

The Diagnosis, Intervention and Treatment of ADHD. A Critical Review

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Abstract: Numerous studies on ADHD and its symptoms in children have been published over a vast number of literature; however, the perception of the condition frequently alters, and thus, it is difficult to determine a universally-accepted, accurate concept for ADHD, which in turn can assist assessment and diagnosis of ADHD. Although disciplines are in agreement that the diagnosis of ADHD can be made utilising the DSM-IV-TR as a sensibly-reliable and valid method of assessing children with ADHD, common practice between the disciplines in the case of identification of ADHD still varies considerably. The clinical guidelines presented by the American Academy of Pediatrics (AAP) and American Academy of Child & Adolescent Psychiatry (AACAP) present a method which allows a health professional to complete the procedure and to also validate a systematic assessment and diagnosis of ADHD utilising the DSM-IV-TR, thus allowing them to directly manage ADHD children. However, this paper tends to believe that the diagnosis of this disorder should be based on valid processes which are supported by empirical investigation evidence.

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1. Introduction

Attention Deficit Hyperactivity Disorder (hereafter referred to as ADHD) is a diagnostic label utilised in order to highlight those children who show developmentally uncharacteristic levels of inattention and hyperactivity/impulsivity (APA, 2000). Notably, if this disorder is left without diagnosis and/or management, there could be major continuing impairments across two main domains: academia and social performance (Rief, 2005). In general, children with the condition show signs out-of-the ordinary constant behaviours, lasting not less than six months, with commencement prior to the age of seven years—despite symptoms possibly appearing prematurely, i.e. as early as three years of age (APA, 2000; Cohen et al., 1993; Barkley, 1998). The majority of children are not diagnosed until the beginning of formal schooling owing to the more prominent sign of symptoms of ADHD in the classroom setting (Barkley, 2006a). With this in mind, it is vital to state that children might also display a number of the predefined ADHD symptoms as an element of regular maturation; therefore, a consistent framework for a precise ADHD diagnosis is required.

2.1 Diagnosis of ADHD

In order to make an accurate and well-informed diagnose of ADHD, three key features ought to be present in order for a child to be diagnosed with ADHD (APA, 2000); these three primary conditions are inattentiveness, hyperactivity, and impulsivity, each of which have to be apparent prior to the age of seven, and ought to continue for six months and in at

least two different environmental settings (APA, 2000). Furthermore, symptoms ought to be moderately stable, chronic, and deemed to be an interference corresponding to key life activities (Volkow *et al.*, 2001). Once these conditions have been fulfilled, then it is mostly suspected that the child has ADHD (Sandberg, 2002), and the most competent professionals for diagnosing ADHD in children are physicians, psychiatrists, and psychologists) Barkley, 1998).

The assessment and subsequent diagnosis of children with ADHD have three significant aims which are: Firstly, determining the existence symptoms and the exclusion of other possible conditions; secondly, implementing intervention and a treatment plan; and, thirdly, identifying any other comorbid disorders which may be present (Barkley, 1998).

Additionally — and in accordance with The European Clinical Guidelines — six principle components ought to be used in the medical assessment, eventually permitting health professionals to make a precise diagnosis, and these include gathering information, child and parent/carer interviews, observation, physical examination, the diagnosis of co-morbidity disorders which are considered to be relevant, and information- and psycho-education-sharing (Taylor *et al.*, 2004). Moreover, four critical elements ought to be included in the assessments of ADHD: Querying regarding the development history, the level of meeting the criteria of DSM-IV-TR via utilising behaviour-rating scales,

interviews, and cognitive and attainment assessment with the purpose of verify educational problems (Goldstein & Naglieri, 2008).

Therefore, in general, as parents or teachers are apprehensive that the behaviours of a particular child are preventing or stopping him or her from performing typically at home, school, or any other settings, children are brought to physicians (Calder, 2003). However, as mentioned previously, the first to propose that a child may have ADHD are teachers (Sax & Kautz, 2003) and, therefore, the first assessments of a child are frequently conducted by psychologists in schools or clinical psychologists prior to making a referral to a physician (Lafleur & Northup, 1997; Hartnett, Nelson & Rinn, 2004). In this respect the school psychologist's role is to assess the severity of learning and communication difficulties (Hoff, Doepke & Landau, 2002), and to further develop and apply suitable plans with purpose of tackling the apprehensions of teachers with the intention of appropriately making the assessment of ADHD (Demaray, Elting & Shaefer, 2003); this should be done by utilising various assessment methods (Shapiro & Heick, 2004), which may comprise interviews with the child him- or herself and his or her parents and teachers, classroom observations, and indirect assessments (Hoff, Doepke & Landau, 2002). This process is complex since it sustains that no critical tests for ADHD are available (Selikowitz, 2009); however, that is not owing to a lack of researcher attempts, due to the complex interaction of ADHD symptoms with the environment, which this clearly reflects (Goldstein & Naglieri, 2006). Furthermore, if it appears that the ADHD symptoms negatively influence the child's education and emotional growth, the child should then be referred to a physician, who should then make a further assessment and diagnosis (Sandberg, 1996).

In most cases, physician is a paediatrician, and only 5 to 10% of cases bring about a specific referral to a psychiatrist (Martin, 1992). However, since physicians do not observe the behaviours of the child in the various settings, they are then forced to greatly rely on the reports of parents and teachers of the child (Parens & Johnston, 2009).

Diagnosis is frequently complicated, since other conditions — such as epilepsy, autism, anxiety, depression, and learning difficulties — are known to bring about behaviour which is similar to ADHD, and which might ultimately mask the ADHD symptoms (British Psychological Society, 2000; Hill & Taylor, 2001; Thompson *et al.*, 2004). Therefore, in order to form an accurate diagnosis, it is necessary to compile an adequate history of the symptoms of the behaviour, comprising birth, medical, home and school situation history. With this in mind, much information ought to

be gathered from parents, the child, the child's teacher and also the school, and medical records ought to be appraised (Root & Resnick, 2003). Each of these key individuals and files need to be examined in order to form an accurate diagnosis and to subsequently plan an effective intervention going forward (Wolraich & Baumgaertel, 1997). Besides the abovementioned, it is also possible that a physician's examination may be needed in order to examine the physical and neurological elements, which should include an assessment of motor and cognitive abilities, learning performance, and language function, which should take into account what is developmentally suitable due to the fact that there is some level of inattention, impulsivity and disruptiveness in every child (Mann *et al.*, 1992; Barkley, 2006b; Gadow & Nolan, 2002). When attempting to make a diagnosis, certain behaviours should be excluded, as these could also point to other learning difficulties; symptoms such as stress and anxiety could be due to other conditions but might also appear to be ADHD symptoms rather than co-occurring phenomena (Lamminmaki *et al.*, 1995; Pliszka, 2000; Kothari & Frosch, 2004).

Moreover, despite the fact that several ADHD-related symptoms have elements in common with other developmental and psychiatric disorders (Jiron, Sherrill & Chiodo, 1995), ADHD is nevertheless currently seen as being clinically distinct from other disorders (Biederman *et al.*, 1996). Many physical and biological differences have been recognised (Dickstein *et al.*, 2005) in addition to genetic dissimilarities (Fisher *et al.*, 2002). Besides, it has even been proposed that there is a neurological component to ADHD (Ballard *et al.*, 1997). However, the precise role of testing neurology in ADHD assessment is so far not obvious (Pliszka, Carlson & Swanson, 1999) because, first, neurological impairments have been identified in ADHD children as well as in children with other conditions (Larner, 2008); second, testing neurology cannot be utilised for the diagnosis of ADHD because no cognitive measures have sufficient predictive power to identify ADHD (Nevin, 2002). On the other hand, these tests play a significant role in both the assessment and treatment of children with ADHD when there is a need to recognise cognitive impairments, which might ultimately bring about insufficient intervention and treatment of co-occurring impairments frequently identified in children with ADHD (Conners, Pliszka & Wolraich, 1999).

Moreover, it is believed that the use of IQ as an indicator to ADHD is insufficient, as children with ADHD represent a different range of intellectual development (Barkley, 2006a). In addition, the Measures of Brain Function have been proposed (Loo & Barkley, 2005); however, despite these

developments, this paper believes that the existing brain scan technologies are extremely expensive to be utilised in every assessment and diagnosis of ADHD.

There are many different assessment and diagnosis instruments which could potentially be utilised in order to provide an accurate diagnosis of ADHD. However, here the focus is on two crucial methods, namely, behaviour rating scales and interviews.

2.2 The Behaviour Rating Scales

When comparing rating scales with other methods, it has been found that they provide a comparatively efficient, simple, and technically accurate way of assessing ADHD behaviours (Pelham, Fabiano & Massetti, 2005) since they provide the perceptions of multiple settings and the input of those adults who are close to a child, which is considered to be a crucial part of a precise assessment of childhood psychiatric disorders (American Academy of Pediatrics, 2000).

Rating scales are useful in a variety of ways: For example, they are able to identify a child with ADHD, suggest potential socio-emotional and behavioural modifications, determine attainment and intelligence, and of distinguish between clinical types (Barkley, 1998). Such scales include the Behavioural Assessment Scale for Children (BASC) (Reynolds & Kamphaus, 1992), the Achenbach Child and Teacher Checklist and report forms (Achenbach & Edelbrock, 1983), Conners Rating Scales — Revised (CRS-R) (Conners, 1997b), and the Revised Behaviour Problem Checklist (RBPC) (Quay & Petersen, 1996). However, the Child Behaviour Checklist (CBCL) and Teacher Response Form (TRF) (Achenbach, 1991) have been frequently utilised within schools and, more so recently, the Behaviour Assessment System for Children (BASC) (Reynolds & Kamphaus, 1992) and Conners' Teacher Rating Scale — Revised (CTRS-R) (Conners, 1997a), each of which has been utilised more often (Vaughn *et al.*, 1997; Hallahan *et al.*, 2005). Moreover, other measures, such as the Parent Rating Scale (PRS) and Teacher Rating Scale (TRS) on the BASC, have also been used with the objective of differentiating between attention problems, hyperactivity, depression, and anxiety (Vaughn *et al.*, 1997). However, When determining which scale to select, the behavioural concerns of the child must also be examined, and not only the routine or the preference (Dykman, Ackerman & Raney, 1993).

One of the important points to make is that a large number of the rating scales used do not essentially ensure that the norm group is representative (Salvia & Ysseldyke, 1988; Reynolds & Kamphaus, 1998). In actual fact, it has been found that, in the norm groups of many of the scales employed, the diversity of cultures of groups is not

represented (Reid, 1995). With this in mind, extra care is needed when using such methods, as there is little information relating to the strength of the findings made utilising behavioural ratings scales in cross-cultural contexts (Reid *et al.*, 1998). Furthermore, from time to time, teachers do not successfully make a distinction between ADHD children and others who are displaying similar symptoms of disruptive behaviour disorders, such as CD and ODD, since a number of rating scales list similar symptoms which can be a sign of both ADHD and ODD. With this in mind, it is then reasonable that teachers' ratings frequently do not distinguish between these conditions, as the items on rating scales may actually relate to both conditions (DuPaul & Stoner, 2003). Therefore, this paper believe that, in order to secure the best accuracy of teacher ratings, descriptive items ought to be incorporated within the rating scales. Besides, having information on or experience of ADHD might not essentially be connected with more precise ratings of ADHD. For example, teachers might rate ODD children as being more like ADHD children due to the fact that they have more knowledge about the latter (Stevens & Quittner, 1998).

From my own experience as a teacher, I believe that, in general, teachers appraise their pupils in several different situations, from pre-arranged learning activities to free play. The teacher's preference for organised against unorganised classrooms might also affect their ratings of ADHD children. Furthermore, the most common reason for using the rating scales is that they have several advantages, such as they are relatively simple and fast, and also require a short time to be completed. In addition, such scales are deemed cost effective for use (Sloan, 1995; Weist *et al.*, 2000; Evans *et al.*, 2004). Moreover, when utilising rating scales, the comparisons of the different information provided from respondents are thought to be highly precise (Reid & Maag, 1994), and could be widely used in assessment, including diagnosis, planning interventions and outcomes of treatment (Shapiro & Heick, 2004).

However, the method of rating according to scales is merely a representation of the views of others; thus, the rating might fall victim to distortions of memory, or there might be a misinterpretation of the scale's items or even a bias in the reporting (Reid & Maag, 1994; Burcham & DeMers, 1995; Hoyt & Melby, 1999). Another limitation is that they concentrate only on the symptoms of interest and subsequently rule-out other very important data, such as the level of the life quality (Klassen, Miller & Fine, 2004) and impairment function (Pelham, Fabiano & Massetti, 2005), which are frequently disregarded. Therefore, they should be used as a component of a comprehensive assessment of ADHD and not a

replacement of other important methods, such as direct observations and interviews.

2.3 The Interviews

Typically, both the child and his or her parents should be involved in the clinical interview (Goldstein & Barkley, 2004). Of course, it is only to be expected that the level of participation of the child would be dependent upon the child's age and developmental stage (Barkley, 2006a). It is necessary to ensure the accuracy of the information has been determined, as there are sometimes some discrepancies in the information provided for use within the same case (HaileMariam, Bradley-Johnson & Johnson, 2002).

A clinical interview has various advantages with regards to the assessment process. First, it helps to build a good relationship between the assessing professional, and the child and parents or carers (Brown, 2000). Therefore, since there are implications following diagnosis of ADHD on the child's and his or her parents' entire lives (Travell & Visser, 2006; Shattell, Bartlett & Rowe, 2008), a good relationship will subsequently reduce these negative effects (Nakaya, 2009). Second, in conjunction with taking the child's and the family's history, the professional is also capable of observing the behaviour of the child while also maintaining a keen awareness of the child's personality history, which is a significant factor in the diagnostic process, as research have shown that there is a high association between definite temperaments and ADHD; besides, a baseline level of behaviour can also be determined by merely observing the child during the period of the interview (Friedman, Doyal & Friedman, 1992). Third, the interview will also provide the opportunity to narrow down the difficult behaviours and to subsequently prioritise which should be tackled first (Pliszka, Carlson & Swanson, 1999). Third, a baseline level of behaviour can be determined by merely observing the child during the period of the interview and, furthermore, the interview will also provide the opportunity to narrow down the difficult behaviours and to subsequently prioritise which should be tackled first (Pliszka, Carlson & Swanson, 1999). However, although the clinical interviews provide the opportunity for an inclusive overview of the child's impairments, it does, however, have some disadvantages, such as the fact that it is time-consuming, (Selikowitz, 2009), necessitates intensive training, and lacks ecological validity in clinical observation (Pelham, Fabiano & Massetti, 2005). Nevertheless, although the interview can provide a vast amount of data, a meeting alone cannot determine the diagnosis for ADHD (O'Regan, 2005).

Although interviews with parents have been criticised for being potentially biased and for heavily relying on the professional's own perceptions of a child's behaviour, they present an 'ecologically valid

and important source of information concerning the child's difficulties' (Barkley, 1998, p. 267). Moreover, parents may provide very useful information, such as regarding any complications of the birth and whether there is any history of psychiatric disorder in the family, which could assist in ruling out or verifying other differential diagnoses (Hammerness, 2009). Furthermore, interviews with the child are also recommended, although a child below the age of 9-12 years is not constantly deemed reliable in the information they provide (Barkley, 1998). Besides, if possible, interviewing the teacher of the child ought to be a process which is included in the process of assessment, as well as in order to determine if the symptoms of ADHD are present in the academic domain (DuPaul & Stoner, 2003).

2.4 Assessment and Diagnostic Issues

The staff of the school in question might be unaware of the differences between psychiatric diagnoses and the labels employed by the school system, since there is less information to be obtained concerning a psychiatric diagnosis (of ADHD, for example) by school psychologists in comparison to other disabilities (Pelham, 1992; Smallwood, 1997); bearing in mind that a medical diagnosis of ADHD does not usually lead to a plan being developed for the school setting, schools ought to assess the symptoms, as well as to actively develop strategies of interventions and ways of measuring the outcomes (The MTA Cooperative Group, 1999; Evans *et al.*, 2007).

The assessment process should include an in-depth evaluation of the academic and behavioural strengths and weaknesses of the child via standardised and non-traditional tests (McCallum, 1995). The results of interviews, observations, rating scales, medical assessments, standardised tests and non-traditional measures should be considered in totality (Goldstein & Ellison, 2002). The assessments administrators should have sufficient knowledge regarding the 'normal' development of children, as well as information concerning ADHD characteristics and other problems relating to ADHD, such as learning difficulties, depression and low self-esteem (Pliszka, Carlson & Swanson, 1999). Furthermore, they ought to also bear in mind the strengths and weaknesses of the tests themselves (Landau & Burcham, 1995).

Moreover, the records of the school may be valuable, since report cards might include the commentaries of the teacher, which is objective evidence that might ultimately assist in providing a more precise picture of the child's history and in documenting early impairments (Weiss & Murray, 2003). In addition, the involvement of key school staff, the child's parents or main carers, as well as the

doctor and psychiatrist is significant in order to make a comprehensive ADHD assessment (Pliszka, Carlson & Swanson, 1999). However, studies have proved the significance of efficient communication amongst all involved in order to ensure diagnosis and intervention which are both accurate and effective have been formulated (Hall & Gushee, 2000). In contrast, if there is a lacking of communication amongst all involved, the length of the assessment and diagnosis process might increase, subsequently resulting in an imprecise assessment and diagnosis of ADHD, and reducing the achievement of the treatment and intervention (Magyary & Brandt, 2002).

It is important to recognise that the implementation of only one assessment method is inadequate when it comes to formulating a diagnosis of ADHD; assessments contain multiple methods and indicators, each of which is sufficiently normed ought to be commonplace (Thomas & Grimes, 1995). Moreover, the diagnosis and the treatment should be guided by the child and the presenting problems experienced and not by the chosen measure, since it is suggested that no measure is superior to another in making a diagnosis of ADHD; however, using different measures is helpful in accurately identifying children with ADHD (Vaughn *et al.*, 1997). Furthermore, avoiding experimental or non-standardised assessment is important, as the utilised tests have to be deemed both reliable and valid (Das, Naglieri & Kirby, 1994; Naglieri *et al.*, 2003). Moreover, this paper is written with the belief that the costs, benefits, advantages and disadvantages of the variety of strategies must all be weighted. For instance, naturalistic observations offer a very good and valid method in assessing the nature and severity of ADHD symptoms; however, it also consumes time and necessitates specialised training. In addition, some behaviours — such as aggression — might not be displayed for the period of the observation session, and thus more than one session is usually necessary in order to ensure the observation has witnessed the majority of problem behaviours.

Furthermore, studies have confirmed that ADHD diagnosis may ultimately have a negative effect on many different areas of a child's life (Travell & Visser, 2006; Shattell, Bartlett & Rowe, 2008). Furthermore, as previously stated, studies have found that parents of ADHD children also may experience stress (Baker & McCal, 1995) as well as depression (West *et al.*, 1999). For example, mothers suffer from emotional stress as a consequence of self-blame, perceiving blame from others — such as other members of the family and teachers — and a lack of support (Harborne, Wolpert & Clare, 2004). Therefore, this paper emphasises that, throughout the

duration and after of this process, parents should be assisted to overcome any negative effects.

3.1 Interventions of ADHD

Given that ADHD is a chronic disorder, treatments are in general centred on symptoms management, rather than curing them. Treatments might, in addition, concentrate on decreasing impairments in life functioning arising from the existence symptoms of ADHD and co-morbid conditions.

3.2 Pharmacological Intervention

As a result of the greater understanding of the underlying mechanisms of ADHD, many researchers appear committed to investigating the effectiveness of a variety of interventions regarding the behavioural symptoms of ADHD. Pharmacological interventions — which mainly covers medications, such as methylphenidate (MPH) and dexamphetamine — are the most frequently utilised of medicinal interventions, and thus seem to be the preferred option for dealing with those children with ADHD (Brue & Oakland, 2002; LeFever *et al.*, 2002; Biederman, Spencer & Wilens, 2004). Moreover, it has been estimated that the prescriptions of stimulant medication has doubled every four to seven years (Riccio *et al.*, 2001).

Medication intervention can include the following groups of drugs:

- Amphetamines, such as amphetamine (sold as Adderall), dextroamphetamine (Dexedrine), and methamphetamine (Methadrine) (Julien, 2005);
- Nonamphetamine Behavioural Stimulants, such as Methylphenidate (Ritalin) (Olfson *et al.*, 2003);
- Pemoline (Cylert) (Goldman *et al.*, 1998; Thompson, 1996);
- Selective Norepinephrine Re-uptake Inhibitors, such as Atomoxetine (Strattera) (Keller, 2001);
- Antidepressants, such as Bupropion (Wellbutrin, Zyban) (Julien, 2005);
- Formulations of Medication (Swanson *et al.*, 2004).

3.3 Behavioural Outcomes

In terms of reducing the core behaviours of ADHD, most studies have identified enhancements which are, from both parents' and teacher's viewpoints, both quick and considerable in relation to inattention, impulsivity and hyperactivity, social interactions and oppositional and defiant behaviour (Barkley, 1998); the benefits appear in 70–80% of children diagnosed with ADHD (Pelham, Wheeler & Chronis, 1998; Clark, Prior & Kinsella, 2002; Clarke *et al.*, 2005). Moreover, the studies of pharmacological treatment are inclined to show that the influence is dose-dependent, with larger doses

characteristically leading to greater improvements in behaviours (Pearson *et al.*, 2004). A secure confirmation for the short-term efficacy of stimulant medications in lessening the core symptoms of ADHD behaviour has been provided by well-controlled clinical research and reviews (Purdie, Hattie & Carroll, 2002).

From the findings of these studies and others discussed in the literature, an overwhelming positive agreement emerges regarding the short-term efficacy of stimulant medication on ADHD behavioural symptoms. However, in spite of the agreement concerning these conclusive consequences, these apparent positive results are frequently tempered by the biases of publications and the lack of quality in relation to the methodology, which consequently affects the accuracy of the findings by restricting the strengths, ability of generalisation and external considerations. In particular, a variety of weaknesses have been highlighted which are considered common amongst the various clinical studies in their meta-analyses (Schachter *et al.*, 2001).

The weaknesses can be summarized as follows: The identification of co-morbid diagnoses is poor, the criteria for inclusion or exclusion are unclear, the publishing of major consequences is biased, the size of the sample is small, the description of methodology is insufficient, and the intervention details are poor (Schachar *et al.*, 2002). However, despite this, there are nevertheless some benefits of stimulant medications on ADHD behaviour, with the improvements appearing in two-thirds of children with ADHD, while almost one third remained unchanged (Barkley, 1990).

Even long-term studies have been rated as being poor in terms of the quality of the methodology. Moreover, the average duration of follow-up of psychostimulant intervention lasted just three weeks, and an enormous amount of research reports an intervention follow-up of no longer than ten days (Vitiello, 2001). In the studies which have an extended follow-up of more than one month, it has been found that stimulant medications are only accountable for temporary decreases in the ADHD behavioural symptoms (Lewin & Fletcher, 1993; Swanson *et al.*, 1993). Although some studies document constant behavioural enhancements with extended use of stimulant medication, in some studies the benefits of the medication were restricted to the school environment, while parents failed to report any considerable enhancements at all in relation to the experience of difficult behaviours at home (Schachar *et al.*, 1997). In contrast, some studies reported that the most significant improvements were actually at home (Gillberg *et al.*, 1997), while others have shown that there were improvements in both environments

(Charach, Ickowicz & Schachar, 2004). With this in mind, it is therefore believed that the differences in the outcomes are due to the different methods available for measuring them (Hale *et al.*, 1998; Solanto, 2002).

3.4 Cognitive Outcomes

There is limited literature available which actively examines the impacts of psychostimulant medication on the cognitive processes in ADHD children. The majority of the studies — which mostly consist of short-term studies — are in support of at least some improvement of a diversity of core cognitive deficits, including improvements in the cognitive measures of variable attentional set, the flexibility of cognitive, working memory, and the skills of planning and perseverance (Hazel-Fernandez, 2003; Mehta, Goodyer & Sahakian, 2004). However, there are also some conflicting findings concerning the general degree of impacts of stimulant medications on the process of central inhibitory function in ADHD (Tucha *et al.*, 2006). Moreover, it has been found that the long-term effects of stimulant medications on the cognitive process are positive (Epstein *et al.*, 2006). Of course, as with all research, disagreement exists in the literature with reference to the nature of the association between the medication dosage and response to the treatment (Pearson *et al.*, 2004).

Furthermore, it appears that there are various negative influences of medication when it is used in the long-term as a solution of symptoms-management in relation to ADHD (Forte, 2006). For example, some of the reported mild side effects comprise headache, stomach ache, sleep disturbance, motor tics, weight loss, reduced appetite and jitteriness (Greenhill *et al.*, 2002). According to The Multimodal Treatment Study, 49.8% of children receiving medication experienced some mild side-effects, with 11.4% encountering moderate side effects, and a significant further 7% experiencing severe side effects (MTA Cooperative Group, 1999).

3.5 Behavioural Interventions

When focusing attention on the non-pharmacological treatment used for children with ADHD, it has been found that behavioural therapy is possibly the most well-recognised and broadly supported option to stimulant medication in present clinical practice (Pelham *et al.*, 2005).

Behavioural treatment represents a wide set of precise strategies, each of which are designed in order to amend the environment of the child with the purpose of inculcating other behaviour (Thorpe & Olson, 1997); it utilises the principles of both positive and negative reinforcement, with the objective of improving suitable behaviour and reducing or completely eradicating unsuitable behaviours (Martin & Pear, 1999). Many studies have found evidence which illustrates substantial benefits in both

environments — home and school — which has been backed by teacher and parent rating scales (Northup *et al.*, 1999; Pelham & Waschbush, 1999). For example, in contrast with stimulant medication, behavioural therapy is not connected with any identified physical influences, and also does not have the probability of any long-term damage, nor any of the temporal impacts which are frequently linked with stimulant medication (Frazier & Merrell, 1997). Moreover, parents are inclined to have a preference for behavioural methods over stimulant medications, as they frequently show higher levels of satisfaction with behavioural intervention programmes in contrast to medication intervention (MTA Cooperative Group, 1999).

The objective of the behavioural approach is to raise the occurrence of wanted behaviour by raising the interest of the child in satisfying parents who provide constant encouragement to the child, when he or she displays preferred behaviours (Delfos, 2004). Behavioural therapy assists social learning by modelling wanted behaviours, and teaches problem-solving skills which ultimately assists in raising the ability of pupils to self-regulate and evaluate (Rabiner, 2000). This paper is written with the belief that behavioural intervention ought to be utilised on a greater scale and to a greater extent, than the initial intervention. However, if a child shows severely problematic behaviours, and it also appears that it is necessary to reduce these behaviours more rapidly and efficiently, it might then be considered valuable to apply an intervention, such as medication, which ultimately takes less time to manage and has a quicker response rate (Forte, 2006).

In spite of the advantages of behavioural intervention, a substantial quantity of debate nevertheless continues concerning its efficiency as a uni-modal treatment, and there are some studies which also challenge the efficacy of behavioural programmes in treating ADHD children (Wigal *et al.*, 1999). When behavioural treatments are utilised in isolation, they infrequently produce enhancements in significant domains of behavioural and cognitive functioning to the degree observed with medication treatments (Miranda, Presentacion & Soriano, 2002). It has been found that stimulant medications have double the effect in comparison to behaviour treatment (Pelham *et al.*, 1993). Moreover, there is a shortage of empirical evidence to verify the long-term effects of behavioural treatments, and this is mainly why some authors tend to state that behavioural treatment alone is not an effective intervention for ADHD symptoms treatment (Klassen *et al.*, 1999; Ercan, Varan & Deniz, 2005).

Furthermore, in comparison, the non-pharmacological therapies — such as cognitive and

behavioural treatment, for example — which generally obtained far less attention in the ADHD-relevant literature. As a consequence of this apparent lack of comparative studies, conclusions concerning the effectiveness of non-pharmacological treatment in improving behavioural and cognitive situation in children with ADHD remain ambiguous due to the apparent lack of substantial research (Schachar *et al.*, 2002). Besides, several studies have failed to verify the efficiency of cognitive therapies for this condition (Hinshaw *et al.*, 2000).

Furthermore, there are several disadvantages of utilising behavioural intervention, with the obvious one being the time required before treatment secures results (Stage & Quiroz, 1997). The second disadvantage of this approach is the quantity of social resources utilised (Forte, 2006). Furthermore, when compared to pharmacological treatment, behavioural intervention frequently requires a large amount of both time and energy to be invested by parents and teachers alike; however, the little enhancement to the child might provide a challenge to this approach being maintained over extended periods of time (Barkley, 2000a). Moreover, such interventions are generally conducted in the context of group therapy and, therefore, it is not usually customised to the individual child and parents' needs (Boyle & Jadad, 1999), which is a clear draw-back.

3.6 Multimodal Intervention

The multimodal treatment approach is a combination of medication and behavioural approaches, which is an alternative to utilising any one intervention approach alone (Pelham *et al.*, 2000). Although there is the hypothesis that multimodal intervention optimises the therapeutic outcome (Purdie, Hattie & Carroll, 2002), several studies could not confirm that there was superiority in the efficiency or beneficial effects of a multimodal approach over a pharmacological approach alone (Greenhill, Halperin & Abikoff, 1999; Ercan, Varan & Deniz, 2005). There are those people who believe that the combined approach is better (Dopfner *et al.*, 2004; Chacko *et al.*, 2005), or at least that the combined treatment might subsequently permit the doses of medication to be lower, which ultimately increases the approval to the intervention (MTA Cooperative Group, 1999). Furthermore, it is believed that, although combined treatments are to be admired (Conners *et al.*, 2001; Swanson *et al.*, 2001), conclusive empirical confirmation is presently lacking in support of the notion that a multimodal approach is better at enhancing behaviour than other treatment options.

Here, however, it is argued that multimodal intervention ought to be utilised both at home and at school in order to guarantee better results for ADHD children (Whalen & Henker, 1991). Moreover, it

ought to be sustained until the symptoms of the child with ADHD no longer considerably hinder his or her academic and social life (Batsche & Knoff, 1994). In the majority of cases, this type of intervention ought to comprise medication, behavioural and social skills, educational intervention and strategies, diet, parent training and teachers' knowledge and training regarding ADHD etc. These aspects are discussed briefly in the following:

3.7 Educational Interventions

Educational interventions principally comprise of strategies of academic management in the classroom, and physical manipulation of the environment of learning in certain ways, for example, arranging classrooms with preferred seating for pupils with ADHD (Cook, 2005), as well as reducing the level of noise (Purdie, Hattie & Carroll, 2002), and frequently giving rest time between different learning tasks (Farrell, 2006). This is due to the fact that a structured classroom supports children with ADHD in being successful (Taylor & Larson, 1998).

This paper does believe that children with ADHD have special educational needs, most of which can be accomplished in the ordinary classroom with some assistance. For instance, as a primary teacher who has worked with children with ADHD, I believe that a child with ADHD could be made to experience lower levels of frustration by always giving extra time for tasks and ensuring rules consistency, which should be essentially deemed. Furthermore, this paper is written with the belief that teachers ought to implement a special plan for each type of ADHD: For instance, with regards to children with the inattentive type, teachers ought to make use of a mixture of visual, audio and tactile means, as well as allowing a pupil with inattention problems to work on the computer whenever possible. Furthermore, the employments of teacher assistants and a permit to stand for the duration of the time of the lesson are beneficial for hyperactive children. Moreover, for impulsive children, the establishment of clear routines for the classroom at the commencement of the year is considered crucial.

This sort of intervention immediately applies focus to the deficits of academic skills, such as reading, writing and mathematics, which are significant in order to enhance the academic attainment of pupils with ADHD (Lamoreaux, 2001; Zentall, 2006). The educational intervention is characteristically focused on instructional modifications, for instance, changing tasks and materials provided to the pupils with ADHD (e.g. Lee & Zentall, 2002; Robinson & Skinner, 2002). However, despite the fact that the instructional modification method has a number of values, the satisfactoriness of this approach in general classrooms

might be an important matter for consideration, as the majority of pupils with ADHD are positioned in general classrooms although they might obtain some special educational services (Barkley, 2006c). Frequently, however, teachers are not able to support these practices, and that is partly due to the fact that they regard these strategies to be disparate from their beliefs regarding how pupils learn and detach with their usual instructional approaches (Boardman & Woodruff, 2004; Boardman *et al.*, 2005).

3.8 Diet

Several people hate taking medicines on a daily basis, and would ultimately have the preference of not wanting to be reliant upon medication for ordinary performance. For this kind of person, the notion of a controlled ADHD diet is quite attractive.

The notion of the theory of dietary control is that the child with ADHD has eaten something which is not acceptable to the system and the consequence is inappropriate behaviours (Hazell, 2000). This might imply the likelihood that a child has an allergy to a certain kind of food or a particular additive, or that the child has ingested too large an amount of something 'unhealthy' or too small an amount of a particular nutrient (Puri, 2006). Instances of the aforementioned additives or compromising ingredients include insecticides, caffeine, pesticides, chocolate, flavours or artificial colours, and preservatives (Rowe & Rowe, 1994). While there is the consideration that several prime ADHD symptoms seem not to be influenced, the consequences nevertheless demonstrate that it is possible that certain foods have a possible negative impact on the child with ADHD (Hazell, 2000). While many researchers (e.g. Boris & Mandel, 1994; Carter *et al.*, 1993) have revealed the advantages of dietary control, the evidence in support of its use is not vast, and so it is not a frequent treatment for ADHD (Jacobson, 1999) and, with this in consideration, The International Food Information Council Foundation (1995) reported that there was no confirmation in support of the fact that additives in food have a negative consequence on hyperactivity. For example, Barkley (2000b) has discussed several researches (e.g. Hoover & Milich, 1994) where certain foods were removed from the diets of children with ADHD, and it was found that there was no considerable alteration in the children's behaviour. As such, it is believed that many researchers subsequently discredit the advantages of dietary changes since the medication intervention is more reliable than diet therapy.

However, attempting to deny the potential advantages of the therapy of diet will ultimately affect the welfare of ADHD children who might be at risk. Studies regarding diet control could raise the matter as to whether to intervene with medicines or with diet modifications (Jacobson, 1999).

It is believed that the factors which make diet modification such a challenge is that it is hard to control the child's eating outside of the home, and to prevent the child from eating what his or her peers eat may also worsen the problem by making the child feel excluded (Morse, 2000); however, this could also occur with medications. Therefore, it is suggested that both treatments are used concurrently; in this case, that the medication intervention would fill any voids in the diet and vice versa; furthermore, it is also possible that the dosage of the medicine could be prescribed at a lower dose as a beneficial result of the diet control (Puri, 2006).

3.9 Parent Training

Generally, parent-training interventions aim to positively affect parent performance and the interactions of parent-child which then has a positive effect on the behaviour, and consequently improves social and academic outcomes of the child with ADHD (Batsche & Knoff, 1994).

This paper believe that school staff should endeavour to work jointly with parents in order to keep them abreast of treatment and intervention strategies utilised at school, which might also be adapted and utilised at home; continuity of an intervention approach is extremely significant, and a breakdown in providing an incorporated treatment package including both home and school could ultimately lead to a lack of social progress and poor academic attainment for ADHD children (Anastopoulos *et al.*, 1993). This type of intervention should include encouraging useful parenting skills (JACOBS, 2000); in particular, social skills training — both at home and at school — ought to concentrate on teaching skills which assist in enhancing the interactions with peers, self-control, and problem-solving skills. Additionally, ADHD children might need organisation and study skills training (Teeter, 1991). This sort of intervention should be used in conjunction with other interventions with the aim of reducing difficult behaviours in the classroom, as well as encouraging consistency across ALL settings.

3.10 Teachers Experiences, Knowledge and Opinions Regarding ADHD

This paper does believe that teachers play a significant role in aiding children's achievement in schools. Teachers are accountable for identifying and implementing the behavioural interventions and classroom accommodations which assist a child's attainment as well as developing these strategies. Furthermore, exclusion of teachers' constant support and cooperation would lead to little possibility for children to accomplish their goals, thus causing frustration for both the child and his or her family (Frank, *et al.*, 2000).

From my own professional experience, I tend to believe that teachers' capacity and attitudes in dealing with a child with ADHD varies. Thus, this paper believes that there is an extreme need to ensure that all school staff are committed to the same objective of assisting children with ADHD. However, this is unfortunately not always the case, owing to diverse reasons; however, in order to make a school ADHD-friendly, training ought to be involved for the school staff — not merely in their abilities but also alterations of both their attitude and approach, since eager and skilled teachers and supportive school administration during the different process with regard to ADHD would assist children with ADHD to attainment in their learning.

From available studies, it has emerged that 89% of teachers in elementary schools had no training regarding ADHD for the duration of their college education, and 92% had just a little instruction concerning ADHD subsequent to graduation (Jerome, Gordon & Hustler, 1994); consequently, teachers obtained insufficient training concerning tackling this condition (e.g., Bussing *et al.*, 2002), which has further highlighted that several teachers have incorrect and mistaken beliefs or attitudes concerning children with ADHD (e.g., Sciutto, Terjesen & Frank, 2000). However, teachers are required not merely be familiar with the different behavioural techniques and approaches, but with the academic instruction strategies as well, which are considered to be suitable for pupils with ADHD (Gardill, DuPaul & Kyle, 1996), owing to the fact that teachers have a direct affect on the pupils' progress. Teachers need to have a willingness to individually work with children with ADHD (Brophy & McCaslin, 1992), and to partake in training and experiences (Reid *et al.*, 1994), attitudes and knowledge (Barkley, 1990; Goldstein *et al.*, 1998). Additionally, 98% of the teachers said that they would hypothetically take advantage of further training concerning the ADHD condition (Barbaresi & Olsen, 1998) and researchers proved that training teachers brings about improvement surrounding ADHD behaviours, even if the child has not met ADHD diagnostic criteria (Boyajian *et al.*, 2001; Borg & Ascione, 2001).

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