution of adults in stimulant treatment in NSW has changed. While males comprised the majority of adults commenced on stimulant medication and evidenced the higher rate of treatment, their majority was reduced somewhat over time. The increased representation of females in adult treatment figures is consistent with trends in prescribing for children in NSW.<sup>55</sup> The ratio of males to females in the present study (about two to one) was much lower than that seen for children (about five to one). A more even gender distribution among adults with ADHD has been reported elsewhere.<sup>51</sup> This occurs for several reasons. As people with ADHD age, the way in which they come to be assessed and

treated changes. Among children, boys tend to attract more attention than girls because they are more hyperactive and disruptive in their behaviour. They may be referred for assessment and treatment by a variety of individuals. Referral for adults is typically self-referral and therefore generally not subject to this gender-based referral bias. Indeed, among the adult population, females may be more willing and likely to seek treatment than males. Also, in recent years, there has been a greater emphasis on the inattentive aspects of ADHD, which are typically predominant among females with ADHD.

The drug most commonly used for the treatment of adult ADHD in NSW is dexamphetamine. A larger proportion of adults are started on dexamphetamine than methylphenidate, and the rate of treatment with dexamphetamine is higher than that for methylphenidate. There is no evidence available to indicate which drug provides better treatment for adults. In the United States, methylphenidate has traditionally been the stimulant of choice. In NSW, the cost of the medication is likely to play a large role in drug choice. A 100 tablet supply of dexamphetamine is presently available for about a third of the cost of the same quantity of methylphenidate. The extended release preparations (only available for methylphenidate) are more expensive again, and as they become more widely used in the future, the cost differential between dexamphetamine and methylphenidate will become more marked.

Almost three-quarters of adults in the present study were being treated with dexamphetamine as at June 2003. The percentage treated with dexamphetamine was quite low among the youngest adults (around 50 per cent for 18–19 year olds), while somewhat high among the eldest adults (around 85 per cent for people aged 50 years and over). These relative differences contrast with the pattern of prescribing seen for children in NSW. In December 2000, just under half of all children with ADHD treated with stimulants in NSW were prescribed dexamphetamine. Across age groups, the percentage variation was much smaller, going from about 43 per cent (four year olds) to about 54 per cent (9–11 year olds).<sup>55</sup>

The relatively low rate of dexamphetamine treatment among young adults (as compared with older adults) is largely explained by the fact that many of these individuals initially received treatment when they were children. The tendency for more children to be treated with methylphenidate than dexamphetamine thus appears to carry over into young adulthood for those individuals for whom treatment is commenced during childhood. Overall differences between children and adults in the type of stimulant medication used in treating ADHD may relate to the cost of treatment and/or variations in drug effectiveness and tolerance. They may also relate to prescriber differences, such as specialty (paediatrician versus psychiatrist).<sup>61</sup>

As has been noted in other studies,<sup>54–57,59</sup> there are regional differences in rates of stimulant treatment. In the present study, five out of 17 area health services in NSW had rates of treatment higher than the State average. In two area health services, the rate of stimulant treatment was no more than a third of the State average. It should be noted that the area health service with the lowest rate (the Far West Area Health Service) is a geographically remote area and has very limited specialist health services compared with other areas in NSW.

It is interesting that the geographical pattern of prescribing seen for adults in this study was not the same as that previously reported for children in NSW.<sup>55</sup> Whereas in this study the Wentworth Area Health Service recorded the highest rate of

treatment in NSW, it ranked as the fifth highest area for rate of stimulant treatment for children. The second highest ranked health area for adults, Northern Sydney Area Health Service, was the eighth highest area health service for rate of stimulant treatment for children. The Far West Area Health Service had the lowest rate of treatment for both adults and children, lending further support to the notion that limited service availability contributes significantly to its low rate. Availability of services may also contribute generally to regional differences in rates of treatment. Among other factors, regional and age differences in treatment rates may also be influenced by different rates of disorder persistence, differences in treatment retention rates, socioeconomic factors, and variations in prescriber practices.

With ADHD being a chronic disorder, it is not surprising that a considerable number of adults were found in the present study to be receiving stimulant treatment for relatively long periods of time. About one-fifth of adults on treatment as at June 2003 had been on medication continuously for more than five years.

As has been observed for children commenced on stimulant medication,<sup>55</sup> a relatively high proportion of patients do not continue with stimulant treatment after initial treatment. For adults examined in this study, about one in four discontinued treatment after their first episode. There is some evidence to suggest that this rate of attrition may be higher for younger age groups than older age groups. An attrition rate of the magnitude found in this study is consistent with reports that stimulant treatment is not effective in about one-quarter of adults with ADHD.<sup>63,64</sup>

The present examination of individuals commenced on stimulant medication for the first time indicates that stimulant treatment is effective for many adult ADHD sufferers. Of the 58 patients commenced on medication for the first time in November to December 2002 and for whom information on treatment effectiveness was available, 53 reported improvements in their symptoms. The remaining five patients reported a mixed response to medication. Unfortunately, information on treatment effectiveness for 40 of the 98 patients who commenced treatment for the first time was not available.

The analysis of the sample of adults with ADHD treated with stimulant medication for the first time found many features commonly reported for adults with ADHD. Comorbidity, or a history of other disorders, was quite prevalent. More than half (55.1 per cent) were reported to have a history of some type of mental health problem other than ADHD. About 45 per cent of the adults had current or previous depression. Almost one in five experienced anxiety at some time. Differential diagnosis and management of comorbidity can be complex. For example, some adults, having experienced ADHD symptoms most of their lives, fail to recognise that their ADHD symptoms are problematic or treatable. It is not until they experience acute mood or anxiety symptoms that they present for assessment and treatment. Because the mood or anxiety problem is the most salient, the clinician may not detect the underlying ADHD. Treatment of these salient symptoms only, and not the underlying ADHD, may lead to a partial response including a continuation of impairment. Stimulant medication, either alone or in conjunction with other psychotropic medication, may relieve the comorbid symptoms, as well as the ADHD symptoms, especially if the comorbid symptoms are a consequence of the untreated ADHD.<sup>1,94</sup>

The presence of ADHD behaviours in adulthood increases the risk for substance abuse disorders.<sup>40</sup> A history of substance abuse or problematic drug use was evident in about 13 per cent of the sample of adults commenced on stimulants

for the first time. In these cases, cannabis was the most commonly reported drug but other substances used included: alcohol, amphetamines, ecstasy, cocaine, heroin, LSD, and therapeutic narcotics. An apparent preference for cannabis among young adult males with ADHD has been reported elsewhere.<sup>10,43</sup>

Although not advocated as an integral part of assessment for ADHD, electrophysiological assessment was commonly employed in relation to adults commenced on stimulant medication. Among the sample of patients examined, just over one-third had undergone (or were referred for) such assessment. In many of these assessments (seemingly conducted by a single specialist centre), the patient also appeared to have undergone assessment with a variety of other tools, including the Wender Utah Rating Scale. That a notable proportion of adults with ADHD undergo such assessment, which is seemingly independent of the doctor treating the patient, suggests that validation of the disorder by some objective means is important to many patients and/or medical practitioners.

A number of adults commenced on stimulants for the first time had undergone non-stimulant treatments. Of the sample examined, about 32 per cent had been treated with a non-stimulant medication. Almost one-quarter had undergone some type of treatment that did not involve medication, such as psychotherapy or cognitive behaviour therapy. It should be noted here that these figures may not include all cases where other treatment was used. The analysis of the sample of adults who commenced treatment for the first time was restricted to information provided by doctors as part of their application for approval to prescribe stimulants. In some cases, they may have failed to provide some details and therefore the prevalence of other treatments, and indeed other characteristics of the sample of adults who commenced for the first time, may be higher than presented here.

It is widely accepted that the treatment of ADHD should not be limited to medication. Although there is very little scientific research to support the use of specific psychosocial or behavioural interventions, there are a variety of strategies that patients can employ to improve their functioning. The more commonly suggested strategies include: joining a support group, environmental restructuring (such as using a daily planner, keeping duplicate keys in accessible locations, obtaining written instructions, using checklists), undergoing communication skills and anger management training, and using a coach. The idea of coaching is to have a person (such as a friend or hired professional) help the individual to solve problems by clarifying goals and developing the skills and strategies needed to achieve those goals. The coach provides encouragement and keeps in regular contact with the individual.<sup>2</sup>

In Australia, the National Health and Medical Research Council has recommended the development of comprehensive treatment management plans for individuals with ADHD.<sup>37</sup> This recommendation is adopted in NSW criteria issued to doctors for the prescribing of stimulant medication for adults with ADHD.<sup>88</sup>

As discussed earlier, ADHD as an adult disorder continues to be controversial, partly because of issues relating to its diagnosis and partly because stimulant medication is the mainstay of treatment. The key to addressing any concerns regarding the use of stimulant medication is to ensure that comprehensive assessment procedures are used. Given the high prevalence of comorbidity and the overlap of ADHD with other disorders, the assessment procedure is vital for differentiating patients who have ADHD and those who don't, and ensuring only those who require stimulant medication are treated with such. Considered

assessment is also necessary to identify those adults who may be at risk of drug misuse.

For patients at risk of substance abuse, stimulant medication may still be appropriate, but requires the doctor to be more prudent. In such cases, the doctor might limit the number of tablets with each prescription and carefully record what he or she has prescribed. The doctor should maintain frequent contact with these patients and document their improvement with established rating instruments. Urine toxicology testing can be used on a scheduled and random basis. To limit the potential for abuse, extended release or long-acting stimulant preparations can be prescribed.<sup>74</sup>

In conclusion, while this report has shown that in NSW there has been a marked upward trend in the prescribing of stimulant medication for adults in the last 10 or so years, the prescribing has not been excessive. Further, data suggest that stimulant prescribing for adults has levelled off somewhat in recent years. Relative to the number of children with ADHD who are already undergoing stimulant treatment, and the likely number of adults with ADHD in the community, only a minority of adults with ADHD are undergoing stimulant treatment. The challenge for the mental health system is to ensure that those adult individuals who require assistance are identified and provided with appropriate treatment, and therefore given the opportunity to maximise their potential.

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## 7. Appendix

The following tables present the data shown in Figures 1–13.

Data for Figure 1: Number of adults with ADHD commenced on stimulant medication for the first time by year of commencement and sex, 1990 to 2002

| <b>Year</b> | <b>Males</b> | <b>Females</b> | <b>Total</b> |
|-------------|--------------|----------------|--------------|
| 1990        | 19           | 2              | 21           |
| 1991        | 27           | 8              | 35           |
| 1992        | 37           | 17             | 54           |
| 1993        | 42           | 17             | 59           |
| 1994        | 192          | 97             | 289          |
| 1995        | 453          | 249            | 702          |
| 1996        | 460          | 275            | 735          |
| 1997        | 523          | 241            | 764          |
| 1998        | 700          | 337            | 1,037        |
| 1999        | 590          | 344            | 934          |
| 2000        | 649          | 379            | 1,028        |
| 2001        | 557          | 369            | 926          |
| 2002        | 453          | 284            | 737          |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 2: Average age of adults with ADHD commenced on stimulant medication for the first time by year of commencement, 1990 to 2002

| <b>Year</b> | <b>Average Age (Years)</b> |
|-------------|----------------------------|
| 1990        | 23.2                       |
| 1991        | 29.0                       |
| 1992        | 28.1                       |
| 1993        | 30.1                       |
| 1994        | 31.6                       |
| 1995        | 32.7                       |
| 1996        | 33.4                       |
| 1997        | 33.0                       |
| 1998        | 33.4                       |
| 1999        | 33.0                       |
| 2000        | 33.3                       |
| 2001        | 33.4                       |
| 2002        | 33.6                       |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 3: Relative frequency distribution of age for adults with ADHD commenced on stimulant medication for the first time, 1992 and 2002

| <b>Age (Years)</b> | <b>1992</b> | <b>2002</b> |
|--------------------|-------------|-------------|
| 18                 | 24.1        | 4.2         |
| 19                 | 9.3         | 3.7         |
| 20                 | 5.6         | 4.5         |
| 21                 | 7.4         | 2.7         |
| 22–24              | 5.6         | 8.1         |
| 25–29              | 14.8        | 17.2        |
| 30–34              | 7.4         | 17.0        |
| 35–39              | 5.6         | 12.5        |
| 40–44              | 7.4         | 12.6        |
| 45–49              | 3.7         | 8.4         |
| 50 or over         | 9.3         | 9.1         |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 4: Number of adults with ADHD commenced on stimulant medication for the first time by year of commencement and drug, 1990 to 2002

| <b>Year</b> | <b>Dexamphetamine</b> | <b>Methylphenidate</b> |
|-------------|-----------------------|------------------------|
| 1990        | 8                     | 13                     |
| 1991        | 22                    | 13                     |
| 1992        | 38                    | 16                     |
| 1993        | 46                    | 13                     |
| 1994        | 239                   | 50                     |
| 1995        | 579                   | 123                    |
| 1996        | 617                   | 118                    |
| 1997        | 660                   | 104                    |
| 1998        | 905                   | 132                    |
| 1999        | 795                   | 139                    |
| 2000        | 857                   | 171                    |
| 2001        | 724                   | 202                    |
| 2002        | 604                   | 133                    |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 5: Rate per 10,000 NSW resident population of adults treated with stimulant medication for ADHD by year and sex, as at 30 June, 1993 to 2003

| Year | Males | Females | Total |
|------|-------|---------|-------|
| 1993 | 0.4   | 0.1     | 0.3   |
| 1994 | 0.9   | 0.3     | 0.6   |
| 1995 | 1.9   | 0.8     | 1.4   |
| 1996 | 2.9   | 1.3     | 2.1   |
| 1997 | 3.9   | 1.8     | 2.8   |
| 1998 | 5.4   | 2.5     | 3.9   |
| 1999 | 7.4   | 3.7     | 5.5   |
| 2000 | 8.8   | 4.2     | 6.5   |
| 2001 | 9.0   | 4.6     | 6.8   |
| 2002 | 9.4   | 4.9     | 7.1   |
| 2003 | 9.0   | 5.0     | 7.0   |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 6: Rate per 10,000 NSW resident population of adults treated with stimulant medication for ADHD by year and age, as at 30 June, 1993 to 2003

| Year | 18 yrs | 19–20 yrs | 21–24 yrs | 25–29 yrs | 30–49 yrs | 50 yrs or over |
|------|--------|-----------|-----------|-----------|-----------|----------------|
| 1993 | 6.7    | 1.4       | 0.3       | 0.1       | 0.1       | 0.0            |
| 1994 | 7.3    | 3.1       | 0.9       | 0.2       | 0.4       | 0.1            |
| 1995 | 10.5   | 4.9       | 2.5       | 1.1       | 1.5       | 0.1            |
| 1996 | 20.0   | 6.9       | 3.3       | 2.3       | 2.2       | 0.2            |
| 1997 | 22.5   | 9.0       | 4.5       | 3.6       | 3.0       | 0.5            |
| 1998 | 26.0   | 13.6      | 6.9       | 4.8       | 4.2       | 0.7            |
| 1999 | 30.1   | 18.3      | 11.1      | 7.2       | 5.7       | 1.2            |
| 2000 | 40.3   | 23.5      | 12.5      | 8.1       | 6.5       | 1.6            |
| 2001 | 41.3   | 24.4      | 14.6      | 8.5       | 6.8       | 1.6            |
| 2002 | 39.9   | 27.2      | 15.0      | 9.1       | 7.2       | 1.8            |
| 2003 | 36.9   | 24.4      | 15.1      | 9.0       | 7.1       | 2.0            |

Note: The 1993 rate for persons aged 30–49 years was less than 0.1 but is shown as 0.1 due to rounding.  
The 1993 rate for persons aged 50 year or over was more than 0.0 but is shown as 0.0 due to rounding.  
Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 7: Rate per 10,000 NSW resident population of adults treated with stimulant medication for ADHD by year and drug, as at 30 June, 1993 to 2003

| <b>Year</b> | <b>Dexamphetamine</b> | <b>Methylphenidate</b> |
|-------------|-----------------------|------------------------|
| 1993        | 0.1                   | 0.1                    |
| 1994        | 0.4                   | 0.2                    |
| 1995        | 1.0                   | 0.4                    |
| 1996        | 1.5                   | 0.5                    |
| 1997        | 2.1                   | 0.7                    |
| 1998        | 3.0                   | 0.9                    |
| 1999        | 4.2                   | 1.3                    |
| 2000        | 4.9                   | 1.5                    |
| 2001        | 5.1                   | 1.7                    |
| 2002        | 5.3                   | 1.8                    |
| 2003        | 5.1                   | 1.9                    |

Note: Rates for the years 1996 to 1998 and 2003 exclude a small number of adults for whom the drug used could not be determined.

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 8: Rate per 10,000 NSW resident population of adults treated with stimulant medication for ADHD as at 30 June 2003 by age and sex

| <b>Age (Years)</b> | <b>Males</b> | <b>Females</b> | <b>Total</b> |
|--------------------|--------------|----------------|--------------|
| 18                 | 49.5         | 23.7           | 36.9         |
| 19                 | 35.4         | 15.8           | 25.9         |
| 20                 | 32.4         | 13.3           | 23.0         |
| 21                 | 27.3         | 9.4            | 18.5         |
| 22–24              | 17.8         | 9.9            | 13.9         |
| 25–29              | 11.0         | 7.0            | 9.0          |
| 30–34              | 9.9          | 5.7            | 7.8          |
| 35–39              | 8.6          | 5.6            | 7.1          |
| 40–44              | 7.8          | 6.0            | 6.9          |
| 45–49              | 7.7          | 5.5            | 6.6          |
| 50–54              | 6.3          | 3.9            | 5.1          |
| 55 or over         | 1.3          | 0.9            | 1.1          |
| Total              | 9.0          | 5.0            | 7.0          |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 9: Per cent of adults treated with stimulant medication for ADHD as at 30 June 2003 by age and drug

| <b>Age (Years)</b> | <b>Dexamphetamine</b> | <b>Methylphenidate</b> |
|--------------------|-----------------------|------------------------|
| 18                 | 46.0                  | 54.0                   |
| 19                 | 53.0                  | 47.0                   |
| 20                 | 61.3                  | 38.7                   |
| 21                 | 61.5                  | 38.5                   |
| 22–24              | 72.7                  | 27.3                   |
| 25–29              | 80.2                  | 19.8                   |
| 30–34              | 81.3                  | 18.7                   |
| 35–39              | 81.3                  | 18.7                   |
| 40–44              | 83.1                  | 16.9                   |
| 45–49              | 80.2                  | 19.8                   |
| 50–54              | 84.6                  | 15.4                   |
| 55 or over         | 83.9                  | 16.1                   |
| <b>Total</b>       | <b>73.3</b>           | <b>26.7</b>            |

Note: Excludes two persons aged 18 years for whom the drug used could not be determined.

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 10: Rate per 10,000 resident population of adults treated with stimulant medication for ADHD as at 30 June 2003 by area health service and sex

| <b>Area Health Service</b> | <b>Males</b> | <b>Females</b> | <b>Total</b> |
|----------------------------|--------------|----------------|--------------|
| Wentworth                  | 18.5         | 10.6           | 14.4         |
| Northern Sydney            | 19.1         | 9.1            | 13.8         |
| Mid North Coast            | 10.5         | 6.9            | 8.7          |
| South East Sydney          | 11.1         | 6.2            | 8.6          |
| Hunter                     | 10.5         | 5.1            | 7.7          |
| Central Coast              | 9.1          | 4.2            | 6.6          |
| Northern Rivers            | 7.9          | 5.0            | 6.4          |
| Western Sydney             | 7.6          | 4.8            | 6.2          |
| Illawarra                  | 7.6          | 4.7            | 6.2          |
| Mid Western                | 8.9          | 3.4            | 6.1          |
| Macquarie                  | 7.4          | 3.8            | 5.6          |
| Central Sydney             | 6.9          | 4.0            | 5.4          |
| New England                | 6.2          | 3.4            | 4.8          |
| South West Sydney          | 5.8          | 3.2            | 4.5          |
| Southern                   | 5.2          | 2.9            | 4.0          |
| Greater Murray             | 2.6          | 1.9            | 2.2          |
| Far West                   | 1.1          | 0.6            | 0.8          |
| <b>NSW</b>                 | <b>9.7</b>   | <b>5.3</b>     | <b>7.5</b>   |

Note: Excludes seven people who were in a correctional facility. Rates are based on population data for 2001 (rather than 2003) and therefore are higher than rates shown in other figures.

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 11: Per cent of adults treated with stimulant medication for ADHD as at 30 June 2003 who were first treated with stimulants as a child, by age and sex

| Age (Years) | Males | Female | Total |
|-------------|-------|--------|-------|
| 18–21       | 90.7  | 87.4   | 89.7  |
| 22–24       | 63.1  | 45.4   | 57.0  |
| 25–29       | 27.3  | 16.1   | 22.9  |
| 30–34       | 10.7  | 1.4    | 7.2   |
| 35 or over  | 0.0   | 0.0    | 0.0   |
| Total       | 38.3  | 25.5   | 33.6  |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 12: Per cent of adults treated with stimulant medication for ADHD as at 30 June 2003 by duration of continuous treatment and age

| Age (Years) | Duration of Continuous Treatment (Years) |       |       |       |       |       |      |
|-------------|--|-------|-------|-------|-------|-------|------|
|             | ≤ 1                                      | > 1–2 | > 2–3 | > 3–5 | > 5–7 | > 7–9 | > 9  |
| 18–21       | 30.0                                     | 15.4  | 11.8  | 12.8  | 8.6   | 8.3   | 13.1 |
| 22–24       | 30.5                                     | 20.6  | 13.6  | 18.7  | 6.7   | 4.0   | 5.9  |
| 25–29       | 27.8                                     | 21.3  | 17.1  | 17.1  | 11.1  | 3.4   | 2.2  |
| 30–39       | 32.4                                     | 19.0  | 15.2  | 19.6  | 9.7   | 3.1   | 0.8  |
| 40–49       | 25.3                                     | 21.6  | 14.6  | 20.5  | 11.5  | 5.6   | 0.8  |
| 50 or over  | 21.0                                     | 17.5  | 13.2  | 26.1  | 16.2  | 4.6   | 1.3  |
| Total       | 28.4                                     | 18.8  | 14.1  | 18.3  | 10.3  | 5.2   | 4.8  |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health

Data for Figure 13: Per cent of adults treated with stimulant medication for ADHD for the first time in 1998 who discontinued after the initial treatment episode by age and sex

| Age (Years) | Males | Females | Total |
|-------------|-------|---------|-------|
| 18–21       | 35.0  | 22.9    | 32.2  |
| 22–24       | 31.1  | 25.0    | 29.2  |
| 25–29       | 26.9  | 25.5    | 26.4  |
| 30–39       | 26.1  | 18.9    | 23.6  |
| 40–49       | 17.3  | 26.0    | 20.4  |
| 50 or over  | 22.7  | 25.9    | 23.9  |
| Total       | 26.3  | 23.1    | 25.3  |

Source: *Pharmaceutical Drugs of Addiction System*, Pharmaceutical Services Branch, NSW Department of Health



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