

**AN EVALUATION OF THE EFFECTIVENESS OF MONITORING
SYSTEMS USED FOR THE TREATMENT OF ATTENTION DEFICIT
HYPERACTIVITY DISORDER WITH METHYLPHENIDATE
(RITALIN) IN A CHILD PSYCHIATRY CLINIC.**

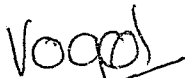
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DECLARATION:

I declare that this dissertation is my own work. It is being submitted as partial fulfillment for the degree of Master of Science (Medicine) in Child Health (Neurodevelopmental Paediatrics) and has not been submitted before for any degree or examination to any other University.

References that have been used have been duly acknowledged. The Committee for Research on Human Subjects has cleared the research and the Clearance Number is: M 970131


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ABSTRACT

Objective: Monitoring the effectiveness of methylphenidate in the treatment of attention-deficit / hyperactivity disorder (ADHD) in children in Johannesburg is based on the Conners' Teacher's Rating Scale (CTRS) and school reports. This is the first study to examine the monitoring of the use of methylphenidate in the "mainstream" classroom in post-apartheid South Africa. Educational changes include racial integration, inclusion of children with learning disabilities, children learning in a second language, and very high pupil: teacher ratios. This study evaluates the CTRS filled in by teachers as a measuring tool for the treatment of ADHD with methylphenidate. It also examines the use of psychological subtests for the monitoring of treatment response.

Method: 26 children on treatment for ADHD with methylphenidate have been examined in a double blind placebo-controlled crossover trial. Children are monitored with the CTRS and psychological tests.

Results: A strong positive correlation with methylphenidate treatment was found on the following CTRS subscales: hyperactivity ($p=0,0001$), conduct problem ($p=0,0012$), and daydream-inattentive ($p=0,0004$).

The psychological subtests are not useful indicators of treatment response.

Conclusion: CTRS can be used to monitor treatment of ADHD in the current school setting.

1 CHAPTER 1: INTRODUCTION

Attention-deficit /hyperactivity disorder is a heterogeneous disorder of unknown aetiology. It is a clinical and public health problem because of its associated morbidity and disability in children, adolescents and adults. Its impact on society is enormous in terms of financial cost, stress to families, interference with academic and vocational activities, as well as negative effects on self-esteem. Data from cross-sectional, retrospective, and follow-up studies indicate that children with ADHD are at risk for developing other psychiatric disorders in childhood, adolescence, and adulthood including antisocial behaviours, substance use disorders, and mood and anxiety symptoms and disorders (Biederman, 1998).

The primary psychopharmacological agents used to treat ADHD are the CNS stimulants such as methylphenidate (Wilens and Biederman, 1992). At least 70% of children will have a positive response to one of the major stimulants on the first trial (Cantwell, 1996). There is no specific diagnostic test for ADHD. However, in the assessment process, rating scales such as the Conner's Teachers' Rating Scale (CTRS) and specialized tests such as the Wisconsin Card-Sorting Test; Matching Familiar Figures Test (MFFT) and the Wechsler Intelligence Scale for Children-Revised (WISC-R) subtests although not diagnostic, are useful in making the diagnosis, as well as monitoring treatment response (DuPaul et al, 1992).

The initial diagnosis of ADHD is usually made after a comprehensive interview with parents and child, a medical and psychological evaluation and the CTRS.

Interventions include parent and child counseling, school focused interventions such as remedial education, and the use of medication. Monitoring of the effectiveness of methylphenidate in the classroom is based on the CTRS, teacher's reports of behaviour in the classroom, and an improvement in academic work and peer relationships. Given the current situation in many schools, with high pupil: teacher ratios, it is important to ensure that the use of medication is effectively monitored.

To date only one double-blind study examining methylphenidate versus placebo using the Conner's Teachers' Rating Scale has been performed in South Africa (Cotton and Rothberg, 1988). The present study is the first to look at the use of methylphenidate in the classroom in post-apartheid South Africa. The significance of the political changes is reflected by numerous changes taking place in the classroom. This includes racial integration in schools, the policy of inclusion of children with all learning disabilities, and children learning in a language which is not their mother tongue, amongst others. In many instances, classroom sizes have increased dramatically. All these factors will influence the teacher's ability to effectively monitor a child placed on medication. Thus it is important to ascertain the effectiveness of current monitoring practices.

"Most children and adolescents with medication-responsive psychiatric disorders will not receive adequate treatment... Efforts to educate the public about the psychiatric needs of children and the biological basis of many childhood conditions have led to a dramatic increase in the use of medication in children. Ironically, even though the vast majority of children in need are still not receiving

treatment, the rapid increase in the number of children receiving medication has triggered a backlash against medication treatment and psychiatric research in general" (Riddle, 1998). Although Riddle was writing about the U.S.A., the same could apply to South Africa. In addition, media coverage, which could play an important role in the dissemination of medical information, has not done so. As in the U.S.A., the media reporting in South Africa has tended to be emotive, unbalanced and negative towards the use of medication in children. Thus this study is also useful in negating some of the negative information as well as providing evidence for parents of the effectiveness of the monitoring of medication usage.

The Alex\Tara Child Psychiatry Clinic is one of 5 child psychiatry clinics in Gauteng, serving a population of 7,4 million people (about 60% of whom are younger than 16 years)(Population Census,1996). There are only three full time state-employed child psychiatrists, and between 8 and 10 psychologists working in the field. Resources are limited. The Alex\Tara Child Psychiatry Clinic is an outpatient clinic operating from Tara Hospital and the Alexandra East Bank Clinic. In order to practice efficiently and effectively, service providers are constantly having to re-evaluate treatment and interventions in order to provide a service that is in keeping with internationally accepted practices of medicine as well as meeting the needs of the population served.

Recent articles in the popular press have highlighted the misuse of methylphenidate, in keeping with scare reports elsewhere in the world. It would appear that methylphenidate is not being used often enough, because many

children who may require it do not have access to health care facilities. Concern has also been expressed about the diagnosis of ADHD and use of methylphenidate in children learning in English when it is not their first language and similarly about the diagnosis of ADHD when children are learning in overcrowded classrooms.

The study is important because it is the first of its kind to be done in a "normal" school. Only one other study has been done in South Africa, at a Remedial School, on a small sample of white children (Cotton & Rothberg, 1988).

It is with this background that the study took place.

2 CHAPTER 2: LITERATURE REVIEW

2.1 HISTORY OF ADHD

ADHD has been identified in the literature for many years under a variety of terms. It was first described by Still as a "defect of moral control" which could arise as a function of three distinct impairments, namely, defect of cognitive relation to the environment, defect of moral consciousness, and defect in inhibitory volition. He hypothesized that they were causally related to each other and to the same underlying neurological deficiency (Barkley, 1998).

Following the encephalitis epidemic in 1917-1918, the concept of brain damage as a cause of behavioural disturbance became popular. This term later evolved to the concept of minimal brain dysfunction (MBD). Between 1937-1941, a series of papers which marked the beginnings of medication therapy for children with behavioural problems as well as the field of child psychopharmacology in general appeared (Barkley, 1998).

Later, hyperactive children were labeled "hyperkinetic reaction of childhood" and the condition first appeared in the *Diagnostic and Statistical Manual of Mental Disorders* (D.S.M.)-II. The focus then shifted from hyperactivity to attention deficit. Thus D.S.M.-III renamed the disorder the attention deficit disorder (ADD). The D.S.M.-III-Revised replaced three separate lists with a single list and the disorder was renamed Attention Deficit Hyperactivity Disorder (ADHD) (Barkley, 1998). The D.S.M.-IV (American Psychiatric Association, 1994) has made significant changes to the diagnostic criteria and has introduced three subtypes:

the inattentive subtype, the hyperactive-impulsive subtype and the combined subtype.

2.2 EPIDEMIOLOGY

Prevalence of ADHD is 3-5% of the school-age population. This figure does not take into account pre-school, adolescent and adult populations.

Prevalence rates vary according to the population that is sampled, the diagnostic criteria, and diagnostic instruments that are used (Cantwell, 1996). This is reflected in marked variation in the incidence between continents. In the U.S.A., the incidence varies between 2-20% of grade-school children. In the U.K. the incidence is less than 1%. There are no exact figures for South Africa, but the incidence probably lies somewhere between the two.

It is more common in males. This may reflect a referral bias, with girls presenting with the inattentive subtype and less of the aggressive, impulsive conduct symptomatology which leads to earlier referral (Cantwell, 1996).

2.3 AETIOLOGY

The aetiology is unknown. Most children with ADHD do not have gross structural changes in the CNS. There is probably an interplay of psychosocial and biological factors that may lead to a final common pathway of ADHD (Cantwell, 1996).

2.3.1 GENETIC FACTORS

Genetic factors have been implicated for many years. ADHD and related symptoms have been diagnosed in close family members of children with ADHD.

Family aggregation studies, adoption studies and twin studies have pointed to the fact that this is genetic, rather than environmental. No single gene has been identified.

2.3.2 NEUROLOGICAL FACTORS

Dysfunction of the prefrontal lobes (inhibition and executive function deficits) is a likely basis for explaining ADHD. Recent studies of cerebral blood flow have shown diminished perfusion to the striatum and orbital prefrontal regions. Some have postulated that ADHD may arise from delayed brain maturation. The positive response to CNS stimulants and antidepressants has pointed towards catecholamine abnormalities in ADHD.

Low dopamine and norepinephrine turnover is suggested by most studies. However, there is interaction between the serotonin and catecholamine systems and a single neurotransmitter hypothesis is too simplistic (Barkley, 1998).

2.3.3 PSYCHO-SOCIAL FACTORS

Although psychosocial problems such as family dysfunction and parent-child relational problems are found in families of children with ADHD these are not thought to be causative factors. Stressful events such as family dysfunction or emotional deprivation may initiate or perpetuate the ADHD.

2.3.4 MISCELLANEOUS

Other aetiological factors that have been proposed include perinatal problems, lead intoxication, and food additives. Although the latter has received much support in the popular press there is very little empirical support (Cantwell, 1996).

2.4 CORE CLINICAL FEATURES

2.4.1 HYPERACTIVITY

Hyperactive children move much more and much faster than is age appropriate.

The following are some of the features of hyperactive children:

* They are fidgety, restless and always on the go, "as if driven by a motor" "like a jack-in-the box".

* Fidgety when seated e.g. at the supper table or at their desk.

* Unable to remain seated for long

* Persistently run and climb all over the place, especially in inappropriate circumstances

* Have difficulty playing quietly

* Talk excessively (verbal hyperactivity)

2.4.2 IMPULSIVITY

These children do things without considering the potential consequences of their actions.

Their impulsivity manifests in the following ways:

* Impatient, they blurt out answers before the question is even asked

* Unable to await their turn in games or queues

* Interfere with the activities of others

- interrupt conversations

- take things from other children

- touch and fiddle with other people's things

- * Tendency to have accidents
 - knock things over
 - bump into people
- * Tend to engage in dangerous activities

2.4.3 INATTENTION

These children only focus for short periods on tasks. They rapidly change tasks and focus on irrelevant aspects of the environment. They can play for brief periods only.

- * Do not pay attention to detail and make mistakes with schoolwork or chores
- * Work is messy and carelessly done
- * Do not persist with tasks
- * Do not finish things
- * Often do not listen and day dream
- * Shift from one task to another
- * Very disorganized
- * Very distractible: disturbed by irrelevant stimuli like dogs barking
- * Forgetful
- * Thoughts are always shifting

(D.S.M. IV, 1994)

Teachers and parents describe these children as unable to listen or follow instructions in the classroom, finish work, sequence auditory or visual material or

work alone. Affected children are inclined to be more distractible than their peers, to daydream, to have poor organizational skills and to persevere on tasks.

Three subtypes occur:

INATTENTIVE subtype, which has at least 6 or more feature of inattention, and relatively few features of hyperactivity and impulsivity.

HYPERACTIVE \ IMPULSIVE subtype with 6 or more symptoms of the hyperactive \ impulsive dimension.

COMBINED HYPERACTIVE \ IMPULSIVE \ INATTENTIVE subtype which has features from all three (D.S.M. IV, 1994).

According to D.S.M. IV, the following requirements need to be met in order to make the diagnosis.

- early age of onset (before 7 years)
- presence for 6 months or longer
- presence in two or more settings
- symptoms must be more frequent and severe than in those children of comparable age or developmental level

Inattention Symptoms:

"Attention" is the first main symptom dimension of ADHD. Various performance attributes to attention are assessed such as the ability to ignore irrelevant stimuli, organizational skills and selective attending. These items, together with an

inability to attend to details and a tendency to make careless errors, create the appearance of a disorganized approach to goal-directed tasks.

Hyperactivity-Impulsivity symptoms:

In school, ADHD children have great difficulty remaining seated and will stroll or run around in the classroom while others are seated. At other times, excessive fidgetiness or squirming in the seat while noisily manipulating objects on the desk will be seen. At home, hyperactivity may be shown by excessive, frantic and noisy play, or by difficulty with remaining seated, such as running around between mouthfuls at meals.

Motor symptoms change, depending on the age or developmental level of the child. In pre-school children, gross motor hyperactivity may be strongest, with excessive running and climbing in places most children will not. Parents describe them as being "driven by a motor." Inattention and impulsiveness are seen in their frequent shifts from one activity to another. As children get older, they exhibit excessive fidgeting and restlessness rather than gross motor activity. Inattention and impulsiveness lead to failure to complete homework assignments or home chores.

Signs of impulsivity vary by situational context. Comments may be made out of turn and answers given before the question is asked. The child fails to wait his \ her turn and often interrupts. At home the child may exhibit accident-prone behaviour (Greenhill, 1998).

Typical age of onset may be quite early. Parents may report heightened motor activity or irregular sleeping or feeding routines as early as 10-18 months. Most disruptive behaviour disorders present similarly during the pre-school phase, with heightened aggressivity, impulsivity, and overactivity, which are only differentiated in the school-age years. Thus it is often hard to make the diagnosis in the pre-school years. The diagnosis depends on teacher's observations while the child is performing academic tasks in the classroom. Perhaps for these reasons, the diagnosis is currently being made most often in a primary school setting around age 9 years, when the child is in the fourth grade.

2.5 ASSESSMENT

As with all children referred for an assessment, there should be a multi-disciplinary team approach. A full evaluation on every child should be done. Often the child's behaviour in the clinician's office is not representative of the behaviour at home or school.

The diagnosis of ADHD is a clinical one and is based on a clinical picture that:

- begins early in life
- is persistent over time
- is pervasive across different settings
- causes functional impairment at home, school or in leisure time

(Cantwell, 1996).

There is no laboratory test or set of tests that currently can be used to make a definitive diagnosis of ADHD (Barkley, 1998).

In order to avoid the diagnostic pitfalls, a careful diagnostic approach can be used which includes the following:

- A comprehensive interview with all parenting figures, which includes symptoms, a developmental, medical and school history and a family and social history.
- A developmentally appropriate interview with the child
- An appropriate medical examination, which also screens for sensory deficits
- Appropriate assessment of cognitive ability and adjunctive assessments such as speech and language as required.
- The use of rating scales (Reiff et al, 1993).

2.6 COURSE OF ADHD

- About 30% of children will no longer manifest functionally impairing symptoms of ADHD by early adult life.
- About 40% will continue to have symptoms into adult life.
- A further 30% will continue to manifest symptoms of ADHD and in addition have more severe psychopathology such as substance abuse or antisocial personality disorder (Cantwell, 1985).

There are a number of factors associated with a positive outcome.

- * early recognition & appropriate handling
- * the higher the overall IQ the better the prognosis
- * availability of treatment

- * family strength
- * lack of aggressiveness
- * social skills
- * low level of hyperactivity

ADHD without treatment often results in school failure, rejection by peers, and family turmoil, all of which can lead to developmental delays and psychiatric complications stemming from low self-esteem and frustration.

2.7 ADHD AND COMORBID DISORDERS

Co-morbidity is a major problem with as many as two-thirds of all children presenting with at least one other diagnosable psychiatric condition. The following are commonly presenting co-morbid conditions:

- language and communication disorders
- learning disorders
- conduct and oppositional defiant disorder
- anxiety disorders
- mood disorders
- Tourette's syndrome or chronic tics.

Assessment and treatment of the co-morbid condition is as important as treating the ADHD symptoms. The presence of co-morbid disorders also affects the natural history and prognosis of ADHD.

Up to two thirds of clinically referred school age children with ADHD may have another Axis 1 disorder. Oppositional Defiant Disorder (ODD) may occur in more

than 50% of ADHD children referred to the clinic. 30-50% of children with ADHD have comorbid conduct disorder. Mood disorders, anxiety disorders and learning disorders have prevalence rates from 10% to 25% of referred ADHD children. ADHD children are more likely than normal children to have trouble with language and communication skills.

2.8 ASSOCIATED PROBLEMS

In addition to co-morbid conditions there are often associated difficulties which need addressing.

2.8.1 ACADEMIC PROBLEMS

The academic problems may be a consequence of the ADHD or the child may have an associated learning disability, which the ADHD makes worse. They may have sequencing problems leading to spelling and reading disabilities. Often the children do not perform to their potential. If the associated learning disabilities are not recognized and treated early enough, there may be serious long-term consequences.

2.8.2 EMOTIONAL PROBLEMS

The child may become frustrated, is often reprimanded and is continuously failing. This may lead to demoralization with a low self-esteem. The child may feel guilty and inadequate. The child may cope by:

- becoming aggressive and fighting
- becoming depressed and withdrawn
- developing physical symptoms
- blaming others

- acting out e.g. the class clown.

There may be temper outbursts, attention-seeking behaviour and oppositional irresponsible behaviour.

2.8.3 SOCIAL PROBLEMS

They may have difficulty playing sport or games or playing with other children.

They may withdraw socially or play with younger children or become aggressive.

They may be unresponsive to social demands with poor social skills. They often have peer relationship difficulties and parent – child relationship problems.

2.8.4 FAMILY PROBLEMS

The family may feel helpless or guilty. There may be disturbances of the family function and balance. The siblings may become worried or anxious.

It is important to be aware of these associated problems, as often the emotional, social, family and academic problems become more prominent than the ADHD (Barkley, 1998).

2.9 DIFFERENTIAL DIAGNOSIS

When making the diagnosis, it is important to remember that there are conditions which occur co-morbidly, and there are conditions which mimic ADHD. Examples of these are absence seizures which may mimic the inattentive subtype of ADHD but which may also occur together with ADHD as a co-morbid condition. Anxiety may also mimic ADHD but can also occur together with it (Cantwell, 1996).

When making the diagnosis of ADHD it is necessary to rule out

- other psychiatric disorders
- developmental disorders

- medical and neurological conditions

and to determine whether they are occurring co-morbidly with ADHD or mimicking it.

2.10 MANAGEMENT of ADHD

The aim is to encourage normal development.

- * Reduce hyperactivity
- * Treat co-existing conditions
- * Prevent or treat behavioural problems
- * Promote academic or social learning
- * Improve emotional adjustment and self-esteem
- * Relieve family distress
- * Encourage appropriate parenting

This can be done with the following:

2.10.1 DRUG MANAGEMENT

The primary agents used to treat ADHD are the CNS stimulants such as

- dextroamphetamine (not available in S.A.)
- pemoline (dynamalert)
- methylphenidate (ritalin)

The drug treatment of choice is methylphenidate (ritalin).

Stimulants are sympathomimetic drugs structurally similar to endogenous catecholamines (e.g. dopamine and norepinephrine). The most commonly used compounds in this class include methylphenidate, dextroamphetamine and magnesium pemoline. Methylphenidate is a short-acting compound, with an onset of action within 30 to 60 minutes and a peak clinical effect usually seen between 1 to 3 hours after administration. Dextroamphetamine is not available in South Africa. Pemoline has been withdrawn from the market in a number of countries due to idiosyncratic hepatotoxicity. It is still available in South Africa, but should be used with caution, and careful monitoring of liver function. Although there are more than 150 controlled studies of stimulants with more than 5000 children, adolescents, and adults, the vast majority of the studies are limited to latency-age white boys treated for no longer than two months. These studies document the short-term efficacy and safety of stimulants in all age groups, but more clearly in latency-age children (Biederman, 1998).

Some of the side effects are:

- * loss of appetite and loss of weight
- * increased blood pressure and pulse rate
- * insomnia
- * tics
- * anxiety, tearfulness
- * headache and stomachache

* growth disturbances (may only occur if the drug is used for long periods of time without a drug holiday)

When using Ritalin, the blood pressure, pulse, weight and height must be monitored regularly.

2.10.2 NON-DRUG MANAGEMENT

Depending on the results of the investigations, the child may need one or more of the following:

2.10.2.1 ACADEMIC INTERVENTION

Correct school placement and classroom management.

Remedial teaching.

Co-operation between parent, school and clinic.

Occupational therapy.

Speech therapy.

2.10.2.2 PSYCHOLOGICAL INTERVENTIONS

Individual therapy.

Group therapy.

Family therapy.

Parental counseling.

Support groups.

3 CHAPTER 3: METHOD

3.1 SUBJECTS

The two schools used in the study were chosen because of their proximity to the clinics and a close association that has developed between teachers and the clinics. A brief history of each of the two schools is important.

Bordeaux primary is situated in a middle class (previously "whites only") suburb of Johannesburg. It has 674 pupils with 27 teachers. It has a remedial teacher who provides interventions for the children during the day. It also has 2 separate classes for children with an IQ between 50-70 who require special education. The average pupil: teacher ratio is 30:1 for the children in this study. 60% of the children are white and 40% are black. In the junior grades (1-3), 80% of the children are black. It was previously a "whites-only" school. It has admitted black children to the school since 1993. 21 children at the school are receiving medication for ADHD (i.e. 3% of the school children). 9 children from this school participated in the study.

Orange Grove School is situated in a lower middle class (previously whites only) suburb of Johannesburg. It was previously a "whites-only" school with a history of transformation which is extremely interesting. (See appendix 1). The number of children at the school is 636 and they are all black children. The pupil teacher ratio is 40:1. 20 children (i.e. 3% of the school children) are receiving medication for ADHD at the school. 17 children from the school participated in the study.

The subjects in the study were therefore 26 children (22 boys and 4 girls) from the two schools. All the subjects had been referred to the clinic prior to the onset of the study. 6 out of the 26 children commenced treatment at the onset of the trial. The remaining 20 children had been on methylphenidate for an average of 6 months (range: 6 months to 4 years) prior to the onset of the study. One child was withdrawn from the study as his teacher had mislaid the CTRS and there were changes in the class teacher during the trial period.

The mean age at onset of the trial was 8 years 7 months (range 6 years 9 months to 12 years 1 month). All the children except for two were black children. The two who were not black were of mixed race origin (so-called coloured children). Of note is that all the children were being taught in an English-medium school and for all of the children, English was not their mother tongue. The teachers felt that most of the children were competent in English.

3.2 DESIGN

All the children had previously been diagnosed as having Attention Deficit Hyperactivity Disorder, either combined or inattentive according to D.S.M. IV criteria (See appendix 2). At presentation at the clinic a detailed history was taken from the parents by the case manager, who was either a psychiatric nurse or the psychiatric registrar (psychiatrist in training). All the parents went through a checklist for ADHD criteria and in addition filled in the Conners' Teachers' Rating Scale (CTRS) (See appendix 3). At the time of the study the clinic did not have access to the Conners' Parents' Rating Scale. All teachers filled in a CTRS and a school report used at the clinic which enquires about school work, school

behaviour and peer relations, in addition to attention and concentration (See appendix 4). All the children had IQ tests performed.

The IQ tests used were the Senior South African Intelligence Scale (SSAIS)¹ and the Senior South African Intelligence Scale- Revised (SSAIS-R) (Van Eeden, 1991). These tests consist of verbal and performance subtests. In addition, the digits and coding subtests of the WISC-R were performed (Wechsler, D, 1981). One child was tested on the WISC-R. All the children were assessed in English (despite it not being their first language) as this was their medium of instruction at school. It should be noted that the use of IQ tests in South Africa is controversial. The SSAIS and SSAIS-R have only been normed on white English and Afrikaans-speaking South African children. Translations of these tests have been done into Zulu and Sotho, but in the absence of Zulu and Sotho speaking testers these were not performed in this study. Many people believe that until "fair and culture-free" tests have been developed they should not be used. It is the policy at the clinic to continue to use these tests as guidelines, as many children are presenting with school difficulties and the tests assist in the diagnostic process. It is not within the scope of this thesis to discuss the merits of IQ tests.

Once all the above had been obtained and a tentative diagnosis of ADHD made, the child was evaluated by a child psychiatrist or a psychiatry registrar. Once the diagnosis of ADHD was confirmed, the child started on a course of medication and was monitored by the child psychiatrist on a regular basis. A full physical examination was performed on the first visit and thereafter the BP, pulse, weight

and height were monitored regularly. Parents were given information booklets regarding ADHD and the management thereof.

Consent for participation in the trial was obtained from the child and the parent or guardian of the child. The methylphenidate and placebo were placed in yellow gelatin capsules and at each school the children were randomly allocated to either placebo or methylphenidate. Each child was administered the medication once daily at the beginning of each school day. The teacher administered the capsule at 8 am every day to ensure compliance. The dose of methylphenidate was 10mg (an average of 0,5mg/kg).

The child, parent, teacher and psychiatrist were blind to the medication. Each child was given the medication or placebo for a four-week period followed by a crossover and another four-week period. The children were assessed once by the child psychiatrist during each of the four-week periods. Teachers filled in the CTRS and the Stimulant Drug Side Effects Rating Scale (Barkley, 1981) on a weekly basis. The parents also filled in the Stimulant Drug Side Effects Rating Scale (See appendix 5).

During the evaluation by the child psychiatrist, the child was asked about possible side effects and had a physical examination. In addition, various tests were administered in order to assess treatment response. The sub-tests used were story memory, number problems and missing parts from the SSAIS-R and the digits and coding of the WISC-R. These tests are thought to measure attention and distractibility in children. The Freedom from Distractibility Factor on

the WISC-R consists of the digit span, coding and arithmetic subtests. Evidence is conflicting as to whether the test can adequately discriminate groups of ADHD children from normal or reading-disabled children (Brown and Wynne, 1982).

In addition, the Matching Familiar Figures Test (MFFT) was administered. This test has been used in research studies investigating impulse control in normal and disturbed children and adolescents (Kagan, 1966). This match-to-sample test involves the examiner presenting a picture of a recognizable object to the youngster, who must choose the identical matching picture from six similar variants. The test includes 12 trials, with scores derived from the mean time taken to the initial response (latency) and the total number of errors (incorrectly identified pictures). This test has shown conflicting and often negative results in detecting stimulant drug effects in ADHD children (Barkley, 1977).

Although there is conflicting evidence about the use of the above tests, the SSAIS-R and WISC-R subtests are used as guidelines for the presence of ADHD. These tests together with the MFFT are freely available and simple and easy to administer. It was therefore felt to be useful to assess them. These psychological tests were administered to each child during the first and second month whether on medication or placebo.

OTHER INTERVENTIONS:

All the children participated in group therapy on a weekly basis for a period of eight weeks. Intern psychologists conducted the groups. The groups were aimed at children with ADHD and dealt with problems such as self-awareness, self-

esteem, and conflict resolution and peer relationships. These groups are run independently of the trial and included children who were not on the trial.

All the parents were offered an eight-week effective parenting course. Not all the parents availed themselves of this opportunity. Teachers were given support on an informal basis telephonically.

Only eight children were receiving remedial intervention. They were in "mainstream" classrooms and excused from the class for their remedial therapy. This occurred at one of the schools (Bordeaux) where there was a remedial teacher. Children were offered occupational therapy at the clinic but the attendance was erratic due to transport difficulties. One child was in a special education class for lower functioning children (with an IQ range of between low borderline to mild mental retardation). The remaining children were not receiving any individual remedial therapy despite their learning disabilities.

3.3 STATISTICAL METHOD

The study used a two period cross over design. The results for the CTRS were analyzed using analysis of variance between subject variable, period, carry over effect and treatment. Results were taken as significant for values of $p \leq 0.05$. The results for the psychological subtests were analyzed manually by looking at trends and patterns. The details are set out in chapter 4 section 4.2.

3.4 DESCRIPTION OF THE CASES

The following two tables summarize the case histories.

Table 1: CASE DESCRIPTIONS

Table 1a: Age; Sex; Main Complaint; School level; Caretakers:

Case:	Age:	Sex	Main Complaint:	School level:	Caretakers:
1.	8 yrs 4mths	Boy	Learning difficulties, Attention, concentration	Grade 3	Grandmother
2.	8yrs 9mths	Boy	Peer problems Attention, Hyperactivity	Grade 3	Relatives in the week Parents over weekends
3.	9 yrs 3mths	Boy	Attention, concentration, hyperactivity	Grade 3	Both parents
4.	8yrs 2mths	Boy	Attention, concentration, forgetful, death of father	Grade 2	Mother
5.	8yrs 2 mths	Boy	Attention, concentration, hyperactivity, Forgetful	Grade 1	Both parents
6.	10 yrs 11mths	Boy	Hyperactivity, attention, concentration, peer problems, aggression	Grade 4	Grandmother
7.	8yrs 8mths	Boy	Hyperactivity, attention, concentration, oppositional, temper tantrums	Grade 3	Both parents
8.	9years	Boy	Attention, concentration hyperactivity	Grade 2	Mother
9.	9yrs 4 mths	Boy	Attention concentration, academic	Grade 3	Both parents
10.	12 yrs 1 mth	Boy	Attention, concentration, learning	Grade 4	Both parents
11.	7yrs 4 mths	Boy	Attention, concentration,	Grade 1	Both parents

			learning hyperactivity, aggression, peer problems		
12	8yrs 11mths	Boy	Attention, concentration forgetful, anxiety	Grade 2	Both parents
13.	9yrs 8mths	Boy	Attention, concentration, general learning, academic, anxiety	Grade 4	Both parents
14.	7yrs 4mths	Boy	Attention, concentration, learning	Grade 2	Both parents
15.	10yrs 8mths	Girl	Attention, concentration, learning, hyperactivity, speech and language delay	Grade 4	Both parents
16	8yrs 4 mths	Boy	Attention, concentration, learning, hyperactivity	Grade 2	Both parents
17	6yrs 9mths	Boy	Attention, concentration, learning, difficult behaviour	Grade 2	Mother
18	10yrs 6mths	Boy	Disruptive and distractible	Grade 4	Maternal grandparents on employer's property
19	8yrs 9mths	Boy	Disruptive and hyperactive	Grade 2	Mother on employer's property
20	8yrs 3mths	Boy	Poor progress at school, poor concentration, distractible and disruptive	Grade 1	Both parents
21	9yrs 10 mths	Girl	Distractible, poor concentration	Grade 3	Both parents
22	7yrs 5mths	Boy	Concentration and behavioural difficulties	Grade 2	Mother and stepfather

23	12yrs 8mths	Girl	Inattentiveness, school problems	Grade 5	Both parents
24	7yrs 2mths	Boy	Poor concentration, disruptive, behavioural problems	Grade 2	Mother (father deceased)
25	6yrs 9 mths	Boy	Poor concentration, easily distracted disruptive, inattentive	Grade 1	Mother
26	7yrs 9mths	Girl	Poor concentration, reading and writing problems	Grade 1 special class	Parents on employer's property

Table 1b: Diagnoses; IQ range , Psychosocial stressors:

CASE:	DIAGNOSES:	I.Q.range	PSYCHOSOCIAL STRESSORS:
1	ADHD(combined type) Learning Disability	Superior	Single, adolescent parent; father murdered; multiple caretakers.
2	ADHD(combined type) Learning Disability	Average	
3	ADHD(combined type) Learning Disability Enuresis Anxiety Disorder (NOS)	Average	Multiple caretakers
4	ADHD(combined type) Learning Disability Vcode: Complicated bereavement	High average	Multiple caretakers Death of father & brother in MVA
5	ADHD(combined type) Learning Disability	Average	Multiple caretakers
6	ADHD(combined type) Learning Disability Oppositional Defiant Disorder	Average	Multiple caretakers

7	ADHD(combined type) Learning Disability	Average	Alcohol Abuse in family
8	ADHD(combined type) Learning Disability	Average	Multiple caretakers Malnutrition
9	ADHD(combined type) Learning Disability	Average	
10	ADHD(combined type) Possible Learning Disability	Average	
11	ADHD(combined type) Learning Disability	Superior	
12	ADHD(combined type) Learning Disability	Average	Multiple caretakers Marital conflict
13	ADHD(combined type) Learning Disability Generalised Anxiety Disorder	High Average	
14	ADHD(combined type) Learning Disability	Superior	
15	ADHD(inattentive type)	Average	Multiple caretakers
16	ADHD(combined type) Learning Disability	Average	Death of sibling by drowning Alcohol Abuse in family
17	ADHD(combined type) Learning Disability	Above average	Single parent
18	ADHD(combined type) Learning Disability	Above average	Multiple caretakers
19	ADHD(combined type) Learning Disability	Above average	Single parent Alcohol Abuse in family
20	ADHD(combined type) Learning Disability	Average	
21	ADHD(combined type)	Average	

	Learning Disability		
22	ADHD(combined type) Learning Disability Vcode: Problem related to abuse & neglect Generalised Anxiety Disorder	Average	Alcohol Abuse Witnessed abuse
23	ADHD(inattentive type) Learning Disability	Average	Multiple caretakers
24	ADHD(combined type) Learning Disability Vcode: Complicated bereavement	Average	Father died in MVA
25	ADHD(combined type) Communication Disorder Conduct Disorder Vcode: Problem related to abuse & neglect	Average	Single parent
26	ADHD(combined type) Vcode: Borderline IQ Learning Disability	Borderline IQ	

All the children were attending an English medium school and were taught in English, which was not their first language.

4 CHAPTER 4: RESULTS

4.1 CONNER'S TEACHERS' RATING SCALE

Table 2 shows the indices which were measured by the CTRS.

Table 2: CTRS

SUBSCALE	MEAN T SCORE ON	MEAN T SCORE OFF	SIGNIFICANT DIFFERENCE	P VALUE
Hyperactivity	60	70	Yes	0,0001
Conduct problem	57.73	65.65	Yes	0,0012
Emotional overindulgent	56.11	62.46	Yes	0,0038
Anxious passive	56.34	55.23	No	0,5356
Asocial	52.19	54.50	No	0,2288
Daydream attentive	56.73	64.04	Yes	0,0004
Hyperactivity index	60.42	71.3	Yes	0,0001

Hyperactivity subscale: there was a significant difference between those on the Ritalin and those off ($p=0,0001$). The mean T-score for hyperactivity was 70 when off the treatment and 60 when on the treatment.

Conduct problem subscale: there was a significant difference between those on the Ritalin and those off with a p -value = 0,0012. The mean T-score was 65,65 for those off treatment compared with 57,73 for those on treatment.

The emotional overindulgent subscale showed a significant difference between those on and off treatment with a p-value of 0,0038. The mean T-scores for those on treatment was 56,11 compared with 62,46 for those off the treatment.

On the anxious passive subscale, there was no significant difference between those on and off treatment with a p-value of 0,5356. The mean T-scores were 55,23 off treatment compared with 56,34 on treatment.

On the a-social subscale, there was no significant difference between those on and off treatment with a p-value of 0,2288. The mean T-score for those receiving no treatment was 54,50 compared with 52,19 for those on treatment.

On the daydream-attentive subscale, there was a significant difference between those on and off treatment with a p-value of 0,0004. The mean T-score for those off treatment was 64,04 compared with 56,73 for those receiving treatment.

On the hyperactivity index there was a significant difference between those on treatment compared with those off treatment with a p-value of 0,0001. The mean T-scores were 71,3 compared with 60,42 on treatment.

Thus the Connors' Teachers' Rating Scale proved to be effective in the monitoring of children on treatment for ADHD. There were significant differences on the subscales measuring hyperactivity and inattention as well as conduct problems. Of note was the correct "off the cuff" observation by the teachers (13 teachers were involved in the study) on whether the child was on medication or placebo, in all but two children.

4.2 USE OF PSYCHOLOGICAL SUBTESTS

The psychological subtests performed were the digits and coding from the WISC-R, and story memory, number problems and missing parts from the SSAIS/SSAIS-R.

The results of the psychological subtests are set out in Tables 3 and 4. The results were analyzed by considering the average trend of all the sub-tests (missing parts, story memory and number problems on the SSAIS-R/SSAIS and digits and coding from the WISC-R). The results for each case were examined to look for a correlation with the medication status. This was also done for the MFFT sub-test. A higher value for the month on medication (either 1 or 2) would indicate a positive response.

Table 3: PSYCHOLOGICAL SUBTESTS

PATIENT NO:	MONTH ON RITALIN:	SUBTEST TREND (MONTH WITH HIGHER VALUE)
1	2	2
2	2	2
3	1	2
4	1	2
5	1	2
6	1	NO CHANGE
7	1	NO CHANGE
8	1	NO CHANGE
9	2	2

10	1	NO CHANGE
11	2	2
12	2	2
13	2	2
14	2	2
15	1	2
16	1	NO CHANGE
17	2	2
18	1	2
19	2	1
20	1	NO CHANGE
21	2	2
22	1	NO CHANGE
23	1	1
24	1	2
25	2	NO CHANGE
26	2	2

1 or 2 = first or second month

Only two of the 26 children tested better in the first month than the second month. Six children actually improved with the re-testing, even although they were not on medication at the time.

There is a strong learning effect in the story memory, number problems, digits and coding subtests. Thus any improvements that were found may be due to a test-retest confounding variable, rather than the effects of medication. This implies that they cannot be used to measure response to medication. At the initial assessment at the clinic and prior to the commencement of medication, all the children had shown a lowered result compared with the means of the other subtests. Thus these tests may be indicators of attention and concentration, but are not useful in showing response to medication. This confirms the findings of Barkley (1998).

Table 4: MFFT

PATIENT NO:	MONTH ON RITALIN:	RESPONSE TIME		ERRORS:		TREND TO LESS IMPULSIVITY:
1	2	4.1	6.1	2.3	2.1	NO CHANGE
2	2	6.5	10.4	2.4	2.2	1
3	1	8.9	8.9	2.7	1.8	NO CHANGE
4	1	9.0	7.1	2.2	1.9	NO CHANGE
5	1	5.9	5.3	3.6	3.8	NO CHANGE
6	1	8.1	2.7	2.1	2.1	1
7	1	9.8	8.2	1.6	2.0	1

8	1	4.3	3.8	3.1	2.5	NO CHANGE
9	2	10.6	14.0	2.1	1.7	2
10	1	7.1	4.6	1.2	1.7	1
11	2	8.9	8.9	2.7	1.8	NO CHANGE
12	2	4.4	5.5	2.4	2.1	2
13	2	5.8	9.5	1.8	1.7	2
14	2	6.8	8.6	2.9	2.2	2
15	1	5.2	8.1	2.1	2.0	2
16	1	3.8	5.7	2.6	2.3	2
17	2	6.1	8.9	2.8	2.1	2
18	1	10.4	5.1	2.1	2.4	1
19	2	2.9	8.4	2.0	1.6	2
20	1	6.9	9.0	2.0	2.4	Indeterminate
21	2	4.5	4.1	2.8	2.9	NO CHANGE
22	1	5.4	6.7	1.8	1.9	2
23	1	5.9	7.9	2.0	1.6	2
24	1	7.8	5.3	2.7	2.5	1
25	2	4.6	2.8	3.9	3.1	1
26	2	4.0	4.1	2.4	2.1	NO CHANGE

17 of 26 children showed a change in the MFFT. One result was indeterminate. 11 of the 17 children showed an improvement in their impulsivity when on the methylphenidate. This was shown by an increase in the response latency and a decrease in the number of error scores. The MFFT thus showed a positive medication response in only 42% (11/26) of the sample. Barkley et al (1991)

state that the MFFT has shown conflicting and often negative results in detecting stimulant drug effects in ADHD children. Barkley (1998) does not endorse this instrument for use in clinical practice in making diagnostic decisions about ADHD children.

4.3 CLINICAL ASSESSMENT

It was not possible for the investigator to ascertain whether or not the children were on the drug or placebo by means of the psychological subtests, the MFFT or by clinical observation, looking at fidgetiness, inattention and distractibility and motor activity. Each was seen for 30 minutes. They were not observed in the classroom setting, as the study was designed to approximate as closely as possible the clinical setting.

4.4 SIDE EFFECT PROFILE

The Side Effects Rating Scale from Barkley (1981) was used. The most common reported side effect was loss of appetite. No loss of weight was recorded. Only three children experienced no side effects. Six children experienced the same side effects on medication and placebo, with one child experiencing more side effects on placebo. This is in keeping with the findings of Fine & Johnston (1993). They found that many of the side effects were present during the placebo condition, and that they may be associated with the disorder rather than the treatment condition. The following table indicates the side effects and the number

of children who experienced them. There was no increase in diastolic blood pressure on medication as was seen by Brown and Sexson (1988).

Table 5: SIDE EFFECTS

BEHAVIOUR:	NUMBER OF CHILDREN:	NUMBER OF CHILDREN:
	PLACEBO:	MEDICATION:
Insomnia	1	1
Nightmares	1	2
Stares a lot\daydreams	1	2
Talks less	Nil	Nil
Uninterested in Others	Nil	Nil
Decreased Appetite	1	14
Irritable	2	6
Stomachaches	2	8
Headaches	3	7
Drowsiness	3	2
Sad\unhappy	Nil	3
Prone to crying	Nil	4
Anxious	Nil	5
Bites fingernails	Nil	Nil
Dizziness	Nil	1
Tics or nervous movements	Nil	Nil

5 CHAPTER 5: DISCUSSION

These results confirm the usefulness of the Conner's Teachers' Rating Scale in assessing the effect of medication in the current classroom situation in South Africa. Despite the large pupil: teacher ratios, and the fact that the children were not learning in their mother tongue, and were often not receiving sufficient interventions such as remedial teaching, occupational therapy, speech and language therapy, the prevalence of children diagnosed as having ADHD in these schools was 3%. This figure is on the lower end of international figures and would suggest that, contrary to reports in the popular press, the diagnosis of ADHD and the use of methylphenidate is not on the increase. However, this would have to be verified by other means. At both of these schools, the children on treatment included children who had been seen by child psychiatrists as well as by other health professionals such as general practitioners. Given that the majority of children of school-going age in South Africa have limited access to general practitioners and even less access to child psychiatry or paediatric facilities where medication for ADHD can be prescribed, it would seem that children are being underdiagnosed and often do not receive treatment. In addition, primary health care nurses are not allowed to prescribe Schedule 7 drugs. Again, this would support the notion that ADHD is being under-diagnosed rather than over-diagnosed.

There is a strong learning effect in the story memory, number problems, digits and coding subtests. Thus any improvements that were found may be due to a test-retest confounding variable, rather than the effects of medication. This

implies that they cannot be used to measure response to medication. Although the psychological subtests were shown to be ineffective in this study, the view of Barkley(1998) is supported. He states "that although no evidence exists to support performance measures as pristinely diagnostic, data do justify their use under certain conditions and with a context of respect for their limitations." He further states that "any meaningful information that can help a clinician judge the nature and the severity of a child's deficits can be of potential benefit. Psychological test data should not be oversold as a basis for diagnosis or as a unitary standard for assessing treatment effects."

Of interest is that all the teachers (except for those of 2 of the children) were able to correctly note whether or not the child was on methylphenidate. Each teacher was asked at the end of the four week period whether or not they thought the child was on treatment or not. The two children where no difference was seen have subsequently been taken off treatment and at follow-up seem to be coping adequately.

The side effect profile of the treatment indicates that these children experienced similar side effects to children studied elsewhere in the world, as would be expected. The most common side effect is loss of appetite.

6 CHAPTER 6: CONCLUSION

This study is important for a number of reasons. As already stated, it is the first study to examine the monitoring of the use of methylphenidate in post-apartheid South Africa. The significance of this is reflected by the numerous changes taking place within the education department and the schools, which are in a state of transition.

It is also the first study published which examines the use of methylphenidate in black African children. This is important both with respect to monitoring as well as providing information regarding the side effect profile in black African children. Although ADHD has been studied broadly, this research has been largely limited to Caucasian males (Samuel et al, 1997). It is unknown whether ADHD may express itself differently among different ethnic groups. This study examined ADHD in children from four different ethnic groups in South Africa (based on home language). Although the aim of the study was not intended to look at ethnic differences or similarities, it appears that it is possible to diagnose and treat ADHD using D.S.M. IV criteria and based on teachers' and parents' reports on the child.

Of concern to the investigator was the contribution that learning in a second language was making to the presentation of ADHD. This was overcome by the careful assessment of cross-sectional and longitudinal presentation of the disorder. Where it was felt necessary, children were referred for English language enrichment.

Although this study has not demonstrated the usefulness of psychological tests in monitoring treatment response, it is felt that these subtests can be used as adjuncts to a careful history and clinical evaluation when making the initial diagnosis of ADHD.

The Conner's Teachers' Rating Scale is a simple and effective scale which monitors treatment response. This study proves its usefulness in the classroom setting in the South African situation. It also serves to highlight the importance of careful monitoring of children who are placed on medication for the treatment of attention-deficit hyperactivity disorder.

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8 APPENDIX 1

Children's lives in South Africa are changing in many ways as a result of the ending of apartheid legislation. Many children are the first generation who are living within a nuclear family structure. The apartheid laws through the migrant labour system and Group Areas Act often separated children from their parents. With the integration of schools, many children are having access to schools that previously were reserved for white children only. These schools are usually better resourced, though not necessarily providing a better education. It is our experience at the clinic that most parents would like their children to go to a previously "white-only" school, as the perception is that the school will provide a better education than they had. Many parents make huge financial sacrifices to send their children to these schools as in most cases they are a very long distance from where the children live. Integration in the suburban areas where these schools exist has not taken place to the same extent as integration in the schools. Thus children have very long school days, much of the time being spent travelling to and from schools. In addition to these difficulties, there are problems with peer relationships. While children may be integrated in the classroom and in the playground, after school friendships such as in the afternoon and weekends are difficult to maintain. White parents are afraid to allow their children to sleep over with their black friends if they live in the townships. Racial prejudices (often the parents') sometimes result in close friends of different colours not being invited to each other's birthday parties. At the clinic, there has not been much evidence of racial prejudice being displayed by the children. Most of the teachers

at the previously whites-only schools are themselves white and often the children are expected to fit into the culture of the school without any effort being made on the part of the school to understand the particular circumstances and cultural heritage of each child. In addition, the teachers and children do not share the same languages. Thus the children are learning in their second or sometimes third language and if they come unstuck have no way of expressing themselves. Children tend to revert to their mother tongue in the playground, and speak their mother tongue at home, thus limiting opportunities to enhance their English language skills. This is however changing and there is greater flexibility of language in the classroom. Children often instruct each other in group work. (personal communication, M.Lines). Many parents send their children to previously "whites only" schools so that the children can learn English.

Parents of black children are often intimidated by a school system which is very different from their own experience. Many parents are illiterate and feel embarrassed to ask questions, and are sometimes treated in a patronizing way by teachers and also by their own children. Parents are also often not in a position to help their children with homework tasks which leads to further frustrations (personal communication, B.Solomon). In addition to all the above, the Education Department is changing the school syllabi, so that teachers are also being faced with new methods of teaching and evaluating pupils. A policy of "mainstreaming" is in place without any interventions being provided for children with special needs. The numbers of teachers per school as well as auxiliary services for children have been curtailed due to budgetary constraints. This

implies that speech therapists, occupational therapists and remedial teachers no longer provide a service for children in need. Thus children sit in classrooms of 40 plus pupils with little chance of having individualized attention. Teachers also experience frustration. This generation of children are pioneers who are facing previously uncharted territory and appear to be coping with remarkable fortitude.

Orange Grove School has an interesting history. It was also a "whites-only" school serving a middle class white suburb. As the demographics changed, the school numbers diminished and in 1990 only 100 white children were left at the school. When the parents were asked to vote to open the school to all races, they voted against this. The school was subsequently shut down, as it was not financially viable to continue with such a small number of children. Alexandra, the neighbouring black township, is situated within about 10km of Orange Grove school. The children of Alex were by apartheid legislation not allowed to attend the whites-only Orange Grove School. Alex has a population of close to half a million served by 14 overcrowded and under-resourced schools. Some of the 14 schools go from grade 1 to grade 4, others start at grade 4 and go to grade 7 (i.e. primary schools), and 2 of the 14 are high schools, which is an indication that many children were unable to receive high school education. An Alex Education Crisis Committee (consisting of parents, educationalists, politicians and activists, amongst others) had been set up to deal with the school crises in Alex. After negotiations with the apartheid education department to open Orange Grove School to children of all races failed, this committee decided to march on the now defunct school and they decided to bus in the children from Alex. The army and

police were called in on the day of the march – to protect the white residents. The march was peaceful and without bloodshed (a rare occurrence in the political turbulence of the time). As a result of this protest action, the school was re-opened and prior to the ending of apartheid it was probably one of the first schools to open its doors to black children without the prejudice or limitations which occurred in the Model C schools. It was also rare to have a government school for black children in a white suburb.

9 APPENDIX 2

Attention-Deficit and Disruptive Behaviour Disorders

- **Attention Deficit/Hyperactivity Disorder**

A. Either (1) or (2):

1. six (or more) of the following symptoms of inattention have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

Inattention

- (a) often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
- (b) often has difficulty sustaining attention in tasks or play activities
- (c) often does not seem to listen when spoken to directly
- (d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behaviour or failure to understand instructions)
- (e) often has difficulty organizing tasks and activities
- (f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
- (g) often loses things necessary for tasks or activities (e.g., toys, school assignment, pencils, books, or tools)
- (h) is often easily distracted by extraneous stimuli
- (i) is often forgetful in daily activities

- 2 six (or more) of the following symptoms of hyperactivity-impulsivity have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

Hyperactivity

- (a) often fidgets with hands or feet or squirms in seat
- (b) often leaves seat in classroom or in other situations in which remaining seated is expected
- (c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
- (d) often has difficulty playing or engaging in leisure activities quietly

- (e) is often "on the go" or often acts as if "driven by a motor"
- (f) often talks excessively
- Impulsivity*
- (g) often blurts out answers before questions have been completed
- (h) often has difficulty awaiting turn
- (i) often interrupts or intrudes on others (e.g., butts into conversations or games).

- B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.
- C. Some impairment from the symptoms is present in two or more settings (e.g., at school, {or work} and at home).
- D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.
- E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Code based on type:

- 314.01 Attention Deficit/Hyperactivity Disorder, Combined Type: if both Criteria A1 and A2 are met for the past 6 months
- 314.00 Attention Deficit/Hyperactivity Disorder, Predominantly Inattentive Type: if Criterion A1 is met but Criterion A2 is not met for the past 6 months
- 314.01 Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type: if Criterion A2 is met but Criterion A1 is not met for the past 6 months.

Coding note: For individuals (especially adolescents and adults) who currently have symptoms that no longer meet full criteria, "In Partial Remission" should be specified.

10 APPENDIX 3

CONNERS' RATING SCALE

Child Name: _____ Child Age: _____ Child Sex: _____ Teacher: _____

Date: _____ File No: _____ Ritalin Dose: _____

Instructions: Read each item below carefully, and decide how much you think the child has been bothered by this problem during the past month.

Not at all	Just a little	Pretty Much	Very Much	
				CLASSROOM BEHAVIOUR
0		2	3	1. Constantly fidgeting
0		2	3	2. Hums and makes other odd noises
0	1	2	3	3. Demands must be met immediately - easily frustrated
0	1	2	3	4. Coordination poor
0	1	2	3	5. Restless or overactive
0	1	2	3	6. Excitable, Impulsive
0	1	2	3	7. Inattentive, easily distracted
0	1	2	3	8. Fails to finish things she starts - short attention span
0	1	2	3	9. Overly sensitive
0	1	2	3	10. Overly serious or sad
0	1	2	3	11. Daydreams
0	1	2	3	12. Sullen or sulky
0	1	2	3	13. Cries often and easily
0	1	2	3	14. Disturbs other children
0	1	2	3	15. Quarrelsome
0	1	2	3	16. Mood changes quickly and drastically
0	1	2	3	17. Acts 'smart'
0	1	2	3	18. Destructive
0	1	2	3	19. Steals
0	1	2	3	20. Lies
0	1	2	3	21. Temper outbursts, explosive and unpredictable behaviour
				GROUP PARTICIPATION
0	1	2	3	22. Isolates him/herself from other children
0	1	2	3	23. Appears to be unaccepted by group
0	1	2	3	24. Appears to be easily led
0	1	2	3	25. No sense of fair play
0	1	2	3	26. Appears to lack leadership
0	1	2	3	27. Does not get along with opposite sex
0	1	2	3	28. Does not get along with same sex
0	1	2	3	29. Teases other children or interfere with their activities

				ATTITUDE TOWARD AUTHORITY
0	1	2	3	30. Submissive
0	1	2	3	31. Defiant
0	1	2	3	32. Impudent
0	1	2	3	33. Shy
0	1	2	3	34. Fearful
0	1	2	3	35. Excessive demands for teacher's attention
0	1	2	3	36. Stubborn
0	1	2	3	37. Overly anxious to please
0	1	2	3	38. Uncooperative
0	1	2	3	39. Attendance problem
Not as All	Just a little	Pretty Much	Very Much	

11 APPENDIX 4

TEACHER'S REPORT

NAME OF PUPIL: _____ DATE: _____
TEACHER: _____ CLASS: _____
SCHOOL: _____
PRINCIPAL: _____ TEL: _____

1. **ACADEMIC PERFORMANCE**

How long has the child attended school?

Has the child repeated any class?

If so, please specify which class, which year and the number of times repeated.

How would you describe the child's present level of achievement relative to the class average?

Has the child demonstrated any problems in any specific area or his/her performance consistently poor in all subjects?

Which areas are particularly problematic?

Are there any areas where no problems are evident?

READING SKILLS

Can the child name all vowels?

Can the child name all consonants?

Does he/she ever pronounce words back to front? (e.g., isusu for usisi)

Can the child read a story aloud?

Can the child correctly answer questions about the story he/she has read?

Any other comments on reading skills.

WRITING SKILLS

Does he/she ever write letters back to front or upside down (e.g., b for d, 2 for S, 41 for 14, f for t, b for p)?

Is the work neat and well spaced on the page and on the lines?

Can he/she copy correctly from the board?

What is the child's spelling ability?

CONCENTRATION

Can the child concentrate as long as children his/her age?

Is the child more restless and fidgety?

Is the child distractible (e.g., loses concentration easily)?

Can the child settle down and complete his/her work?

2. **SOCIAL PERFORMANCE**

How does the child relate to other children?

Does s/he tend to isolate themselves or do they relate easily in a group?

Does he/she seek the company of children of the same age as themselves or of that of younger children, or of that of older children?

How does the child relate to figures of authority?

How does the child respond to success or praise?

How does the child react to criticism or failure?

Please describe the child's ability to assume responsibility for tasks in the classroom situation:

Does the child demonstrate any strange behaviour?

How would you describe this child?

Does the child participate in any extra-mural activities?

If so, please specify and comment on his ability.

CONTACT WITH FAMILY

Are there any siblings of the child attending the same school?

If yes, could you please describe their school progress and include any other relevant information.

What form of contact have you had with the parents of the children?

Have you discussed any problems that the child may have experienced with the parents?

Have they taken an interest in the child's progress?

GENERAL HEALTH

Do you feel that the child is well cared for?

Have you noticed any problems with vision, or hearing, or speech?

Have you noticed any co-ordination problems?

Are there any additional comments that you would like to make or any other matter that you would like to bring to our attention:

if possible, could you please include any samples of the child's school work and a recent report card.

We thank you most sincerely for your co-operation.

12 APPENDIX 5

STIMULANT DRUG SIDE EFFECTS RATING SCALE

NAME: _____ DATE: _____
 PERSON COMPLETING THIS FORM: _____

Instructions: Please rate each behaviour from 0 (absent) to 9 (serious). Circle only one number beside each item. A zero means that you have not seen the behaviour in this child during the past week, and a 9 means that you have noticed it and believe it to be either very serious or very frequently.

<u>Behaviour</u>	<u>Absent</u>									<u>Serious</u>								
Insomnia or trouble sleeping	0	1	2	3	4	5	6	7	8	9								
Nightmares	0	1	2	3	4	5	6	7	8	9								
Stares a lot or daydreams	0	1	2	3	4	5	6	7	8	9								
Talks less with others	0	1	2	3	4	5	6	7	8	9								
Uninterested in others	0	1	2	3	4	5	6	7	8	9								
Decreased appetite	0	1	2	3	4	5	6	7	8	9								
Irritable	0	1	2	3	4	5	6	7	8	9								
Stomachaches	0	1	2	3	4	5	6	7	8	9								
Headaches	0	1	2	3	4	5	6	7	8	9								
Drowsiness	0	1	2	3	4	5	6	7	8	9								
Sad/Unhappy	0	1	2	3	4	5	6	7	8	9								
Prone to crying	0	1	2	3	4	5	6	7	8	9								
Anxious	0	1	2	3	4	5	6	7	8	9								
Bites fingernails	0	1	2	3	4	5	6	7	8	9								
Euphoric/unusually happy	0	1	2	3	4	5	6	7	8	9								
Dizziness	0	1	2	3	4	5	6	7	8	9								
Tics or nervous movements	0	1	2	3	4	5	6	7	8	9								

The Stimulant Drug Side Effect Rating Scale, used to monitor side effects to stimulant medication. From *Hyperactive Children: A Handbook for Diagnosis and Treatment* by R.A Barkley, 1981, New York: Guilford Press.

Author Vogel W M

Name of thesis An Evalutation Of The Effectiveness Of Monitoring Systems Used For The Treatment Of Attention Deficit Hyperactivity Disorder With Methylphenidate (Ritilin) In A Child Psychiatry Clinic Vogel W M 1999

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