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## **MANAGING THE IMPACT OF ADHD ON READING ACHIEVEMENT**

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### **Introduction**

Attention Deficit Hyperactivity Disorder (ADHD) may affect up to 1 in 30 children with individuals affected, to differing degrees, for the entire life span. In cases where ADHD is diagnosed, family life, social conformity, mental health and success in school and the workforce may be compromised due to the impact of the disorder. Also, significant numbers of ADHD students have associated learning difficulties, the most common of which are reading difficulties. While acknowledging that the current understanding of ADHD is still incomplete and many aspects remain controversial, the latest understanding of the disorder has been used to design a reading intervention to remediate reading difficulties in ADHD students. The intervention will be useful for teachers who are faced with the problems associated with trying to teach ADHD students with reading difficulties how to read. This paper reports a work in progress in a study that uses a case study methodology to evaluate the effectiveness of this especially designed reading intervention for ADHD students.

### **Background to the study**

#### ***History of ADHD***

ADHD as we now know it is not new. It has been around for many years, albeit under different definitions and terms. Children exhibiting the symptoms of ADHD were observed and documented in the mid 1800's, with symptoms noted as appearing after central nervous system damage or disease. However, the first well documented descriptions of the disorder and attempt to understand and explain the symptoms, occurred in England in 1902 when George Still labeled the set of behaviours as "defects in moral control". Still described those affected with the disorder as aggressive, defiant, resistant to discipline, highly emotional, evidencing little self-control, with many of his sample also exhibiting excessive activity and poor sustained attention to task. Since these early identifications of the disorder both the label and the diagnostic requirements have changed several times reflecting the current understandings of the time. Table 1 provides a historical overview of the terms and descriptors.

Such changes have contributed to the many misconceptions and prejudices that currently exist about the disorder despite the availability of a wide body of scientific knowledge. However the problems presented by the presence of an ADHD student in the classroom are real and confronting to teachers and overshadow these ongoing debates and controversies. As stated by Giorcelli (1997):

A great deal of pedagogical energy has been wasted on such debate, obfuscating educators' vital work of having students learn more effectively (despite their presenting behaviours) and bedeviling teachers' efforts to come to grips with what is essentially an old phenomenon described anew. (p. 132)

**Table 1 Historical overview of terms and conditions**

Date	Label	Diagnostic characteristics	Source
1941/1947	Brain Damaged Syndrome	Hyperactivity, distractibility, impulsivity, emotional instability, perseveration	
1962	Minimal Brain Dysfunction	Soft neurological indicators, specific learning deficits, hyperkinesis, short attention span, impulsivity	
1968	Hyperkinetic Reaction of Childhood	Hyperactivity	(DSM-II cited in McBurnett, 1993)
1980	Attention Deficit Disorder  Sub categories:  with Hyperactivity (ADHD)  Attention Deficit Disorder without hyperactivity (ADD)  Attention-Deficit Hyperactivity Disorder (ADHD)	Inattention, impulsivity, hyperactivity; onset before age seven; duration at least six months; task completion difficulty; inattention; disorganisation  Minimum of 8 criteria from a list of 14;  onset before age seven; duration at least six months  18 possible symptoms divided into two sub-groups, 'Inattention' and 'Hyperactivity'.	(DSM-III-R cited in Baker, 1994)
1987	Attention Deficit Hyperactivity  Sub-categories:  ADHD- Predominantly Inattentive (ADHD-PI)	ADHD-PI – minimum of 6 symptoms from inattention subgroup  ADHD-PH - minimum number of 6 symptoms from hyperactivity subgroup	DSM-IV
1994	ADHD- Predominantly-Hyperactive (ADHD-PH)	ADHD-C –6 symptoms	

	ADHD-Combined (ADHD-C)	<p>from each sub-group.</p> <p>Behaviours must occur in more than one setting.</p> <p>Onset before age seven; duration at least six months</p>	
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### ***Current understanding***

The current label for the disorder, Attention Deficit Hyperactivity Disorder (ADHD), is found in the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) . The disorder is seen as having three core characteristics, that of hyperactivity, impulsivity and inattention. However, debate is still continuing over the significance of these behaviours as they relate to diagnosis and management. Hyperactivity and impulsivity are being seen in some circles as the core factors of ADHD. Barkley (1996) combines these deficits in the label 'Disinhibition'.

This trend is evident in the current sub-types of the disorder used in the DSM-IV (1994). These are the ADHD-Predominantly Inattentive type (ADHD-PI) where inattention is the principal source of problems; ADHD-Predominantly Hyperactive-Impulsive Type (ADHD-PHI) where the main problem area is hyperactivity-impulsivity with some or none of the symptoms of inattentive behaviour, and ADHD-Combined Type (ADHD-C) which is used to describe the disorder where both inattention and hyperactivity-impulsivity are evident.

### ***Prevalence of ADHD***

ADHD is a disorder that affects a significant proportion of the population . However variations in prevalence figures occur both within and between countries depending on a number of factors, including the diagnostic criteria used, age and gender of the population, socioeconomic status and urban living . However when the diagnostic criteria set out in the DSM-IV is used, Australia has a prevalence rate similar to that of the United States with a rate of 2.3% to 6% .

### ***Long-term effects***

ADHD is a disorder that is most commonly associated with children, particularly within the context of schooling. However, ADHD continues to affect individuals into adulthood with only 11% of ADHD children developing adequate coping strategies by adulthood . In adulthood ADHD impacts on family life, employment, health and community interaction.

It is likely that ongoing symptoms of ADHD will impact on family life in the form of stressed parents, dysfunctional families and ultimately family breakdown . Adults with ADHD show a higher rate of unemployment and when employed are rated by employers as being less independent, less capable of completing set tasks, less amenable to co-workers and more likely to lose their job . As well, ADHD adults are more likely to be in low-status jobs and to change jobs more frequently .

ADHD adults also have a high co-morbidity rate of conduct disorders as well as depression and anxiety disorders, and when ADHD occurs concomitantly with Conduct Disorder (CD), these persons have an increased risk of developing personality disorders . Attempted and successful suicide rates are also higher , as are substance abuse rates , police contact in

relation to traffic offences and speeding and court involvement related to theft and physical aggression .

For ADHD adults who experienced ADHD symptoms concomitantly with learning disorders and CD as children, the possibilities of achieving a near normal adult life is further diminished with these individuals most likely to have greater on-going problems in adulthood .

### ***ADHD and schooling***

During the years of schooling the impact of ADHD is evident both educationally and socially. Symptoms of ADHD include academic underachievement as well as peer rejection and difficulty conforming to rules and behaviour expectations.

The majority of children affected by ADHD have significant and persistent problems with social relationships . The difficulty in conforming to expected social behaviours in the classroom and playground often causes rejection by peers and may negatively influence their relationship with their classroom teachers and other school staff.

Students affected by ADHD are more likely than other children to experience problems with reading, spelling and written language . By adolescence approximately 50% experience school failure or fail at least one subject, one third will not finish high school and only a minority attempt tertiary education . The precise nature of the impact of ADHD on learning is as yet unclear, though it is possible that the learning difficulties experienced by ADHD students are the result of deficits in executive functioning caused by the impact of the disorder.

### **Developing a theoretical framework**

#### ***The impact of ADHD on executive functions***

Current understanding of the disorder indicates that ADHD results in deficits in executive functioning . Executive functions have been described as those functions that allow for analysis of information, reflection on current knowledge, planning and organisation, self-monitoring , mobilising attention, and inhibiting responding . They allow self-regulation (Barkley, 1996) and are necessary for the initiation and maintenance of goal directed behaviour .

has developed a theoretical model of ADHD that provides further insight into the role of executive functions in causing ADHD behaviours. This model is reproduced in Figure 1. This model forms part of the theoretical framework used in this study to conceptualise the cognitive processes associated with ADHD and to design the reading intervention.

The model identifies inhibition as the primary executive function that affects four other executive functions, working memory, self-regulation of affect/motivation/arousal, internalisation of speech and reconstitution.

### **Figure 1 A graphic illustration linking inhibition with four executive functions and motor control/fluency (Barkley, 1996, p. 13)**

In Barkley's model behavioural inhibition is seen as being comprised of three processes, that of response inhibition, interference control and ceasing an inappropriate on-going response. Response inhibition allows for a delay in responding that provides time for other self-regulatory cognitive processes to occur. Interference control acts to protect and maintain the delay in responding against irrelevant stimuli. Deficits in inhibition prevent and/or interrupt the execution of thoughtful responses.

Working memory retrieves relevant information from long-term memory and allows students to remember that they intend/need to finish a task. It also assists students to remember what the task requires as well as prompting students to get back on task after an interruption.

Self-regulation of affect allows students to consider emotional responses before responding and helps to modify inappropriate responses. It also allows students to be internally motivated so that they are able to initiate and maintain task oriented behaviour.

Internalisation of speech is the self-talk used to evaluate and direct behaviour of the self. It allows the student to reflect before acting and to select behaviour or action that is going to help them reach their goal.

Reconstitution allows students to analyse and use information to create a novel response such as reciprocal speech during a conversation. It also facilitates problem solving by allowing the development of new plans of action when failure in a current plan is detected.

It is expected that development in all five of these executive functions will result in greater motor control-fluency. That is, lengthy, goal-directed behaviour maintained internally, rather than contingency-shaped by the motivational qualities of the task and/or environment.

#### ***The impact of executive function deficits on the reading process***

An analysis of the executive function deficits experienced by ADHD children indicates that these deficits are likely to impact upon the ADHD reader's ability to successfully engage in the reading process. Both affective and cognitive conditions of the ADHD reader, as well as the capacity of executive control functions to monitor the meaning construction process are likely to be compromised.

Reading is a meaning constructing process that involves the reader in a continuous series of hypotheses and revisions. This process is monitored by executive control functions to assess progress toward the goal of understanding the text. It is a process that relies on the active use of the reader's past life experiences and knowledge to facilitate interaction with the text. The result of successful reading is the construction of meaning that is both relevant and meaningful to the reader and true to the intended meaning of the text, with meaning evolving through the interactions between the text and reader.

The impact of executive function deficits on the reading process is likely to be significant and pervasive. It begins as the ADHD child attempts to engage in the reading process and continues throughout the reading experience and reduces the ability to successfully engage in post reading activities. The cumulative result is likely to be an underachieving student who views themselves as a non-reader, and reading as a threatening unenjoyable experience.

## ***Reducing the impact of executive function deficits***

Reading instruction for underachieving ADHD children is likely to be successful if it addresses the impact of executive function deficits on the reading process and is complemented by additional components which help to support and maintain reading improvement. The reading intervention used in this study supports executive functioning by combining reading strategy training, the cognitive training components of self-instruction, self-monitoring, self-reinforcement, and visual memory prompts.

This particular combination of factors is thought to be useful since cognitive training, where all three components are used in conjunction with specific strategy training, has in the past been found to be successful with ADHD students. The additional use of visual memory prompts was included to support working memory. All the students selected as participants in the study were also receiving prescribed stimulant medication.

Self-instruction for the intervention focused on the self-statements needed to prepare for reading, to initiate and maintain monitoring of meaning construction and to select and assess appropriate repair strategies. To ensure that a repertoire of appropriate strategies were available, and that strategy use was seen as valuable, the intervention also involved explicit teaching of reading strategies used for monitoring and repairing meaning. Self-monitoring was used to record the use of reading strategies and self-reinforcement was contingent on the use of taught reading strategies, detected through self-monitoring.

### **A brief overview of the research design**

The study was implemented to find out if the designed reading intervention was able to promote an improvement in the reading achievement and/or attitude of ADHD students. A multiple case study method was used that involved seven students enrolled in a State (primary) school in regional Queensland. The students participated in an eight-week training program during which they were introduced to the components of the intervention. The program involved the students in one-to-one teaching sessions, three times a week.

### **Findings**

Results of the study show that the students improved their reading achievement as measured by standardised reading tests and analysis of oral reading. Two of the students showed over twelve months improvement in reading age on both comprehension and sight vocabulary while others showed more modest increases of two to six months on these measures. Analysis of oral reading indicated that all students demonstrated enhanced strategy use, employing a wider range of strategies and applying strategies more effectively. Improved monitoring of meaning was also evident with less uncorrected errors and demonstrated improved comprehension.

Students also demonstrated increased motivation to engage in reading with six out of the seven preferring to read rather than spend a session playing a game that had been negotiated as part of their self-reinforcement. Parents also cited increased motivation and confidence. For example, one student displayed a corresponding improvement in willingness to engage in daily classroom homework, using the reading intervention to help him read the homework instructions. Another student took it upon himself to train his ADHD classmate in the intervention as well as an older neighbour who is also ADHD.

However the intervention did not evoke such an enthusiastic response from the teachers. After the initial training period the teachers were shown the test results and asked if they would like to continue the program in their classroom. A commitment to this would require

them to provide reading time two to three times a week so that the students could use the intervention and support for use of the intervention by reminding students to use it. All other aspects of the intervention such as supply of materials and rewards were the responsibility of the researcher. Despite all teachers agreeing to maintain the intervention, not one teacher encouraged or reminded the students to use the intervention and many did not provide the necessary reading time.

It is likely that reading achievement levels and motivation increased since the intervention provided a multi-modal approach that addressed the academic needs of the ADHD reader as well as the executive function deficits associated with ADHD. It provided the tools to access text (strategies), a means of controlling cognition during reading (self-instruction), motivation to engage in goal directed reading behaviour (self-reinforcement), and promoted the attribution of success to the actions of the reader (self-monitoring). In doing so it established affective and cognitive conditions conducive to successful reading.

### **Summary**

This paper provided a brief report on a current study that considered the effectiveness of a reading intervention for ADHD students who were exhibiting reading underachievement. The intervention included the cognitive training components of self-instruction, self-monitoring and self-reinforcement; training in reading strategy use; visual memory prompts, and prescribed ADHD medication. The intervention was found to be useful in improving the reading achievement and motivation of seven ADHD students. Once initial training is completed the intervention should be relatively easy for the classroom teacher to maintain through continuation of the self-reinforcement system, and management of resources, such as allocated reading time, access to interesting texts appropriate to the reader's ability and the self-monitoring chart.

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