Evidence-Based Assessment and Intervention for ADHD in School Psychology

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Description and Overview of ADHD

The hallmark symptoms of attention-deficit/hyperactivity disorder (ADHD) are developmentally inappropriate levels of inattentive and hyperactive-impulsive behaviour. Attention is a multifaceted process that requires the ability to sustain attention to a given task and to ignore extraneous stimuli while engaged in that task (Roberts, Milich, & Barkley, 2014). Difficulties in either of these attentional processes result in deficits commonly associated with ADHD (e.g. difficulty sustaining attention in tasks). Similarly, hyperactivity–impulsivity is multidimensional involving volitional, motivational, and automatic attentional processes (Nigg, 2000). Additionally, general deficits in response inhibition and the capacity to anticipate an outcome, positive or negative, typify students with ADHD (Johansen, Aase, Meyer, & Sagvolden, 2002). This general inability to defer outcomes, without consideration of the potential consequences is manifested in the core hyperactive–impulsive symptoms of ADHD.

There is abundant evidence that ADHD has neurophysiological origins and is associated with clinically significant impairment across settings (Barkley, 2015). The most ubiquitous impairments occur within the academic and social domains. Students with ADHD consistently underperform academically relative to their same-aged peers across their educational careers (Frazier, Youngstrom, Glutting, & Watkins, 2007). Students with ADHD have been found to exhibit high rates of active (e.g. getting out of their seat) and passive (e.g. daydreaming) off-task behaviour during classroom instruction (Kofler, Rapport, & Alderson, 2008). Typically, students with ADHD are rated high on social impact (i.e. other students indicate they effect the classroom), but are not well liked, have fewer reciprocal friends, and are identified as non-friends by popular peers (Hoza et al., 2000).

The global prevalence of ADHD is approximately 5 %, and in a meta-analysis by Polanczyk, Silva de Lima, Horta, Biederman, and Rohde (2007), they collapsed studies conducted throughout Oceania (i.e. Australia and proximate islands) together, and estimated prevalence to be just under 5 %, functionally equivalent with the worldwide estimates.

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Assessment of ADHD

Gathering Data for Diagnosis

In conducting a thorough assessment of students with ADHD, data should be collected from multiple sources; both directly from the student as well as from caregivers such as parents and teachers. In Australia the DSM-5 (American Psychological Association, APA, 2013) is mainly used for diagnosis by clinicians (paediatricians, psychiatrists, and psychologists). As specified in the DSM-5, evidence for the symptoms need to be identified in two or more settings. Usually, as a minimum, the symptoms are assessed across home and school settings. Sometimes, the teacher may be able to ascertain the level of functional deficits to a greater extent than parents given the higher expectations for attention and impulse control at school, and teachers will also be able to compare the student to their peers. Often issues will be flagged concerning a child at school, and in many cases classroom teachers will raise their concerns either via parent interview and/or school report. In some cases, the school psychologist will be asked to consult with the teacher or attend a meeting where a child may be referred for a formal assessment. Gathering data regarding the child's behaviour in the classroom and playground can be extremely helpful in order to assist the clinician with making a diagnosis.

Throughout each stage of assessment, it is important to determine the following: (a) whether the presenting inattention symptoms are due primarily to a core developmental attention-based issue that needs direct treatment of attention skills, or (b) whether the presenting inattention symptoms are due primarily to a non-ADHD-based issue that needs a more specific treatment addressing the underlying cause (e.g. various medical conditions, visual processing disorder). This distinction can only be ascertained through a thorough assessment targeting an understanding of a potential differential diagnosis versus any potential co-morbidities. The main goal, therefore, is to understand the full extent of symptoms and then determine the core cause (or potentially multiple causes) of these symptoms.

Clinical Interview

Assessment should always begin with a clinical interview with the student's parents/guardians, to obtain a complete developmental and medical background, and to clarify current issues for the student. A full list of areas that should be screened by the clinician is included in Table 1, and where appropriate the student should be referred for further testing to clarify whether there is a specific condition creating (or contributing to) the attention weakness.

Standardised Questionnaires

To complement the clinical interview, it is extremely helpful to have both parents and teachers complete standardised behaviour rating scales. Preferably these can be obtained prior to the clinical interview, so that the results can inform the direction of the interview as teachers may have additional concerns that may need exploration. There are numerous standardised questionnaires that include ADHD symptom and impairment ratings including brief ratings that focus on ADHD symptoms (e.g. ADHD Rating Scale-5, Brown Attention Deficit Disorder Scales, Clinical Assessment of Attention Deficit-Child), mid-length questionnaires approximately 50–100 questions (e.g. ADHD Symptoms Rating Scale, Attention-Deficit/Hyperactivity Test—2nd Ed), and comprehensive questionnaires that include items for other disorders (Behaviour Assessment Scale for Children-3, Conners Comprehensive Behaviour Rating Scales, Conners 3). There are also several executive functioning questionnaires (e.g. Delis-Rating of Executive Function, Behaviour Rating Inventory of Executive Function, Comprehensive Executive Functioning Inventory) that are valuable in understanding the extent of the functional problems and devising a treatment plan. Whilst these scales tend to have U.S. normative data, they are still highly valid and indicative of issues within the Australian population.

Table 1 Conditions that create symptoms of inattention and/or hyperactivity–impulsivity that may need assessment prior to confirming a diagnosis

Areas of screening	Potential problems that may result in symptoms similar to ADHD	Potential referral for further assessment
Vision	Low acuity, ocular motor issues, acuity problems, accommodation insufficiency, higher level visual processing deficits	Orthoptist or behavioural optometrist
Hearing	Potential hearing loss or higher level auditory processing issues	Audiologist
Sensory Processing	Sensory defensiveness, poor sensory integration	Occupational Therapist
Intellect	Giftedness, low intellect	Psychologist
Learning	Specific learning disabilities, gifted learners who are bored	Psychologist
Sleep	Obstructive sleep apnoea, poor sleep hygiene	Paediatrician or psychologist if psychological in nature
Developmental, birth or genetic conditions	Autism spectrum disorder, prematurity, birth trauma, foetal alcohol syndrome, genetic disorders (e.g. Fragile X, William's Syndrome, etc.)	Medical specialist (depends on issues and symptoms noted)
Other medical conditions:	Allergies, heavy metal poisoning, hyper/hypothyroidism	Medical specialist
Neurological conditions	Hypoxia, head injury, epilepsy	Paediatrician, paediatric neurologist
Nutrition and/or digestive issues	Food allergies, constipation, diarrhoea, nutritional deficiencies, anaemia	General Practitioner (blood tests), gastroenterologist, dietician
Psychological state and behaviour	Depression, anxiety, low self-esteem, perfectionism, oppositional defiant disorder, pre-psychiatric conditions (e.g. childhood bipolar)	Psychologist, psychiatrist
Language skills	Receptive or expressive language disorder	Speech Therapist

Direct Assessment of Student

If the clinical interview and standardised questionnaires indicate significant issues with attention and/or hyperactive–impulsive behaviour, the next stage will be to formally assess the child. The starting point will depend on the issues raised during the clinical interview (as summarised in Table 1). If there is any evidence of medical issues; nutritional deficiencies; sleep problems; or language, vision, or hearing impairments, it is important for these to be followed up as a priority.

Standardised assessment of attention and other core cognitive processing skills underlying the ADHD symptoms is highly debated in relation to clinical utility in the diagnosis of ADHD (McConaughy, Ivanova, Antshel, & Eiraldi, 2009). Although ADHD, by definition, requires the presence of attention, hyperactivity, or impulsivity impairments, there are no guidelines to actually formally assess these skills directly with the child, and behaviour ratings completed by parents and teachers are considered the current benchmark (Barkley, 2015). The use of subjective ratings seems highly counterintuitive given that there exists many objective attention tests, and that research has shown that parent and teacher ratings in ADHD are only modestly correlated (Narad et al., 2015). Research has found that neuropsychological assessment, which identifies the precise cognitive issues underlying the attention problems, can lead to better initiation of treatment and promote better symptom reduction and improved quality of life due to more precise targeting of treatments (Pritchard, Koriakin, Jacobson, & Mahone, 2014). Continuous performance tests such as the Tests of Variables of

Attention (TOVA; Leark, Greenberg, Kindshcki, Dupuy, & Hughes, 2007) and Conners CPT (Conners, 2014), while having mixed psychometric properties, are used typically in a more thorough neurocognitive assessment of ADHD in Australia.

Attention is an umbrella term to describe many different cognitive skills including visual sustained attention, auditory sustained attention, visual attention span, auditory attention span, visual selective attention, switching attention, and divided attention. Issues with any particular cognitive skill can create similar functional weaknesses, therefore testing only elements of attention is not likely to result in an adequate assessment of ADHD. Studies examining the cognitive profile of children with ADHD show that attention, executive functioning, working memory, and information processing should be assessed to understand the core cognitive issues creating the functional attention problems (Barkley, 1997).

Classroom Observations

Depending on the results from the clinical interview, behaviour ratings, and formal testing, enough data is usually available to make a differential diagnosis of whether the attention issues are being caused by a core cognitive issue (like ADHD) versus a different medical, processing, or psychiatric condition. Alternatively, in some cases where there is a great discrepancy between parent and teacher ratings, or a conflict between more subjective ratings and objective test data, clinical observations can help determine what is happening functionally, particularly in the classroom. Depending on the nature of the child's unique cognitive profile, some attention weaknesses may not present as obvious within the classroom setting. For example, if a student demonstrates strong visual attention but weak auditory attention, the student may appear focused but may not be listening, which may be overlooked by a teacher. Where possible, it can be helpful for observations to be conducted by the school psychologist who will be able to collect these data less intrusively than clinicians.

Differential Diagnosis, Potential Misdiagnosis, and Co-morbid Conditions

The relationship between ADHD and various medical conditions has resulted in a controversial debate within the literature, and some researchers even argue that ADHD does not exist and it is actually a cluster of symptoms that may represent other disorders (Saul, 2014). It is generally recognised that ADHD can be misdiagnosed if other conditions that have similar attention problems are not ruled out as a possible aetiology, and that treatment should be targeted at the core condition causing the attention problems. Sometimes it can be challenging to distinguish between whether another condition (e.g. depression) is causing the ADHD symptoms or whether the symptoms would still be at clinical levels if the other condition was not present.

Children and adolescents with ADHD are significantly more likely to have one or more psychiatric disorders, with the most common co-morbidity being oppositional defiant disorder (30–90 %; Rydell, 2010). Other co-morbid disorders include conduct disorder (24–27 %; Larson, Russ, Kahn, & Halfon, 2011), Tourette's syndrome (25–85 %; Geller, Biederman, Griffin, Jones, & Lefkowitz, 1996), tic disorder (20 %; Banaschewski, Neale, Rothenberger, & Roessner, 2007), bipolar disorder (22–24 %; Gillberg et al., 2004), depressive disorders (14 %; Larson et al., 2011), and anxiety disorders (18–50 %; Larson et al., 2011). Up until the publication of the DSM-5 in 2013, ADHD and autism spectrum disorders (ASD) could not be diagnosed as co-morbid; however, roughly 20–50 % of children with ADHD meet the criteria for ASD whilst 30–80 % of patients with ASD meet criteria for ADHD (Rommelse, Franke, Geurts, Hartman, & Buitelaar, 2010).

In regards to the co-morbidities with other processing problems, there is considerable co-occurrence between ADHD and learning disorders (10–50 %; Margari et al., 2013), language disorders (45 %; Hutchinson, Bavin, Efron, & Sciberras, 2012), speech problems (12 %; Larson et al., 2011), reading disorder/dyslexia (18–45 %;

Margari et al., 2013), and executive dysfunction (33 %; Biederman et al., 2004). When other processing issues are present, it is important to ensure that there is a core attention weakness, rather than the main processing weakness subsequently creating functional issues with attention. For example, a student with a receptive language disorder may not be able to sustain focus in the classroom due to the high language demands, but the student may have intact auditory and visual attention skills when the language component is reduced.

Visual processing disorders and auditory processing disorders are also hard to distinguish from ADHD due to the subsequent attention problems associated with these disorders. For example, children with convergence insufficiency have many symptoms of ADHD due to difficulties maintaining eye focus on targets (Damari, Liu, & Smith, 2000). Symptoms of a variety of eye disorders involving eye teaming and oculomotor problems have also been shown to be misdiagnosed as ADHD (Damari et al., 2000). Likewise, auditory processing disorders can produce symptoms of what appears to be inattention in noisy settings such as a classroom or on sporting fields. Even a simple differential diagnosis between ADHD and learning problems can be difficult, as children with delayed learning may become inattentive in the classroom when presented with work beyond their capabilities.

Role of School Psychologist in Assessment

Schools are often the first place that symptoms of inattention and hyperactivity–impulsivity are raised as a problem. The typical age for identification of ADHD is 7 (Australian Institute of Health and Welfare, 2009) and DSM-5 diagnostic criteria are typically used for evaluation purposes. Each school will have a different policy as to when the school psychologist gets involved. Many teachers have very little training in ADHD and new teachers are particularly at risk for labelling a student as a badly behaved child opposed to as a child with a core processing difficulty (Ohan, Visser, Strain, & Allen, 2011). It can be helpful for school psychologists to speak to teachers about ways to identify children with ADHD or other processing disorders and set up a system for referral to the psychologist to determine whether a recommendation for a more thorough assessment is warranted. The school psychologist may want to conduct some classroom or playground observations prior to this recommendation. Each school has different policies over whether the psychologist will be able to offer any formal assessment in the form of behaviour ratings or intellectual/academic assessment.

One of the most important considerations for a school psychologist who does not possess the competency or have the resources available to conduct their own thorough assessment of the student is who to refer the child to for assessment or intervention services. In Australia, ADHD is typically diagnosed by paediatricians, child psychiatrists, or psychologists, with these professions often working closely together to provide a multidisciplinary team. When referring a child for formal assessment, it is vital for a school psychologist to consider the difference among clinicians in the assessment as well as treatment process. For example, whilst all three use clinical interviews and rating scales, psychologists are able to additionally conduct detailed psychometric testing to identify the core processing issue underlying the functional attention weaknesses.

Variables That May Impact Referral, Assessment, and Diagnosis in Schools

Age

A small but compelling body of literature suggests that in addition to a student's age relative to the diagnostic criteria (i.e. onset prior to age 12, the reduction of needed symptoms during later adolescence according to the DSM-5), a child's age relative to classmates is an important factor to consider. For example, Elder (2010) reported that ADHD diagnoses among children who were born just before the kindergarten eligibility cut-off were 60 % more prevalent relative to children

who were born following the cut-off age. Stated differently, the youngest students in a given classroom are diagnosed much more frequently relative to the oldest students in a given class. Thus, it is very important to use measures with age-based (not grade-based) norms when assessing for ADHD as the use of age norms may help to minimise possible bias regarding younger students in a given grade level.

Among very young children, the process of referral, assessment, and diagnosis is complicated due to the relatively low levels of developmentally appropriate attention and behavioural control in this age group. Given the typically high levels of inattention and hyperactivity in early childhood, it may be difficult to differentiate ADHD-related behaviour from typical functioning (DuPaul & Kern, 2011). Further, it may be difficult to accurately differentiate clearly atypical behaviour between other childhood disorders (e.g. autism). Nevertheless, recent studies have shown that diagnosis of ADHD in young children can be done in a reliable and valid fashion as long as measures that take developmental factors into account are used (DuPaul & Kern, 2011).

When students reach adolescence, there are several factors that may impact their referral, assessment, and diagnosis. First, adolescents with ADHD may have higher levels of impairment in behavioural and academic functioning relative to younger children (Barkley, Murphy, & Fischer, 2008). Additionally, teens with ADHD have a higher rate of substance abuse (Sihvoia et al., 2011). These factors may serve as the primary referral question, in which case, screening for ADHD may be warranted. Second, adolescent input should be incorporated into the assessment protocol as teens will likely have important insights into their daily functioning. Given the high co-morbidity rate of ADHD and internalising disorders, adolescent self-report should be utilised to gather information that may otherwise be missed (e.g. symptoms of depression). Finally, the DSM-5 criteria for ADHD has been changed such that symptoms must be evident prior to age 12 and individuals 17 years and older need only five symptoms to meet diagnostic criteria. The increase in age of onset from age 7 to age 12 provides an opportunity for students who begin displaying symptoms of ADHD later in childhood to receive a diagnosis and associated treatment. The reduction in required number of symptoms for older adolescents will facilitate diagnosis among individuals who are experiencing a developmentally appropriate reduction in ADHD symptomatology over time.

Gender

There are few, if any, gender differences in specific or associated impairment among students diagnosed with ADHD. Although some research has reported higher rates of externalising co-morbidity among males and higher internalising co-morbidity among females, these findings are similar to population estimates for those disorders and are likely not specific to ADHD (Owens, Cardoos, & Hinshaw, 2014). In contrast, childhood estimates indicate that males are four times more likely to be diagnosed with ADHD; however, these gender differences are largely attenuated by adulthood (Barkley et al., 2008). Again, it is critical to use assessment measures that include gender-based norms so that symptom frequency for a specific child is considered in the context of normative data for boys relative to girls. Fortunately, gender-based norms are provided for most behaviour rating scales used in identification of ADHD.

Race/Ethnicity

The impact of racial or ethnic minority status appears to have important implications for the referral, assessment, and diagnosis of ADHD; however, their impact is equivocal and poorly understood. We were unable to locate any studies that explicitly examined the impact of race/ethnicity on assessment of ADHD in Australia. Given that many assessment measures (e.g. rating scales) have been developed in the United States (U.S) or other countries, the use of these measures when assessing children from racial minority backgrounds in Australia should be done with caution. Cultural differences need to be considered in assessment in relation to culturally biased test items on formal testing, as well as rater bias on

behavioural rating scales. International research suggests that different cultural groups get rated in different ways by teachers, parents, and mental health professionals (Pierce & Reid, 2004). In Australia, particular caution should be applied to Indigenous and Asian populations. Clinicians must be aware of possible cultural differences in tolerance for ADHD-related behaviours and make sure to obtain assessment data from multiple sources (parents, teachers, and test administrators) to provide a comprehensive view of a child's symptoms, i.e. not just views based on a particular cultural perspective.

Intervention for ADHD

Pharmacological Options

In Australia, fewer medication options are available compared to other countries. There are two categories of medications available for the treatment of children with ADHD: central nervous system (CNS) stimulants and non-stimulants. CNS stimulants are the most commonly used medical treatment for children with ADHD and research has shown that up to 90% of children will show some level of improvement of ADHD symptoms from at least one type of stimulant medication (Connor, 2015).

In Australia, the stimulants that are available are methylphenidate (Ritalin and Concerta), dexamphetamine, and lisdexamfetamine dimesylate (Vyvanse). Short-acting stimulants (e.g. methylphenidate and dexamphetamine) have noticeable benefits for 3–4 h, while the long-acting stimulants (e.g. Vyvanse and Concerta) are effective for approximately 10–12 h, (Kratochvil, Daughton, & Kratochvil, 2009). For the majority of children receiving medication, it is not active within their system in the mornings and after school in the early evenings, which can make family life and home behaviour very challenging.

The most widely used non-stimulant medication is atomoxetine (Strattera) which shows therapeutic effects gradually over 2–6 weeks (Kratochvil et al., 2009). Whilst the effects of Strattera are not as strong as stimulant medications, this medication can be helpful as the benefits are more consistent and do not vary over the day (Garnock-Jones & Keating, 2010), and mild antidepressant properties are also present (Ryan, Katsiyannis, & Hughes, 2011). Most of the previously mentioned medications are under the Pharmaceutical Benefits Scheme (PBS) and are subsidised by the government; however, Concerta and Strattera are not available on PBS from 19 years of age. Vyvanse (lisdexamfetamine) is the latest stimulant medication to be released onto the market; however, its application to the PBS was rejected even for children.

Despite the efficacy of medication, many families are resistant to medicating their children. Approximately 79–90% of children on medication experience adverse side effects such as nausea, sleep problems, mood swings, loss of appetite, and slowed growth, although these side effects dissipate with time and/or reduced dosage (Connor, 2015). Another concern with pharmacotherapy is that the causes of the attention deficits are not treated directly. Thus, as the medication wears off, often in the early evening, the child and family still need strategies to manage cognitive weaknesses, social, and behavioural issues. Medications are also not effective for all children, with up to 30% of children failing to demonstrate a distinctive improvement (Chronis, Jones, & Raggi, 2006). Some children also benefit partially from medication, with skills improving but still not falling within the average range (Qian, Shuai, Chan, Qian, & Wang, 2013). For other children, taking the medication is contraindicated due to specific health or emotional concerns (Elia & Vetter, 2010). Therefore, despite the benefits of medication, it should not be offered as the sole treatment option to families and the benefits need to be closely monitored to determine whether the efficacy of the medication is optimal or whether additional forms of treatment are required. In Australia, the school role in pharmacotherapy is minimal beyond the school nurse administering medication, if necessary.

Of greatest concern is the assumption that medication will improve learning in the classroom and overall academic achievement. Children with ADHD have lower academic skills after adjusting for IQ and are more likely to underachieve at school and have lower educational attainment (Barry, Lyman, & Klinger,

2002). Whilst it appears intuitive that medication should improve these outcomes, research actually indicates limited academic benefits (Van der Oord, Prins, Oosterlaan, & Emmelkamp, 2008).

Community-Based Interventions

Due to many of the core symptoms as well as the co-morbidities and related behavioural issues, relationships with parents and teachers can be affected. Interventions aimed at parents, teachers, schools, and the general community as a whole can significantly improve awareness towards ADHD and the impact it has on the student. Community-based interventions, such as training primary care providers, have resulted in significant improvements in evidence-based care for these children during assessments and treatments (Epstein & Langberg, 2009).

Having such a high prevalence of ADHD amongst children and adolescents in Australia means that schools should facilitate appropriate programs designed for both the student coping with the disorder and the teachers. It would be extremely damaging if these students are labelled as misbehaved or uncooperative by their teachers, as a result of behaviours not within their control, which could further result in social isolation and lower self-esteem. Unfortunately, there is no current government funding for ADHD services and interventions in schools, leaving teachers with very little support to help maximise their learning potential. ADHD is not listed as a recognised disability by the NSW Department of Education and Training criteria to be able to obtain integration funding in public school classrooms (as opposed to autism or other visual, hearing, language, or mental disorders).

Parenting and Behavioural Management

Parent training and behaviour therapy are aimed at teaching parent's strategies to manage and change their children's behaviour, such as hyperactivity, impulsivity, inattention, and other related conduct problems (Raghibi, Fouladi, & Bakhshani, 2014). Most parent training programs focus on a set of core parenting skills that have been shown effective for students with ADHD. For example, programs may address setting consistent, developmentally appropriate, and clear expectations for their child's behaviour overall; using clear and concise directives when needed; rewarding appropriate behaviour with attention, praise, or tangible reinforcers; ignoring minor inappropriate behaviours and providing direct, firm, but neutral reprimands and punishments when required. Additionally, many programs for the parents of children with ADHD discuss effective communication with the child's school and managing the additional stress related to parenting a child with ADHD (Owens, Storer, & Girio-Herrera, 2011). After parents are taught strategies aimed at managing their children's ADHD-related behaviours, there are significant improvements in the core ADHD symptoms in both home and school settings as well as reductions of parental stress and improvements in parental confidence (Zwi, Jones, Thorgaard, York, & Dennis, 2011).

Treating Core Skills

Attention Training

Neurofeedback involves direct training of brain function whereby brain activity is relayed back to the individual via a computer program, so they can develop self-regulation strategies to be used in everyday life (Gevensleben et al., 2010). Meta-analyses of the current body of research show promising results and particularly good improvements in core attention skills. Research has found that children and adolescents who received neurofeedback training had fewer ADHD symptoms, and greater improvement and stability of behaviour at 6 months after the intervention (Gevensleben et al., 2010). Neurofeedback is based upon findings that children with ADHD have brain dysregulation characterised by imbalances noted in various brainwaves as measured by EEG. These imbalances are associated with under-arousal (inattention, daydreaming, low motivation, and energy), as well as over-arousal

(hyperactivity, impulsivity, agitation, and anxiety). Through training the brain to be more regulated, these symptoms have been shown to improve significantly. Neurofeedback could possibly provide a very valuable way for school psychologists to treat ADHD directly in the school setting; however, it is important to note that findings are mixed regarding generalisation of obtained effects in classroom settings (Evans, Owens, & Bunford, 2014).

The use of computerised programs to improve cognitive skill has become increasingly widespread, with commercially available 'brain training' programmes being developed rapidly. The use of these programmes in assisting children with ADHD is only just becoming explored in the research. As understanding of specific neuropsychological skills is becoming better understood and targeted in the design of these programmes, there does seem to be increasing evidence for some utility in improving core cognitive skills. In general, the benefits of computer cognitive training have been shown to be inconsistent (Sonuga-Barke et al., 2013). Increasing evidence is beginning to emerge for the benefits of well-designed cognitive training programmes that recognise that different aspects of attention and executive functioning can be specifically impaired and trains skills in a variety of areas (Tucha et al., 2011); however, much more research is needed at these early stages. CogMed is a common programme some clinicians in Australia recommend to help alleviate specific issues with working memory and attention and is beginning to be used in many private school settings by school psychologists or special needs departments. Research on this programme has shown some utility with improvements noted on functional ratings in regards to ADHD symptoms as well as functional working memory (Beck, Hanson, Puffenberger, Benninger, & Benninger, 2010). Although early research was promising in relation to improvements on untrained measures of cognitive ability, more current research has found little generalisation and only benefits on trained tasks (Shipstead, Hicks, & Engle, 2012).

Non-computerised cognitive training that specifically targets attention skills is currently quite limited. The 'Pay Attention!' programme targets a full range of attention skills in both auditory and visual domains, and has been shown to improve numerous cognitive skills on neuropsychological tests, as well as show improvements on standardised ratings in relation to ADHD symptoms and executive skills by parents (Tamm et al., 2010). Interestingly, research shows that mindfulness training can reduce attentional and behavioural problems, improve performance on attentional tests, and enhance working memory among adolescents with ADHD, in addition to reducing parental stress (Van de Weijer-Bergsma, Formsma, de Bruin, & Bögels, 2012).

Executive Training

As our understanding of ADHD has improved over the past decades, it has become apparent that executive function difficulties are often a key feature in ADHD and frequently affect quality of life, diminishing educational outcomes. Issues with planning, organisation, time management, problem-solving, and working memory are often part of the cognitive profile and need to be targeted directly in treatment. There is minimal evidence to show that stimulant medication helps improve executive skills such as organisational ability (Abikoff et al., 2009). For this reason, it is important to treat the frequently found executive deficits through more cognitive-based skill training. This type of therapy is often conducted by either psychologists or occupational therapists with experience in this area. Research into this field is relatively new; however, studies support executive training with a particular metacognitive focus as a promising intervention for young children with ADHD (Tamm, Nakonezny, & Hughes, 2014). Self-management training in adolescents with ADHD has been shown to be highly effective when implemented by school psychologists in remediating executive deficits (Gureasko-Moore, Dupaul, & White, 2006). Organisational training has been shown to have positive outcomes in school-related activities, with some evidence that it can reduce ADHD symptoms and result in academic gains (Langberg, Epstein, & Graham,

2008). Two evidence-based programmes should be considered including the Homework, Organisation, and Planning Skills (HOPS) programme (Langberg, 2011) and the Organisational Skills Training for Children with ADHD (Gallagher, Abikoff, & Spira, 2014). Both programmes involve manualised procedures for directly training student's note taking, completing homework in a timely fashion, and organising school materials.

Classroom Behavioural Interventions

As is the case for parents, classroom teachers can implement behavioural interventions such as token reinforcement or response cost to increase sustained attention to tasks, work completion, and compliance with school rules (Evans et al., 2014). Further, the concomitant use of classroom behavioural strategies and stimulant medication can lead to using lower dosage of both interventions while maintaining optimal academic and behavioural outcomes (Fabiano et al., 2007).

There are several steps involved in designing and implementing a classroom behavioural intervention (for additional detail, see DuPaul & Stoner, 2014). First, three to four student behaviours (e.g. following classroom rules) are identified for improvement. Next, the classroom teacher and/or school psychologist collect baseline data to document pre-treatment levels for target behaviours as well as to identify antecedent (e.g. task demands) and consequent (e.g. avoiding work) events that may precede and follow problematic behaviour, respectively. Specific goals are then delineated so the student knows the performance level necessary to earn an immediate reinforcer (i.e. token reinforcement such as a sticker or point on a chart). Third, the teacher monitors student performance over a specified period of time. If the student meets the specified goal for a particular behaviour, then the teacher praises the student and provides the token reinforcer. If the goal is not met, the teacher praises student effort and encourages continued efforts for the future. Fourth, token reinforcers are exchanged at the end of the class period or at the end of the school day for backup reinforcement (i.e. gain access to a preferred activity). Finally, as students make progress, behavioural goals can be modified so that performance gradually improves over time.

Self-regulation strategies such as self-monitoring and self-evaluation can be used to facilitate maintenance and generalisation of behavioural improvements obtained through a token reinforcement programme (DuPaul & Stoner, 2014). For example, students can be prompted at specific intervals to monitor and record their on-task behaviour and/or their productivity on academic tasks (Reid, Trout, & Schartz, 2005). The process of self-monitoring involves observing and recording one's behaviours and includes two basic steps. First, the student must determine if the target behaviour has occurred and following that determination the student must record that occurrence or non-occurrence (Mace, Belfiore, & Hutchinson, 2001). Some variations of this strategy include an initial stage of matching with teacher evaluations followed by gradual transition to self-evaluation alone (DuPaul & Stoner, 2014).

Home–School Communication Program

Another treatment strategy that has been found effective for children and adolescents with ADHD is the use of a home–school communication program, also known as a daily report card (DRC) system (Evans et al., 2014). Over 70% of students with ADHD show behavioural improvement within the first month of a DRC program with additional gradual improvement over the course of several months of treatment (Owen et al., 2012). The DRC involves several steps including: (a) identification of several academic (e.g. work completion) and behavioural (e.g. follow class rules) goals ideally through a collaborative meeting among school personnel, parents, and students; (b) construction of a DRC wherein the teacher indicates whether the student met each goal over the course of a class period or portion of the school day; (c) imple-

mentation on a daily basis with parents reviewing the completed DRC and providing reinforcement (i.e. access to preferred activities) at home contingent on successful days; and (d) periodic meetings among school personnel, parents, and students to modify DRC goals and procedures as necessary. Basically, the DRC employs the same principles as classroom behavioural strategies; however, reinforcement is provided by parents at home after the school day rather than being provided by teachers in the classroom setting.

Academic Intervention Strategies

As described previously, children and adolescents with ADHD often experience significant difficulties with academic achievement as demonstrated by lower report card grades and scores on achievement tests (DuPaul & Stoner, 2014; Frazier et al., 2007). Although stimulant medication and behavioural interventions may be associated with improvements in academic performance, the magnitude of effects is typically small and not sufficient to normalise achievement (DuPaul, Eckert, & Vilardo, 2012; MTA Cooperative Group, 1999). Thus, classroom interventions that directly address academic skill and performance deficits often are necessary. For academic skill deficits, teachers can use principles of explicit instruction, a direct approach to teaching that involves providing clear information to students about what is to be learned; instructing skills in small steps using concrete, multiple examples; continuously assessing student understanding of specific skills; and supporting active student participation that ensures success (Nelson, Benner, & Mooney, 2008). Peer tutoring can also be used to enhance academic performance and involves pairing two students wherein they take turns in the roles of tutor and tutee. Peer tutoring strategies have been found to improve on-task behaviour and academic performance of students with ADHD (DuPaul, Ervin, Hook, & McGoey, 1998) as well as students without disabilities (Bowman-Perrott et al., 2013).

Social Skills Training

Whilst CNS stimulant medication can help with some of the socially intrusive behaviours of children with ADHD, social issues persist as medication target symptoms of inattention, impulsivity, and hyperactivity, rather than educating children on positive social behaviours (de Boo & Prins, 2007). Social skills training can be an important part of the ADHD treatment plan, as social impairments can increase the risk for emotional, behavioural, and even substance abuse problems later in life (Greene, Biederman, Faraone, Sienna, & Garcia-Jetton, 1997). Typical manifestations of impairment that ADHD youth demonstrate in social situations include disrupting and intruding in on conversations or the avoidance of peers (Marshall, Evans, Eiraldi, Becker, & Power, 2014). Research has shown that social skill training in children with ADHD can have mixed results, with children demonstrating more positive social behaviours in a session, but less generalisation to a more naturalistic setting, along with issues with changing peers negative biases towards the child with ADHD (Mikami, Jia, & Na, 2014). Alternative approaches to social skills training that involves parents and teachers have found a greater likelihood of generalisation to real-world settings (Pfiffner & McBurnett, 1997).

Assessment and Promotion of Treatment Integrity

It is important to promote treatment integrity to ensure that positive outcomes are maximised. Thus, when monitoring the progress of ADHD treatments, objective clinical data are needed to determine whether changes or additional therapy is necessary. Treatment plans can consist of single to multiple therapies, either given consecutively or concurrently, and the plan can become quite complex depending on the number of comorbidities that require treatment.

In many cases, particularly when ADHD symptoms are mild in severity, behavioural and other psychosocial treatments will be tried before pharmacotherapy (DuPaul & Stoner, 2014). If

medication is provided, it is essential to have the student on a stable medication at the correct dosage before other types of treatment are provided directly to the child, in order to be able to assess whether the medication is working optimally and to discern among the effects of medication relative to other treatments. Paediatricians may need to try several dosages or even several different medications in order to find the most suitable medication. It is also important to monitor the emotional and behavioural side effects of medication as some children can have increased anxiety and others may rebound when coming off medication with very negative behaviour (Garland, 1998). This could be something that school psychologists could monitor given that the medication is mostly in the child's system during the school day. The efficacy of the medication needs to be evaluated relative to the benefits and costs, and it needs to be recognised that even though some students may benefit cognitively from medication, the costs in relation to adverse side effects may result in medication not being a good option for some children.

Similarly for all other types of non-pharmacological interventions, it is important to monitor the progress of the interventions and make sure that the student's skills are improving. Unlike medication where the benefits are often immediately effective (<1 h), the benefits of all other interventions are more gradual and can take weeks, if not months. Often these interventions are given concurrently by the same therapist (including school practitioners) and it can be hard to determine which therapies are producing the most beneficial results. Standardised questionnaires can provide good evidence for improvements over time and if intensive therapy is being conducted it can be helpful to get ratings at the end of each term. These should include not only attention ratings, but also assessment of co-morbidities and areas of functional impairment including social skills, academic achievement, behaviour/conduct, emotional status, and parental/family stress.

If specific attention or executive training is conducted, it is very helpful to have neuropsychological test data particularly in relation to objective attention and executive tests. These data can provide guidelines as to what specific skills need treating (e.g. visual sustained attention, auditory sustained attention, divided attention, working memory planning, organisation). Post-treatment testing can then also objectively assess whether all the skills that were below average are normalised compared to their peers following treatment.

Case Example of Assessment and Intervention: ADHD with Co-morbid Issues

Background

LS was a 7-year-old girl identified for assessment by her teacher due to problems completing independent seatwork, talking without permission, and noncompliance with school rules. The teacher indicated that the quality of LS's academic work was similar to that of her classmates when the teacher worked with her individually. Alternatively, due to her inconsistent completion of assigned work and frequent inattention during exams, LS was reported to achieve below her presumed potential. Some of these same issues were noted by the school when LS was 6 and a paediatric assessment was recommended. Her paediatrician raised the possibility of ADHD but had not formally assessed for it. LS had completed neurofeedback with a psychologist to help with her ongoing attention issues; however, no formal assessment of ADHD was conducted, and neurofeedback was discontinued early. Given the apparent chronicity of LS's attention and behaviour problems, the school psychologist collected data to identify possible school-based indicators of ADHD.

Assessment

After briefly discussing the case, the school psychologist asked the teacher to complete a screening instrument (i.e. the ADHD Rating Scale—5). LS's ratings were beyond the 93rd percentile based on her age and gender for the total score as

well as the Inattention and Hyperactivity–Impulsivity factor scores. Also, six inattention and six hyperactivity–impulsivity symptoms (using DSM-5 criteria) were reported to occur "often" or "very often". Based on this screening information, the nature of the referral, and the chronicity of LS's school difficulties, a multimethod assessment of ADHD appeared warranted.

As a first step in the assessment process, the school psychologist interviewed LS's classroom teacher. In the course of the interview, it was reported that she displayed frequent problems with inattention, impulsivity, overactivity, and noncompliance across most school settings and classroom activities. These problems were most evident when independent seatwork was assigned and when the teacher was instructing the whole class or small groups. There did not appear to be any differences in this behaviour across academic subject areas. LS was reported to evidence seven of the nine inattention symptoms and six of the nine hyperactivity–impulsivity symptoms of ADHD on a frequent basis. These symptoms had been exhibited on a daily basis since the beginning of the school year. Furthermore, a significant number (i.e. five out of eight) of symptoms of oppositional defiant disorder were reported to occur on a frequent basis. The latter included noncompliance with teacher commands, frequent losses of temper, and deliberate annoyance of others. Problems associated with other disorders (e.g. conduct disorder, depression) were not reported to occur frequently.

Due to the nature and severity of her attention and behaviour problems, LS was not achieving at a level consistent with her classmates in any academic subject area; however, her teacher did not feel that LS had a learning disability. She reported that when she worked with LS on an individual basis, she was able to demonstrate adequate knowledge in key skill areas (e.g. she was able to read high-interest material). When she was asked to complete independent work, particularly material that did not capture her interest, she was not able to demonstrate her abilities due to a lack of work completion.

LS had very few friends in the classroom and was rejected by many of her peers. She did not follow the rules of games and frequently was verbally aggressive in unstructured settings (e.g. on the playground). Her teacher felt that many of her disruptive behaviours (e.g. talking out in the classroom) were an attempt to elicit attention from her peers. Unfortunately, these efforts to promote peer interaction resulted in further ostracism by her classmates.

The teacher reported a great deal of frustration in trying to manage LS's behaviour. Attempted interventions included ignoring her disruptive behaviour, making public reprimands to get back on task, sending notes to her parents following misbehaviour, giving her a reward (e.g. access to classroom computer) for a week of appropriate behaviour, and reducing the number of items she is expected to complete for seatwork. None of these strategies resulted in consistent behavioural improvement.

LS's report cards from previous school years were reviewed. Written comments from previous teachers indicated that she displayed similar problems with behaviour control, albeit less severe, as reported by his current teacher. A pattern of attention and behaviour control problems beginning at an early age and occurring across school years was evident.

LS's mother was interviewed briefly by telephone and corroborated the teacher's report of significant problems with inattention, impulsivity, and overactivity. In fact, nearly all of the symptoms of ADHD were reported to occur on a frequent basis at home. These had been evident from an early age (i.e. since she was 3 years old). She reported that LS was very defiant and uncooperative at home, especially in response to maternal commands. A majority of the symptoms of oppositional defiant disorder were indicated to be present. No further DSM-5 symptomatology was reported. She did not have a history of significant medical difficulties or developmental delays. LS's father was reported to have had similar attention and behaviour problems as a child, but was now a successful businessman. No other significant problems were reported for immediate family members. Finally, her mother stated that she was very interested in receiving help in managing LS's behaviour as the stress level in the household was directly related to the degree to

which she behaved in an appropriate manner. Previous attempts at intervention, including family therapy, had failed.

Maternal responses on the Behaviour Assessment Scale for Children-3 resulted in significant elevations on subscales related to ADHD symptoms all of which were at or beyond the 95th percentile. All remaining subscales were below the 93rd percentile (i.e. in the normal range). Teacher ratings on the Behaviour Assessment Scale for Children-3 were consistent with those provided by LS's mother as significant elevations were obtained on subscales related to ADHD with all scores at or above the 98th percentile. Remaining subscale scores were in the normal range. LS's mother and teacher also completed ratings of her social skills using the Social Skills Improvement System (SSIS; Gresham & Elliott, 2008). These ratings indicated LS exhibited problems with peer relationships and social interactions to a greater extent than 93% of similar-aged girls in the normative sample.

LS's classroom behaviour was observed on several occasions using the Behaviour Observation of Students in Schools (BOSS; Shapiro, 2011). Observations were conducted for 20 min on three occasions (once during math seatwork, twice while working on a reading assignment). LS was noted to display high rates of off-task verbal and motor behaviours. She displayed off-task verbal behaviour during an average of 20% of the observation intervals, while exhibiting off-task motor behaviour approximately 15% of the time. In contrast, randomly selected classmates were observed to exhibit off-task verbal behaviour only 4% of the time and were engaged in off-task motor behaviour during less than 8% of the observation intervals. Thus, direct observations were consistent with both parent and teacher report of significant behaviour control difficulties relative to LS's peers.

The next step in the evaluation process was to interpret the results. LS's teacher and mother independently reported at least six inattention and six hyperactivity–impulsivity symptoms to be evident on a frequent basis. According to his mother, she began exhibiting ADHD-related difficulties at the age of 3 with no diminishment of severity. Thus, these symptoms were evident at an early age and were displayed across several years. Maternal and teacher ratings indicated LS's problems with inattention, impulsivity, and overactivity were more frequent and severe than those of the vast majority of other girls her age. This was corroborated by direct observations of her classroom behaviour. Furthermore, attention problems were reported to be pervasive across numerous school and home situations. Finally, LS's ADHD-related behaviours had impaired her peer relationships and academic performance to a significant degree.

Because LS also was reported to display a significant number of oppositional defiant disorder symptoms, she was referred for further diagnostic evaluation with a clinical psychologist in the community. A comprehensive neuropsychological evaluation was conducted that basically affirmed school-based data in indicating that LS's difficulties warranted diagnoses of both ADHD combined presentation and oppositional defiant disorder.

In an effort to gather data that would inform development of a behavioural intervention, the school psychologist interviewed LS's teacher regarding the antecedents and consequences surrounding her off-task disruptive behaviour in the classroom. In addition, the school psychologist recorded the frequency of antecedent (e.g. task presentation) and consequent (e.g. peer laughter) events during various classroom situations. Interview and observation data indicated that LS's disruptive behaviour was most likely to occur when she was asked to complete independent seatwork and that this behaviour was followed by frequent teacher reminders for her to focus on her work. It appeared that the function of her off-task behaviour was to avoid and escape classwork.

Treatment

Several school-based interventions were implemented based on this evaluation. First, the school psychologist and teacher designed a classroom intervention programme that included modifying task demands, token reinforcement, response cost, and a home–school communication programme

(for more details regarding classroom intervention, see DuPaul & Stoner, 2014). These interventions were designed to reduce LS's desire to avoid work by enhancing the positive aspects of the latter while providing greater motivation for her to complete assigned tasks. Second, referrals were made to a clinical child psychologist and LS's paediatrician for provision of parent education and a medication assessment, respectively. Parent education was necessary due to her high level of defiance and inattention at home. A medication assessment was recommended due to the severity of LS's ADHD and the high likelihood of continued impairment in functioning in a number of key areas. Finally, a peer relationship intervention was designed to address LS's problematic social behaviours. Specifically, a peer-mediated procedure was used wherein several of his classmates were trained to prompt and reinforce appropriate social behaviour on the playground. It was felt that this combination of interventions would be necessary over the long term given the chronicity and severity of LS's ADHD.

In collaboration with the treatment team (i.e. paediatrician, clinical psychologist, parents, teacher), the school psychologist periodically assessed LS's classroom performance to evaluate her progress and to determine whether changes were warranted to the school-based intervention programme. Teacher ratings and classroom observations were obtained on at least a weekly basis during the initial stages of implementing the multicomponent behavioural intervention. Adjustments were made to the timing and frequency of reinforcement as a result. Over the course of the school year, teacher and parent ratings were collected periodically and shared with the clinical psychologist and paediatrician to inform possible changes in medication dosage and/or parent education.

Future Directions for Research and Practice

Given the chronic impact of ADHD on school and academic outcomes, there is a critical need to increase the number and complexity of empirical studies focused on educational impairment. Longitudinal investigations of educational functioning among children with ADHD should be conducted to advance our understanding of (a) the nature of educational impairments associated with ADHD, (b) the dynamic changes that may occur with respect to scholastic functioning, and (c) the critical time periods when intervention may be most needed (e.g. entry to elementary school, transition to high school).

Substantial progress has been made regarding the development of school-based interventions for students with ADHD; however, several notable limitations remain. For example, there has been almost no research evaluating educational interventions for students attending secondary school or university. This is important because treatment strategies effective for younger students with ADHD may not help older students. As a second example, many available interventions targeting educational impairment include multiple components that are staff- and resource-intensive. Even if these interventions are highly effective, it is not clear that schools have the expertise or resources needed to carry them out. Additional research is needed on interventions such as daily report cards that can be implemented with minimal staff effort and resources. Ultimately, it is critical that school psychologists are involved to a greater degree in identification of students with ADHD as well as design, implementation, and evaluation of school-based interventions. Without involvement of school mental health professionals and an increased focus on feasibility, acceptability, and dissemination, it is unlikely that effective school interventions will reach the students for whom they were designed.

Test Yourself Quiz

1. The prevalence of ADHD has been found to vary across boys vs. girls and across cultural groups. In what ways can you take gender and culture into account as you conduct an assessment of ADHD?
2. It is very important to consider possible alternative explanations for a child's apparent

ADHD symptoms. What other conditions and disorders might involve symptoms that affect attention, impulse control, and activity level? What actions can you take to account for these alternatives in the assessment of ADHD?

3. Sam is an 8-year-old boy with ADHD combined presentation. Sam's completion of classwork is very inconsistent and he struggles to stay on-task for more than 10 min at a time. As a school psychologist, what behavioural interventions would you recommend in consultation with the teacher to promote classwork completion?
4. A variety of psychotropic medications are available for treating ADHD. What do you think are the most important considerations in recommending medication to treat symptoms of this disorder? What role could school psychologists and other practitioners play in assisting physicians in making medication decisions?
5. A variety of psychosocial and educational support strategies have been found effective for children and adolescents with ADHD. What are the primary treatment approaches and how can school psychologists support the implementation of these strategies in schools?

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Suggested Resources

Children and Adults with ADHD (CHADD). www.chadd.org

National Resource Center for ADHD. www.help4ADHD.org

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