ATTENTION DEFICIT HYPERACTIVITY DISORDER IN ADULTHOOD

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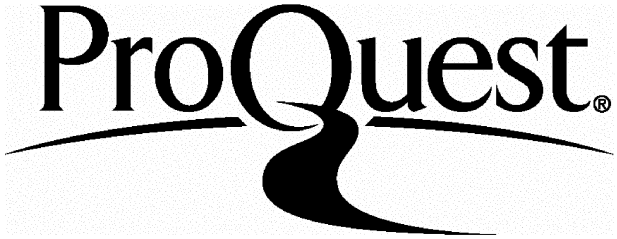

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ABSTRACT

A thorough review of the literature for adults with ADHD was carried out and generally the outlook was discouraging. It was clear that childhood ADHD posed a risk for adverse outcome, including a continuation of core cognitive and behavioural deficits. However, a shortage of data about adults was revealed as most studies in the literature examine the disorder in childhood and follow them up only into adolescence. Issues of comorbidity and precise neuropsychological deficits in adulthood were unknown. It was hypothesised that clinically referred adults with ADHD would present with academic underachievement, poor occupational adjustment, antisocial and criminal behaviour, poor social interaction and relationship difficulties. It was hypothesised that they would have comorbid personality disorder, make a greater number of errors on cognitive measures of attention and impulsiveness, and overestimate on a time estimation task. These hypotheses were examined in a clinically referred sample of (1) ADHD adults, comparing them with (2) a matched clinically referred control group and (3) a matched community control group. Generally the hypotheses were supported and the pattern of results emphasised the developmental nature of the disorder. The ADHD group was significantly more impaired than the normal control group on all measures. The ADHD group was more impaired than the clinic control group on childhood measures of academic underachievement, antisocial and criminal behaviour. There was a suggestion that antisocial personality problems were present in adulthood. Cognitive testing clearly differentiated the ADHD group from the control groups; they made more error scores and were more impaired in their perception of time. Adult diagnosis was validated by relating a behavioural diagnosis of ADHD in adulthood and predicting this to their cognitive deficits. The long-term consequence of ADHD is a source of concern, particularly considering that it is largely understood to be a problem of childhood and not commonly recognised or accepted by clinicians as a disorder of adulthood. The implications of the results for research and clinical practice are discussed in the conclusion..

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CHAPTER 1

INTRODUCTION

Attention Deficit Hyperactivity Disorder [ADHD] is a common disorder of childhood. Extrapolating from U.S. data, it is estimated that approximately 0.5% to 1% of the young adult population continues to have symptoms associated with ADHD (Toone & van der Linden, 1997). In childhood, the disorder is more prevalent in boys in a ratio of 2.9:1 (Anderson et al., 1987; Bird et al., 1988; Safer & Krager, 1988).

DSM-IV criteria (American Psychiatric Association, 1994) for diagnosis are presented in Appendix D. They suggest inattentive, impulsive and hyperactive behaviours must be pervasive across two or more settings before age 7. There must be clear evidence of clinically significant impairment in social, academic or occupational functioning. Exclusions include symptoms that occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia or other Psychotic disorder. It is anticipated that ADHD in adults is more widely recognised in the United States but it is likely to be more frequently diagnosed in the UK than in the past as clinicians are becoming increasingly aware that as children grow up they may continue to need treatment (Toone & van der Linden, 1997). The aetiology of ADHD remains uncertain. Studies evidence the importance of genetic factors (Goodman & Stevenson, 1989), alterations in brain function (Lou et al, 1984; 1989), alterations in brain structure (Castellanos et al, 1994; Giedd et al, 1994) and neurochemical change (Rapoport et al., 1974; Bowden et al., 1988; Shen & Wang, 1984; Zametkin et al., 1984).

Although ADHD is commonly diagnosed in childhood, its consequences in adulthood are not clear. The prevailing view in past years has been that this disorder held a good prognosis; indeed, the onset of puberty and adolescence supposedly witnessed a remission of symptom patterns (Mendelson et al., 1971). Today, however, results from several well-conducted prospective investigations portray a far more sobering portrait of the natural history of ADHD. These evidence that many continue to be impaired by the core symptoms of inattention, impulsiveness and restless behaviour as well as experiencing significant associated psychosocial difficulties.

The focus of the thesis is ADHD which differs from children referred to as "hyperactive". ADHD is a classification defined by strict diagnostic criteria for the presence of inattentiveness, impulsiveness and overactive behaviour. As such it implies that there is a qualitative change in some children, so that only those falling into this category are vulnerable to psychosocial maladjustment in later years. On the other hand hyperactivity is a term for an enduring disposition to behave in a restless, inattentive, distractive and disorganized manner. The concepts of an attention deficit, overactivity and impulsiveness are defined for clarity, but these should be viewed as overlapping concepts. To a certain extent all styles of hyperactive behaviour are present in many normal children and scores based on rating scales are continuously distributed in the population (Taylor et al., 1991).

Both dimensional and categorical approaches to classifying hyperactivity are in use, although categorical approaches are more common. In practice proponents of a dimensional ordering of problems apply an arbitrary cut-off on that dimension to

identify a hyperactive group. Furthermore, semantics often belie the heterogeneity of these youngsters. Although one refers to "a hyperactive child" or "hyperactive children" as a group, it is important to keep in mind that there are extensive individual differences and that any descriptor or characterisation will apply to some but never to all children considered hyperactive.

It is also important to recognise that while genetic influences are present at aetiology, these are not exclusive as environmental influences are also likely to influence the overall pattern. Furthermore hyperactive behaviour may mean different things at different stages of development, e.g. hyperactivity may be quite different at ages 7, 12 or 15. A potential problem with DSM-IV criteria is that it applies childhood symptoms to adulthood and it is not known if the adult expression of the disorder is the same as that seen in childhood. A primary presenting problem of childhood ADHD is motoric overactivity. In adulthood this may be less of a problem as individuals may develop more behavioural control with maturity and/or they do not have to spend long periods of time in a structured environment (such as the school setting). In adolescence the ability to concentrate improves and activity levels decrease in normal subjects as well as in hyperactive cases as demonstrated by longitudinal analyses of repeated measures (Fischer et al., 1993). Yet DSM-IV criteria requires 6 out of 9 inattention items to be met and 6 out of 9 hyperactive/impulsive items to be met. Six of the latter items relate to hyperactivity. This potentially creates a higher threshold for meeting symptom criteria in adulthood.

1.1 THE DEVELOPMENTAL COURSE OF HYPERACTIVITY

The major findings in the literature are that, despite overall improvement in functioning as participants move into their 20s and early 30s, the risk for continuing problems with ADHD-related deficits, antisocial behaviour and in some cases substance abuse is substantially greater than in comparison groups. Police contacts are also more frequent, especially when antisocial behaviour patterns develop over and above the persistence of ADHD (Weiss et al., 1985; Gittelman et al., 1985; Klein & Mannuzza, 1991; Mannuzza et al., 1991a; Mannuzza et al., 1993). On the other hand, the relationship between adult ADHD and emotional adjustment is unclear. Some investigations have failed to find any greater risk for mood disorders in adolescence and adulthood, directly contradicting the findings of Biederman and colleagues (1991) that ADHD and mood disorders share common risks (Taylor et al., 1996; Gittelman et al., 1985; and Mannuzza et al., 1991a).

Adolescent outcome is relatively well documented. Klein & Mannuzza (1991) reviewed the major prospective investigations of youngsters with childhood patterns of ADHD, and the following issues appeared to be important factors regarding outcome in adolescence:-

(a) Childhood symptom patterns tended to persist in a majority of individuals, with over two thirds of diagnosed children continuing to meet diagnostic criteria in mid- to late adolescence. Symptoms of inattention, impulsiveness and overactivity were quite stable, not transient, as previously assumed (August et

al, 1983; Barkley, Fischer, Edelbrock, & Smallish, 1990; Gittelman et al., 1985; Mannuzza et al., 1991a).

(b) Antisocial behaviour and substance abuse developed in one fourth to one half of the participants followed into their teenage years, with delinquency or incarceration a common outcome (Gittelman et al., 1985; Loney, Whaley-Klahn, Kosier, & Conboy, 1983; Satterfield et al., 1982).

(c) Various indices of underachievement, cognitive dysfunction, and school failure were widespread in adolescents with histories of hyperactivity or ADHD (Fischer et al. 1990). Continuing behavioural symptomatology clearly compromised academic performance during adolescent years and academic and social failures were commonly cited as causes of the poor and distorted self-image typical of hyperactive children in adolescence (Laufer, 1962; Minde, Lewin, Weiss, Lavigueur, Douglas & Sykes, 1971; Weiss et al., 1971).

(d) Families of ADHD adolescents were more unstable and disharmonious than those of comparison youth, with a greater likelihood of separation or divorce (Barkley et al., 1990; Hechtman et al, 1984b; Wallander, 1988).

(e) A sizeable minority of youngsters with ADHD - perhaps one- third - displayed remission of symptomatology by late adolescence, signifying the heterogeneity of the disorder both symptomatically and prognostically (Weiss & Hechtman, 1986).

Klein & Mannuzza (1991) concluded that in adolescence hyperactive boys retained significant levels of restlessness and poor attention, showed a greater rate of school failure and more frequently engaged in antisocial activities than non-hyperactive adolescent boys. Lilienfeld & Waldman (1990) came to similar conclusions, but argued that the reported persistence of antisocial behaviour may be an artifact of the overlap between hyperactivity and conduct disorder. Indeed, hyperactivity and conduct disturbance appeared to interact to produce an outcome that was far worse than either hyperactivity or conduct disorder individually. Taylor et al. (1996) addressed this issue by controlling for conduct disorder[1] in their epidemiological follow-up of 16-18 year old boys and concluded that hyperactivity was indeed a risk for antisocial behaviour, independent of comorbid behavioural problems in childhood.

A review of prospective studies by Hechtman (1996) concluded that as ADHD children mature, one of three outcomes was in store -

(1) a well functioning group who were not significantly different from a matched normal control group

(2) more commonly, a second group who continued to have significant problems with concentration, impulsiveness, and social and emotional functioning. These symptoms often resulted in difficulties with work, interpersonal relationships, poor self-esteem, impulsivity, irritability, anxiety and emotional lability;

[1] Behavioural problems featuring aggressive and antisocial behaviour patterns.

(3) a third group with a negative outcome characterised by antisocial and/or psychiatric pathology. They may be depressed (even suicidal), involved in drug or alcohol abuse or significant antisocial behaviour (eg. assault, armed robbery, breaking and entering, or drug dealing).

It is suggested that adult outcome is predicted by the additive interaction of personality characteristics, and social, familial and environmental parameters. Particularly important variables that influenced adult outcome included the mental health of family members, IQ, social class, continuation of ADHD symptoms and the coexistence of significant aggression and conduct disorder.

Thus research suggests ADHD is a far from benign disorder. It carries significant risk for antisocial outcomes and for continuing patterns of disinhibited behaviour, cognitive dysfunction and interpersonal difficulties. A significant proportion of ADHD children retain many of their symptoms through mid-adolescence and into young adulthood. Significant antisocial behaviour characterises around one third of this population; indeed, a substantial subgroup is at risk for multiple disorders, including substance abuse, during late adolescent development. Yet symptom remission awaits many ADHD youngsters as they mature. It is essential to understand the developmental pathways and identify key variables and processes that mediate outcome.

1.2 MODELS OF ATTENTION

Attention is a multidimensional construct that has come to stand for so many things that it no longer has a precise meaning. Taylor (1986) suggests that it "refers to the processes by which an organism uses orderly strategies to sample information from the environment. Without them, learning would be inefficient and behaviour ill regulated". Various strategies are involved in the regulation of responsiveness and these include selective attention, division of attention and sustained attention, although these processes should not be regarded as separate entities.

Selective attention

There is a limit to processing capacity and individuals are therefore forced to select the most relevant information in order to reach satisfactory task performance. For example the 'cocktail effect' describes how we select one stimulus (e.g. attend to one voice) against a background of noise. Thus selection involves the directing of attention to the relevant object as well as the suppression of attention to the irrelevant.

Attentional shifting is related to the selection process. Most cognitive processing will involve sequences where there is engagement of attention on a stimulus, then disengagement from this stimulus, followed by engagement on the original stimulus or another relevant one.

Distraction - our selective perception can be disturbed by responses to stimuli that are irrelevant for task performance. Experimental psychology usually investigates selective

attention by manipulating distraction (i.e. by adding irrelevant stimulation in a task situation such as the dichotic listening task or the Stroop colour word test).

Divided attention

In daily life one is often required to perform two tasks simultaneously (such as driving a car and having a conversation with a passenger). Depending on the degree to which tasks share common resources, it may be easier to perform some tasks together than others. For example, it may be easier for an experienced driver to drive and talk than to count and talk. Thus in such situations it may be difficult to pay attention to more than one source of information and a combination of tasks may lead to a decline in performance in one or both of the tasks.

In such cases, the core problem is that the controlled processing of information is serial in nature. For example, there is a great difference between 'automatic' and 'controlled' processing (Schneider & Shriffrin, 1977). Automatic processing is used for a practised and mastered task. Very large quantities of information can then be handled (as by a skilled musician), with enough resources left over to spare for other kinds of activity. There is no need for the deliberate selection and organisation of stimuli. 'Controlled' processing, by contrast, is needed for unfamiliar tasks and places heavy demands upon concentration.

Sustained attention

This refers to the degree of concentration and duration of attention once an object has been selected, e.g. by a child in a vigilance task playing close attention to the qualities

of the letters being flashed up on a screen in rapid succession. Thus sustained attention requires that task performance continues to be accurate over an extended period - that relevant stimuli continue to be selected and irrelevant stimuli continue to be ignored.

Lapses of attention are phasic changes in alertness, resulting in a decreased receptivity to stimulation. They are usually operationalized as response omissions in a continuous task, or as extremely long reaction times in a continuous reaction time task (i.e. exceeding the mean by at least two standard deviations).

Theories of Attention

Theories about the nature and measurement of attention often define it, in part, by its distinction from the related concepts of working memory and executive function (although in practice, there is considerable overlap among these terms).

Working memory is conceived of as a short-term storage and operational area. It is a limited capacity work space in which information relevant to a current task is both held on-line and subjected to further processing (Baddeley, 1986).

Broadbent (1958) put forward an information-processing model for the selective attention in adults. In this theory, an individual can be thought of as being flooded by a great number of stimuli: to attend to all of them would overwhelm the limited capactity to process information. Accordingly the individual filters out all but the more relevant stimuli. This is done on the basis of simply physical properties at a rather

peripheral level, so that appraisal and response selection can be reserved for a manageable fraction of the information available. He modified the theory in 1971 to allow for the physical filtering process to attenuate stimuli, not exclude them; and for a subsequent process of 'pigeon-holing', in which surviving stimuli are categorized on the basis of decisions about the probabilities and relative importance of the categories. Broadbent (1958, 1971) suggested that the notion of a single channel of limited capacity can still cope with divided stimulus inputs that all require a response. In this case, the information-processing channel deals with one source of information at a time, and switches between sources quickly enough to cope with limited test demands.

Broadbent's early theory is an overly simplistic account of information processing. It does not account for more complex attentional processes such as rapid shifts in attention, multiple processing functions and sequencing processes.

Executive function involves the planning and control over behaviour. Practically all our activities are consciously monitored by control strategies and they are also likely to be fundamental to the operation of working memory (Roberts & Pennington, 1996). From this perspective attentional processes are conceptualised in terms of both hierarchical processes (e.g. strategy monitoring and planning) and horizontal processes (such as attentional control). The four primary attentional components are initiation, sustaining, shifting and inhibition/stopping (Denckla, 1996). These strategies will determine, for example, when attention will be shifted to other aspects of the stimulus situation, or how responses are sequenced. In this sense, flexibility of attention is an aspect of supervisory control. The inhibition/stopping element (otherwise known as

inhibitory control or impulsivity) has received considerable scrutiny in the child and adolescent literature, given its relevance to ADHD and other disruptive behaviour disorders.

Evidence for a Supervisory Control System stems from the work of Shallice (1982) who developed an information processing model in which a "Supervisory Attention System" supervises the running of highly specialised routine programmes. Norman & Shallice (1980) distinguished between habitual and novel action routines and suggest that the selection and integration of these two classes of action were based on different principles. They proposed that control over the sequencing and integration of the components required for complex but well-established patterns of behaviour is mediated by hierarchically organised schemas. (For example, when driving, high-level schemas will relate to abstract representation of the route and low-level schemas will relate to instructions to muscles)

Normal & Shallice suggested that under many conditions we function automatically, selecting and integrating cognitive or behavioural skills on the basis of established schemata. Once triggered, a schema will compete for dominance and control of action by inhibiting other schemas which would be likely to conflict with it. In this model, the question of which schemas will be activated in a given task situation depends on two qualitatively distinct processes: Contention scheduling, and the influence of the Supervisory System.

Contention Scheduling quickly selects schemas from the strongest perceptual triggers, or from the output of previously run schemas. Contention scheduling is, therefore, mainly dependent on automatic processing of information, and most effective in the performance of well-trained tasks.

The Supervisory System is responsible for controlled processing and the selection of alternative schemas. With some effort, the supervisory system can suppress contention scheduling and allow the subject to concentrate on a non-routine aspect of the stimulus material. For example, normal reading is largely automised and when a skilled reader is confronted with text, he/she immediately perceives semantic meaning (without realising that the process started with the perception of little black figures, grouped in horizontal lines on a white background). Supervisory Attention Control enables us to take a step back from this reading process when we want to check the text for misprints. The routine reading of semantic meaning is then replaced by "reading" at a lower level (i.e. a search for abnormalities in the combination of letters into words).

Models of attention and ADHD

The models of attention discussed above are based on an information-processing paradigm in which skilled performance requires a shift from controlled to automatic processing. This requires the organisation of stimuli into orderly strategies and the integration of high-level schema for complex tasks.

Norman & Shallice's Supervisory Attention System theory suggests this is achieved by the inhibition of conflicting schemas. The supervisory system can inhibit contention scheduling and this in particular is likely to be problematic for people with ADHD. Individuals suffering from an attention deficit and poor impulse control are likely to have difficulty in organising high-level schema from low level schemata, and in inhibiting conflicting schemas. For example, a situation that requires an individual to not read for semantic meaning but check text for misprints would present difficulty for individuals who have problems with controlled processing. Furthermore, if they are easily distracted by irrelevant stimuli, they may have difficulty staying on task or sustaining performance.

However, the information-processing models of attention are based on adult models of dysfunction of attention and do not include the developmental aspect that is characteristic of the ADHD syndrome or adequately account for the inhibitory deficits evident in ADHD. People with ADHD have had an attention deficit and poor impulse control from early childhood and have not developed attention problems in later years as in, say, acquired brain injury.

Quay (1987, 1988, 1997) has put forward a theory of the development of ADHD that is based on the behavioural inhibition system (BIS), drawing on Gray's neuropsychological model of anxiety (Gray, 1982, 1987, 1994). The model predicts that people with ADHD are less sensitive to signals of impending punishment and non-reward (e.g. passive avoidance). In turn, this results in diminished activity in the brain's BIS causing an individual to react impulsively (i.e. with poor inhibition). For example,

when touching fire, an individual may be slow to anticipate pain and the BIS is not activated resulting in the person burning himself. The theory thus specifies predictions that can be used to test and falsify the model as it applies to ADHD and some predictions have received such support (Milich et al, 1994; Quay, 1997).

The behavioural inhibition model thus provides a cognitive theory of the development of ADHD that accounts for the behavioural inhibition that characterises the syndrome. These problems are expressed by the individual as an attention deficit and impulsive behaviour. A difficulty with learning and understanding new material, together with an inability to inhibit an impulse are likely to result in underperformance in a structured environment, such as the school setting. Individuals are likely to have difficulty learning new information resulting in academic underachievement and school failure. On leaving school, ADHD individuals may feel more comfortable in an occupation that requires less cognitive effort such as manual labour or semi-skilled work. An inability to think things through or consider appropriate alternative behaviour may result in opportunistic antisocial behaviour. They may engage in delinquent and criminal behaviour and, because of their inattention to detail and easy distractibility, they may be more likely to get caught. A tendency to misappraise situations and make hasty decisions based on inadequate information is likely to result in a social skills deficit. In social situations they may also have difficulty recognising subtle social cues, or have difficulty when faced with the need to make rapid shifts in topic of conversation. Thus people with ADHD may be understood by others to be unfriendly, lazy and/or unintelligent and develop a social reputation as a difficult personality.

1.3 ASSESSMENT OF ADHD IN ADULTS

There is ongoing debate about the validity of assessing ADHD retrospectively in adults. Most agree that ADHD is a legitimate diagnosis that can be dependably made from historical self-reports of childhood symptoms (Gittelman et al., 1985; Mannuzza et al, 1991a; Spencer et al., 1984; Weiss et al., 1985). Biederman et al. (1993) evaluated clinically referred adults with childhood onset ADHD whose diagnoses were confirmed by structured interviews. They found the pattern of psychopathology, cognition and functioning of ADHD adults was similar to findings among children with ADHD.

The persistence of the ADHD syndrome beyond childhood gives rise to an increasing need for the development of reliable and valid assessment procedures in adolescence and adulthood. Current diagnostic criteria include little guidance for adult assessment of ADHD in adults. With the understanding that the adult diagnosis of the disorder is a valid clinical entity, it should be similar to the childhood disorder with regard to patterns of psychiatric and cognitive findings. Nevertheless, it is unclear whether the motoric overactivity seen in children is relevant to the adult expression of the disorder. More and more adult patients seek treatment for problems of inattention-impulsiveness and the number of studies on stimulant treatment beyond childhood is increasing rapidly (eg. Matochik et al., 1994; Wender et al., 1981; 1985). However, diagnosis is beset by a number of difficulties and adult psychiatric services should be cautious when faced with "self-diagnosed" ADHD symptomatology. As it is a maturational disorder, a childhood history strongly suggestive of ADHD is mandatory for the adult diagnosis. Such a criterion, however, is not easy to elicit in retrospect nor reliable. Patients' own

recollections have been found to show poor agreement with parental recall (Mannuzza et al., 1993), and the latter seems to be a better predictor of treatment response (Wender et al., 1981). Contemporaneous medical and educational records offer the firmest evidence, although this information may also be unreliable or inadequate since in school and among general practitioners there has often been little awareness of these disorders. DSM-IV provides the most detailed account of ADHD as it presents in childhood, because it recognises the persistence of symptoms into adulthood and has modified the wording of the criteria accordingly. Some patients may continue to satisfy the full complement of ADHD criteria, but the heterogeneous nature of the syndrome means that others may remain symptomatic but fall short of criteria. In this case they are designated to be in remission or as ADHD 'not otherwise specified' according to whether or not childhood ADHD can be diagnosed.

Elaboration of DSM-IV ADHD criteria is clearly needed in order to evaluate the disorder in adulthood and screen for comorbidity. Guidelines are needed for clinical interviews to elicit relevant history and data on adult ADHD symptoms in work, family and social settings. A self-report instrument sensitive to a broad range of cognitive and affective impairments characteristic of ADHD adults also needs to be developed. To date there are few validated measures appropriate for adults which could aid in the differential diagnosis of adult ADHD from other disorders. This is in marked contrast to childhood ADHD, where several well validated diagnostic instruments are available (Losier et al., 1996), as well as access to informants other than the patient who can provide reliable historical information. Once parents and teachers have ceased to be reliable informants, clinicians may need to turn to other sources such as the individual's

partner, or they may have to put more weight on observational, cognitive or neurophysiological measures.

Attention Deficit

Many studies have altered the parameters of stimulus presentation or response requirement in order to identify an experimental manipulation that could define an attention deficit. These tests suggest that the deficit is at a high executive level and not one involving a breakdown of any one of the steps of processing information, eg. the deficit arises in tests lasting a few seconds, ten minutes or more, or several hours (Taylor et al., 1991; van der Meere & Sergeant, 1988). Furthermore, it is unlikely to be a problem of selecting one source of attention from others (as implied by distractibility) as the addition of irrelevant information to test stimuli does not worsen performance disproportionately in hyperactive children (Douglas & Peters, 1979; Sergeant & Scholten, 1985).

Sergeant (1988) reviewed the literature from an information-processing theoretical perspective and concluded that early stages are not affected, but that there is some evidence for abnormalities at the later stages of response selection and enaction, eg. many children make the response incompatible with the stimulus (van der Meere et al., 1989). Douglas (1988) also reviewed the literature but from a standpoint of cognitive psychology and she noted that experimenter effects are strong as are details of the way an experiment is set-up. She concluded that impaired performance was due to high-level control processes of self-regulation and inhibition rather than failure in elementary steps of perception and attention. Taylor (1994) suggested that both Sergeant and

Douglas' conclusions are compatible as control processes are one possible explanation for abnormalities at the response end of the chain of events that lead to action.

Thus research evidence is inconclusive but points to an attention deficit being a misnomer for inattentive, restless behaviour in children and this problem seems to be due to the way that children regulate their responsiveness. Again, it is unknown to what extent a difficulty with self-regulation translates into adult performance.

Impulsiveness

Studies that have experimentally examined the self-regulation of hyperactive children point to impulsiveness as a key construct in understanding cognitive changes. Taylor (1994) defined the cognitive notion of impulsiveness as "a reduced ability or willingness to inhibit appropriate actions and to wait for a delayed consequence". It is suggested that this need not be the same as a clinical definition of intrusive behaviours (such as acting out of turn) that is usually used to describe impulsiveness. "Just as in the case of attention, one must not assume that the behaviours bearing that name necessarily have any close connection with the altered neurophysiological process".

Taylor suggested the best way of testing the cognitive idea of impulsiveness is through the Matching Familiar Figures test (Kagan et al., 1964). Theoretically, when impulsive children are uncertain, they make rapid and uncertain responses - thus they are inaccurate because they are too rapid. This is supported by epidemiological research which found hyperactive children have a fast response time with poor accuracy (Fuhrman & Kendall, 1986; Taylor et al., 1991). In clinical research the evidence is

mixed, since children have been found to perform less accurately but no faster in their responses than clinically referred controls (Sandberg et al., 1978; Firestone & Martin, 1979). This may be due to the fact in such samples there is likely to be a high rate of developmental disorders which leads to slower reaction times as processing takes longer, especially if directed to work quickly (Sergeant, 1988). Sonuga-Barke et al., (1992) examined hyperactive children's inability to inhibit a response with regard to the effect of delay and size of reward/incentive on children's choices. They found hyperactive children showed impaired performance in response times and inability to wait for a reward. On the other hand if the total amount of time they were told to wait was controlled, then they were no more impulsive than ordinary children. In other words, their impulsiveness appeared when *they* could control the time they spent waiting. Thus impulsiveness was related to aversion to delay rather than a failure to control.

It is this proposal that hyperactive children may be delay averse that validates investigating time estimation of sufferers of ADHD. It is possible that hyperactive people do not like waiting, then time duration may seem to last longer for them than for others. External time, for them, may therefore pass slowly or, to put it another way, internal time runs at a faster rate.

Neuropsychological testing

ADHD as defined by diagnostic criteria in DSM-IV includes a number of cognitive impairments which can be assessed by neuropsychological measures. Indeed during adolescence motoric over-activity may become less prominent, and in young adults

inattention, impulsivity and personal disorganisation may have greater impact. Cognitive impairments impact not only upon academic functioning, but also on adaptation to demands of the social environment. Neuropsychological impairments are thus likely to be robust indicators of ADHD in adulthood.

Hyperactive children show impaired performance on tests that require sustained and organized concentration (Douglas, 1988; Sergeant, 1988). The tests that have shown handicap include those that intend to measure the maintenance of vigilance over a period of time (eg. Continuous Performance Test, Rosvold et al., 1956), the inhibition of over-rapid and thoughtless responding (eg. Matching Familiar Figures test, Kagan et al., 1964), the allocation of processing capacity in line with changing task demands (Sergeant & Scholten, 1985) and the maintenance of readiness to respond (reaction time tests with varying delays after a preparatory signal), (Sonuga-Barke & Taylor, 1992). Interestingly, reaction times differ for tests of vigilance and impulsivity. Hyperactive children tend to respond slower in tests of vigilance such as the CPT, yet faster in tests of impulsivity such as the MFF (Douglas, 1988; Taylor, 1994). This is likely to be because in a test of vigilance an individual is waiting for the presentation of a cue, and this results in response latency as an individual is slower to process incoming information in the face of cued stimuli. On the other hand, in a task of perceptual search such as the MFF (which does not involve the identification of cued stimuli) then impulsivity, especially in the face of uncertainty, results in faster reaction times.

A problem with testing is that an individual can be affected by unrelated factors such as motivation and cooperation to participate. Secondly impairment on test scores may be a nonspecific accompaniment to many types of disturbance in behaviour and learning. For example failure to attend is a feature of many psychiatric disorders, many of which frequently present in early adulthood; thus the distinction between primary and secondary attentional deficit may be difficult to establish at times. This emphasises the need to evaluate accompanying symptomatology and the evolution and cause of the disorder.

It has been shown that poor test performance is relatively specific to the behaviour of hyperactivity in primary school children (Schachar, 1991). Population-based samples delineate a correlation with impaired test scores whereas non-hyperactive conduct disorder is not (McGee et al., 1984a; Sergeant, 1988; Szatmari et al., 1989; Taylor et al., 1991). In most of these studies, IQ is also lower in hyperactive children but lower performance has also been found even after IQ has been controlled for by analysis of covariance.

Thus it can be concluded that in childhood the relationship between hyperactivity and cognitive impairment is specific but weak. Most experimental studies are carried out on samples defined by questionnaire scales as showing the presence of hyperactive behaviour and the relationship between cognitive impairment and hyperactivity becomes much stronger when the underlying condition is more strictly defined. Nevertheless, it is unknown how this relationship evolves as children mature into late adolescence and adulthood.

To summarise, a major hurdle is to determine the validity of the ADHD syndrome in adulthood. A prerequisite is to retrospectively establish the presence of problems in attention, impulsiveness and hyperactivity in childhood and then to identify the level of disability in adulthood. Yet there are few guidelines as to how to proceed. It is clearly important to use information from a variety of sources wherever possible, eg. information (especially parent), school records and objective testing. With regard to objective assessment, there is a dearth of information on adult performance and functioning and this clearly needs to be established and documented.

CHAPTER 2

ADHD IN ADULTS

A REVIEW OF THE LITERATURE

This chapter reviews the literature relating to the long-term outcome of ADHD. It begins with a discussion of the methodological issues and problems relating to researching ADHD and then goes on to consider the developmental impact of ADHD with respect to psychiatric and psychosocial outcome. It is clear that despite a paucity of investigation in long term risk, symptoms persist for many individuals well beyond adolescence. This highlights the necessity to determine guidelines and methods for assessing the syndrome in later years.

2.1 A CRITIQUE OF STUDIES OF ADHD IN ADULTHOOD

To date there are few studies of ADHD in adulthood and Table 2.1 presents those that exist along with studies that have investigated ADHD in mid- to late-adolescence. There are three major investigations which followed hyperactive youngsters prospectively through adulthood - the London, New York and Montreal cohorts (Mannuzza et al., 1993; Taylor et al., 1996; Weiss et al., 1985). These studies have found childhood hyperactivity to be a risk in adulthood for the persistence of core problems, antisocial behaviour, lower educational achievement and occupational status.

Evidence for substance abuse was mixed and mood/affective disorders were rare in adulthood.

The majority of the remaining studies use clinically referred participants and the New York cohort is teacher referred. A major strength of the London study is that it is a well controlled, community study and of meticulous design and as such it has much to contribute to our conceptual understanding of the syndrome. Taylor and colleagues (1996) found half of the hyperactive group received a psychiatric diagnosis in late adolescence, many of which included a persistence of the ADHD syndrome. Hyperactivity was found to be a risk for aggressive and antisocial behaviour, social and peer relationship problems. Importantly, deviant outcome was not attributable to comorbidity with conduct disorder in childhood.

A problem with longitudinal studies however is that diagnoses were made sufficiently long ago that current diagnostic standards do not apply - some of the early measures appear crude 15-20 years later. Secondly, comorbidity of ADHD with other diagnostic categories was seldom specified.

Retrospective studies evaluate the histories of currently available participants to determine if the participants were once hyperactive and typically such studies are biased towards more disturbed cases. Borland & Heckman (1976) and Loney et al. (1981) are two such studies - both were conducted over twenty years ago and are open to the criticisms mentioned above.

In order to make sense of the rather varied findings from many of the outcome studies, it is therefore necessary to consider the inherent problems of investigating the outcome of hyperactive children. Careful examination of the literature indicates that the majority of these studies have been plagued with a number of methodological difficulties. These problems include inappropriate diagnostic samples, lack of adequate control groups, and problematic research designs. Some of the major issues are discussed as follows:-

Epidemiological vs. clinical samples

Clinical and population studies have various advantages and disadvantages and both methods are important contributors to research. A major strength of epidemiology is its representativeness and exclusion of referral bias - findings reflect the experience of hyperactivity in the community. However nearly all the studies have referred participants and these studies may not be investigating anything developmental - they may simply be studying the reason for referral. On the other hand, clinical studies have the advantage of addressing issues of severity since participants are referred - relatively few children are found in population studies with severe problems.

Selection Criteria

The variability of selection criteria across studies is problematic. Indeed, early studies frequently offer little or no information regarding selection criteria while others appear to rely on the opinion of the investigators who define a symptom selection criteria in the absence of a detailed diagnostic scheme (eg. Borland & Heckman 1976). Furthermore, as clinicians and researchers have developed a deeper understanding of

the ADHD syndrome, criteria as defined by diagnostic manuals have changed over time (for example DSM-IIIR introduced the need for symptoms to be pervasive across settings whereas earlier versions did not include this requirement). This results in criteria being inconsistent across studies over time and earlier studies (e.g. those using DSM-II and DSM-III criteria) are not comparable to the later and more reliable and valid studies.

Sample attrition

When reported, attrition rates vary between 10%-40% (representing original participants being untraced or refusing to participate at time of follow-up in longitudinal research). Thorley (1984), in his review of the follow-up and follow-back studies of childhood hyperactivity, cautioned that the hyperactives not investigated may represent a more disordered group than their peers who were evaluated. This is well illustrated by Satterfield, Hoppe & Schell, (1982) who obtained court records for the subgroup who did not return for interview and found they had twice the offender rate. Likewise there is evidence that drop-outs in the Montreal cohort were more aggressive than follow-up participants. Thus findings may underestimate long-term psychopathology and the issue of attrition represents a major weakness in longitudinal research.

Control Groups

Another problem with the studies reviewed is the inadequate and/or inappropriate use of control groups. For example, one study did not incorporate a control group at all

(Hechtman et al., 1984b) and other studies made use of controls who were chosen at a much later point in time than when the hyperactive samples were originally selected for investigation (Gittelman et al., 1985; Hechtman et al., 1984a; Mannuzza et al., 1991a).

Normal controls were often selected randomly from the school class of hyperactive children and "super-normal controls" were frequently used which excluded children with any type of behavioural or cognitive disturbance (eg. the early Montreal cohort). This type of control may have been adequate in early studies which were relatively simplistic in their examination of core issues. However research has developed to an extent whereby more defined controls are required to examine the complexities of the hyperactivity syndrome. It is not appropriate for the *only* control group to be one of normal and super-normal controls. In particular if super-normal controls are the only control group, then the difficulty of isolating specific effects of hyperactivity is intensified. Any disparity between hyperactives and controls would simply reflect differences that could be detected between any sample with a psychiatric diagnosis and a group free of pathology. Studies therefore need to incorporate a contrast pathological group in addition to a normal control group as the recruitment of both psychiatric and normal control groups (and preferably matching them on core variables, eg. age, social class) will minimise the differences between the target group and controls at follow-up.

Matching controls

Studies are inconsistent as to whether they match control participants or not. The question of whether to match (and on what variables) is important and requires consideration for the impact this will have on outcome. Matching groups reduces the differences that are found between groups; whereas data derived from unmatched groups are difficult to interpret because variables such as IQ, social class, age and sex may strongly influence outcome. For example, matching for age and sex will be important as the ADHD syndrome may present differently in males and females and problems may improve with maturity. On the other hand, the evidence is less clear for the impact of social class (Taylor, 1994). With respect to IQ, matching may not be helpful as a consistent finding from studies examining IQ and learning deficits shows that both ADHD children (Frick et al., 1991; McGee et al., 1985) and adults (Biederman et al., 1993) tend to have lower IQ's than peers.

Information sources

Self-report, informant-report, direct observation and official records all constitute a typology of information source and each source varies as to its accessibility to information about an individual. Furthermore self-report and informant report are each constrained by potential cognitive biases and limitations that influence the quality of the information provided about an individual. Most of the adult studies rely heavily on self-report interviews (and are given by investigators who are not always blind to status) as their source of information yet there have been recent suggestions that self-report lacks validity when reporting core symptoms and difficulties of the ADHD

syndrome (Toone & van der Linden, 1997; Young, 1998).

2.2 OUTCOME

2.2.1 Core features of ADHD

The long-term outcome of hyperactive children has been studied in four centres - in Montreal by Weiss et al. (1985), New York by Mannuzza et al. (1993), in London by Taylor et al. (1996) and in a smaller, rural study in Iowa by Loney et al. (1983). Early research suggested that many children grow out of their symptoms as they mature (Mendelson et al., 1971) but in recent years an accumulating body of data (including long-term prospective studies) has suggested that the ADHD syndrome persists into adulthood for many young adults who continue to be impaired by the core symptoms of inattention, impulsiveness and restless behaviour.

The Montreal & New York cohorts (Mannuzza et al., 1993; Weiss et al., 1985) both revealed that ADHD persists well into adulthood and this has been supported by Taylor et al's (1996) London epidemiological study. The authors investigated a cohort of 6-7 year old boys and followed them up at age 16-18 years using detailed interview techniques, parental and self-report ratings and cognitive tests. They found around one-quarter of the ADHD group received a diagnosis of ADHD at follow-up, and the authors concluded that hyperactivity should not be conceptualized only as an immaturity of young schoolchildren as it is still present at school-leaving age. They

also proposed that it should not be viewed only as a risk factor for other disorders as it is possible that the persistence of hyperactive behaviours is the key factor determining later social impairment.

The New York studies of Mannuzza, Gittelman and colleagues followed up two cohorts of hyperactive 6-12 year old boys until they reached between 16 and 23 and compared them with a control group. At follow-up one-quarter still met criteria for ADHD compared with 3% of controls (Gittelman et al., 1985). Seven years later the proportion of ADHD had fallen to 8% and 1% respectively (Mannuzza et al., 1993) reflecting how a sizeable number of individuals go into remission of core symptoms during late-adolescence.

The Montreal cohort was less stringent in its criteria for persisting symptoms in adulthood resulting in Weiss & colleagues finding two-thirds of hyperactive children followed-up in adulthood (at 25 years) retained at least one disabling ADHD symptom, compared with 7% of a normal control group. From these studies, Toone & van der Linden (1997) estimate between 0.5% to 1% of the young adult population have symptoms associated with ADHD.

2.2.2 Antisocial behaviour

Although ADHD youngsters are at risk for a number of negative outcomes, particular attention has been directed to their propensity for antisocial behaviour and related

substance abuse, in part because of the clear impairment engendered by such sequelae. Comorbidity with conduct disorder in childhood has been so consistently documented that it has been suggested by some reviewers that hyperactivity and conduct disorder are not distinct problems. Taylor (1994) examines this issue in his review of the literature and concludes that the two problems are distinct but that when comorbidity occurs then this is a group more seriously affected "more conduct-disordered than those with conduct disorder, more hyperactive than the hyperactive". Taylor bases his conclusion on findings derived from epidemiological samples (using interview measures and rating scales), evidence from clinically based studies and from a developmental perspective. Nevertheless, he cautions that the DSM-III definitions may not have adequate discriminative validity, and that this may also be a problem in DSM-IV.

Childhood studies consistently evidence that ADHD overlaps with CD and with Oppositional-Defiant Disorder (ODD)[1] at rates well above chance levels (Biederman et al, 1991), that comorbidity between ADHD and categories range from 30%-50%, and that the prognosis of hyperactivity is worse when associated with conduct disorder (Schachar, 1991). Moreover, much of the poor outcome of hyperactivity is usually found among the subgroup with persisting conduct disorder, eg. higher rates of substance abuse (Barkley et al., 1990; Gittelman et al., 1985) and school expulsion (Barkley et al., 1990). Indeed, Moffitt (1993) suggested a subgroup progresses from early ADHD through a chronic course of antisocial-spectrum disorders.

[1] A milder form of CD featuring negative, defiant, irritable behaviour patterns.

Poor outcome may well be explained by the strong association between aggressive behaviour and conduct disturbance. McGee, Williams & Silva (1984) found that aggressive hyperactive boys were referred almost four times as often as non-aggressive hyperactive boys. Loney et al. (1981) investigated youngsters with ADHD and found that concomitant aggressive behaviour was a stronger predictor of adolescent substance abuse, delinquency, and even hyperactivity than was childhood hyperactivity. The major concern about findings from many of the older studies is that they may not have disentangled the contribution of conduct disturbance to poor prognosis.

In a review article, Lilienfeld and Waldman (1990) critically examined existing evidence regarding the predictability of adult antisocial behaviour patterns from childhood attention deficits and hyperactivity. They concluded that, given the marked overlap between childhood aggressive behaviour patterns and ADHD, investigators must attempt to systematically tease apart such behaviour patterns in predictive reports. Taylor et al. addressed this issue in their London community study and found that antisocial behaviour in adolescent boys was not necessarily determined by childhood conduct problems. This study independently controlled for childhood conduct disorder in a four group design (hyperactive, conduct disordered, mixed HA/CD and normal control groups) and found ADHD was a risk factor in its own right. This is supported by Satterfield et al. (1994) who compared ADHD with and without defiance and concluded that a lack of defiance does not protect from risk for antisocial behaviour in mid to late adolescence. Clearly, further research needs to be conducted to establish the progression of risk.

2.2.3 Personality disorder

Both the Montreal and New York studies found hyperactivity to be a risk for personality disorder. Mannuzza and colleagues followed-up a cohort of hyperactive 6-12 year old boys and found that compared with controls, the index group was nearly ten times more likely to have antisocial personality disorder at follow-up. At 23-30 years, 18% met DSM-IIIR criteria for antisocial personality disorder compared with 2% of controls. The Montreal group reported antisocial personality disorder to be the only DSM-III diagnosis that was more common to the former hyperactive group than controls (23% vs 2%) at 21-33 years. The authors cautioned, nevertheless, that one-third of cases were mild. These finding are supported by Biederman et al.'s (1993) cross-sectional study which found ADHD adults had higher rates of antisocial personality disorder.

In a smaller, rural study in Iowa, Loney et al. (1983) compared 22 hyperactive boys with their brothers and found antisocial personality disorder to be more prevalent in the hyperactive group at age 21-33 years compared with their brothers (45% and 18% respectively).

Although personality disorder was not the focus of their long-term investigation, the somewhat younger London cohort (Taylor et al., 1996) found that only members of a 'pure' hyperactive group (compared to a conduct problem group, a comorbid conduct problem and hyperactive group, and a normal control group) had developed

personality disorder in their adolescent years. Four members of this group (13%) were judged by an experienced child psychiatrist using ICD-10 criteria to have a personality disorder.

Taking a different perspective, relatively little research has focused specifically on the causes of personality disorder diagnoses. Research in personality disorders is constrained by methodological problems as retrospective reports from patients about their families are a major source of information. Such information may be biased by forgetting and also by individuals' contributions of what they believe happened in their early years. However, two prospective studies have shown that disruptive disorders (for example conduct, oppositional and attention-deficit disorders) in childhood or adolescence may be a risk for the development of personality disorders. By contrast, emotional disorders such as depression and anxiety were significantly less predictive of personality disorders in later life (Bernstein et al., 1996; Rey et al., 1995).

2.2.4 Criminal activity

Analysis of court records has revealed that ADHD is a risk for criminal activity, especially serious offences and institutionalisation (Hechtman & Weiss, 1986; Lambert, 1988; Satterfield et al., 1982; 1994). Police contacts are higher in adults with histories of ADHD than in controls, but as with substance abuse patterns, risk for criminality appears to exist if antisocial behavioural patterns develop over and above the persistence of ADHD (Fergusson, 1997; Mannuzza, 1991). Satterfield et al. (1984)

examined Official Records from Los Angeles courts (mean age 17 years) and reported that ADDH adolescent children were four to five times more likely to have been arrested and were 25 per cent more likely to be institutionalised because of delinquency than controls. In their study, Satterfield separated the hyperactive groups into 'high defiance' and low defiance' and found the high defiance group had 43% of offences compared to normal controls (8%). Even the low defiance group had an arrest rate that was three times higher than normal controls. Thus ADHD with little comorbid defiance does not appear to protect from antisocial behaviour in late adolescence.

Mannuzza, Klein, Konig, & Giampino, (1989) supported the Satterfield finding (mean age 22), although they found that hyperactive men were arrested twice as often as male controls (39% vs 20%) and were more likely to have been charged with an aggressive of felonious offence. Hyperactive men were also more likely to be convicted and incarcerated than controls (9% vs 1%), to have multiple arrests (23% vs 8%) and multiple convictions (18% vs 2%).

Other investigators have found little difference in the number of police contacts (Hechtman et al., 1984; Loney et al., 1981). However these studies rely on self-report as a source of information which lacks the validity of those using data derived from court and police records. Even though they reported no increased contact with police, Loney and colleagues found 41% of the index group had been incarcerated (compared to 5% of their brother controls) suggesting that they had more serious offenses.

2.2.5 Substance abuse

Risk for substance abuse in adulthood is unclear. Alcohol abuse has been reported to be a problem by Weiss and colleagues (1985) who reported that two-thirds of the group who retained at least one disabling symptom of ADHD had significantly higher ratings for alcohol abuse. The Montreal study also evidenced hyperactive adults have more non-medical drug use (Hechtman et al., 1984a) and this finding is supported by Biederman et al. (1993) but other studies suggest that substance abuse disorder follows onset of conduct disorder and is significantly related to persistence of the syndrome. Thus without the presence of anti-social disturbance, the risk for substance use disorder has been reported to be almost non-existent by some studies (Gittelman et al., 1985; Mannuzza et al., 1991b).

Gittelman et al. (1985) found 16% of hyperactive adults vs 3% of controls had substance abuse disorder (other than alcohol). They concluded that the likelihood of developing conduct disorder is greater if ADHD persists and that substance abuse is often linked to or follows the conduct disorder. This study suggests that hyperactive individuals are more prone to having ADHD, antisocial personality disorders and substance abuse disorders in adulthood and that these three conditions aggregate in the same individuals. Thus results reject a straight-forward link between childhood hyperactivity, antisocial behaviour and substance abuse.

2.2.6 Emotional problems

As far back as 1976, investigators have noted an association between hyperactivity and later symptoms of nervousness, sadness, depression and of being easily upset (Borland & Heckman, 1976; Riddle & Rapoport, 1976). Biederman, Newcorn & Sprich (1991) review overlap rates ranging from chance levels to over 70% in various reports. However, the association has historically been considered to have little predictive power for outcome.

Considerable controversy exists with regard to the comorbidity of affective or mood disorders with ADHD, but very recently consensus has begun to emerge that ADHD displays above-chance comorbidity with the internalizing spectrum of anxiety disorders. In both community and clinic samples, overlap has been found to occur (Anderson, Williams, McGee & Silva, 1987; Biederman et al., 1991b; Bird, Canino & Rubio-Stipec, 1988). They suggest that the rate of overlap with overanxious disorder, separation anxiety and phobic disorders is in the neighbourhood of 25%. Biederman et al. (1993) found ADHD adults had higher rates of depressive and anxiety disorders. On the other hand, a number of influential investigators have not found increased risk for affective or anxiety disorders in their adolescent and adult probands (Gittelman et al., 1985; Lahey, Pelham et al., 1988; Mannuzza et al., 1991b; 1993; Taylor et al., 1996; Weiss et al., 1985).

Self-esteem has not been included as an outcome measure in contemporary studies but early studies evidenced that hyperactive children developed low self-esteem in adolescence and adulthood (Berry et al., 1985; Borland & Heckman, 1976; Hechtman et al., 1980; Hoy et al., 1978).

Thus in contrast to findings for antisocial behaviour, prospective studies have not evidenced children with ADHD to be at risk for mood and anxiety disorders in adulthood, nor have they shown that anxiety or depression are robust predictors of adult outcome. Nevertheless, many of the follow-up studies of ADHD children commenced before current knowledge about the extensive comorbidity of ADHD with other disorders. Thus the assessment of anxiety and depression may not have been comprehensive, especially from the perspective of lifetime history. There is evidence that children with ADHD and comorbid depression are at risk for developing particular poor outcome (Kovacs et al., 1984; 1988) and Weiss et al. (1985) found hyperactive participants made more suicide attempts. A study evaluating predictors of suicide in adolescents (Brent et al, 1988) found that those who committed suicide had increased rates of bipolarity and ADHD compared with those who attempted suicide. Thus ADHD comorbidity with mood disorder may represent a subpopulation at higher risk for greater psychiatric morbidity and disability.

2.2.7 Educational underachievement

Academic failure clearly incurs major consequences in our achievement-oriented society. For years researchers have noted an association between academic underachievement and externalising behaviour in childhood and adolescence, with the predominant theories implying either poor achievement as a cause or predictor of later aggression or early aggressive behaviour as causal of subsequent school failure. Attention deficits and hyperactivity are likely to be directly implicated in such causal chains.

Weiss et al. (1979; 1985) and Klein & Mannuzza (1991) independently reported that adults with childhood ADHD completed less education, had poorer marks, failed more grades and were more commonly expelled from school than control participants. Klein & Mannuzza (1991) also reported they had worse scores on standardised achievement tests (after controlling for IQ). Biederman et al. (1993) found ADHD adults to have lower IQ and higher rates of school failure than controls.

Lambert & Sandoval (1980) reported approximately 50% of hyperactive children having learning difficulties while Safer & Allen (1976) estimate the overlap to be as high as 80%. Groups of hyperactive primary and secondary school children have been shown to have lower IQs and higher levels of academic failure than either aggressive children or controls (Douglas, 1988; Frick, Kamphaus, Lahey, Loeber, Christ, Hart & Tannenbaum, 1991; McGee, Williams, Bradshaw, Chapel, Robins & Silver, 1985).

Although reports of a relationship between hyperactivity and learning difficulties are consistent, the deficits however vary from overall low academic achievement to specific reading problems or visual motor dysfunction.

Hinshaw (1992), in a comprehensive review of the literature has suggested that while both hyperactive and aggressive children fail academically, the link between behavioural deviance and intellectual impairment may be the result of different, though often interacting, developmental processes. Many researchers tend to see the link between hyperactivity and intellectual impairment as part of a "syndrome" with neuro-developmental origins, compared to that between conduct problems and underachievement as having socio-developmental origins. Hinshaw suggested these distinctive patterns of associations were consistent with the idea that hyperactive children's intellectual impairment appeared more often at an earlier age than is the case for children with conduct problems. Being of neuro-developmental origin, hyperactive children's intellectual disadvantage appears *prior* to school entry, while the link with conduct problems only appears *after* school entry.

This means that academic problems start for ADHD children at an early age and continue throughout their school career and their poor academic performance in childhood and adolescence is well documented from both clinically referred and community studies. Indeed their deficits are such that they frequently attend special school, leave school early and with few or no qualifications and do not progress onto college (Lambert, 1988; Mannuzza et al., 1993; Taylor et al., 1996; Weiss et al., 1985;

Young, in submission).

2.2.8 Occupational status

Given the poor academic performance and educational attainment of ADHD children, it is reasonable to expect their employment history to become equally poor in adulthood. Occupational status of ADHD probands has been the focus of three investigations into adulthood (Borland & Heckman, 1976; Mannuzza et al., 1993; Weiss et al., 1979; 1985). Each study independently reported that ADHD adults were gainfully employed at follow-up but that they had more employment-related problems than controls or reached a lower than expected occupational status.

The New York follow-up (Mannuzza et al., 1993) found ADHD adults had significantly lower occupational rankings than controls and were employed in significantly fewer professional positions (eg. lawyer, accountant). It was found that significantly more individuals in the index group were self-employed owners of small businesses (18% vs 5%).

The Montreal study (Weiss et al., 1978) found hyperactive participants were gainfully employed. In the subsequent follow-up (age 21-33 years) only a partial sample of cases could be evaluated since most would not allow contact with employers (a reluctance not found for controls). For those whom information could be obtained, employers reported that their work status was inferior to that of controls and that they

changed jobs more frequently. Employers of ADHD adults also reported that they had poor levels of work performance, were poor in task completion, lacked independent skills and had poor relationships with supervisors (Weiss et al., 1979).

Mannuzza et al (1988) investigated hyperactive children who did not receive DSM-III diagnosis at follow-up and found that, although they fared worse than control participants on school adjustment, no differences were found for occupational adjustment, temperament, alcohol use or antisocial behaviour. Thus continuation of ADHD symptoms is an important determinant of poor outcome, with a more positive outcome awaiting individuals who experience a remission of core symptoms.

Borland & Heckman (1976) in their early study of 20 hyperactive men compared to their brothers found that despite little difference in educational attainment and subsequent employment, the hyperactive group had achieved significantly lower SES than their brothers. This suggests that, although the hyperactive groups found and remained in regular employment, this tended to be at a lower status than that predicted (compared to that achieved by their brothers).

2.2.9 Interpersonal relationships

Peer relationship problems plague nearly all youngsters with ADHD and rates of peer rejection are nearly universal for ADHD children who also display additional disruptive behaviour disorders (Berry et al., 1985; Borland & Heckman, 1976; Milich & Landau,

1989; Riddle & Rapoport, 1976). Milich and Landau (1989) summarised the body of research regarding these jointly impaired children contending that (a) skill deficits relating to ADHD rendered them relatively unable to perform key developmental tasks and (b) the defiance characteristic of aggressive-spectrum disorders depleted motivation and effort. Thus a multiple loading of biological and psychosocial factors were likely to be operative in the developmental trajectories of youngsters with comorbid ADHD and aggression.

Social adjustment is often considered to be a 'secondary' feature of the disorder, yet this issue is hardly secondary in importance for ADHD individuals. Important contributions have been made by researchers who focus attention on the interpersonal aspects of ADHD. From their perspective, interpersonal difficulties are not peripheral but central aspects of the disorder yet to date, few studies have examined social and peer relationship problems in adulthood or romantic partnerships. A large body of literature has found that hyperactive children are rated to have more negative relationships with their peers and fewer friends than non-hyperactive children (Klein and Young, 1979; Milich and Landau, 1982; Pelham and Bender, 1982; Whalen and Henker, 1985, 1992). One study using an observational technique lends support to findings from studies using rating measures. Hyperactive boys and girls in childhood were described as more negative towards their peers and more disruptive in group play (Battle & Lacey, 1972).

ADHD youngsters have been identified to be among the most negatively appraised by

peers (Milich & Landau, 1982; Whalen & Henker, 1992). Furthermore, although aggression is a potent elicitor of peer rejection (Coie, Dodge & Kupersmidt, 1990), nonaggressive ADHD youngsters are also disfavoured by peers (Pelham & Bender, 1982). Much of what is known about the social interaction of individuals with ADHD is derived from childhood studies and there is little information in the literature about the social interactions of ADHD adults. It is known that ADHD children seem to develop negative peer reputations after extremely limited periods of contact (Bickett & Milich, 1990; Pelham & Bender, 1982) and, levels of aggression may be the overwhelming factor in mediating such a speedy response (Campbell & Paulauskas, 1979). A considerable literature has developed documenting the importance of aggressive behaviour in fostering peer rejection in "normal" populations (Coie et al., 1990). Yet it is important to note that hyperactive children *without* significant aggressive behaviour are also at strong risk for receiving peer disapproval (Milich & Landau, 1989; Pelham & Bender, 1982; Pope, Bierman & Mumma., 1989).

Disruption to social relationships is evident from an early age and there is evidence it continues into mid-adolescence. The London epidemiological follow-up of boys and girls into mid- to late adolescence found hyperactivity to be an independent risk for severe disruption to peer relationships (Taylor et al., 1996; Young, in submission). During adolescence developing youngsters begin to determine their own social environment, forming dyadic relationships, small groups of friends and a wider set of acquaintances. This latter environment generally provides the opportunity for romantic relationships to develop. These studies portrayed how hyperactive boys and girls were

deviant in creating a network of close personal friendships and romantic attachments, how they lacked involvement in social activities and tended to not engage in constructive activities generally.

Little is known about the romantic attachments of ADHD adolescents and adults. The romantic liaisons of ADHD girls in mid-adolescence were investigated in the prospective London study by Young (in submission) and it was found that ADHD was a risk for poor social interaction with peers and the opposite sex, independent of comorbidity with conduct disorder in childhood. It is unknown how these complex relationships develop as individuals mature and enter young adulthood and develop intimate, longer-term sexual partnerships, although one study suggests ADHD adults tend to be divorced or separated (Biederman et al., 1993).

Thus from an early age hyperactive children may be disadvantaged both by their behavioural difficulties and difficulties in social cognition. Overactivity, aggression and/or disruptive behaviours are not likely to be valued characteristics by peers. One can only speculate as to the underlying cause of the social disruption characteristic of individuals with ADHD. It may be that ADHD is a risk for the production of inappropriate social behaviour. Thus individuals may engage in socially noxious behaviour and have difficulty in modifying social behaviour in accordance with shifting situational demands. It is evidenced that ADHD youngsters tend to persist in social roles calling for assertion and dominance even when the situation shifts to call for more deferent or accommodating behaviour (Grenell, Glass & Katz, 1987; Landau & Milich,

1988; Whalen, Henker, Collins, McAuliffe & Vaux, 1979). Alternatively they may have social agendas that differ from those of their others; they may, for example, value sensation seeking or social disruption at the expense of smooth interaction as desired goals.

It is also possible that the attention problem underlying ADHD causes individuals to have difficulty processing social information, eg. they may be slow to recognise vital social cues, or have inadequate knowledge of social rules, roles and routines (Landau & Milich, 1988; Whalen & Henker, 1992). Grenell et al. (1987) observed hyperactive boys to express little difference from controls in initiating friendship. They were however deficient in their knowledge of how to maintain friendships and negotiate interpersonal conflict and this resulted in poor performance. Alternatively, their impulsive and restless nature may mean they engaged in limited activity with peers or appeared distracted and unfocused, moving on sharply to other stimuli. This behaviour may actually be desirable for younger children (Milich, Landau, Kilby & Whitten, 1982; Pope et al., 1989; Whalen & Henker, 1985) but this is unlikely to be valued in adulthood.

Discordant relationships with parents, teachers, and particularly peers are sources of considerable stress, in addition to being strongly predictive of later maladjustment (Parker & Asher, 1987). ADHD adults may have long internalised negative social interactions and failed relationships. Indeed, disturbed peer relationships have been linked to a plethora of problems in later life such as general mental health problems,

schizophrenia, school related difficulties, delinquency and criminality.

2.3 SUMMARY

While there is increasing awareness that ADHD is a common disorder in adults and associated with considerable disability and distress, it remains an underdiagnosed and undertreated adult psychiatric disorder. Clinicians in child services do not follow-up patients into adulthood and adult ADHD is rarely considered in psychiatric settings in the UK. Furthermore, despite growing recognition of the legitimacy of its diagnosis in adulthood, this has not been matched by parallel advances in knowledge about assessment and treatment.

It is clear from the research reviewed that apart from the core problems of attention regulation, activity modulation and impulsivity, ADHD children also display major developmental difficulties in learning, aggression control and social relationships. Indeed, it would be difficult to imagine a list of variables that are more predictive of maladjustment in our society than these associated aspects of the disorder. Long term adjustment difficulties are in store for a high percentage of children and prospective follow-up studies generally indicate considerable risk for negative outcomes. Furthermore the psychiatric profile may be complex in adulthood, with adult ADHD coexisting with other psychiatric disorders such as affective disorders, substance misuse, intermittent explosive behaviour and antisocial behaviour. Every effort should be made to identify ADHD as a distinct nosological entity while recognising that the

presence of comorbidity may obscure the specific attribution of disability. Results from studies are nevertheless variable and it is unclear whether differences in results across longitudinal studies are attributable to divergent sampling methods, possible cohort effects, the role of different cultures or other artifacts.

From the literature, it seems possible that the concurrent presence of attention deficits, neuropsychological dysfunction, aggressive behaviour and poor interactive skills may combine to promote an increasingly antisocial trajectory as individuals mature. In particular it seems that when ADHD is comorbid with aggressive and antisocial behaviours, risk is increased for criminal activity. Although aggression may appear to be a more specific predictor of poor outcome, attention deficits and hyperactivity also independently predict key outcomes in a number of cases. Learning deficits are also associated with ADHD in childhood, and this combination is particularly likely to presage the link between delinquent/antisocial behaviour, school failure and deviant occupational status in later life.

It is not clear whether hyperactivity is a risk for poor emotional adjustment in later life. Low self-esteem and poor self-image have been reported along with social and academic failure, the combination of which may lead to emotional problems in later life. One needs to be cautious, however, as any association found between symptoms of hyperactivity and emotional difficulties could also be due to all kinds of possible artifactual reasons, such as referral bias and nosological considerations. Furthermore, severe disorders with many symptoms are likely to have a greater chance of fulfilling

the criteria for more than one disorder, for example, agitation is one criterion for anxiety, depression and ADHD. Thus there is a danger that there exists an artifactal association between severity and extent of comorbidity.

The lack of satisfactory knowledge about social adjustment in adulthood is clearly an outstanding matter, although it is well documented that hyperactive children have significant social problems. It has been suggested that hyperactive children are rejected due to their inappropriate social behaviour or problems in social cognition and, as children develop, it is necessary to take into account the increasing influence of the peer culture and the particular difficulties that adolescence and young adulthood may bring to a youngster whose core problems lie in the area of self-regulation. On entering adulthood, individuals form a series of intimate, permanent relationships. This requires the development of social interactive skills and an ability to negotiate interpersonal differences and conflict in addition to the flexibility to adapt these skills to a variety of social and occupational situations.

It is clear from the literature reviewed that very little is known about ADHD in adulthood. This represents a gap in our knowledge of the ADHD syndrome. Early studies suggested hyperactivity was a disorder characterised by developmental delay which would be overcome by maturity during adolescence. However, recent outcome studies on community samples and clinically referred patients emphasise the heterogeneous nature of the developmental course of the syndrome. Variability at follow-up is quite large. Many children grow out of their symptoms in adolescence,

while for others hyperactive symptomatology persists into young adulthood together with associated academic difficulties and psychosocial adjustment problems. It is clear that the developmental process of hyperactivity carries risk for continuing symptomatology relating to attention deficits, impulsive and hyperactive behaviour as well as for antisocial behaviour, educational and occupational failure and disturbed interpersonal relationships. Indeed, a significant proportion of hyperactive children appear to be at risk for the development of relatively severe psychiatric syndromes in adulthood, such as antisocial personality disorder. It is not clear to what extent substance abuse and emotional difficulties are a problem in adulthood.

2.4 AIMS AND OBJECTIVES OF THE STUDY

A primary goal for this thesis is to increase our knowledge about ADHD in adult life by examining the mental health problems and psychosocial profiles of adults referred to a National Adult ADHD Clinic and diagnosed to have ADHD in adulthood.

As well as producing a general description of adults with ADHD, some specific questions will be tested. First, psychiatric comorbidity is examined with regard to antisocial behaviour, personality disorder, mood and affective disorders. Secondly, the psychosocial adjustment of ADHD adults is examined with regard to their educational achievement, occupational status, leisure activities, criminal activity, substance abuse, social and intimate relationships. A third aim of the thesis is to report the cognitive functioning of adults with ADHD using objective neuropsychological measures and

relating these to the clinical criteria for ADHD as proposed by DSM-IV. This is important to establish as little is known about the neuropsychological functioning of adults with ADHD. Indeed, the development of objective measures that are sensitive for adult use are vital for clinicians attempting to assess, manage and treat ADHD in adulthood.

In order to examine these questions, the study examines a clinically referred sample of adults who were referred (both General Practitioner and tertiary referrals) to a national London clinic for assessment for ADHD. The sample is represented by three groups:-

(1) a clinically diagnosed ADHD symptomatic group ["the ADHD group"];

(2) a clinically diagnosed non-ADHD symptomatic group ["the clinic control group"] (for a full description refer to methodology section)

(3) a normal control group recruited in the community ["the normal control group"].

Classification was based on the presence or absence of ADHD in childhood and adulthood according to DSM-IV guidelines and determined by clinical judgement informed by three sources of information - self-report, informant-report (usually parent) and whenever possible school reports. Groups were matched on age, sex and social class.

Specific research questions and hypotheses are as follows:-

1. What is the psychosocial impact of ADHD in adult life? It is hypothesised that the ADHD group will present with academic underachievement, poor occupational adjustment, antisocial and criminal behaviour, poor social interaction and relationship difficulties.

2. What is the psychiatric impact of ADHD in adult life in terms of how this affects an individual's mental health? In particular, to what extent is there comorbidity in adulthood? It is hypothesised that the ADHD group will present with personality disorder. There are no specific predictions in the areas of substance misuse, mood and affective problems.

3. What is the neuropsychological profile of adults with ADHD? It is hypothesised that there will be no difference in response time between clinically referred groups on a test of attention (the Continuous Performance Test) and test of impulsiveness (the Matching Familiar Figures Test). It is hypothesised that the ADHD group will make a significantly greater number of errors on tests of attention (the Continuous Performance Test and the Letter Cancellation Test) and on a test of impulsiveness (the Matching Familiar Figures Test). It is hypothesised that the ADHD group will significantly overestimate time on a measure of retrospective time and underestimate time on a measure of prospective time.

TABLE 2.1 - SUMMARY OF ADULT STUDIES IN CHAPTER 2

Author Date	Location	HA	Other	Normal Control	Age	Subjects	Diagnosis Selection	Design	Findings	Source	Comment
Bieder-man et al. 1993	Massachus-setts	84 adults	140 ADHD children 36 adult relatives with ADHD	207 adult relatives without ADHD	not report-ed	clinic referred	SCID (DSMIII-R) KIDDIE-SADS-E 5 DSMIII-R symptoms at assessment	cross-section	ADHD adults tended to be male, divorced or separated, lower SES and IQ. They had higher rates of antisocial personality disorder, conduct disorder, oppositional disorder, substance use, depressive disorders, anxiety disorders and school failure.	Self-report Test battery	Interviewers of referred adults blind to clinical diagnosis but not to the referral status. Clinically referred group compared with groups identified at an earlier time.
Borland & Heckman 1976	Pennysyl-vania	20		20 brothers	30 years	clinic referred	Overactivity + short attention span. 4/35 symptoms over 2 yrs prior referral (Mendelson et al 1971). IQ >80, attended regular school, no chronic medical/neurological disease nor orthopaedic /special sensory handicap.	retrospective 20-25 years.	50% had psychiatric problems, 50% continuing symptoms. No difference in education, all employed and self-supporting but HA had achieved lower SES than their brothers.	Self-report . School records.	17 met criteria but were unavailable for follow up. Controls were brothers who share psychosocial exposure thus differences may be minimised.
Gittelman et al 1985	New York	101		100	16-23 years	school referred	DSM-II Teacher rated on Conners.	prospective 9 yearrs.	Substance use disorders usually followed onset of CD. CD and substance abuse significantly related to persistence of syndrome. One quarter met criteria for ADHD (3% controls); one third personality disorder (8% controls) and one sixth substance abuse (8% controls). Considerable comorbidity, one half had DSM-III diagnosis (20% controls).	Self-report. Parent	27% attrition. Controls recruited at follow-up. They were significantly older. No CD control. Controls were male siblings of probands or attendees at clinic for physical ailments.
Manuzza et al 1989	New York	101		100	16-23 years	school referred	..Ditto..	prospective 9 years	HA significantly higher rates of attention-deficit, antisocial and drug use disorders. More probands arrested (39%), convicted (28%) and incarcerated (9%) - accounted for by presence of antisocial/CD. ADDH alone not associated with arrest history.	Court records. Self-report interview. Parent interview.	..Ditto..

Author Date	Location	HA	Other	Normal Control	Age	Subjects	Diagnosis Selection	Design	Findings	Source	Comment
Manuzza et al 1991	New York	94		78	16-23 years	school referred	..Ditto..	prospective 8-14 years	Significantly more probands were given ongoing diagnoses of ADD (43%), antisocial disorders (32%) and drug use disorders (10%). No increased risk of affective disorders at follow-up. No direct link between childhood HA and later substance abuse - antisocial syndrome preceded drug use.	Self-report interview. Parent interview.	10% attrition. Controls had significantly higher SES and were recruited at follow-up.
Mannuzza et al. 1993	New York	91		95	26	school referred	..Ditto..	prospective 16 years	Proportion of ADHD fell in adulthood. 8% ADHD (1% controls). Probands had significantly more (18%) antisocial personality disorder and (16%) drug abuse. Education and occupation significantly poorer. Lower SES ranking. Affective/anxiety disorders rare	Self-report interview	12% attrition
Fergusson et al., 1997	New Zealand	468 attention problem	501 low attention		18 years	epidemio-logical	Rutter and Conners	prospective 10 year	Attention problems related to poor academic achievement but not antisocial behaviour, juvenile offending or substance use unless attention problems had been comorbid with conduct problems in childhood.	Self-report	25% attrition from more socially disadvantaged families.
Hechtman et al 1984 (a)	Montreal	75		44	21 years	clinic referred	Pervasive HA. No epilepsy, cerebral palsy or psychosis. IQ>85. Living at home with parent.	prospective 12 years	Antisocial behaviour and substance abuse: HA had more non-medical drug use in preceding 5 years, but no difference in preceding year. Little difference in type of drug used and severity of use. Adult outcome less severe than adolescent outcome. Trend for more court referrals to be reported by HA group but no difference in number and seriousness of offenses reported.	Self-report interview.	27% attrition. Trend for drop-outs to be more aggressive.

Author Date	Location	HA	Other	Normal Control	Age	Subjects	Diagnosis Selection	Design	Findings	Source	Comment
Hechtman et al 1984 (b)	Montreal	76			17-24 years	clinic referred	..Ditto..	prospective 10 years	Predictors of outcome: Outcome associated with an additive interaction of personality characteristics, social and family parameters. Particularly important were SES, mental health of family members, IQ, aggression, emotional instability and low frustration tolerance.	Self-report interview	27% attrition. Inadequate controls. No measure of intervening variables. Some measures not corroborated.
Weiss et al 1985	Montreal	61		41	25 years	clinic referred	..Ditto..	prospective 15 years	DSMIII - 23% antisocial. 66% retained at least one disabling ADHD symptom compared to 7% of control group (of this subgroup 64% were significantly more antisocial and 68% alcohol abuse). HA completed less education. Mood/anxiety, drug abuse rare.	Self-report interview.	40% attrition - trend for drop-outs to be more aggressive.
Hechtman & Weiss 1986	Montreal	61		41	25 years	clinic referred	..Ditto..	prospective 15 years	No significant differences in drug/alcohol use and anti-social behaviour but HA trend for greater involvement.	Self-report interview. Court records.	..Ditto..
Lambert, 1988	California	166	74 behav. control	127	17-18 years	clinic referred	"medical" diagnosis	prospective 12 years	HA children had significantly poorer educational outcome and greater CD. They more frequently attended special schools, did not finish high school, not go on to college, left school and ran away, lived in foster or residential setting, involved in delinquent activity, smoked more cigarettes.	Self-report. Parent. School. Counsellor.	18% attrition. Possible bias to show better than actual outcome. Method of diagnosing HA group not defined.

Author Date	Location	HA	Other	Normal Control	Age	Subjects	Diagnosis Selection	Design	Findings	Source	Comment
Loney et al. 1981		22		22 brothers	21-23			retrospective	No difference between groups on reported number of police contacts. 41% of HA had been incarcerated. Antisocial personality disorder in 45% of ADHD group (18% in brothers).	Interview	Negative outcome for ADHD not completely explained by shared factors between siblings - parental psychopathology and SES are also factors. SADS-L measure for antisocial personality disorder (similar to DSMIII).
Mannuzza Klein & Addalli, 1991	New York	50	50 ADHD brothers	50	16-23	school referred	DSM-II, IQ>85	prospective 9 years	HA group received significantly more DSM-III diagnoses at follow-up, especially continuity of ADHD syndrome. Both ADHD males and their brothers had antisocial personality disorder but ADHD group had a more severe form.	Self-report Parent report	Children excluded if primary reason for referral was aggression. Blind assessment at follow-up.
Satterfield et al 1982	Los Angeles	110		88	17 years	clinic referred	IQ>80, 6 months duration, parent or teacher, HA symptoms	prospective 8 years	Serious offences and institutionalisation significantly higher for ADD.	Court records.	28% attrition. Exclusions had twice the offender rate.
Satterfield et al. 1994	Los Angeles	High defiance = 70 Low defiance = 54		88	17 years	referred	Ditto	prospective 9 year	High defiance ADHD had 43% offences compared to low defiance ADHD. Low defiance ADHD boys arrest rate was 3 times higher than normal control (8%). A lack of defiance does not protect from risk of antisocial behaviour in adolescence.	Court records.	Minor arrestable offences did not differentiate groups.
Taylor et 1996	Newham, London	31	24 CD 25 HA/CD	32	16-18 years	epidemio-logical	Rutter A/B (teacher and parent).	prospective 9 years	50% received a psychiatric diagnosis (including persisting HA). HA risk for violence and antisocial behaviour, social and peer problems. Findings independent of co-existing conduct problems.	Objective testing. Self-report interview. Parent interview.	17% attrition. Control for CD. Parental account of HA behaviour more discriminative.

CHAPTER 3

METHODOLOGY

This chapter describes how participants were recruited to take part in the study, the procedure and measures used. There is also a section relating to the criteria used to define the ADHD group.

3.1 RECRUITMENT OF PARTICIPANTS

The ADHD group and clinic control group were recruited through GP and tertiary referrals for an assessment at a specialist clinic for ADHD adults based in a neurospychiatric service in South London. Referrals were aged between 17 and 42 years, whose clinical presentation included symptoms of inattention and impulsivity. **Normal control participants** were recruited by advertisements in GP Health Centres. Through this method it was hoped to recruit a non-behaviour-disordered group with similar demographic characteristics to clinic referred probands. Thirty-eight individuals responded to the advertisement. The first 30 individuals that matched the inclusion criteria were recruited. Altogether 90 adults were recruited to the study, 60 clinic and 30 control participants.

All participants gave written consent for information to be used for research purposes.

This, along with Ethics Committee approval, are presented in Appendix A.

Exclusion Criteria

Prior to entry into the study, referrals were screened using the following criteria:- (1) IQ below 70 as measured by Ravens Standard Progressive Matrices (Raven, 1976); (2) evidence of psychotic illness or any neurological illness or injury potentially affecting brain function; (3) pervasive developmental disorder; and (4) age outside range of 17 to 42 years. Thus all individuals with major psychoses were excluded, as were individuals with a history of physical illness that might affect cognitive functioning. Patients referred to the clinic who failed to meet criteria for adult ADHD but who satisfied criteria for childhood-onset ADHD (ie. a remission group) were also excluded from the study. Additionally, for *normal controls*, those individuals who reported a history of mental health problems were excluded.

3.2 PROCEDURE

Individuals were asked to attend the clinic accompanied by a close relative, preferably a parent. If participants were not able to attend the clinic with a parent, they were asked to attend with someone who knew them well in childhood. They were additionally asked to bring with them any documentation they might have from childhood (e.g. school reports, Statements of Educational Needs; probation reports).

People referred to the clinic first underwent a psychological assessment (comprising

a comprehensive battery of cognitive tests). Concurrently, the parent was interviewed by a psychiatrist. The clinically referred individual was then interviewed by the psychiatrist, who was blind to the findings of the psychological interview and cognitive assessment. In order to control for the effects of fatigue, the ordering of the interview and test battery was randomised for each individual. However, in order to control for sequence effects, individual tests were presented in a fixed order across groups.

The format of the assessment can be summarised as follows:-

Assessment	**Source**	**Mode**	**By**
Childhood problems	Parent report Objective reports (e.g. school reports)	Questionnaires Interview	Psychiatrist
Adulthood Problems	Self-report Objective testing Parent report	Questionnaires Interview Cognitive assessment	Psychiatrist/ Psychologist

Following the psychological and psychiatric assessments, referrals to the clinic (who did not meet the exclusion criteria referred to in the previous section) were allocated to two groups: (1) "the ADHD group" and, (2) "the clinic control group". ADHD index cases were consecutive cases presenting at the clinic, once exclusions had been made for missing data (e.g., no informant) and matching criteria (e.g., age, sex and social class). Clinic controls were selected as the next non-ADHD individuals that met the matching criteria.

The Clinic Control Group

The clinic control group was a group without a diagnosis of ADHD in adulthood and subject to the exclusion criteria set out in section 3.1. This group was categorised by their primary presenting problem and predominantly consisted of individuals meeting DSM-IV diagnostic criteria for affective and mood disorders, and ICD-10 criteria for personality disorder. Table 3.1 presents diagnostic information relating to this group. It should be noted that categories are not mutually exclusive.

TABLE 3.1
Description of Clinic Control Group

	Frequency	Percent
Anxiety disorders	8	27
Depression	11	36
Personality Disorder	8	27
Other (including aggressive behaviour, low self-esteem, somatic problems)	3	10
TOTAL	30	100

3.3 CRITERIA FOR ADHD DIAGNOSIS

For a diagnosis of ADHD in adulthood, DSM-IV requires evidence of childhood symptom criteria by age 7 years and evidence that these symptoms persist in adulthood. Adult symptom criteria requires the individual to meet 12 out of 18 potential symptoms (see Appendix D). In the Introduction of this thesis it has been

suggested that DSM-IV offers clinical guidelines for determining ADHD symptoms in adults - but that these do not necessarily represent valid criteria for the disorder in adulthood as they are based on the childhood expression of the disorder, which may differ in adulthood. For example, DSM-IV includes 6 items relating to motoric overactivity (such as is "on the go" or often acts as if "driven by a motor", leaves seat in classroom or in other situation in which remaining seated is expected). Motoric overactivity may be a problem in childhood (when a child has little choice but to spend long periods of time in a structured setting) but clearly less so in adulthood when choice is an option. In order to meet DSM-IV criteria, 6 out of 9 hyperactive/impulsive items must be met. If 6 of these items relate to hyperactivity, then potentially this creates a higher threshold for meeting symptom criteria in adulthood. Thus a checklist of DSM-IV adult symptoms was taken as a measure but not specifically used for diagnosis.

a) Criteria to meet ADHD diagnosis at the clinic

Given the rationale outlined above, a less stringent interpretation of DSM-IV symptom criteria for ADHD in adults was adopted. The use of a less stringent symptom definition is commonly accepted for the diagnosis of adult ADHD in a clinical setting. Nevertheless, the general diagnostic principles of the DSM were applied by requiring that (1) childhood criteria were met in a retrospective assessment of childhood problems (with a parent) and (2) adult criteria were met in a current assessment of behavioural functioning and (3) that problems caused impairment in social, academic

or occupational functioning. Information was taken from four sources whenever possible - parent report, self report, objective retrospective information (eg. school reports) and psychometric assessment.

The ADHD group was identified by whether individuals met two core criteria:-

1. *Childhood* - Parents were required to score a high rating (of around 15) on the Conners 10-symptom Abbreviated Parent Questionnaire (see Appendix E). It is suggested that a cutoff of 15 is a "fair" marker of childhood hyperactivity, however as this information was being collected retrospectively, childhood criteria were also met in cases when ratings fell just short of this cutoff and if school reports made it consistently clear that hyperactive behaviour problems were present in school and evidenced an attention deficit.

2. *Adulthood* - Individuals were required to meet 8 (instead of 12) out of 18 potential symptoms defined by DSM-IV (see Appendix D). Self-reported symptoms of inattention and impulsiveness were required to be supported by objective evidence (e.g. occupational reports) and/or parent interview (giving specific examples).

Using these criteria, three groups were matched for age, sex and social class:-

1. *ADHD Group* (N = 30). Clinic attenders who received a diagnosis of ADHD (subject to exclusion criteria)

2. *Clinic Control Group* (N = 30). Clinic attenders who did not receive a diagnosis of ADHD (subject to exclusion criteria).

3. *Normal Control Group* (N = 30). A group of non-referred adults drawn from the general population (subject to exclusion criteria and additionally screened for evidence of mental health problems).

b) ADHD subgroup meeting full DSM-IV criteria

Two problems arise using the clinic criteria for diagnosing ADHD in adults for research purposes. Firstly, the index group may be over-inclusive compared with a group defined by the stricter DSM-IV criteria (that would identify a more conservative index group by requiring 12 out of 18 symptom items to be met). Secondly, although a clinically referred group is ideal to answer questions about severity of problems, the nature and extent of problems, a tautology may arise in the study as significant differences between groups in data analysis may reflect their initial selection criteria.

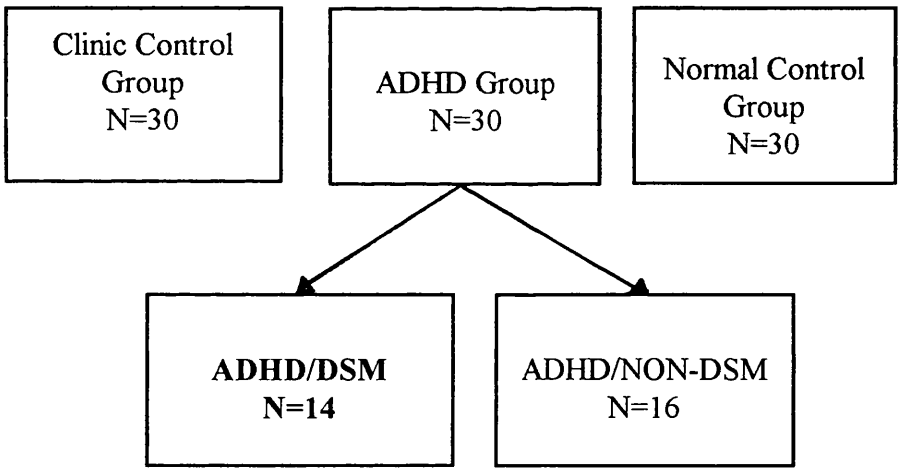
In recognition of the need for experimental rigour and in order to ensure the utility of the DSM, the effect of only those meeting DSM-IV criteria was examined by creating a subgroup of ADHD adults ["ADHD/DSM"]. The subgroup was identified by whether individuals in the ADHD group met two core criteria:-

1. Symptom criteria as set out in DSM-IV (self-reported) - 6 out of 9 inattention

items and 6 out of 9 hyperactive/impulsive items, and

2. A score of 15 or over on the Conners 10-Symptom Abbreviated Parent Questionnaire (parent reported).

Both measures were administered by a psychiatrist who was blind to results of cognitive testing and the psychological interview. Those ADHD individuals who met the DSM-IV defined diagnosis [ADHD/DSM] were compared with those ADHD individuals who did not [ADHD/NON-DSM] (i.e. the remainder in the ADHD group, once the ADHD/DSM had been removed). This redefinition of the ADHD group using an operational diagnosis for research purposes resulted in a more conservatively defined ADHD group (N = 14) as follows:-



3.4 MEASURES

For clinically referred individuals, the following measures were administered by either (A) a psychiatrist during the psychiatric interview, or (B) by the author in a psychological interview (including cognitive testing). All measures were administered to the normal control group by the author.

A) Psychiatric Interview

Parent interview

1. *Standard Assessment of Personality* [SAP] (Pilgrim & Mann, 1990) based on ICD-10 criteria for diagnosis of personality disorder or trait accentuation. The SAP provides a means of detecting the presence and type of personality disorder in a patient, regardless of the nature of the illness, by means of a short, semi-structured interview with an informant (relative or close friend). The informant should have known the patient for at least five years and be familiar with their behaviour in a variety of settings. Inter-rater reliability for the SAP is reported to be very good (kappa = 0.76), as well as good temporal reliability over a two year period (kappa = 0.65) (Pilgrim et al., 1993).

2. The 10-symptom *Abbreviated Parent Questionnaire* for childhood behaviour developed by Conners (1969, 1970, 1973) and revised by Goyette et al. (1978) (see Appendix E). This is a widely used questionnaire with good psychometric

properties. A score of 15 is reported to be evidence of "fair" hyperactivity. The Conners rating scales were originally designed as measures of change in the behaviour of children treated by drugs for hyperactivity, and have subsequently become widely used as general measures of behaviour in both clinic and general populations. Parents and/or teachers are asked to rate items such as 'constantly fidgeting' in terms of four degrees of severity: 'very much', 'pretty much', just a little and 'not at all'.

3. A *Birth and Developmental History Questionnaire* (see Appendix F) relating to problems encountered during birth, early childhood infections and developmental milestones.

Self-report Interview

4. *DSM-IV checklist of symptoms* (A.P.A., 1996) relating to core features of ADHD (see Appendix D). Individuals are asked to rate symptoms of inattention, impulsiveness and hyperactivity in terms of three degrees of severity: 'never', 'sometimes' and 'often'. Symptom criteria are met if 6 out of 9 inattention items are rated as 'often' and if 6 out of 9 impulsive/hyperactive items are rated 'often'. It should be noted that this fulfills *symptom* criteria only and not criteria for diagnosis of ADHD which requires additional qualifications (e.g. onset before age 7 years; pervasive across two or more settings; evidence of impairment in social, academic or occupational functioning; primary problem).

B) Psychological interview

Self-Report interview and psychometric assessment

5. *The Adult Functioning Interview* [AFI] (Young, unpublished) (see Appendices B and C). In the absence of any known published interview instrument that included every domain that is considered to be relevant for the assessment of ADHD in adulthood, the AFI was developed. It is based on the Parental Account of Children's Symptoms [PACS] which is a standardised, investigator-based interview developed to measure parental accounts of children's behaviour problems and frequently applied to hyperactive populations (Taylor et al., 1996; Taylor & Sandberg, 1984). It thus has the advantage of being designed for completion by adults. The AFI is administered by a trained interviewer (trained by representatives of the hyperactivity team at the Maudsley Hospital, London, UK. The author received such training in 1993).

In 1991 Ellen Heptinstall of the Maudsley ADHD team adapted the PACS for use in adolescence (Heptinstall, unpublished) and it is on this adaptation that the AFI is based. The author also received training for this version of the PACS in 1993. The adult version is adapted for self-report. It includes new items relating to type of school attended, occupation of family members, verbal aggression, use of a weapon, police contacts, intimate and sexual relationships. The adult version excludes items that refer to running away from home in the last year and parental views of social relationships.

The AFI is a semi-structured interview into ADHD features, psychiatric history, educational achievement, occupational history, psychosocial function, drug use, forensic record. It asks questions about school behaviour and academic achievement, occupational history, antisocial behaviour, substance/alcohol abuse, forensic history, past links with psychiatric services, leisure interests, social and personal relationships. The AFI assesses adult behaviour and history by use of detailed questioning. It yields ratings of severity and frequency of behaviours in terms of the recent past, in adulthood and in childhood. This is an investigator-based interview measure, so ratings of severity and frequency are made by explicit written criteria.

6. *Beck Depression Inventory* (Beck et al., 1961) was selected to measure current depression. This is a widely used questionnaire with good psychometric properties - see review by Beck et al., (1988).

7. *The Hospital Anxiety and Depression Scale [HADS]* (Zigmond & Snaith, 1983). This is a widely used questionnaire with good psychometric properties. The HADS was selected to measure current anxiety and depression on account of its freedom from extreme and somatic items.

8. The 10-symptom *Abbreviated Parent Questionnaire* (Conners, 1973) adapted for self-reported behaviour in adulthood. This is similar to the measure of childhood behaviour described in (2) above and presented in Appendix G.

C) Cognitive Testing

9. *The Continuous Performance Test* [CPT] (Erlenmeyer-Kimling and Cornblatt, 1978) is a test of sustained vigilance in a signal detection task. The individual is required to sit in front of a video monitor attached to a microcomputer, on which pictures composed of a number and a simple shape are presented. Each stimulus picture is presented for one second with a one second interstimulus interval. The individual's task is to press the space bar on the computer keyboard whenever a picture appears that is identical to the preceding one. Altogether 268 stimuli are presented, among which there are 32 pairs of successively identical stimuli. The computer records the number of correct identifications (hits), incorrect identifications (false positives), failures to identify (false negatives) and the mean reaction times (RT) for those successfully recognised. From these results four scores were calculated: hits, false positives, false negatives and RT hits.

10. *Time estimation* (both prospective and retrospective). Individuals are asked to estimate how long the CPT took to run. They are then asked to say when one minute has passed.

11. *Ravens Standard Progressive Matrices* [RSPM] (Raven, 1976) was selected as an estimate of performance IQ because it has the advantage of being fast to administer. (It was considered that a full IQ measure, such as the WAIS-R,

would be too lengthy and too taxing for people with problems with concentration, in addition to the test battery of cognitive functioning).

12. *Letter Cancellation Test* of sustaining attention (Lezak, 1983). This consists of rows of letters randomly interspersed with a designated target letter. Strategy of search is derived from the reading process, as participants search from left to right, line by line, from top to bottom. Performance is scored for errors and number of lines completed within a two minute time limit.

13. *Revised [MFF-20] version of the Matching Familiar Figures Test* (Cairnes and Cammock, 1978) of impulsiveness vs reflectiveness in cognitive style. This dimension is intended to explain individual differences in problem-solving abilities over and above the variation explicable on the basis of IQ and verbal ability. "Impulsiveness" is represented by an enduring disposition to respond rapidly but incorrectly in a situation where there is uncertainty about which response is correct. Individuals are shown a set of very similar pictures differing only in points of detail; they also have a duplicate of one of those pictures presented by itself. The task is to match the single picture with the identical member of the initial set. Two measures are taken: the number of times an individual gets it wrong and the time that is taken to do each trial. The number of errors made is the measure of impulsiveness.

CHAPTER 4

RESULTS

In order to examine whether there were any significant differences between the ADHD/DSM group and the ADHD/NON-DSM group, Chapter 4 first presents a summary of the comparison of these two groups on core variables. As there were no significant differences present, both groups were aggregated to create the "ADHD group" as this is the larger sized group with greater statistical power.

Analysis

The mean scores of the three groups are compared for dimensional data using analyses of variance. Bonferroni corrected t-tests were carried out for post hoc pairwise comparison between groups. Categorical data were analysed using chi-square crosstabulation of scores. A table presenting the mean scores for each group is located within each relevant section.

An important data analytic issue was that the normal control group substantially differed in variance from the ADHD and clinic control groups and the data were not normally distributed. Although analysis of variance is commonly used in departures of normality (Howell, 1997, pp303), for the sake of experimental rigour non-

parametric measures were also carried out for each scale and it was found that no substantive differences in the interpretation of the results were present.

Because multiple tests were carried out, each hypothesis was tested at the conservative level of $\propto < .05$ divided by k (k = the number of comparisons in each table). Thus a column headed "corrected significance" in each table presents significance corrected for the possibility of Type 1 errors.

4.1 COMPARISON OF THE ADHD/DSM GROUP AND THE ADHD/NON-DSM GROUP

This section presents the comparison of the ADHD/DSM group with those remaining in the ADHD/NON-DSM group. They are compared on core variables relating to demographic information, cognitive function and comorbidity.

4.1.1 Demographic information

In order to evaluate whether there were significant differences between these groups on demographic information, these two groups were compared on the matching variables (sex, age and social class) and IQ. These variables are described in detail in Chapter 4.2.

Tables 4.1 summarises the data. Analyses of independent sample means showed that there were no significant differences between the groups for age (t = .45, df 28, NS), social class (t = 1.07, df 28, NS) and IQ (t = .34, df 28, NS). Crosstabulation of the groups by sex also showed no significant differences existed (X^2 = 1.21, df=1, NS).

TABLE 4.1

COMPARISON OF ADHD/DSM AND ADHD/NON-DSM GROUPS - DEMOGRAPHIC INFORMATION

	ADHD DSM N = 14 mean (SD)	**ADHD NON-DSM N = 16 mean (SD)**	**t**	**Sig.**
Age	22.86 (5.17)	23.75 (5.63)	.45	NS
IQ (Ravens standard score)	10.79 (3.49)	10.33 (3.66)	.34	NS
Social class	3.38 (2.02)	2.62 (1.75)	1.09	NS
	Percent	**Percent**	**X^2**	
Sex - male	71.4	87.5	1.36	NS
Sex - female	28.6	12.5		

** significance p<.01
* significance p<.05

4.1.2 Cognitive Testing

The two groups were then compared on their cognitive functioning as measured by the cognitive testing described in the previous chapter and the data are presented in Table

4.2. These variables are described in detail in Chapter 4.7.

Continuous Performance Test

Analyses of independent sample means showed that there were no significant differences between the groups for the sum of the reaction times for hits and false positives (t = .0.2, df 28, NS), false positives (t = .53, df 28, NS), false negatives (t = .05, df 28, NS) and the number of correct responses (hits) (t = .53, df 28, NS)

Matching Familiar Figures

Analyses of independent sample means showed that there were no significant differences between the groups for mean reaction time to do each trial (t = .61, df 28, NS), error scores (t = .35, df 28, NS) and the number of correct responses first time (t = .19, df 28, NS)

Letter Cancellation Test

Analyses of independent sample means showed that there were no significant differences between groups for the number of errors (t = 1.05, df 28, NS) and the number of correct lines completed (t = 1.09, df 28, NS).

Time estimation

Analyses of independent sample means showed that there were no significant differences between groups for a retrospective estimate of time (t = 1.64, df 28, NS)

and a prospective estimate of time (t = .16, df 28, NS).

TABLE 4.2

COMPARISON OF ADHD/DSM AND ADHD/NON-DSM GROUPS - COGNITIVE FUNCTIONING

	ADHD DSM N = 14 mean (SD)	ADHD NON-DSM N = 16 mean (SD)	t	Sig.
CPT mean reaction time	0.86 (0.15)	0.86 (0.23)	.02	NS
False positives (missed)	3.22 (3.72)	4.00 (4.38)	.53	NS
False negatives (missfires)	4.42 (8.39)	4.56 (5.56)	.05	NS
Hits	20.79 (3.72)	20.00 (4.38)	.53	NS
MFF mean reaction time	13.42 (6.37)	14.81 (6.04)	.61	NS
Errors	7.93 (3.81)	7.44 (3.90)	.35	NS
Correct	6.79 (2.19)	6.63 (2.41)	.19	NS
Time prospective	41.07 (15.74)	40.06 (18.38)	1.64	NS
Retrospective	11.71 (5.06)	8.75 (4.84)	.16	NS
LCT errors	9.29 (10.09)	13.63 (12.16)	1.05	NS
Lines completed	11.71 (3.41)	10.50 (2.68)	1.09	NS

*** significance p<.001
** significance p<.01
* significance p<.05

C Sig. = corrected significance (for multiple tests)

4.1.3 Comorbidity

The two groups were compared on comorbid problems of depression, anxiety, antisocial behaviour and personality disorder. The data are presented in Table 4.3.

These variables are described in detail in Chapter 4.6.

Depression

Analyses of independent sample means showed that there were no significant differences between groups on the BDI ($t = .46$, df 28, NS) or on the HAD depression scale ($t = .79$, df 28, NS).

Anxiety

Analysis of independent sample means showed that there was no significant difference between groups on the HAD anxiety scale ($t = 1.52$, df 28, NS).

Antisocial behaviour

Analysis of independent sample means showed that there was no significant difference between groups on a scale of antisocial behaviour in the last year ($t = .29$, df 28, NS).

Personality disorder

Analysis of independent sample means showed that there was no significant difference between groups on a scale of personality problems (including traits) ($t = 1.49$, df 28, NS).

TABLE 4.3

COMPARISON OF ADHD/DSM AND ADHD/NON-DSM GROUPS - COMORBID PROBLEMS

	ADHD DSM N = 14 mean (SD)	**ADHD NON-DSM N = 16 mean (SD)**	**t**	**Sig.**
Scale of Number of Personality Disorders*a*	2.77 (2.77)	1.44 (2.03)	1.49	NS
Scale of Antisocial Behaviour in Adulthood*a*	10.86 (9.93)	9.88 (8.75)	.29	NS
Becks Depression Inventory*a*	17.85 (8.33)	15.93 (12.89)	.46	NS
HAD - Depression *a*	7.67 (2.16)	6.00 (4.88)	.79	NS
HAD - Anxiety *a*	15.17 (3.49)	11.45 (5.37)	1.52	NS

*** significance p<.001
** significance p<.01
* significance p<.05

a High score = deviance
C Sig. = corrected significance (for multiple tests)

To summarise, there were no siginificant differences between individuals in the ADHD/DSM group and the ADHD/NON-DSM group on demographic variables, cognitive functioning or comorbid problems. Thus these groups were aggregated and this from here on this study reports on the findings from the aggregation of both groups, the "ADHD group".

The remainder of this chapter presents the results of the analyses of data for the three groups, the ADHD group (N = 30), the clinic control group (N = 30) and the normal control group (N = 30). Demographic information relating to the sample is presented,

followed by childhood information, psychosocial functioning reported in the Adult Functioning Interview, comorbidity and results of the cognitive testing.

4.2 DEMOGRAPHIC INFORMATION

Three groups of thirty people were analysed. Groups were matched for sex, age and social class. Tables 4.4 and 4.5 summarise the mean scores and it can be seen that the groups were predominantly male and aged between 23-25 years. Social class was measured by recording the father's occupation of participants and scores ranged from '1' (professional/managerial) to '7' (unemployed). Therefore the higher the score, the lower the social class. The mean average of participants was 2.13 for clinic controls, 2.30 for normal controls and 2.96 for the ADHD group and these ratings suggest that participants were generally middle class with fathers working in skilled non-manual (e.g. clerical, administration) and vocational employment (e.g. teaching, nursing).

The criteria used to match the groups were statistically analysed to ensure that matching was appropriate. One-way analysis of variance indicated no significant differences existed between the groups for age ($F(2,87) = 1.25$, NS) and social class ($F(2,86) = 1.50$, NS). Crosstabulation of the groups by sex also showed no significant differences existed ($X^2 = 1.36$, df=2, NS). Groups were not intentionally matched on IQ but there was no significant difference between groups for this variable ($F(2,86) = 2.12$, NS).

TABLE 4.4 DEMOGRAPHIC INFORMATION FOR SAMPLE

	ADHD N = 30 mean (SD)	Clinic Controls N=30 mean (SD)	Normal Controls N=30 mean (SD)	F	Sig.
Age	23.33 (5.34)	25.83 (7.37)	24.03 (6.05)	1.25	NS
IQ (Ravens standard score)	10.55 (3.52)	11.67 (2.71)	12.10 (2.62)	2.12	NS
Social class	2.96 (1.88)	2.13 (2.31)	2.30 (1.64)	1.50	NS

** significance p<.01
* significance p<.05

TABLE 4.5 GENERAL SAMPLE INFORMATION

	ADHD N = 30 percent	Clinic Controls N=30 percent	Normal Controls N=30 percent	X^2	Sig.
Sex - male	80.0	73.3	66.7	1.36	NS
Sex - female	20.0	26.7	33.3		NS
Parent Informant	100.0	100.0	100.0	-	NS
Reports available	63.3	48.1	N/A	1.33	NS

** significance p<.01
* significance p<.05

Information was available from a parent for every participant. Childhood reports (e.g. Statements of Educational Need, Educational Psychology Reports, Probationers Reports, Psychiatric Reports) were available for approximately two-thirds of the

ADHD sample and half of the clinic controls.

4.3 CHILDHOOD INFORMATION

Parents were questioned in an interview about their child's birth and developmental history, symptomatology and behavioural problems before age 7 years. Data relating to childhood history are presented in Table 4.6. After correcting for the effect of multiple testing, one finding relating to developmental delay was lost. The other significant finding remained significant at the $\propto < .01$ level.

4.3.1 Birth and developmental history

Parents were questioned about the birth of their child and especially about any problems they encountered at that time. A birth risk index was created by summing the number of significant risk factors participants had. Thus a scale was created from a score of '0' representing no problem and '1' representing a problem for whether the baby reached full term, whether delivery was vaginal (as opposed to breech or caesarian section birth), whether the baby required resuscitation at birth and whether the baby had the umbilical cord around his/her neck.

One-way analysis of variance with the birth scale as the dependent variable showed no significant difference between groups ($F(2,82) = 1.56$, NS).

TABLE 4.6 TABLE OF CHILDHOOD HISTORY

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Conners as a child*a*	24.18 (3.69)	15.93 (7.77)	2.87 (3.18)	116.08	***	**
Scale of birth problems	0.65 (0.69)	0.41 (0.63)	0.37 (0.61)	1.56	NS	NS
Developmental Delay	**Percent**	**Percent**	**Percent**	X^2		
Sitting	25.9	6.9	10.3	4.69	NS	NS
Crawling	22.2	7.1	17.2	2.49	NS	NS
Walking	37.0	17.2	31.0	2.87	NS	NS
Talking	37.0	17.2	10.3	6.38	*	NS

*** significance p<.001
** significance p<.01
* significance p<.05

a High score = deviance
C Sig. = corrected significance (for multiple tests)

Parents were asked about the developmental milestones of their child, whether they were on time, early or late for sitting, crawling, walking and talking. Developmental delay was defined as the parent rating 'late'. Crosstabulation of the groups for developmental delays showed that the ADHD group had significantly more speech delay (X^2 = 6.37, df=2, p=.04). Thirty-seven percent of the ADHD group had a language delay compared with 17% of clinic controls and 10% of normal controls. There were no significant differences for other developmental delays - sitting (X^2 = 4.69, df=2, NS), crawling (X^2 = 2.49 df=2, NS), or walking (X^2 = 2.87, df=2, NS). However strictly speaking, and given the number of tests carried out, this no longer remained a significant finding when corrected for the possibility of Type 1 errors in multiple testing.

4.3.2 ADHD Symptoms

Parents were given the structured Conners 10-symptom Abbreviated Parent Questionnaire which assesses cognitive and behavioural problems present in a child by age 7 years. Parents were asked to rate items such as 'constantly fidgeting' in terms of four degress of severity: 'very much', 'pretty much', 'just a little' and 'not at all'. These ten items were summed to create a scale of childhood hyperactive symptoms and the internal consistency of this scale (N=10) as estimated by Crohnbach's alpha = 0.96 was excellent.

One-way analysis of variance with the Conner's childhood scale as the dependent variable showed a significant main effect was present ($F(2,84) = 116.08$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed significant differences between all three groups. The scores of the ADHD group differed from both the clinic control group ($p<.001$) and the normal control group ($p<.001$) and the clinic control group differed from the normal control group ($p<.001$).

To summarise, despite no significant differences being present in the birth risk index, the ADHD group went on to experience significantly more language delay than the clinic and normal control groups (although this finding was no longer significant when corrected for multiple testing). As they moved into childhood their parents retrospectively rated them to have had significantly more hyperactivity-related

problems by 7 years of age than both control groups.

4.4 ADHD SYMPTOMS IN ADULTHOOD

Two measures were taken of core symptomatology in adulthood; (1) the Conners 10-symptom Abbreviated Parent Questionnaire adapted for self-report in adulthood, and (2) a checklist of DSM-IV symptoms. Data relating to these variables are presented in Table 4.7 and all findings remained significant after correction for Type 1 errors at the $\propto < .01$ level.

Conners Questionnaire

Participants were given the structured Conners 10-symptom Abbreviated Parent Questionnaire (adapted for self-report in adulthood) in order to determine the presence of cognitive and behavioural problems. Participants were asked to rate items such as 'constantly fidgeting' in terms of four degress of severity: 'very much', 'pretty much', 'just a little' and 'not at all'. These ten items were summed to create a scale of childhood hyperactive symptoms and the internal consistency of this scale (N=10) as estimated by Crohnbach's alpha = 0.92 was excellent.

One-way analysis of variance with the Conner's scale as the dependent variable showed a significant main effect was present ($F(2,87) = 70.08$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed significant differences between all three

groups. The scores of the ADHD group differed from both the clinic control group ($p=.04$) and the normal control group ($p<.001$) and the clinic control group differed from the normal control group ($p<.001$).

DSM-IV checklist

A checklist of ADHD symptoms of impulsiveness, inattention and hyperactivity was generated using the criteria set out in DSM-IV guidelines. This includes nine items relating to problems with attention (Section A) and nine items relating to problems with hyperactivity/impulsiveness (Section B). Participants were asked to rate items in terms of three degress of severity: 'never', 'sometimes', and 'often'. Criteria for symptomatology is met if an individual has experienced in the last six months six items (rated as 'often') from Section A and six items from Section B.

For *diagnosis* of ADHD, certain qualifications must also be met such as symptoms must have caused impairment before age 7 years; symptoms must be pervasive across settings, there must be clear evidence of clinically significant impairment in social, academic or occupational functioning; and symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, schizophrenia or other psychotic disorder and are not better accounted for by another mental disorder (e.g. mood disorder, anxiety disorder, dissociative disorder or personality disorder).

TABLE 4.7 TABLE OF CORE ADHD SYMPTOMS

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Conners adult scale*a*	21.67 (4.68)	18.27 (5.46)	6.33 (5.62)	70.08	***	**
Scale of DSM-IV symptoms*a*	28.69 (4.57)	21.50 (5.75)	10.17 (6.99)	74.88	***	**
Inattention scale*a*	15.07 (2.48)	11.83 (3.49)	5.03 (3.24)	80.43	***	**
Hyperactivity scale*a*	8.86 (2.05)	6.37 (2.51)	3.17 (2.77)	39.62	***	**
Impulsive scale*a*	4.76 (1.45)	3.30 (1.24)	1.97 (1.79)	25.15	***	**
	Per cent	**Per cent**	**Per cent**	**X^2**		
Criteria met for DSM-IV core symptoms	55.2	-	-	40.36	***	**

*** significance p<.001
** significance p<.01
* significance p<.05

a High score = deviance
C Sig. = corrected significance (for multiple tests)

The eighteen items were summed to create a scale of symptoms according to DSM-IV guidelines and the internal consistency of this scale (N=18) as estimated by Crohnbach's alpha = 0.94 was excellent.

One-way analysis of variance with the DSM-IV scale as the dependent variable showed a significant main effect was present ($F(2,86) = 74.88$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed significant differences between all three groups. The scores of the ADHD group differed from both the clinic control group ($p<.001$) and the normal control group ($p<.001$) and the clinic control group differed from the normal control group ($p<.001$).

The DSM-IV guidelines have been created from clinical knowledge of ADHD in childhood, and in order to look at whether the criteria for inattentiveness, impulsiveness and hyperactivity are each relevant as adult criteria, they were examined separately. Thus scales were created from the data relating to inattentiveness (N = 9), hyperactivity (N = 6) and impulsiveness (N = 3). One-way analysis of variance with the three scales as the dependent variables showed a significant main effect was present for the inattentive scale ($F(2,86) = 80.43$, $p<.001$), the hyperactivity scale ($F(2,86) = 39.62$, $p<.001$), and the impulsiveness scale ($F(2,86) = 25.15$, $p<.001$).

Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed significant differences between all three groups for each variable. For the inattentive and hyperactivity scales, these differences were all at the ($p<.001$) level. For the impulsiveness scale, the scores of the ADHD group also differed from the clinic control group ($p=.001$) and the normal control group ($p<.001$) and the clinic control group differed from the normal control group ($p=.003$).

The data were also examined by category in order to determine how many participants met DSM-IV criteria for the core symptoms in adulthood. (Note - this is <u>not</u> the same as meeting criteria for diagnosis of ADHD). Just over half of the ADHD group met criteria, compared with none of the clinic controls or normal controls. Crosstabulation of the groups showed this was a significant difference ($X^2 = 40.36$ df=2, $p<.001$). In order to examine whether motoric overactivity was less of a problem in adulthood, the

scale was again sub-divided into core symptoms but by category. Three-quarters of the ADHD group met inattention symptom criteria (6 out of 9 symptoms), 62% met impulsive symptom criteria (2 out of 3 symptoms) and 48% met hyperactive symptom criteria (4 out of 6 symptoms).

In summary, the childhood problems of the ADHD group as reported by their parents in the Conner's scale of hyperactivity is mirrored by their own self-rated scores on this measure when it is adapted for self-reported adult use. The ADHD group also self-rated themselves to have significantly more severe problems on a scale of DSM-IV symptoms than both the clinic and normal control groups. When this scale was examined in more detail (i.e. by symptom type) it became clear that all three core symptoms continue to be a problem for the ADHD group in adulthood. A checklist of symptoms was thus shown to be a useful diagnostic measure in adulthood as it clearly differentiated the ADHD group from the two control groups for meeting clinical criteria for symptomatology.

4.5 PSYCHOSOCIAL INFORMATION FROM THE ADULT FUNCTIONING INTERVIEW

This section presents self-reported data from the Adult Functioning Interview [AFI] (see the Appendix for AFI and the AFI Manual) and reports on their academic achievement, occupational status, antisocial behaviour, alcohol and substance abuse, social activities, interpersonal relationships and a history of presentation to services.

4.5.1 Academic Achievement

The school history section of the AFI asked detailed questions about problems participants may have experienced with academic work, attitude and behaviour, relationships with staff and peers, truancy/school refusal and any suspensions/expulsions from school. The qualifications they had achieved were also recorded. Data relating to school history are presented in Table 4.8 and all findings remained significant after correction for Type 1 errors at the $\propto < .01$ level.

Most of the control groups were educated in mainstream schools. Seven percent of the clinic control group attended special school for children with behavioural problems compared with one-third of the ADHD group. Crosstabulation of the groups showed that there was a significant difference between groups in terms of the type of school they attended ($X^2 = 18.22$, df=4, p=.001).

An index of school problems was created by aggregating variables relating to academic problems, attitude problems, behaviour problems, peer problems, teacher problems, truancy, school refusal, contact with education authority and suspension/expulsions from school. This data were rated either on a two point scale representing '0 = no/few problems' or '1 = more severe problem' or on four degrees of severity ranging from '0 = no problem' to '4 = severe problem'. Data on this latter scale was collapsed to a two point scale '0 = no/few problems' or '1 = more severe problem'. For variables reporting academic problems, attitude problems, teacher problems, truancy and school refusal this resulted in no problem or trivial codings of '0' and '1' becoming '0' representing no/few problems; and more severe codings of '3' and '4' becoming '1' representing more severe problems. For the variable relating to suspensions and expulsions from school, ratings of '1', '2' and '3' (representing at least one suspension, more than one suspension and any expulsion) were recoded to '1' representing presence of more severe problems.

These 21 items were summed to create a scale of school problems and the internal consistency of this scale (N=18) as estimated by Crohnbach's alpha = 0.92 was excellent.

One-way analysis of variance with the school problem scale as the dependent variable showed a significant main effect was present ($F(2,87) = 46.75$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed significant differences between all

three groups. The scores of the ADHD group differed from both the clinic control group ($p<.001$) and the normal control group ($p<.001$) and the clinic control group differed from the normal control group ($p<.001$).

TABLE 4.8 TABLE OF SCHOOL HISTORY

	ADHD N=30 Mean (SD)	**Clinic Controls N=30 Mean (SD)**	**Normal Controls N=30 Mean (SD)**	**F**	**Sig.**	**Sig.**
Scale of school problems*a*	11.37 (4.57)	6.4 (4.97)	1.3 (1.76)	46.75	***	**
Academic qualifications*b*	5.97 (7.87)	12.33 (13.35)	19.24 (11.27)	10.62	***	**
Age of leaving school	15.93 (0.80)	16.57 (1.20)	17.37 (1.00)	14.16	***	**
Type of School	**Per cent**	**Per cent**	**Per cent**	**X^2**		
State/comprehensive	43.3	46.7	66.7			
Private/public/grammar	23.3	46.7	33.3			
Special school	33.3	6.7	-	18.22	***	**

*** significance p<.001
** significance p<.01
* significance p<.05

a High score = deviance
b Low score = deviance
C Sig. = corrected significance (for multiple tests)

Participants were asked at what age they left school. On average, the ADHD group left when they were 16 years, the clinic control group left six months later and the normal control group left one year later when they were 17 years. One-way analysis of variance with age of leaving school as the dependent variable showed a significant main effect was present ($F(2,81) = 14.16$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the normal control group left school significantly later than both the ADHD group ($p<.001$) and clinic control group ($p=.01$). The finding

that the ADHD group left school earlier than the clinic control group approached significance (p=.058).

Participants were questioned about what qualifications they had achieved on leaving school. These were then awarded points as follows: GCSE's or equivalent = 1 point per qualification; 'A' levels or equivalent = 5 points per qualification; Degree and Post-graduate degree = 10 points per qualification; CSE = 1 point; Ordinary National Diploma or equivalent = 2 points; Higher National Diploma = 5 points; BTECH = 5 points; City and Guilds = 5 points.

A scale of educational qualifications was created by aggregating the points and one-way analysis of variance with this scale as the dependent variable showed a significant main effect was present ($F(2,86) = 10.62$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the ADHD group achieved significantly fewer qualifications than the normal control group ($p<.001$). A difference between the ADHD group and the clinic control group fell just short of significance (p=.085) and the difference between the clinic control group and the normal control group approached significance (p.056).

To summarise, most of the sample were educated in mainstream facilities with the exception of the ADHD group of whom one-third attended special school for children with behavioural and/or learning problems. They experienced significantly more school

problems than both the clinic and normal control groups. A finding that approached significance suggested that they tended to leave school at an earlier age and on leaving school they achieved significantly fewer qualifications than the normal control group.

4.5.2 Occupational History

Participants were questioned about their current occupational status and past occupational history. Ratings were made for the number of different types of occupation they had been employed in (e.g. factory worker, clerical office work, scaffolder); the number of full-time jobs; the longest period of employment to date; the number of periods of unemployment and the longest period of unemployment. The occupation of family members was also recorded. The data are presented in Table 4.9 and all findings remained significant after correction for Type 1 errors at the $\propto < .01$ level.

Just under two-thirds of both the ADHD and clinic control groups were unemployed (compared with 3% of the normal control group). Just under two-thirds of the normal control group were in full-time employment compared with 20% of clinic controls and 23% of the ADHD group. One-third of the normal control group were students in full-time education compared with 17% and 20% of the ADHD and clinic control groups respectively. Crosstabulation of the groups showed that there was a significant difference between groups in terms of their employment status ($X^2 = 27.43$, df=4,

$p<.001$) reflecting the high number people unemployed in the ADHD and clinic control groups compared with the normal control group.

When employed, an individual was asked about their job, the job title and for a brief description of the work it involves. Ratings were then made on a dimensional scale of job status ranging from '1' for professional/managerial, '2' for vocational, '3' for skilled non-manual, '4' for skilled manual, '5' for semi-skilled manual, '6' for unskilled, and '7' for unemployed. Full-time students were excluded from this analysis. One-way analysis of variance with the employment status scale as the dependent variable showed a significant main effect was present ($F(2,51) = 20.86$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the normal control group had a significantly better job status than the ADHD group ($p<.001$) and clinic control group ($p<.001$). Inspection of the mean scores shows that the normal control group were employed in skilled work at around three points higher on the job status scale than the ADHD and clinic control groups who tended to be in manual employment.

Given a history of school problems and academic failure it is possible that the ADHD group deviate in their occupational status compared to family members. In order to examine whether they do not reach family expectation of occupational status, participants' occupations were compared to those of a family member - usually the eldest sibling of potential employment age. In cases where the participant was an only child, or the eldest sibling was in full-time education then the father's occupation (or

if retired, past occupation) was recorded. Individuals who were not working and received benefit for disability or invalidity were coded as unemployed.

TABLE 4.9 TABLE OF OCCUPATIONAL HISTORY

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Scale of occupational history*b*	-0.80 (2.77)	-0.69 (2.99)	1.49 (2.14)	7.04	***	**
Type of job*a*	5.95 (1.82)	5.60 (2.20)	2.42 (1.54)	20.86		
Sibling occupation*a*	4.10 (2.27)	3.40 (2.44)	2.05 (1.61)	4.47	***	**
	Per cent	**Per cent**	**Per cent**	**X^2**		
Unemployed	60.0	60.0	3.3			
Employed	23.3	20.0	63.3			
Student	16.7	20.0	33.3	27.43	***	**

*** significance p<.001
** significance p<.01
* significance p<.05

a. High score = less skilled
b. Standardised scores, low score = deviance
C Sig. = corrected significance (for multiple tests)

The occupational status of the participant was compared with the occupational status of a sibling in a 3 x 2 repeated measures analysis of variance. Figure 4.1 presents the data graphically. There was a main effect of participant versus sibling occupations that was highly significant (Wilks' Lambda =.71; Exact F(1,51) = 20.75, p<.001) showing that siblings tended to have higher occupational status than participants. There was also a significant main effect of group indicating there were overall differences between groups in occupational status (F(2,51) = 16.34, p<.001).

However there was also a participant versus sibling x group interaction that approached significance suggesting that differences between siblings and target individuals may not be consistent across groups (Wilks' Lambda = .89; Exact F(2,51) = 3.05, p=.056). Simple effects showed that ADHD group siblings were significantly better employed than ADHD participants (p=.001), clinic control siblings were significantly better employed than clinic control participants (p=.001) but there was no difference between sibling and participant occupational status for the normal control group (NS).

Pairwise comparisons ($\propto$ = .05) showed that the ADHD group was significantly different to the normal control group for both participant (mean difference 3.53, s.e. of difference .59, p<.001) and sibling occupational status (mean difference 2.05, s.e. of difference .68, p=.004). There were no significant differences between the ADHD group and the clinic control group for both participant (mean difference .35, s.e. of difference .63, NS) and sibling occupational status (mean difference .70, s.e. of difference .72, NS). There was a significant difference between the clinic control group and normal control group for participant occupational status (mean difference -3.18, s.e. of difference .64, p<.001), but not for sibling occupational status (mean difference 1.35, s.e. of difference .73, NS).

An index of occupational history was created from the standardised scores of ratings made in answer to questions about the number of different types of occupation; the

number of full-time jobs; the longest period of employment to date; the number of periods of unemployment and the longest period of unemployment. In creating the scale, scores were recoded to reflect the same direction of deviance. For example, deviance was represented by a high frequency of type of occupation, job turnover, periods of unemployment, length of unemployment and low frequency for the longest period the individual had ever been employed.

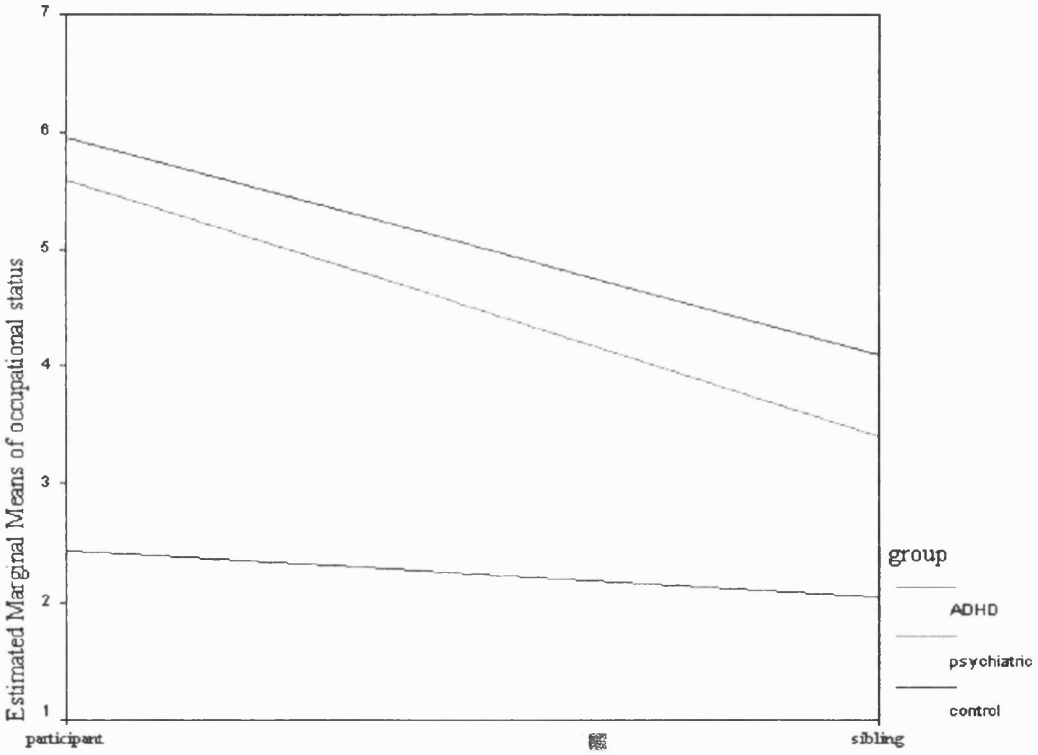


FIGURE 4.1 PARTICIPANTS' OCCUPATION COMPARED WITH SIBLING OCCUPATION

The standardised scores of the five items were then summed to create a scale of occupational history and the internal consistency of this scale (N=5) as estimated by Crohnbach's alpha = 0.62 was adequate. One-way analysis of variance with the scale of occupational history as the dependent variable showed a significant main effect was present ($F(2,87) = 7.04$, $p=.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the normal control group had significantly less deviant scores, reflecting they experienced fewer occupational problems, than both the ADHD group ($p=.004$) and clinic control group ($p=.006$).

4.5.3 Antisocial Behaviour

Participants were questioned about frequency and severity of antisocial behaviour in childhood (prior to 18 years), in adulthood and the past year. Questions related to verbal and physical aggression; use of a weapon; vandalism and fire-setting; theft (including shoplifting, joyriding, breaking and entering); mental cruelty toward others; cruelty to animals; and trouble with the police. Participants were encouraged to describe specific incidents that came to mind and through discussion and probing an estimate of the average frequency and severity of behaviour in a typical year was made for each of the questions with three exceptions - only frequency ratings were recorded for verbal aggression and theft and only severity ratings were recorded for use of a weapon. Thus ratings were made on four degrees of severity and frequency, '0' representing no problem behaviour, '1' representing mild or infrequent behaviour, '2'

representing marked and regular problem behaviour (once a month), and '3' representing severe and repetitive problem behaviour (more than once a month).

From the data two scales were created, (1) a scale of antisocial behaviour in childhood, and (2) a scale of antisocial behaviour in adulthood taken from ratings of behaviour in the past year. Thus 13 items were summed to create a scale of antisocial behaviour in childhood and the internal consistency of this scale (N=13) as estimated by Crohnbach's alpha = 0.88 was very good. A second scale of antisocial behaviour in adulthood (as rated for behaviours in the last year) was created and the internal consistency of this scale (N=13) as estimated by Crohnbach's alpha = 0.87 was also very good. The data are presented in Table 4.10 and all findings remained significant after correction for Type 1 errors at the $\propto < .01$ level.

Childhood

One-way analysis of variance with the antisocial behaviour in childhood scale as the dependent variable showed a significant main effect was present ($F(2,89) = 24.66$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed significant differences between all three groups. The ADHD group had significantly more conduct problems in childhood than the clinic control group ($p=.001$) and the normal control group ($p<.001$). The clinic control group had more conduct problems than the normal control group ($p=.007$).

Adulthood

One-way analysis of variance with the antisocial behaviour in adulthood scale as the dependent variable also showed a significant main effect was present ($F(2,89) = 12.37$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the ADHD group had significantly more conduct problems in adulthood than the normal control group ($p<.001$).

In order to examine the extent to which participants got into trouble with the police, the frequency and severity of police contact were summed for both contact in childhood and contact in adulthood. One-way analysis of variance with police contact in childhood as the dependent variable showed a significant main effect was present ($F(2,89) = 11.30$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the ADHD group was significantly more deviant than the clinic control group ($p=.03$) and the normal control group ($p<.001$). The clinic control group was not significantly different from the normal control group. Thus in childhood the ADHD group reported more frequent police contact of a serious nature than the two control groups.

One-way analysis of variance with police contact in adulthood as the dependent variable showed a significant main effect was present ($F(2,89) = 8.64$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the normal control group was significantly more deviant than the ADHD group ($p=.001$) and the clinic control

group (p=.004). There was no difference between the clinic control group and the ADHD group. The childhood pattern of higher rates of police contact for the ADHD group continued into adulthood suggesting that their earlier delinquent behaviour developed into criminal activity as they matured.

TABLE 4.10 TABLE OF ANTISOCIAL BEHAVIOUR

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Scale of antisocial behaviour in childhood*a*	18.77 (8.96)	11.13 (8.26)	4.93 (5.16)	24.66	***	**
Scale of antisocial behaviour in adulthood*a*	10.33 (9.17)	6.77 (6.37)	1.80 (3.01)	12.37	***	**
Police contact in childhood*a*	2.87 (2.22)	1.57 (2.21)	0.50 (1.17)	11.31	***	**
Police contact in adulthood*a*	2.17 (2.51)	1.90 (2.23)	0.20 (0.76)	8.64	***	**

*** significance p<.001
** significance p<.01
* significance p<.05

a. High score = deviance
C Sig. = corrected significance (for multiple tests)

To summarise, these results show that the ADHD group had significantly more conduct problems in childhood than both clinic and normal controls. As they mature there is a dropping-off of problem behaviour which becomes more in line with that of the clinic control group, although the ADHD group remain significantly more antisocial than normal controls. This general pattern is reflected in the police contact and criminal activity of the participants - in childhood, the ADHD group were significantly more deviant than both clinic and normal controls whereas in adulthood they continued

to have significant problems compared with normal controls but not compared with the clinic control participants.

4.5.4 Alcohol and Substance Abuse

Participants were questioned about frequency and severity of alcohol and drug use in childhood (prior to 18 years), in adulthood and the past year. Data are presented in Table 4.11. However findings were no longer significant when corrected for the possibility of Type 1 errors due to multiple testing. As for the ratings of antisocial behaviour, an estimate of the average frequency and severity of alcohol and drug use in a typical year was made on the four degrees of severity and frequency ranging from '0' representing no use, to '3' representing the regular use of substances causing major impairment to the individual (the latter handicap being defined as personal, social and/or occupational impairment). Participants were also asked to list the type of drugs they had ever used and questioned about cigarette smoking (how many cigarettes participants smoked per day and the maximum ever smoked in a day).

From this data four scales were created by aggregating the two severity and frequency variables for each measure resulting in (1) a scale of alcohol use in childhood; (2) a scale of alcohol use in adulthood (i.e. in the last year); (3) a scale of drug use in childhood; and (4) a scale of drug use in adulthood (i.e. in the last year). Two further scales were created by summing the average number of cigarettes smoked per day and

the maximum number of cigarettes ever smoked in a day to represent (5) and scale of smoking; and by summing the total number of drugs ever used representing (6) a scale of the number of drugs ever used. For the latter scale 8 items were summed to create a scale of drug use and the internal consistency of this scale (N=8) as estimated by Crohnbach's alpha = 0.87 was very good.

Childhood

Fifty-seven percent of the sample reported not to have experimented with or used any drugs at all in childhood (40% ADHD group, 53% clinic control group and 77% normal control group). One-way analysis of variance with the drug use in childhood scale as the dependent variable showed a significant main effect between groups ($F(2,87) = 5.45$, $p=.005$). There was only one pairwise significant difference ($\propto = .05$) - the ADHD group were more deviant than the normal control group ($p<.01$). There were no other significant differences. However strictly speaking, this result is not significant given the number of tests carried out and the result was lost when the Bonferroni correction for multiple testing was applied. With respect to alcohol use, one-way analysis of variance with the alcohol use in childhood scale as the dependent variable showed no significant differences between groups ($F(2,87) = .61$, NS).

Adulthood

About half of the sample reported to be cigarette smokers (50.6%), most of whom were in the ADHD and clinic control groups (60.7% and 65.5% respectively). Only

a quarter of the normal control group smoked (26.7%). One-way analysis of variance with the scale of smoking as the dependent variable showed a significant main effect was present ($F(2,84) = 6.46$, $p=.002$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the normal control group were less deviant than the clinic control group ($p=.004$) and the ADHD group ($p=.02$). The ADHD group was not significantly different from the clinic control group. However strictly speaking, this result is not significant given the number of tests carried out and this result was lost when the Bonferroni correction for multiple testing was applied.

With respect to alcohol, one-way analysis of variance with the alcohol use in adulthood scale as the dependent variable showed no significant differences between groups ($F(2,87) = 1.79$, NS).

In adulthood, 58% of the sample reported not to have experimented with or used illicit substances in the past year (55% ADHD group, 48% clinic control group and 70% of normal control group). One-way analysis of variance with the drug use in adulthood scale as the dependent variable showed a significant main effect between groups ($F(2,87) = 4.07$, $p=.02$). There was only one Bonferroni post hoc pairwise significant difference ($\propto = .05$) - the clinic control group was significantly more deviant than the normal control group ($p<.021$). There were no other significant differences. However strictly speaking, this result is not significant given the number of tests carried out and the result was lost when the Bonferroni correction for multiple testing was applied..

One-way analysis of variance with the scale of drugs ever used as the dependent variable showed a significant main effect between groups ($F(2,87) = 4.28$, $p=.02$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the normal control group was less deviant than the ADHD group ($p<.04$) and the clinic control group ($p=0.04$). There was no difference between scores of the ADHD group and the clinic control group. However strictly speaking, this result is not significant given the number of tests carried out and the result was lost when the Bonferroni correction for multiple testing was applied.

Individuals were asked to name the various substances that they had ever experimented with or used. Inspection of the data presented in Table 4.8 suggests that the pattern of drug use for the ADHD group is similar to that for the clinic control group. Crosstabulation of the groups by substances abused showed that compared with both the ADHD and clinic control groups, the normal control group used significantly less cocaine ($X^2 = 6.03$, df=2, $p<.05$), amphetamines ($X^2 = 5.87$, df=2, $p<.05$) and LSD ($X^2 = 11.14$ df=2, $p<.01$). However strictly speaking, this result is not significant given the number of tests carried out.

TABLE 4.11 TABLE OF ALCOHOL AND SUBSTANCE ABUSE

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Scale of smoking*a*	38.07 (42.60)	42.86 (36.53)	13.13 (19.88)	6.46	**	NS
Scale of alcohol use in adulthood *a*	4.43 (1.89)	4.40 (2.03)	5.13 (0.97)	1.79	NS	NS
Scale of alcohol use in childhood *a*	4.47 (2.08)	3.90 (2.09)	4.03 (2.06)	0.61	NS	NS
Scale of drug use in adulthood *a*	2.13 (2.18)	2.47 (2.51)	0.97 (1.63)	4.07	*	NS
Scale of drug use in childhood *a*	2.27 (2.21)	1.83 (2.28)	0.63 (1.24)	5.54	**	NS
Scale of number of drugs ever used *a*	3.00 (2.78)	3.03 (2.59)	1.43 (1.79)	4.26	*	NS
Type of drug	**Per cent**	**Per cent**	**Per cent**	**X^2**		
Cannabis	73.3	76.7	56.7	3.21	NS	NS
Cocaine	40.0	36.7	13.3	6.03	*	NS
Heroin	20.0	13.3	3.3	3.93	NS	NS
Amphetamines	50.0	50.0	23.3	5.87	*	NS
Glue/Solvents	20.0	16.7	6.7	2.33	NS	NS
LSD	36.7	43.3	6.7	11.14	**	NS
Ecstasy	40.0	30.0	13.3	5.43	NS	NS
Other	20.0	36.7	20.0	2.92	NS	NS

*** significance p<.001
** significance p<.01
* significance p<.05

a High score = deviance
C Sig. = corrected significance (for multiple tests)

To summarise, it should be noted that all the significant results in the analyses of substance abuse were lost when a correction was made for multiple test effects. Before

this correction was applied, both the ADHD group and the clinic control group were more deviant than normal controls in terms of their use of illicit substances and cigarette smoking. Both groups reported to be heavy smokers and were similar in their drug abuse patterns. The ADHD group reported to have abused more drugs (and to have had more drug-related problems) in childhood and the clinic control group reported to have abused more drugs (and to have had more drug-related problems) in adulthood. The groups did not report to differ in their alcohol consumption.

4.5.5 Activities and interests

The AFI included questions relating to social functioning and participants were asked about what they like to do in their spare time. Once participants had talked about particular interests, they were gently prompted regarding constructive leisure interests and activities they may have omitted such as hobbies; sporting activities; playing a musical instrument ; club membership; attending sporting events; regularly going to the cinema, theatre, museums or concerts and listening to music.

In this way, eight items were rated either '1' representing presence of activity or '0' representing absence of activity and a scale for the total number of constructive leisure activities was created by aggregating these eight items. Data for this scale are presented in Table 4.12 One way analysis of variance with this scale as the dependent variable showed there was no significant difference between groups in their number of

leisure activities and interests (F(2,87) = 2.39, NS).

TABLE 4.12 TABLE OF ACTIVITIES AND INTERESTS

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Scale of activities*b*	3.17 (1.78)	3.20 (1.81)	4.00 (1.39)	2.39	NS	NS

*** significance p<.001
** significance p<.01
* significance p<.05

b. Low score = deviance
C Sig. = corrected significance (for multiple tests)

4.5.6 Interpersonal Relationships

Participants were asked about their friendships as well as intimate relationships and data relating to interpersonal relationships are presented in Table 4.13 and findings remained significant after correction for Type 1 errors at the $\propto < .01$ level.

Friendships

Participants were questioned about how many good friends they perceived themselves to have and that they were in regular contact with and, out of those nominated friends, what was the longest standing friend they had. They were also asked whether they felt that they made friends easily and whether they felt they fell out with friends easily (for example, resulting in a high turnover of friendships). The number of friends was recorded and information for ability to make friends, falling out with friends and presence of long-standing friends was coded as '1' representing yes and '0' representing

no. Presence of long-standing friends was defined as present if a friendship had been regularly sustained for over two years.

TABLE 4.13 TABLE OF INTERPERSONAL RELATIONSHIPS

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Scale of friendships*b*	-1.42 (2.93)	-0.04 (2.72)	1.46 (1.79)	9.78	***	**
No. of significant relationships	1.87 (1.57)	1.87 (1.55)	1.83 (1.53)	0.005	NS	NS
Age of sexual intercourse	15.72 (2.12)	16.00 (4.30)	16.73 (1.86)	0.72	NS	NS
	Per cent	**Per cent**	**Per cent**	**X^2**		
Currently in relationship	60.0	43.3	50.0	1.69	NS	NS
Satisfied with current relationship	73.7	60.0	82.4	2.02	NS	NS

*** significance p<.001
** significance p<.01
* significance p<.05

b. Standardised scores; low score = deviance
C Sig. = corrected significance (for multiple tests)

An index of friendships was created from the standardised scores of ratings made in answer to the above four questions. In creating the scale, scores for the variable relating to whether a participant fell out with friends were recoded to reflect the same direction of deviance as the other variables. One-way analysis of variance with the scale of friendships as the dependent variable showed a significant main effect was present ($F(2,87) = 9.78$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the ADHD group had significantly more deviant scores, reflecting they experienced greater friendship problems, than the normal control group ($p<.001$).

There were no other significant differences.

Intimate relationships

Participants were questioned about whether they currently had a partner and whether they were satisfied with this relationship. They were encouraged to talk about this relationship, for example, how long they had been together, how they had met and future plans. If they reported to be dissatisfied with their relationship, participants were gently probed for sources of their dissatisfaction. They were also questioned about prior significant relationships (significant being defined as important to them and not a temporal measure) and at what age they became sexually active. The number of significant relationships was recorded and age they first had sexual intercourse. Whether they had a current partner and their satisfaction with this relationship was recorded as '1' for yes or '0' for no.

One-way analysis of variance showed there was no difference between groups for the total number of significant relationships they had experienced ($F(2,87) = .005$, NS) and for the age at which they first had sexual intercourse ($F(2,75) = .72$, NS).

Around half of the sample as a whole were in a relationship at the time (i.e. had a partner) represented by 60% of the ADHD group, 43% of the clinic control group and 50% of the normal control group. Crosstabulation of the groups showed that these were not significant differences ($X^2 = 1.69$, df=2, NS). Of those in a relationship, 26%

of the ADHD group reported to be dissatisfied, 40% of the clinic controls and 18% of the normal controls. Crosstabulation of the groups again showed that these were not significant differences ($X^2 = 2.02$, df=2, NS).

To summarise, although the ADHD group reported significantly more problems in their friendships and social interactions with others, their difficulties do not appear to prevent them from forming intimate and romantic attachments that are similarly reported by normal and clinic controls.

4.5.7 Presentation to Services

Participants were questioned about their past use of various health, education and psychiatric services. They were questioned about how many times they had been seen and/or been treated for non-physical problems and ailments by their NHS GP (i.e. primary care services) and/or by community/hospital psychiatric services (i.e. secondary care and tertiary services). They were also asked about services they received from private practitioners for non-physical problems (including sessions with psychiatrists, psychologists, counsellors as well as allergists, acupuncturist and homeopathy). Contact with child guidance and social services was also recorded. In terms of educational help, they were asked if they had ever been assessed by an educational psychologist, had extra-professional tuition provided by the school or privately paid for by parents. For extra-tuition, the number of subjects were recorded. Data are

presented in Table 4.14 and findings remained significant after correction for Type 1 errors at the $\propto < .01$ level.

Six items were summed to create an index of presentation to services relating to presentations to (and services provided by) GP's (primary care services); community and/or hospital psychiatric services (secondary care and tertiary services); private practitioners; educational psychologists; child guidance clinics; and social services. One-way analysis of variance with this scale as the dependent variable showed a significant main effect was present ($F(2,86) = 13.71$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed that the normal control group had significantly fewer multiple presentations to services than the ADHD group ($p<.001$) and the clinic control group ($p<.001$). There was no significant difference between the ADHD group and the clinic control group.

It is clearly documented in the literature (and supported in the retrospective analysis of data for the ADHD group in this study) that the ADHD syndrome impacts negatively on the childhood and developmental history of children with ADHD. Thus variables relating to the use of various childhood services were examined separately. To this effect, five items were summed to create an index of presentation to services relating to childhood presentations to (and services provided by); educational psychologists; extra-professional tuition provided by the school; extra-professional tuition from the private sector; contact with child guidance clinics; and social services. One-way

analysis of variance with this scale as the dependent variable showed a significant main effect was present ($F(2,86) = 12.06$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the ADHD group had significantly more multiple presentations to services in childhood than the clinic control group ($P=.002$) and the normal control group ($p<.001$). There was no significant difference between the normal control group and the clinic control group.

TABLE 4.14 TABLE OF PRESENTATION TO SERVICES

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Scale of presentation to services*a*	5.10 (4.27)	4.69 (4.09)	0.83 (1.21)	13.70	***	**
Scale of childhood presentations to services*a*	3.07 (2.74)	1.34 (1.37)	0.77 (1.10)	12.06	***	**

*** significance p<.001
** significance p<.01
* significance p<.05

a. High score = deviance
C Sig. = corrected significance (for multiple tests)

4.6 COMORBIDITY

Comorbidity with depression, anxiety and personality disorder was examined. Data relating to comorbidity are presented in Table 4.15. After correcting for the effect of multiple testing, three results relating to specific personality disorder type were lost. All other results remained significant at the $\propto < .05$ level.

4.6.1 Depression and anxiety

Participants were asked to complete the Becks Depression Inventory [BDI] which is a self-report questionnaire measuring symptoms of current depression. The BDI has 21 items and scores in the range of 0 to 63 can be achieved. Scores in the 0-9 range are 'normal', 10-18 represent mild to moderate depression, 19-29 represent moderate to severe depression and 30-63 extremely severe depression.

The mean scores of the BDI for both the ADHD and clinic control groups were in the moderately depressed range (17 and 19 respectively). The normal control group mean score was 6 which was within normal limits. One-way analysis of variance with the total BDI score as the dependent variable showed a significant main effect was present ($F(2,84) = 13.81$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed a the normal control group were significantly better functioning than the ADHD group ($p<.001$) and the clinic control group ($p<.001$). There were no other significant differences.

Participants were also asked to complete the Hospital Anxiety and Depression Scale [HAD] which is a self-report questionnaire measuring symptoms of current depression and anxiety. The HAD has 14 items in total (7 each relating to anxiety and depression and alternatively presented). Scores in the 0-42 range can be achieved and 0-7 represent 'normal', 8-10 represent borderline problems and 11+ clinical caseness.

Depressive symptoms as measured by the HAD for the ADHD (7) and clinic control groups (8) were in the borderline range, a finding which supports a moderate classification from the BDI. Normal controls scored within normal limits (3). One-way analysis of variance with the HAD depression score as the dependent variable showed a significant main effect was present ($F(2,62) = 12.74$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the same pattern as the BDI. The normal control group was significantly better functioning than the ADHD group ($p<.01$) and the clinic control group ($p<.001$). There were no other significant differences.

With respect to symptoms of current anxiety, the mean scores for the ADHD group met clinical caseness (13) which was similar that of 12 for the clinic control group (also meeting clinical caseness). The score of 7 for normal controls is within the normal range. One-way analysis of variance with the HAD anxiety score as the dependent variable also showed a significant main effect was present ($F(2,62) = 13.91$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the normal control group were significantly better functioning than the ADHD group ($p<.001$) and the clinic control group ($p<.001$). There were no other significant differences.

Thus with respect to current symptoms of depression and anxiety, the ADHD and clinic control groups were very similar to each other. Compared with normal controls who reported problems that fell within normal limits, they had moderate problems with depression and more significant problems with anxiety.

TABLE 4.15 TABLE OF COMORBID PROBLEMS

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
Scale of Number of Personality Problems*a*	2.03 (2.44)	2.50 (2.23)	0.10 (0.40)	12.87	***	*
Becks Depression Inventory*a*	16.82 (10.86)	19.10 (11.51)	6.47 (6.59)	13.81	***	*
HAD - Depression *a*	6.59 (4.12)	7.89 (4.34)	2.87 (2.64)	12.75	***	*
HAD - Anxiety *a*	12.76 (5.02)	11.94 (3.54)	6.83 (4.11)	13.91	***	*
Personality Disorder	**Percent**	**Percent**	**Percent**	**X^2**		
Total (any PD)	37.9	61.5	-	25.11	***	*
Paranoid	10.3	23.1	-	7.84	*	NS
Dissocial	27.6	15.4	-	9.30	**	NS
Histrionic	-	-	-	-	NS	NS
Schizoid	-	3.8	-	2.30	NS	NS
Impulsive	27.6	30.8	-	10.84	**	NS
Anakastic	-	7.7	-	4.65	NS	NS
Anxious	6.9	11.5	-	3.43	NS	NS
Dependent	6.9	3.8	-	2.07	NS	NS
Borderline	3.4	7.7	-	2.42	NS	NS

*** significance p<.001
** significance p<.01
* significance p<.05

a High score = deviance
C Sig. = corrected significance (for multiple tests)

4.6.2 Personality Disorder

The Standard Assessment of Personality [SAP] is based on ICD-10 criteria for diagnosis of personality disorder or trait accentuation. This is a semi-structured

interview and it was administered with the parent(s) accompanying the participant to the clinic. Classification is made for trait accentuation when a number of set criteria are met for the following personality types: paranoid, schizoid, dissocial, impulsive, histrionic, anankastic, anxious, borderline and dependent. Traits must be durable and extend into different areas of the individual's life. For a classification of full-blown disorder, the individual's problems must additionally be viewed as causing him either considerable personal distress, significant occupational impairment, and/or significant social impairment. In this way, data were scored as '0' representing no problems, '1' representing personality trait and '2' representing personality disorder.

An index representing the number of personality problems (i.e. traits and disorders) was created by aggregating ratings for each of the nine personality categories. Thus the potential range in this dimensional scale was 0 to 18. One-way analysis of variance with the scale of personality problems as the dependent variable showed a significant main effect was present ($F(2,82) = 12.87$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the normal control group were significantly better functioning than the ADHD group ($p=.001$) and the clinic control group ($p<.001$). There were no other significant differences.

Personality disorder was then examined by category, first by presence or absence of personality disorder regardless of type and secondly by individual categories. None of the normal controls received a diagnosis of personality disorder compared with 38%

of the ADHD group and 61% of the clinic control group. Crosstabulation of the groups showed that there was a significant difference between these groups (X^2 = 27.42, df=2, p<.001) reflecting the high number of people with personality disorder in the two referred groups compared with normal controls.

With respect to individual personality categories, crosstabulation of the groups showed that there were significant differences between groups for Paranoid Personality Disorder (X^2 = 7.84, df=2, p=.02), Dissocial Personality Disorder (X^2 = 9.30, df=2, p=.01) and Impulsive Personality Disorder (X^2 = 10.84, df=2, p=.004). A higher proportion of the ADHD group were dissocial (28% compared with 15% of clinic controls), the groups were about the same for impulsive behaviour (28% and 31% respectively) and the clinic control group was more paranoid (23%) than the ADHD group (10%). However strictly speaking these results for risk of specific personality disorder types are not significant, given the number of tests carried out and these results were lost when the Bonferroni correction for multiple testing was applied.

To summarise, the ADHD group and clinic control group both have significant personality problems compared with the normal control groups. Just over one-third of the ADHD group met criteria for personality disorder and nearly two-thirds of the clinic control group met this criteria. Impulsive, Paranoid and Dissocial Personality Disorders were the most frequently reported and both groups were rated to have a similar frequency for Impulsive Personality problems. The ADHD group was rated to

have twice the amount of Dissocial Personality Disorder than the clinic control group, and the clinic control group was rated to have twice the amount of Paranoid Personality Disorder than the ADHD group.

4.7 COGNITIVE TESTING

Three tests that are known to be sensitive to measuring attention/concentration and impulsiveness in childhood were conducted on participants, the Continuous Performance Test, the Matching Familiar Figures Test and the Letter Cancellation Test. An assessment of time estimation, both prospective and retrospective, was also made. The data are presented in Table 4.16. After correcting for the effect of multiple testing, two results were lost (relating to prospective time estimation and letter cancellation). All other results remained significant at $\propto < .05$ level.

4.7.1 Continuous Performance Test

The Continuous Performance Test [CPT] is a computerised test of sustained vigilance in a signal detection task. Each stimulus picture is presented for one second with a one second interstimulus interval. Altogether 268 stimuli are presented, among which there are 32 pairs of successively identical stimuli. The computer records the number of correct identifications (hits), incorrect identifications (false positives), failures to identify (false negatives) and the sum of the reaction times (RT) for hits and false

positives. From these results four scores were calculated: hits, false positives, false negatives and RT hits.

One-way analysis of variance with the CPT reaction time as the dependent variable showed a significant main effect was present ($F(2,85) = 10.36$, $p<.001$). There was only one Bonferroni pairwise significant difference ($\propto = .05$) - the clinic control group took significantly longer than the normal control group ($p<.001$). There were no other significant differences.

The number of correct responses were recorded as the number of hits. One-way analysis of variance with the hits as the dependent variable showed a significant main effect was present ($F(2,85) = 7.76$, $p=.001$). There was only one Bonferroni pairwise significant difference ($\propto = .05$) - the ADHD group had fewer hits than the normal control group ($p=.001$). There were no other significant differences.

False negatives represent failures to identify a target (i.e. errors of omission). One-way analysis of variance with the false negatives as the dependent variable showed a significant main effect was present ($F(2,85) = 7.76$, $p=.001$). There was only one Bonferroni pairwise significant difference ($\propto = .05$) - the ADHD group made significantly more false negatives (or misses) than the normal control group ($p=.001$). There were no other significant differences.

False positives represent incorrect identifications (i.e. errors of commission). One-way analysis of variance with the false positives as the dependent variable showed a significant main effect was present ($F(2,85) = 3.80$, $p=.03$). There was only one Bonferroni pairwise significant difference ($\propto = .05$) - the ADHD group made significantly more false positives (or misfires) than the normal control group ($p=.03$). There were no other significant differences.

These results suggest that the record of errors is more helpful than mean reaction time for this CPT assessment of deficits associated with ADHD in adulthood. Mean reaction time discriminated between clinic controls and normal controls only, showing that clinic controls take longer to process incoming information than a normal control group. With respect to errors of commission and omission, the ADHD group consistently performed worse than the normal control group and they identified fewer hits overall. Thus when taking a similar time to process information as normal controls, the ADHD group make far more errors of omission and commission.

4.7.2 Matching Familiar Figures Test

This is a test of impulsiveness vs reflectiveness in cognitive style. Impulsiveness is represented by an enduring disposition to respond rapidly but incorrectly in a situation where there is uncertainty about which response is correct. The task is to match a single picture with the identical member of an initial set. Three measures were taken:

the number of times an individual gets it wrong (i.e. errors), the number that are identified correctly the first time, and the time that is taken to do each trial. The measure of impulsiveness is the number of rapid errors.

One-way analysis of variance with the MFF RT as the dependent variable showed there was no significant main effect ($F(2,87) = 2.88$, NS). The number of correct responses identified the first time was compared in one-way analysis of variance with the correct responses as the dependent variable. This showed a significant main effect was present ($F(2,87) = 7.98$, $p=.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the ADHD group was significantly slower than the normal control group ($p=.01$) and the clinic control group ($p=.001$). There was no significant difference between scores for the normal control group and the clinic control group.

The number of errors were also compared in one-way analysis of variance with the errors as the dependent variable. This showed a significant main effect was present ($F(2,87) = 10.72$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the ADHD group made significantly more errors than the normal control group ($p=.002$) and the clinic control group ($p<.001$). There was no significant difference between scores for the normal control group and the clinic control group.

Thus a similar pattern of results was found in analysing the MFF data and the CPT data. Mean reaction time did not discriminate between groups, but variables relating

to the number of errors and the number identified correctly the first time revealed that the ADHD group made significantly more errors and identified fewer pictures correctly first time than both clinic and normal control groups.

4.7.3 Letter Cancellation Test

The Letter Cancellation Test [LCT] is a measure of ability to sustain attention. This consists of rows of letters randomly interspersed with a designated target letter and performance is scored for errors and number of lines completed within a two minute allocated time.

The association between the number of lines completed within the time period and the number of errors made was examined in one-way multivariate analysis of variance with the number of errors and lines as dependent variables. There was a significant main effect that revealed differences between the groups (Wilks' Lambda =.88; Exact $F(4,170) = 2.68$, $p=.03$). As a follow-up to this multivariate ANOVA, two one-way ANOVAS were carried out in order to isolate the source of the differences between the groups. These analyses indicated that the source of the difference stemmed from the letter cancellations ($F(2,88) = 3.78$, $p<.03$) rather than the number of lines completed ($F(2,88) = 1.48$, NS). However, strictly speaking, these results for the LCT are not significant, given the number of tests carried out and the result was lost when the Bonferroni correction for multiple testing was applied.

TABLE 4.16 TABLE OF COGNITIVE TEST RESULTS

	ADHD N=30 Mean (SD)	Clinic Controls N=30 Mean (SD)	Normal Controls N=30 Mean (SD)	F	Sig.	C Sig.
CPT mean reaction time	0.86 (0.19)	0.99 (0.23)	0.74 (0.19)	10.36	***	*
False positives (missed)	3.63 (4.04)	2.32 (2.21)	0.77 (1.57)	7.76	***	*
False negatives (missfires)	4.50 (6.90)	3.61 (5.49)	0.90 (2.29)	3.81	**	*
Hits	20.37 (4.04)	21.68 (2.21)	23.23 (1.57)	7.76	***	*
MFF mean reaction time	14.17 (6.13)	18.60 (9.40)	15.33 (6.24)	2.88	NS	NS
Errors	7.67 (3.80)	3.83 (3.18)	4.57 (3.19)	10.72	***	*
Correct	6.70 (2.28)	9.00 (2.02)	8.47 (2.66)	7.98	***	*
Time prospective	40.53 (16.91)	44.40 (18.50)	52.77 (17.82)	11.23	**	NS
Retrospective	10.13 (5.08)	6.28 (3.24)	5.87 (2.79)	3.69	***	*
LCT errors	11.60 (11.27)	8.10 (11.04)	4.70 (5.95)	3.78	*	NS
Lines completed	11.07 (3.05)	12.17 (3.74)	12.43 (2.97)	1.48	NS	NS

*** significance p<.001
** significance p<.01
* significance p<.05

C Sig. = corrected significance (for multiple tests)

Pairwise comparisons ($\propto$ = .05) showed that the ADHD group made significantly more letter cancellations than the normal control group for letter cancellation (mean difference 6.90, s.e. of difference 2.51, p=.02), but there was no difference between the ADHD group and clinic control group for letter cancellation (mean difference 3.50, s.e. of difference 2.53, NS). There were no significant differences between the clinic control group and the normal control group for letter cancellation (mean difference 3.40, s.e. of difference 2.53, NS).

4.7.4 Time Estimation

A measure of time estimation was calculated retrospectively by asking the individual to estimate how long the eight minute CPT test had taken to run. An estimate of prospective time was then taken by starting a stop watch and asking the participant to say when they thought one minute had passed. S/he was directed to use their perception of time and not to count seconds.

One-way analysis of variance with retrospective time as the dependent variable showed a significant main effect was present ($F(2,86) = 11.22$, $p<.001$). Bonferroni post hoc pairwise comparisons ($\propto = .05$) revealed the ADHD group significantly overestimated a retrospective measure of time compared with the normal control group ($p<.001$) and the clinic control group ($p=.001$). There was no significant difference between scores for the normal control group and the clinic control group.

One-way analysis of variance with prospective time as the dependent variable also showed a significant main effect was present ($F(2,87) = 3.69$, $p=.03$). There was only one Bonferroni pairwise significant difference ($\propto = .05$) - the ADHD group significantly underestimated a prospective measure of time compared with the normal control group ($p=.03$). There were no other significant differences. However, strictly speaking, these results for prospective time estimation are not significant, given the number of tests carried out and the result was lost when the Bonferroni correction for multiple testing

was applied..

To summarise the results of the cognitive testing, a clear pattern has emerged that shows that in all three tests (CPT, MFF and LCT) measurement of error was the most sensitive factor in discriminating between the ADHD group and normal controls. The MFF test discriminated the ADHD group from clinic controls. Thus, despite similar reaction times, ADHD adults tend make more errors and this suggests that they process information at a comparable speed to clinic and normal controls but their attention deficit and impulsiveness results in higher error margins. With respect to time estimation, the ADHD group significantly overestimate time when it is retrospectively measured and significantly underestimate time when it is prospectively measured. The ADHD scores were significantly different from clinic controls for retrospective time but not for prospective measures of time.

4.8 SUMMARY OF RESULTS

This study examined a clinically referred sample of adults referred to a clinic for assessment for ADHD. Three groups were compared - the ADHD group, the clinic control group and a normal control group. Classification was based on the presence or absence of ADHD in childhood and adulthood according to DSM-IV criteria and determined by clinical judgement informed by three sources of information - self-report, informant-report (usually parent) and whenever possible school reports. Groups were

matched on age, sex and social class.

Chapter 4 reports the results from four domains:-

a) Childhood information - symptomatology and developmental history

b) Psychosocial information from the AFI

c) Comorbidity

d) Cognitive testing

Section 4.8 summarises (a) the variables that discriminated between the ADHD group and the normal control group; and (b) the variables that discriminated between the ADHD group and the clinic control group.

4.8.1 Differences between the ADHD group and normal control group

Table 4.17 summarises the data that reported a significant difference between the ADHD group and the normal control group. Inspection of this data shows that the ADHD group are clearly deviant to community controls in terms of their childhood history and adult functioning. Furthermore the self-reported difference is supported by information from a parent and objective assessment of cognitive functioning.

Psychosocial Information

Core symptoms: The adult ADHD group reported significantly more severe problems with attention, impulsiveness and restlessness/hyperactivity than normal controls as measured by the DSM-IV checklist of symptoms and the Conners scale of cognitive and behavioural problems (adapted for adult use). Fifty-five percent met criteria for adult symptoms compared with none of the community controls. (Note - adult symptoms are not the same as adult criteria for ADHD diagnosis which requires symptoms to have been present by age 7 years). The ADHD group were also rated to have experienced significantly more cognitive and behavioural problems in childhood by a parent.

Developmental delay: The ADHD group tended to have language delays, although this finding was no longer significant after correcting for multiple testing.

Education and occupation: The ADHD group reported themselves to have had significantly more academic and behavioural difficulties at school. They tended to attend special schools for children with learning and/or behavioural problems, they tended to leave school earlier than normal controls. They achieved significantly fewer academic qualifications. Compared with normal controls, a high proportion of the ADHD group were unemployed. They reported to have achieved a lower job status than normal controls and to have had a more deviant occupational history (high job turnover, trying numerous different careers, frequent periods of unemployment).

When comparing the job status they achieved compared with that of a family member (usually the eldest sibling not in full time education), the ADHD group achieved a job status that was lower than family expectation - a finding that was not present in the normal control group comparison.

Antisocial behaviour: The conduct problems reported to be present in childhood continued as the ADHD group matured into adulthood, when they reported more severe antisocial and aggressive behaviour than normal controls. Criminal behaviour and frequent police contacts were commonly reported. Substance abuse and misuse tended to be more prevalent in the ADHD group, although this finding must be considered exploratory as when the data were corrected for the possibility of Type 1 errors, this finding was no longer significant.

Relationships: The ADHD group reported to have more deviant friendship patterns reflecting a difficulty in making and keeping friends. Their social deficits did not impact on their ability to form satisfactory romantic relationships.

Comorbidity

Compared with normal controls, the ADHD group self-reported to have significantly greater problems related to anxiety and depression. An interview with a parent revealed that they were at significantly greater risk for developing a personality disorder. In both childhood and adulthood, they had frequently presented at (and made

use of) various community, education and psychiatric services from both the public and private sectors.

Cognitive testing

Error scores on all three cognitive tests discriminated the ADHD group from normal controls (although on one test, the LCT, this finding was no longer significant when corrected for the possibility of Type 1 errors). Thus, despite taking a comparable mean reaction time to perform a task, the ADHD group made significantly more errors. They also tended to overestimate time in a retrospective time task (the finding that they underestimate time in a prospective time task was no longer significant when data were corrected for the possibility of Type 1 errors).

TABLE 4.17

SUMMARY OF POST-HOC COMPARISONS SHOWING SIGNIFICANT DIFFERENCES BETWEEN ADHD AND NORMAL CONTROL GROUPS (BASED ON BONFERRONI T TESTS)

Statistics for these tests can be found in their relevant sections.

	ADHD N=30 Mean (SD)	**Normal Controls N=30 Mean (SD)**
AFI Core symptoms		
DSM-IV symptoms*ae*	28.69 (4.57)	10.17 (6.99)
Conners as a child*ae*	24.18 (3.69)	2.87 (3.18)
Conners adult scale*ae*	21.67 (4.68)	6.33 (5.62)
Education/Occupation		
School problems*ae*	11.37 (4.57)	1.3 (1.76)
Academic qualifications*be*	5.97 (7.87)	19.24 (11.27)
Age of leaving school	15.93 (0.80)	17.37 (1.00)
Occupational history*cde*	-0.80 (2.77)	1.49 (2.14)
Type of job*a*	5.95 (1.82)	2.42 (1.54)
Sibling occupation*a*	4.10 (2.27)	2.05 (1.61)
Antisocial behaviour		
Antisocial in childhood*ae*	18.77 (8.96)	4.93 (5.16)
Antisocial in adulthood*ae*	10.33 (9.17)	1.80 (3.01)
Smoking*ae*	38.07 (42.60)	13.13 (19.88)
Drug use in childhood*ae*	2.27 (2.21)	0.63 (1.24)
No. of drugs ever used*ae*	3.00 (2.78)	1.43 (1.79)
Police contact childhood*ae*	2.87 (2.22)	0.50 (1.17)

	ADHD N=30 Mean (SD)	Normal Controls N=30 Mean (SD)
Police contact adulthood*ae*	2.17 (2.51)	0.20 (0.76)
Relationships		
Friendships*bde*	-1.42 (2.93)	1.46 (1.79)
Comorbidity		
Presentation to services*ae*	5.10 (4.27)	0.83 (1.21)
Childhood presentations to services*ae*	3.07 (2.74)	0.77 (1.10)
Personality problems*ae*	2.03 (2.44)	0.10 (0.40)
BDI*ae*	16.82 (10.86)	6.47 (6.59)
HAD - Depression*ae*	6.59 (4.12)	2.87 (2.64)
HAD - Anxiety*ae*	12.76 (5.02)	6.83 (4.11)
Cognitive testing		
CPT missed	3.63 (4.04)	0.77 (1.57)
Missfires	4.50 (6.90)	0.90 (2.29)
Hits	20.37 (4.04)	23.23 (1.57)
MFF errors	7.67 (3.80)	4.57 (3.19)
Correct	6.70 (2.28)	8.47 (2.66)
Time prospective	40.53 (16.91)	52.77 (17.82)
Retrospective	10.13 (5.08)	5.87 (2.79)
LCT errors	11.60 (11.27)	4.70 (5.95)
	Percent	**Percent**
Dev. delay - talking	37.0	10.3
Criteria met for DSM-IV core symptoms	55.2	-
Special school	33.3	-
Unemployed	60.0	3.3

a High score = deviance
b Low score = deviance
c High score = less skilled
d Standardised scores
e Scaled data

4.8.2 Differences between the ADHD group and clinic control group

The clinic control group were a group whose primary problems related to anxiety (27%), depression (26%), personality disorder (27%) and other problems (including aggressive behaviour, low self-esteem, somatic problems) (10%). Nevertheless it should be borne in mind that they were a particularly strict control group as members had been referred to the ADHD clinic for suffering from specific problems with attention, hyperactivity and impulsiveness. The merits of this control group and/or its problems are discussed in Chapter 5.1.

Table 4.18 summarises the data that reported a significant difference between the ADHD group and the clinic control group. Inspection of this data shows that the ADHD group are clearly deviant to clinic controls in terms of their childhood history, the continuation of core ADHD symptoms in adulthood, and in objective cognitive testing. Childhood problems were both self-reported in AFI and reported by a parent in the Conners scale of childhood symptoms. Continuation of symptoms were self-reported in the DSM-IV checklist of symptoms and in the Conners scale (adapted for adult use) and this was supported by objective assessment of cognitive functioning using the MFF.

Childhood problems

Parents of ADHD participants rated their children in a retrospective measure to have

had significantly greater cognitive and behavioural problems in childhood than parents of clinic controls. They also tended to have language delays, although this finding was not significant after correcting for multiple testing. The ADHD group tended to go to special schools for children with learning and/or behavioural problems. They rated themselves in AFI to have had more academic and behavioural difficulties at school, in addition to conduct problems in childhood. In childhood they had significantly more multiple presentations to education and child behavioural services than clinic controls, reflecting an earlier onset of severe problems.

Core symptoms in adulthood

ADHD adults rated themselves to have significantly more problems with attention/-concentration, restlessness/hyperactivity and impulsiveness than the clinic control group in both the DSM-IV checklist of symptoms and the Conners scale of cognitive and behavioural problems (adapted for adulthood). Fifty-five percent of the ADHD group met criteria for adult syumptoms in the DSM-IV checklist of symptoms compared with none of the clinic controls. (Note - adult symptoms are <u>not</u> the same as adult criteria for ADHD diagnosis which requires symptoms to have been present by age 7 years).

Cognitive testing

The MFF significantly discriminated between the ADHD group and clinic controls in terms of the number of errors they made and the number of correct images they identified first time. A measure of time estimation that was taken retrospectively also

significantly discriminated between these two groups.

TABLE 4.18

SUMMARY OF POST-HOC COMPARISONS SHOWING SIGNIFICANT DIFFERENCES BETWEEN ADHD AND CLINIC CONTROL GROUP (BASED ON BONFERRONI T TESTS)

Statistics for these tests can be found in their relevant sections.

	ADHD N=30 Mean (SD)	**Clinic Controls N=30 Mean (SD)**
Core symptoms		
DSM-IV symptoms*ae*	28.69 (4.57)	21.50 (5.75)
Conners as a child*ae*	24.18 (3.69)	15.93 (7.77)
Conners adult scale*ae*	21.67 (4.68)	18.27 (5.46)
Scale of childhood presentations to services*ae*	3.07 (2.74)	1.34 (1.37)
Education/Occupation		
Scale of school problems*ae*	11.37 (4.57)	6.4 (4.97)
Antisocial behaviour		
Antisocial in childhood*ae*	18.77 (8.96)	11.13 (8.26)
Police contact childhood*ae*	2.87 (2.22)	1.57 (2.21)
Cognitive testing		
MFF errors	7.67 (3.80)	3.83 (3.18)
MFF correct	6.70 (2.28)	9.00 (2.02)
Time Retrospective	10.13 (5.08)	6.28 (3.24)
	Percent	**Percent**
Dev. delay - talking	37.0	17.2
Criteria met for DSM-IV core symptoms	55.2	-
Special school	33.3	6.7

a High score = deviance
e Scaled data

CHAPTER 5

DISCUSSION OF RESULTS

This chapter evaluates the strengths and weaknesses of the study and takes account of findings from research reported in the literature. It then goes on to interpret the results presented in Chapter 4 and discuss possible explanations for differences between groups.

5.1 STRENGTHS AND WEAKNESSES OF THE STUDY

The methodology has some advantages for examining ADHD in adulthood. Clinical and population studies have various advantages and disadvantages and both methods are important contributors to research. This is a clinical study which has the advantage of addressing issues of severity, the extent and nature of individuals' problems, since participants are referred. Relatively few individuals are found in population studies with severe problems as, although a major strength of epidemiology is its representativeness and exclusion of referral bias, attrition rates and non-participants are likely to be more impaired individuals.

The ADHD group were consecutive cases presenting at an adult ADHD clinic and clinic controls were selected as the next non-ADHD individuals that met matching

criteria. The clinic was a national centre and referrals were from all over the United Kingdom, thus participants were from various urban and country geographic locations and not representative of any one area with greater or lesser psychiatric disorder.

Participants were diagnosed with ADHD following a rigorous and lengthy assessment by a psychologist and psychiatrist, and based on information from multiple sources. Although a weakness of the study is that it uses a retrospective account of childhood behaviour to determine the likelihood of childhood diagnosis (and is thus open to poor recall and memory bias), a parent interview was conducted for every case and childhood reports were available for just under two-thirds of the ADHD group and just under half of the clinic control group. The ADHD assessment took several hours and in order to counterbalance the effect of fatigue on the individual, the interview and test battery were randomly varied in order of presentation.

Because the DSM-IV checklist of symptoms was not included as a defining measure, it was recognised that the ADHD group could be over-inclusive and a potential tautology may have arisen in the study as significant differences between groups in data analysis may have reflected their initial selection criteria. In recognition of experimental vigour and in order to avoid subjectivity, the "ADHD/DSM" group was defined from cases selected on the basis of predetermined cut-offs on standardised rating scales and classified according to presence or absence of childhood and adulthood symptoms. Thus scientifically valid criteria were applied to classify this group and scales were administered by a psychiatrist blind to the psychological

interview and results of cognitive testing. Comparison of the ADHD/DSM defined group with the ADHD/NON-DSM defined group revealed there were no significant differences between them.

Confounding factors were controlled for. Cases were matched for age, sex and social class. Although IQ was not controlled for, there were no significant differences between groups in IQ. Exclusion criteria included IQ below 70, evidence of psychotic or neurological illness or injury potentially affecting brain function; pervasive developmental disorder. Participants who failed to meet criteria for adult ADHD but who satisfied criteria for childhood ADHD (i.e. a remission group) were also excluded.

A major weakness of the study is the clinic control group as this is a group with multiple problems. They are a mixed group reporting various symptoms of depression and anxiety as well as personality problems and thus represent a group of general disorder that does not adequately control for more specific psychopathology. Furthermore, individuals were referred for having specific difficulty with impulse control and attention problems and thus represent a very strict control group. It could be argued that they represent a mild ADHD group, although this is unlikely as they did not meet the childhood or adulthood criteria, nor had the developmental problems of ADHD children. The clinic control group illustrates the problem with differential diagnosis that clinicians face when assessing adult ADHD (especially when individuals expect to receive a diagnosis), although when researching the disorder it may be better to compare an ADHD group with a clinic control group recruited from a community

outpatient service.

5.2 CORE SYMPTOMS OF ADHD

Core symptoms of ADHD were measured in childhood by the Conners 10-symptom Abbreviated Parent Questionnaire and parents rated the ADHD group to have developed significantly more behavioural problems by 7 years of age than both control groups. The findings from the Conners childhood scale are retrospective ratings and thus depend strongly on the memory of family members. However school reports were available for 63% of the ADHD group and 48% of the clinic control group and these also evidenced the presence (or absence) of behavioural problems in childhood.

In childhood, it is suggested that a cutoff of 15 on the Conners Scale is a "fair" marker of the hyperactive syndrome (Conners, 1969, 1970, 1973) and this mean score is met by both the clinic controls and the ADHD group. The ADHD group have clear and definite severe problems as rated by their parents in childhood (mean score of 24 compared with 16) and variability within this group was half that of clinic controls (ADHD and clinic control groups have a standard deviation of 4 and 8 respectively). Nevertheless the clinic control group's mean score shows that some members of this group met the arbitrary cut-off point of 15 on this scale. Thus one needs to be cautious when using retrospective information and be aware of its limitations. This emphasises the need to use objective childhood documentation wherever possible, such as school reports, probationer reports, educational psychology reports and/or

Statements of Educational Need.

Adult functioning was measured by the Conners scale adapted for self-report in adulthood and by the DSM-IV checklist of symptoms. When adapted for adult use, the Conners scale also significantly discriminated between the ADHD and clinic control groups. Although differences were not as clear-cut as the childhood scale - scores were 22 and 18 for the ADHD and clinic control group, and they had a similar standard deviation of around 5 points. Bearing in mind that the clinic control group were referred for having problems with attention/concentration and impulsive behaviour, this may explain why they met this arbitrary cut-off. Perhaps the threshold for clinical caseness in adults this should be raised to 18 for hyperactive behavioural problems in adulthood.

The DSM-IV checklist is symptom-based. Thus one can meet criteria for ADHD symptomatology but not meet criteria for diagnosis which requires certain additional qualifications to be met, e.g. onset before age 7; problems must be pervasive across settings; problems must be primary and cause social, academic or occupational impairment).

To meet DSM-IV symptom criteria, 6 out of 9 inattention items must be rated as occurring often, and 6 out of 9 hyperactive/impulsive items must be rated as occurring often. Out of the latter 9 items, two-thirds (i.e. six) relate to hyperactive items and it was hypothesised that ADHD adults may not have the motoric overactivity problems

reported in childhood. Indeed, motoric overactivity is an important precursor to diagnosis in childhood, and it is likely to be the reason that children are identified by teachers and referred for treatment at an early age. If this were the case then an adult required a higher threshold of symptoms to meet DSM-IV criteria as an adult. In order to examine this, symptoms were examined by creating independent dimensional scales by symptom type and ADHD adults differed significantly on each of these dimensions suggesting that motoric overactivity (or perhaps restlessness in adulthood), along with impulsiveness and an attention deficit, remain a problem for many people in adulthood. Thus a checklist of symptoms was shown to be a useful diagnostic measure for symptoms in adulthood as it clearly differentiated the ADHD group from the two control groups on a dimensional measure of criteria for symptomatology, with the ADHD group self-rating themselves to have significantly more severe problems.

Yet when categorising the data using an arbitrary cut-off to determine whether criteria has been met for diagnosis then just over half of the ADHD group met this criteria and none of the clinic control group or normal control group. This means that around half the ADHD group did not meet this criteria in adulthood, despite there being evidence of this being a severe problem in the parental interview and/or in the cognitive assessment.

It is possible that many adults do not meet criteria because the motoric overactivity appears to be the most clearly remitting symptoms with maturity (Fischer et al., 1993). Alternatively, there may be a problem with self-reporting ADHD symptomatology.

Because of their deficits, ADHD adults may be poor at accounting their difficulties and they may have poor insight into their functioning. There is some evidence for this in the literature which reports parents are better informants of functioning (Mannuzza et al., 1993; Wender et al., 1981). This emphasises the need to use alternative sources of information, e.g. informant report and objective assessment such as cognitive testing for assessment and cautions the clinician not to rely on one source of information.

5.3 DEVELOPMENT, SCHOOL AND WORK

Problems for the ADHD group were rated by parents to have commenced at a very young age. Despite there being no significant differences present for the birth risk index, parents reported the ADHD group tended to experience more language developmental delay than the clinic and normal control groups. After correcting for errors this finding was non-significant, nevertheless it is consistent with previous research that reports language deficits in ADHD children, especially girls (Berry et al., 1985; James & Taylor, 1990; Kashani et al., 1979) and this is unlikely to be a chance finding. Language delays in ADHD children may significantly impact on their academic, educational and social development. For example, they may have difficulty at an early age learning to read and write and may be perceived by their peers as 'stupid' and become a target for bullies.

Academic and school problems were self-reported in AFI and supported by childhood documentation (e.g. school reports) and parent interview. School problems and

educational failure are well documented in the literature (Biederman et al., 1993; Douglas, 1988; Frick et al., 1991; Klein & Mannuzza, 1991; McGee et al., 1985; Weiss et al., 1985) and this study found the ADHD group were significantly deviant from the clinic control and normal control groups in terms of both academic and behavioural functioning in school. One-third of the ADHD group attended special school for children with behavioural and/or learning problems, a finding that was also reported by Lambert (1988). They experienced significantly more school problems than both the clinic and normal control groups. These school problems not only related to academic problems, but also to poor attitude, conduct problems, poor interaction with peers and teachers, truancy, school refusal and suspensions/expulsions from school. A finding that approached significance suggested that the ADHD group tended to leave school at an earlier age. On leaving school it was found that they achieved significantly fewer academic qualifications than the normal control group. These findings support the literature that reports that people with ADHD complete less education and leave school early with fewer academic qualifications (Klein & Mannuzza, 1991; Lambert, 1988; Mannuzza et al., 1993; Taylor et al., 1996; Weiss et al., 1985).

Lambert & Sandoval (1980) reported that 50% of hyperactive children have learning difficulties. Specific learning problems rather than general are often associated with language problems (e.g. reading) and the possibility of language delay in childhood may significantly disadvantage the ADHD group in school.

The childhood problems of inattention and impulsive behaviour are likely to cause hyperactive children to have difficulty remaining on task in a structured school setting. They may have poor concentration and find it difficult to follow instructions. They may copy information incorrectly. They may struggle in a large class environment, becoming easily bored and distracted. They may fidget and distract others. Thus their cognitive problems, together with their behavioural difficulties, are likely to result in a lack of confidence in their potential to achieve and scholastic performance. They may develop low self-esteem and underachieve academically, behaviourally and socially.

Given the well documented academic failure of ADHD children, it was anticipated that as adults they would underachieve in their occupation. Two independent findings in the longitudinal literature suggests this would be the case (Mannuzza et al., 1993; Weiss et al., 1979; 1985). The job status of the ADHD group was significantly different from the normal control group but similar to the clinic control group. They tended to be employed in manual work of significantly lower status than the more skilled employment of normal controls, and a higher proportion were unemployed. Normal controls reported to have experienced fewer occupational problems than the ADHD and clinic control groups. This supports the New York and Montreal studies which compare index groups with normal controls and found significantly more employment-related problems than controls and lower than expected occupational status. However, this study suggests that these differences do not extend to a non-ADHD clinic control group referred for problems with attention and impulsiveness.

When participants were compared with sibling occupation, it was found that siblings in general tended to have a higher occupational status than participants. This likely reflects that data were collected for the eldest sibling of working age (and defaulted to father's occupation if none present) and thus individuals were likely to be older and have greater career advancement. When comparing participants and siblings, it was found that the ADHD and clinic control participants were at lower occupational status than their siblings, yet for normal controls this was not the case. Thus the ADHD and clinic control groups both deviated from family expectations of job status by having jobs that were significantly lower in status than those of their siblings. The ADHD siblings were also employed in jobs that were significantly lower in status than the normal control siblings. This was not the case for the clinic control siblings who were employed in jobs of similar status as the normal control siblings.

Thus clinically referred individuals are deviant on a measure of occupational status compared with normal control participants and compared with their own siblings. The siblings of the ADHD group are more deviant than normal control siblings, but the siblings of the clinic control group are not. There is growing interest in the genetic inheritability of hyperactivity (Swanson et al., 1998) and it may be that comparing siblings with siblings is comparing like with like on a dimension of hyperactive behaviour as siblings may have some symptoms of ADHD. If impairment is familial then this may explain why siblings of the hyperactive group underachieved compared with the siblings of the clinic control and normal control groups.

5.4 ANTISOCIAL BEHAVIOUR AND SUBSTANCE ABUSE

Antisocial behaviour was measured in childhood and adulthood. It was found that the ADHD group had significantly more conduct problems in childhood than both clinic and normal controls. As they matured they remained significantly more antisocial than normal controls. This pattern has been evidenced in the literature which documents onset of conduct problems in childhood (Schachar, 1991), that continue as youngsters move into adolescence (Taylor et al., 1996) and adulthood (Biederman et al., 1993; Mannuzza et al., 1989, 1991; Weiss et al., 1985). The continuity of conduct disorder from childhood into adolescence is well documented (Farrington, 1995; Patterson et al., 1991), although in their follow-up comparing clinically referred hyperactive adults with community controls, Hechtman et al., 1984 found that antisocial problems were less severe in adulthood than in adolescence for the hyperactive group. The value of this study is that it compares an ADHD group with clinically referred adults as well as normal controls. This illustrates that they had early onset of behavioural problems that persisted as they matured. Clinic controls, by contrast, had a later onset of problems.

This general pattern of antisocial behaviour in childhood and adulthood is reflected in the police contact and criminal activity of the participants. In childhood, the ADHD group were significantly more deviant than both clinic and normal controls whereas in adulthood they continued to have significant problems compared with normal controls but not compared with the clinic control participants. Thus in childhood the ADHD group reported more frequent police contact of a serious nature than the two control

groups and they continued into adulthood to be more deviant than normal controls. This suggests that early delinquent behaviour developed into criminal activity as they matured.

These findings support previous research that has found ADHD is a risk for criminality and frequent police contact (Hechtman & Weiss, 1986; Satterfield, 1982; 1994). Again these studies used community controls for comparison and this study emphasises an early onset of problems that persists as they mature into adolescence and adulthood. This study used self-report but the above-mentioned studies used more reliable objective methods, such as examination of court records. Other investigators using self-report have found this method to not discriminate between groups (Hechtman et al., 1984; Loney et al., 1981) but their findings may have had a positive bias due to attrition that was likely to represent the most severe cases.

All the substance abuse findings were lost when a correction was made for multiple testing. However, before this adjustment, it was clear from inspecting the data that the ADHD group tended to report more childhood problems and the clinic control group tended to report more problems in adulthood. The literature is not clear regarding the risk for substance abuse in later life for hyperactive children. Compared with community controls it has been found that drug abuse is an outcome (Biederman et al., 1993; Gittelman et al., 1985; Hechtman et al., 1984a) but it has also been suggested that this is only the case if comorbid conduct disorder is present and that ADHD, personality disorders and substance abuse aggregate in some individuals (Gittelman et

al., 1985).

In order to establish whether those at risk for the development of substance abuse are individuals with conduct problems in childhood, then future research should include a comorbid ADHD/antisocial behaviour control group. It is important to establish the interplay between ADHD in adulthood, personality factors and substance misuse because the fundamental treatment for ADHD is stimulant medication and one needs to be wary that this could be a possible motivation for diagnosis (individuals may refer themselves in the hope of being prescribed a drug of potential misuse).

The groups did not report a difference in their alcohol consumption. Only one other study has reported on alcohol use, and these findings do not concur with those of Weiss et al. (1985) who found ADHD adults self-reported significantly greater alcohol abuse than normal controls. It is possible that the AFI measure, that focussed on a general frequency/severity range, is adequate to evaluate chilhood alcohol consumption but is not sensitive enough to evaluate adult consumption. Alcohol use is common and widespread in our society and regular low intake may even have health benefits. It is likely that most young adults (in their mid-twenties) drink alcohol more than once a month and many would have been drunk more than once a month. Future research should be more specific in this measure, for example it may be better to ask how many units of alcohol had been consumed in the past week.

To summarise, as children, the ADHD group reported to have significantly more

antisocial problems than clinic controls and normal controls. In adulthood, they reported to have more antisocial problems than normal controls but not clinic controls. Thus the clinic control group had a later onset of antisocial behaviour.

5.5 SOCIAL AND INTIMATE RELATIONSHIPS, ACTIVITIES AND INTERESTS

Despite there being no significant difference between groups in their number of leisure activities and interests, the ADHD group reported significantly more problems in their friendships and social interactions with others. This has been consistently reported in the childhood literature irrespective of the presence of comorbid conduct problems (Battle & Lacey, 1972; Klein & Young, 1979; Milich & Landau, 1982; Pelham & Bender, 1982; Pope et al., 1989; Whalen & Henker, 1985; 1992). Yet their social difficulties do not appear to prevent ADHD adults from forming intimate and romantic attachments as there was no significant difference between groups on their self-reported sexual and romantic liaisons. Biederman et al. (1993) found that clinically referred ADHD adults compared with normal controls were more likely to be divorced or separated. The investigators do not report the age of their sample and it may be that they are older than the mean age of 23-25 year olds in this study, who are perhaps too young to have faced difficulties in long-term relationships.

The ADHD group reported they were equally satisfied in their intimate relationships as other participants. The childhood literature suggests that positive change can be

achieved as hyperactive symptoms and noncompliant behaviour improve while on medication resulting in concomitant changes in parent behaviour (Barkley, 1989; Schachar et al., 1987). The negative impact of an ADHD child on family relationships has been well documented and it is likely that this is likely to persist in family relationships in adulthood, given the continuation of untreated symptomatology. It is possible that self-report is not a good measure of social interaction and/or problems with partners. For example, cognitive deficits may prevent individuals from accurately appraising situations. There is some evidence that self-report lacks validity for reporting behavioural symptoms (Mannuzza et al., 1993; Wender et al., 1991) and for reporting family conflict (Barkely et al., 1991). Thus individuals with ADHD may have little insight on how their behaviour impacts on loved ones.

An alternative explanation for the finding that the ADHD group had apparent self-awareness of their social problems in friendships but not in their intimate relationships, is that the friendships data were aggregated to create a scale of social functioning and thus were a more reliable measure. This procedure could not sensibly be applied to the intimate relationships data, so the data were analysed independently.

5.6 COMORBIDITY AND PSYCHIATRIC HISTORY

With respect to current symptoms of depression and anxiety, the ADHD and clinic control groups were very similar to each other. Compared with normal controls who reported problems that fell within normal limits, both groups reported symptoms of

depression and anxiety. The ADHD group reported significantly more contact with childhood services than either the clinical control or normal control groups, again reflecting an earlier onset of severe problems.

Mood and affective disorders have not been found in research following-up school-referred children into adolescence and adulthood (Gittelman, 1985; Mannuzza et al., 1991b; 1993; Weiss et al., 1985) nor in an epidemiological follow-up into adolescence (Taylor et al., 1996). There has been only one other clinically referred group examining mood and effective disorders and these findings support the research by Biederman et al. (1993) who found that clinically referred ADHD adults had higher rates of depressive and anxiety disorders than normal controls. Nevertheless this study found they were similar to a psychiatrically disturbed clinic control group of whom 27% were diagnosed with a primary disorder of anxiety and 36% with depression. However, any clinically defined group is more likely to be a psychiatrically disturbed group. Thus one expects a clinically referred group to be more severely impaired than participants in community studies. On the other hand, clinically referred groups are open to referral bias as well as artefact as severe psychopathology with many symptoms has a greater chance of fulfilling more than one disorder (e.g. agitation is one criteria for anxiety, depression and hyperactivity). Epidemiological longitudinal studies that control for comorbidity by including controls groups of 'pure' anxiety, depression, personality disorder are needed to answer these questions. Community identified groups should also be compared with clinically referred groups.

The ADHD group reported early onset of behavioural problems and multiple presentations to childhood psychiatric and educational services. They are thus likely to have long internalised academic and social failure, and developed problems with self-esteem. It is not therefore surprising that as they mature they develop secondary problems with anxiety and/or depression. There is evidence in the literature that there is an association between ADHD, depression and suicide (Brent et al., 1988; Weiss et al., 1985) and poor impulse control may be an important factor in determining suicidal thoughts and impulses. Thus when depressed, people with ADHD may be unable to inhibit suicidal ideation and attempts.

The ADHD group and clinic control groups also both had significant personality problems compared with the normal control group. Just over one-third of the ADHD group met criteria for personality disorder and nearly two-thirds of the clinic control group met this criteria (of whom one-third of this group were clinically diagnosed as having personality problems as their primary presenting problem).

When examining personality disorder by category, Impulsive, Paranoid and Dissocial Personality Disorders were the most frequently reported. The ADHD group was rated to have two-fold Dissocial Personality Disorder than the clinic control group, and the clinic control group was rated to have two-fold Paranoid Personality Disorder than the ADHD group. However, after correcting for errors, these findings were non-significant and this result should be treated with caution. Nevertheless, the finding that the ADHD group tended to have significantly greater Dissocial Personality Disorder

is unlikely to be a chance finding, given the risk for antisocial behaviour and criminality reported in the literature and discussed previously. Indeed, antisocial personality disorder has ben reported to be present in ADHD probands in adulthood by a cross-sectional clinic-referred group (Biederman et al., 1993); in longitudinal follow-up studies of school referred children (Mannuzza et al., 1991; 1993; Weiss et al., 1985) and in a retrospective study comparing ADHD participants with their siblings (Loney et al., 1983). Taylor et al's (1996) London epidemiological study did not focus on personality disorder but reported that only members of a "pure" hyperactivity group (compared with a conduct problem group; a comorbid conduct problem/hyperactive group and a normal control group) developed personality disorder in adolescence (16-18 years).

Thus in terms of comorbidity, the hyperactive group was very similar to the clinic control group in terms of disorders of anxiety, depression and personality. These findings support the literature that compares ADHD probands with normal control groups but this study illustrates that they do not present in adulthood any differently than a psychiatrically disturbed clinically referred group. Indeed, it is striking that the clinic control group did not have more comorbid problems than the ADHD group (although in childhood the hyperactive group reported significantly more contact with educational and psychiatric services, suggesting an earlier onset of severe problems). This demonstrates a drawback of researching clinically referred groups with severe psychopathology - referrals may be people with multiple problems resulting in a loss of the core phenomena that may be present in the index group of interest.

5.7 COGNITIVE TESTING

The results of cognitive testing showed that error scores were more important predictors of adult ADHD than mean reaction time. This was supported by the CPT, MFF and LCT assessments of deficits (although in the latter case after correcting for errors this was non-significant nevertheless this is unlikely to be a chance finding given the results of the CPT and MFF). For the CPT, mean reaction time discriminated between clinic controls and normal controls only, showing that clinic controls take longer to process incoming information than a normal control group. Perhaps they were overanxious in the testing environment or slow due to low mood. These findings support the trend in the literature to report that hyperactive children perform less accurately but no faster in their responses than clinically referred controls (Sandberg et al., 1978; Firestone & Martin, 1979) whereas epidemiological research reports hyperactive children to have fast reaction times and poor accuracy (Fuhrman & Kendall, 1986; Taylor et al., 1991).

With respect to error scores in the CPT, the ADHD group consistently underperformed compared with the normal control group and they identified fewer hits overall. Thus when taking a similar time to process information as normal controls, the ADHD group made far more errors of omission and commission. Nevertheless they made a similar number of error scores as the clinic control group, suggesting these groups had similar problems with inattention in adulthood.

By contrast, the MFF test discriminated well between the ADHD and clinic control groups. As for the CPT, the groups took a similar time to precess information but the ADHD group made significantly more errors and identified fewer pictures correctly than both clinic and normal control groups. Thus impulsiveness may be an important defining characteristic of adult ADHD.

The ADHD group significantly overestimated time when it was retrospectively measured and tended to underestimate time when it was prospectively measured. After correcting for errors, the latter finding was non-significant but this finding is consistent with the retrospective measure that suggests people with ADHD have a fast internal clock. This means that time passes quickly for people with ADHD and they are likely to be tardy time keepers. A fast internal clock may explain the aversion to delay reported in the childhood literature (Sonuga-Barke et al., 1992) as time duration is longer for people with ADHD than others. Thus impulsiveness is demonstrated under conditions when they can control the time they spend waiting and not as a general problem with self-regulation or failure to control. Thus if they have to wait and they have no control over this, then they can wait - but given the choice they will not and act impulsively in this condition.

Thus a clear pattern emerged that showed that measurement of error was the most sensitive factor in discriminating between the ADHD and control groups. In particular, the MFF test discriminated the ADHD group from clinic controls. Thus, despite similar mean reaction times, ADHD adults tended to make more errors suggesting that

they process information at a comparable speed to clinic and normal controls but their attention deficit and poor impulse control results in higher error scores.

So why did MFF error scores discriminate between ADHD and clinic control group and not CPT error scores? The clinic control group were a group referred for problems with attention and/or impulsive behaviour and just under two-thirds of this group had a primary diagnosis of anxiety or depression. Problems with inattention, as measured by the CPT, may have been present for different reasons. They may have been present in the clinic control group because they were agitated and anxious in the testing environment and/or gave poor attention to detail, and were unable to sustain attention due to cognitive symptoms of depression. By contrast, the ADHD group (who also performed poorly compared with normal controls) may have demonstrated impaired performance on the CPT because they are unable to regulate their response set. Further research is needed using more defined psychiatric control groups (e.g. pure groups as opposed to a clinic control groups with multiple types of primary problem) in order to answer these questions and using more sensitive test instruments than a rather crude measure of sustained vigilance in a signal detection task.

A measure of impulsiveness, the MFF, discriminated between the ADHD and the clinic control groups, perhaps suggesting that impulsivity is the more salient feature of the syndrome in adulthood. To date, the cognitive characteristics of ADHD in adulthood have not been reported in the literature and it is clear that future research needs to establish the complex interplay of the cognitive deficits of ADHD in adulthood using

the 'pure' clinically referred controls suggested above and more sophisticated measures of functioning. It has been suggested that impaired neuropsychological function is at a high executive level, with the neuroanatomical location of deficits in the frontal-basal ganglia (Swanson et all, 1998; Taylor et al., 1991; Van der Meere & Sergeant, 1988) Future neuropsychological research should focus on more specific performance using tests of executive function (such as the Tower of London/Hanoi, variations of the Stroop test, the Trailmaking Test) as frontal lobe involvement may account for many symptoms.

CHAPTER 6

GENERAL DISCUSSION AND CONCLUSION

A detailed discussion of the results has been presented in Chapter 5. This chapter summarises these findings and, with the general aims of the thesis in mind, highlights their clinical implication and issues for future research.

6.1 GENERAL DISCUSSION

6.1.2 Summary

The ADHD/DSM group was determined by individuals meeting criteria for DSM-IV symptoms in adulthood and the Conners Scale of behavioural problems in childhood. This group was compared with ADHD/NON-DSM group who just fell short of this criteria but who presented to suffer from the central features of ADHD. These two groups were compared on core variables relating to demography, cognitive functioning and comorbidity. It was found that there were no significant differences between groups and the two groups were aggregated to create the "ADHD group".

Comparison of these groups showed that the ADHD group had an early onset of severe problems compared with clinic controls. Developmentally there was a

suggestion that they had language deficits and they went on to have school problems and academic failure. In childhood they were conduct disordered and had dealings with the police from a young age. They had multiple presentations to child psychiatric and educational services. These problems persisted as they grew up and became adults when, compared with normal controls, they had antisocial behaviour problems, frequent police contact, comorbid mood and affective problems, personality problems as well as social and cognitive deficits. Their cognitive functioning, as measured by neuropsychological testing, was more impaired than that of the clinic control group.

By contrast, the clinic control group was also significantly more impaired compared with the normal control group, but they had a later onset of problems that started in adulthood. At this stage they reported antisocial behaviour, frequent police contact, comorbid mood and affective problems, personality problems, social and cognitive deficits.

The literature has evidenced that ADHD is a developmental disorder that can be identified in early childhood and for many individuals the disorder persists into adolescence and young adulthood. There is a suggestion in the literature that, developmentally, ADHD individuals are more hampered by their deficits and associated problems in adolescence than in adulthood. The results of this study are consistent with the literature that emphasises the presence of severe cognitive and behavioural problems from an early age and documents the poor outcome of ADHD children in adolescence. This study further demonstrates that ADHD adults continue to have

significant problems with the core symptoms of ADHD and deviant cognitive functioning. These findings need to be replicated and future work should examine both clinically referred groups and epidemiological samples in studies designed to control for comorbid problems.

All the adult studies in the literature compare a hyperactive group with normal community controls (i.e. they do not compare them with a behaviourally disturbed group). Longitudinal studies are generally based on school referred participants and compared with normal controls. Thus follow-up studies that document improved adult outcome may be optimistic - attrition of cohorts may well remove those who have the worst outcome and their initial selection ensured they had all been treated. The Montreal studies excluded some of the worst outcome cases such as those with brain damage and intellectual retardation, and many participants of this study were treated in childhood and thus may have presented with improved behaviour in adolescence. Only one adult study to date has investigated a clinically referred group (Biederman et al., 1993) but this study again compares the index group with normal community controls.

The value of the study reported in this thesis is that it compares an ADHD group with clinically referred adults as well as normal controls and results reflect a developmental difference with clinic controls in that they had early onset of behavioural problems that persisted as they matured. Clinic controls, by contrast, had a later onset of problems. Nevertheless, in adulthood the clinic control group were very similar in presentation

to the ADHD group and this could be due to a severity issue. They represent a mixed bag of severely psychiatrically impaired individuals, referred for having problems in attention and impulse control, that results in a loss on the core features one takes to find in the ADHD disorder. Thus, although diagnostically they are clearly not a mild ADHD group as they neither have the childhood history nor meet adult criteria, they may self-report to have problems similar to ADHD adults. For example, they differed from the ADHD group on self-reported items that could be substantiated by alternative sources, i.e. childhood variables that were supported by either parent report and/or childhood reports. Furthermore, the clinic control group had been referred to the clinic for problems with attention and impulsiveness and expected to receive a diagnosis of ADHD (Van der Linden et al, in submission). Therefore they did not represent an ideal comparison group for researching the psychosocial impact of ADHD in adulthood using a self-reported measure. Future research should use a better control comparison, such as a personality disordered group, in order to examine the psychosocial outcome of adult ADHD.

To date, the cognitive functioning of ADHD adults has not been reported and the results show that the index group were significantly more impaired than the normal control group on tests of vigilance, impulsiveness and time estimation. They were more impaired than the clinic control group on tests of impulsiveness and time estimation. Generally, it was found that despite taking a similar time to process information, the ADHD group made more errors. Again, these results need to be replicated using a more defined clinic control group and using more specific measures

of executive function. Nevertheless the results validate ADHD in adulthood by relating a behavioural diagnosis of ADHD to cognitive functioning.

6.2.2 Meeting of goals

A primary goal for the thesis was to report on the psychosocial profile of adults referred to a National Adult ADHD Clinic and diagnosed to have ADHD in adulthood. Specifically, it was hypothesised that the ADHD group would present with academic underachievement, poor occupational adjustment, antisocial and criminal behaviour, poor social interaction and relationship difficulties.

These hypotheses were supported by finding the ADHD group were significantly more impaired than normal controls on all measures, and significantly more impaired that clinic controls on childhood measures of academic underachievement, antisocial and criminal behaviour. The index group therefore experienced problems early on in their development and these continued as they matured into adolescence and young adulthood.

A second aim of the thesis was to examine psychiatric comorbidity. Specifically, it was hypothesised that the ADHD group would present with personality disorder. The literature was unclear as to potential substance misuse, mood and affective problems, thus analyis of these data were exploratory.

It was found that the index group had more personality problems than the normal control group and there was a suggestion that these problems related more to antisocial personality disorder compared with the clinic control group. However, this was a tentative finding that needs replicating using a more defined clinic control group.

With respect to mood and affective disorder, it was found that the index group were significantly more impaired than normal controls but similar to clinic controls. Indeed, one of the striking things about comorbidity generally is that the clinic control group did not have more of it. It would be predicted, for example, that clinically referred people without ADHD would have something the index group do not. This finding could reflect a problem studying clinically referred groups as one may simply be studying the reason for referral as opposed to developmental phenomena. However in this case this is unlikely, as the two groups were distinguishable on childhood variables.

It is important that future research includes a clinically referred group in order to examine what problems are specific to ADHD. A problem perhaps arose with the clinic control group used in this study because they were referred for having `similar problems to the ADHD group and they expected to receive a diagnosis. Thus, while not having ADHD, they presented in a similar way. The most confounding comorbid problem reported in the childhood literature is that of conduct disorder and it is recommended that clinically referred individuals with antisocial problems would be preferable controls and recruited from a different service.

A third aim of the thesis was to report the cognitive functioning of adults with ADHD using objective neuropsychological measures. Specifically, it was hypothesised there would be no difference in response time between clinically referred groups for either the Continuous Performance Test or the Matching Familiar Figures Test. It was hypothesised that the ADHD group would make a significantly greater number of errors on tests of attention (the Continuous Performance Test and the Letter Cancellation Test) and a test of impulsiveness (the Matching Familiar Figures Test). It was hypothesised that the ADHD group would significantly overestimate time on a measure of retrospective time and underestimate time on a measure of prospective time.

These hypotheses were supported by discriminating between the index group and both control groups. It was found that (consistent with the literature of clinically referred children) mean reaction time was not a factor, thus ADHD individuals took a similar time to process information as both control groups. For each test error scores were found to significantly discriminate between the index and normal control groups. The Matching Familiar Figures error scores discriminated between the index and clinic control groups. This pattern of results suggests that, while an attention deficit is evident in adulthood, impulsivity may be the more significant factor. Individuals with ADHD were also significantly impaired in their perception of time compared with clinic controls. They overestimated time on a retrospective time measure, suggesting they have a fast internal clock.

6.3 CONCLUSION

Clinical criteria

One of the key aspects one wants to know about adult ADHD is whether the people meeting the criteria would have the neuropsychological changes that are believed to characterise ADHD. This study achieves this by relating a behaviourally defined diagnosis (meeting DSM-IV criteria using predetermined cut-offs on standardised rating scales) to cognitive functioning. It thus validates a behavioural diagnosis of ADHD in adulthood by predicting this to their cognitive deficits.

The DSM-IV checklist of symptoms significantly discriminated between the ADHD group and clinic/normal control groups for each independent symptom. Yet when the data were examined categorically, just under half the ADHD group fell short of meeting diagnosis for core symptomatology. Sub-analysis suggested that motoric overactivity was less of a problem for adults compared with impulsiveness and inattention. Clearly, these results need to be replicated but they suggest that the DSM should be reexamined for what is normative for different ages and developmental levels as perhaps, for adults, less emphasis should be placed on motoric overactivity.

In spite of this, this study demonstrates that young adults with ADHD could be identified using straight-forward screening instruments. The DSM-IV checklist of symptoms and Conners' abbreviated scale of childhood symptoms could relatively easily be administered to an individual and a parent. If a parent were not available,

then a close relative who knew the individual in childhood is likely to represent an informant of similar reliability. Both measures are relatively short and thus not time consuming. Nevertheless early identification at, say, school entry is optimal (using age-appropriate screening instruments) in order to maximise treatment programmes that intervene in the long-term outlook of the disorder.

There may be particular utility in identifying and treating adults living in structured environments, such as prisons, special hospitals and secure units for two reasons. First, individuals in such environments have access to further education facilities, group and individual therapies which may favourably supplement the more direct impact of pharmacotherapy on cognition and behaviour. Secondly, there are advantages from a clinical management perspective, as individuals who become more focused and successful in tasks may experience less frustration, behave with less aggression toward others, and break a cycle of negativity and perception of hopelessness for the future. Thus individuals have the potential to develop increased self-esteem and to become less restless, calmer and interact more positively with peers and staff.

Clinical implications

It is clear that childhood ADHD is a risk for multiple problems in adulthood. The index group continued to have difficulties relating to inattention and impulsive behaviour. This means individuals may act without reflection and fail to plan ahead. They are likely to be disorganised, forgetful, and have planning deficits and poor time management skills. Impetuous, novelty-seeking behaviour may result in criminal acts.

People with personality problems may present as rigid and inflexible in thought and behaviour in addition to having long-term interpersonal problems.

They reported a history of underperformance and academic failure and later experienced difficulties with work adjustment. They also had problems maintaining social relationships. Individuals may feel they have the ability yet they are unable to achieve positive outcomes. A longstanding history of failure is likely to result in low self-esteem and demoralisation resulting in individuals avoiding certain situations, anticipating failure, lacking in confidence and feeling misunderstood by others.

The clinical management of adults with ADHD has focussed almost exclusively on stimulant medication. Yet psychological therapy may be a useful adjunct to stimulant medication (Young, 1999). Pharmacotherapy is generally reported to be efficacious and, as such, treated individuals are likely to be more receptive to psychological intervention.

An important component of therapy is likely to be an educative factor in order that family members, as well as the individual, develop an understanding of the disabling effects of ADHD in addition to its long-term implications. This information may facilitate the development of appropriate, realistic expectations of behaviour and potential achievement. Furthermore, by understanding their own limitations, individuals can develop realistic expectations of performance - for example, patience is unlikely to be characteristic of adults with ADHD and information about the disorder

can help individuals appreciate that learning new strategies requires ongoing practice until a new skill becomes automatic and routine. Thus individuals may stick with a programme for longer and not give up at the first hurdle.

Psychological therapy should be aimed at symptom reduction by the development of coping strategies. A structured cognitive-behavioural approach is likely to be most effective with a focus on self-management strategies, although the context in which strategies are offered will vary according to presentation. This could be applied either within a one-to-one or group setting and should focus on specific issues such as self-esteem, managing attention problems and impulsive tendencies, problem-solving difficulties, dysfunctional interpersonal skills and problems controlling anger. A central tenet of therapy would be to empower the individual to develop self-efficacy and the confidence that change can be achieved. This would require educating people about the disorder, cognitive-restructuring and reframing the past. Therapy should aim to teach self-regulation and the ability to curb impulses, e.g. to "stop and think" and consider alternatives to and consequences of action.

A tendency toward disorganisation; poor motivation; and aggressive, impulsive behaviour is likely to have negative impact on family dynamics. There may be severe marital dissatisfaction and non-ADHD partners may have little understanding about the disorder and complain that their partner fails to listen to them, is unreliable, insensitive, argumentative or irresponsible. Marital therapy may encourage couples to re-examine their relationship from an ADHD perspective, to stop blaming each other and reduce

conflict.

Family therapy may also be useful. It aims to reduce cycles of negative reciprocity and conflict within the family. This could be achieved by identifying different points of view and acknowledging the impact of ADHD on the feelings and motivations of others. ADHD adults may well become parents of ADHD children and ill-equipped to deal with a hard to manage, disruptive child.

Future research and recommendations

It is clear that a lot more research is required to determine explicit criteria for what is normative for ADHD in adults. These findings indicate that clinically referred ADHD adults were considerably more impaired on tests of attention and impulsivity. The development of objective measures that are sensitive for adult use is important for clinicians attempting to assess, manage and treat ADHD in adulthood. Future research should focus more specifically on the nature of these impairments. At present there is considerable interest in the neuroanatomical and biochemical characteristics of ADHD. To date, brain imaging studies have implicated frontal basal ganglia neural networks and the molecular genetic studies have implicated the dopamine pathways that moderate and integrate neural activity of these networks. Thus neuropsychological research that can help to establish more precise deficits of executive function will be an important contributor to this font of knowledge.

This study has shown that ADHD in adulthood can be relatively simply defined using

the Conners Scale for childhood behaviour and the DSM-IV criteria for adult symptoms. However, using these criteria a more conservative ADHD group was defined. In clinical practice it should be borne in mind that DSM-IV criteria for overactivity may not be so relevant in adulthood - potentially making the clinical threshold for caseness higher for ADHD adults. Thus when assessing adults, clinicians should be wary of applying strict predetermined cut-offs for adult diagnosis.

The most common comorbid problem reported in childhood is conduct disorder. Thus it is recommended that future research should compare an index group with a behaviourally disturbed control group. Secondly, given the evidence that ADHD adults may have particular problems with impulsiveness and that they may develop personality problems and engage in criminal behaviour, there may be particular utility in identifying and treating adults held in forensic settings. The main advantage would be from a clinical management perspective, as (in response to treatment) individuals may become more focused and successful in tasks. They may experience less frustration and behave less aggressively towards others resulting in them interacting more positively with peers and staff..

Finally, it would be interesting to examine what it is about the ADHD group that gives them continuing problems. This could be achieved by comparing them with the remission group (the latter being defined as those meeting Conners' criteria in childhood but fail to meet symptom criteria in adulthood as determined by the DSM-IV checklist).

Summary

This thesis reports on a study of clinically referred ADHD adults. It is clear that hyperactivity in childhood poses a risk for adverse outcome , including a continuation of core cognitive and behavioural deficits. The long-term consequence of the hyperactive syndrome is a source of concern, particularly considering that it is largely understood to be a problem of childhood and not commonly recognised or accepted by clinicians as a disorder of adulthood. With early identification measures can be put into force that intervene the long-term outlook, but it is clear that many individuals are not referred to childhood services. The study delineates how a straight-forward screening instrument could simply and practically be applied to determine ADHD in adulthood. Once referred treatment is usually pharmacological, despite the positive impact psychological therapy may have on an individual's personal, social and occupational functioning. Further research needs to focus on more precise neuropsychological markers of the disorder, the development of explicit criteria of what is normative at different ages, and the development and efficacy of treatment programmes.

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Appendix A

CONSENT FORM

RESEARCH INTO ATTENTION AND IMPULSIVENESS

Thank you for agreeing to participate in our research into attention and impulsiveness. This will mean asking you some questions in an interview and asking you to carry out some straight-forward tests. This will last about 1 ½ hours.

Consent

The research has been explained to me and I ..... agree to participate.

Signed:_____

Date: _____

CONSENT FORM

RESEARCH INTO ATTENTION AND IMPULSIVENESS

Thank you for agreeing to participate in our research into attention and impulsiveness. This will mean asking you some questions about your son, daughter or an adult you knew well in their childhood. This will last about 1 hour.

Consent

The research has been explained to me and I.....
agree to participate.

Signed:_____

Date: _____

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ETHICAL COMMITTEE (RESEARCH)

Tel: (0171 919) 2892

30 April, 1997

Dr B K Toone
Dept. of Psychological Medicine
King's College Hospital

Dear Dr Toone

Re: The impact of ADHD in adulthood (013/97)

The Ethical Committee (Research) considered and confirmed Chair's action to approve Study No. 013/97 from an ethical point of view at its meeting on 18 April 1997.

Yours sincerely

Margaret M. Chambers

Margaret Chambers
Committee Administrator

Appendix B

ADHD - ADULT FUNCTIONING INTERVIEW

DATE OF INTERVIEW	
STUDY NUMBER	
NAME	
DATE OF BIRTH	
AGE	
GROUP	

PRESENT PLACEMENT:

LIVING WITH SPOUSE/PARTNER	0
LIVING WITH PARENT	1
LIVING ALONE	2
LIVING WITH RELATIVES	3
LIVING WITH FRIENDS	4
LIVING IN LODGINGS (INCL. FLAT/HOUSE SHARE)	5
LIVING IN AN INSTITUTION	6
OTHER	7

	Had	Anxiety	Depression	
	Becks			
	DSM-IV			
	Connors self	parent - child/adult		
	Birth/Dev			
1	MFF mean	errors	rt	
2	Ltr			
3	Ravens			
4	CPT mean	misses	missfires	recognised
5	Time Retrospective	Prospective		
	Personality 1 = Trait 2 = Disorder Paranoid Dissocial	Histrionic Anxious	Schizoid Impulsive	Anakastic Dependent Borderline

FAMILY DETAILS

PARENTAGE	NAME	AGE	PSYCHOPATHOLOGY	TICK IF IN SAME HOUSEHOLD
SPOUSE/ PARTNER				
CHILD				
CHILD				
CHILD				
CHILD				
MOTHER				
FATHER				
SIBLING				
SIBLING				
SIBLING				
SIBLING				
SIBLING				
SIBLING				

TWIN YES/NO ADOPTED YES/NO

ORDINAL POSITION: ONLY CHILD 0 YOUNGEST CHILD 2
ELDEST CHILD 1 MIDDLE CHILD 3

SCHOOL HISTORY

HOW DID YOU GET ON AT SCHOOL? DID YOU LIKE IT THERE?

CHILDHOOD REPORTS AVAILABLE YES/NO

Describe reports.....

1. SCHOOL TYPE:

State/comprehensive/sec. modern	1
Public/private/grammar	2
Special for learning/behavioural difficulties	3

2. ACADEMIC PROBLEMS: HOW DID YOUR WORK PROGRESS?

No problems	0
Trivial (weak in some subjects)	1
Definite but slight (behind in some subjects)	2
Definite and marked (needed remedial help)	3

3. ATTITUDE PROBLEMS: DID YOUR PARENTS GET COMPLAINTS ABOUT YOUR ATTITUDE? DID YOU BREAK SCHOOL RULES OR REFUSE TO WORK?

No problems	0
Trivial (eg. didn't wear school uniform)	1
Definite but slight (eg. worked below ability)	2
Definite and marked (eg. refused to work/played truant)	3

4. BEHAVIOUR PROBLEMS: WERE THERE COMPLAINTS ABOUT YOUR BEHAVIOUR? WERE YOU ANY OF THE FOLLOWING? *(TICK EACH PROBLEM)*

Disruptive in class
Gets into fights
Steals or destroys things
Daydreams
Withdrawn, won't talk
Plays clown TOTAL:.....

5. **PEER PROBLEMS:** HOW DID YOU GET ON WITH THE OTHER PUPILS? DID ANY OF THE FOLLOWING HAPPEN? *(TICK EACH PROBLEM)*

Is bullied or excessively teased
Is a bully himself
Is excluded by peers
Doesn't mix at all
Is part of a "bad" crowd TOTAL:.....

6. **TEACHER PROBLEMS:** HOW DID YOU GET ON WITH YOUR TEACHERS? *(TICK EACH PROBLEM)*

Dislikes/deliberately annoys teacher(s)
Is disliked/victimized by teacher(s)
Is uncooperative with teacher(s)
Swears at/threatens teacher(s) TOTAL:.....

7. **TRUANCY**: HOW OFTEN IN A YEAR WOULD YOU SAY YOU PLAYED TRUANT FROM SCHOOL?

Never	0
Some lessons only	1
Whole days	2
Whole weeks	3

8. **SCHOOL REFUSAL:** DID YOU EVER STAY AT HOME AND REFUSE TO GO TO SCHOOL?

Never	0
Days only	1
As long as one week	2
Periods longer than one week	3

9. DID YOU EVER HAVE **CONTACT WITH THE EDUCATION AUTHORITY** BECAUSE OF TRUANCY OR MISSING SCHOOL?

No	0
Yes	1

10. HAVE YOU EVER BEEN **SUSPENDED OR EXPELLED** FROM SCHOOL? IF SO WHY WAS THAT?

Never	0
Suspended once	1
Suspended more than once	2
Any expulsion	3

Reason:.....

11. HOW OLD WERE YOU WHEN YOU LEFT SCHOOL?

AGE IN YRS.....

12. WHAT DID YOU DO AFTER YOU LEFT SCHOOL?

Re-taking GCSE's or other (school or college)	0
Preparing for A-levels (school or college)	1
Other full-time education	2
Vocational training	3
Apprenticeship	4
YTS scheme	5
Job	6
Unemployed	7

DESCRIPTION OF FULL-TIME FURTHER EDUCATION:

.....

13. **QUALIFICATIONS OBTAINED**:

GCSE's or equivalent .....

A Levels .....

OND .....

HND .....

City and Guilds .....

Degree .....

BTECH

Other (eg NVQ)..... .....

Dropped out of courses ..... (no. of courses)

CURRENT OCCUPATION

1. **JOB**

Unemployed (including housewife)	0
Employed	1
Student	2

2. DESCRIPTION OF JOB:

.....

IS IT:	Full time	0
	Part time	1
	Other	2

Are you interested in the job, do you work well? *(Interest/effort)*

Do you want to stay in this job?

If you don't want to stay in the job, why is that? Why do you want to leave?

3. **HOW MANY TYPES OF OCCUPATION HAVE YOU HAD?**

.....

4. **HOW MANY JOBS HAVE YOU HAD SINCE LEAVING SCHOOL?**

.....

5. **WHAT WAS THE LONGEST PERIOD YOU STAYED IN A JOB?**

Months.....

Do you have any plans for the future? Do you want to get on, improve yourself?

6. **HAVE YOU EVER BEEN UNEMPLOYED?** HOW MANY TIMES?

....

7. **WHAT IS THE LONGEST PERIOD OF UNEMPLOYMENT?**

Months.....

IF UNEMPLOYED NOW:

8. **ARE YOU UNEMPLOYED BECAUSE YOU ARE UNABLE TO WORK FOR SOME REASON?** (eg. disabled, on invalidity benefit)

Unemployed (can't get job or not interested)	0
Disability/invalidity	1
Children	2
Institution	3

What do you mostly do with your time? *(At home, outside, constructive/non-constructive activities)*

Are you looking for a job?

9. OCCUPATION OF FAMILY MEMBERS:-

Wife/partner .....

Father .....

Mother .....

Eldest Sibling .....

Sibling .....

Sibling .....

Sibling .....

Sibling .....

777	student
1	professional/managerial
2	vocational (teacher, nurse)
3	skilled non-manual (secretary, hairdresser)
4	skilled manual (carpenter, welder)
5	semi-skilled manual
6	unskilled (shop assistant)
7	unemployed (including housewife, invalidity benefit, prison, secure unit)

ANTI-SOCIAL BEHAVIOUR

1. AGGRESSION

VERBAL: HAVE YOU BEEN INVOLVED IN ANY SERIOUS ARGUMENTS WITH OTHER PEOPLE OUTSIDE THE HOME? *(Note detail)*

	Last Year	Prior 18 yrs	Post 18 yrs
None	0	0	0
1-2 isolated episodes	1	1	1
3 or more episodes	2	2	2
At least monthly	3	3	3

PHYSICAL: HAVE YOU BEEN INVOLVED IN ANY FIGHTS OUTSIDE THE HOME? WHAT HAPPENED? HOW BAD WAS IT? *(Note detail)*

USUAL SEVERITY	Last Year	Prior 18 yrs	Post 18 yrs
No fighting	0	0	0
Defence only	1	1	1
Mild (no injury caused)	2	2	2
Severe (injury caused)	3	3	3

USUAL FREQUENCY	Last Year	Prior 18 yrs	Post 18 yrs
Not at all	0	0	0
Once or twice	1	1	1
Regular, on average 1 x month	2	2	2
Regular, more than once a month	3	3	3

HAVE YOU EVER USE A WEAPON IN ANY OF YOUR FIGHTS? WHAT KIND? DO YOU CARRY A WEAPON AROUND TO DEFEND YOURSELF 'JUST IN CASE'? *(Note detail)*

	Last Year	Prior 18 yrs	Post 18 yrs
None	0	0	0
Carries weapon, never used	1	1	1
Only used to threaten	2	2	2
Used weapon in fight	3	3	3

2. VANDALISM

HAVE YOU EVER VANDALISED ANYTHING OR SET FIRE TO ANYTHING? *(Note detail)*

USUAL SEVERITY	Last Year	Prior 18 yrs	Post 18 yrs
No vandalism	0	0	0
Minor (little damage)	1	1	1
Major (serious damage)	2	2	2
Fire setting	3	3	3

USUAL FREQUENCY	Last Year	Prior 18 yrs	Post 18 yrs
Not at all	0	0	0
Once or twice	1	1	1
Regular, on average 1 x month	2	2	2
Regular, more than once a month	3	3	3

HAVE YOU EVER BEEN INVOLVED IN SHOPLIFTING, JOY RIDING OR BREAK-INS? HOW OFTEN DID THAT HAPPEN? *(Note detail)*

USUAL FREQUENCY	Last Year	Prior 18 yrs	Post 18 yrs
Not at all	0	0	0
Once or twice	1	1	1
Regular, on average 1 x month	2	2	2
Regular, more than once a month	3	3	3

3. **CRUELTY TO PEOPLE**

HAVE YOU EVER BEEN CRUEL TO OTHER PEOPLE, LIKE TORMENTING THEM OR ATTACKING THEM OTHER THAN IN A FIGHT? *(Note detail)*

USUAL SEVERITY	Last Year	Prior 18 yrs	Post 18 yrs
None	0	0	0
Minor (no injury)	1	1	1
Marked (some injury)	2	2	2
Severe (serious injury)	3	3	3

USUAL FREQUENCY	Last Year	Prior 18 yrs	Post 18 yrs
Not at all	0	0	0
Once or twice	1	1	1
Regular, on average 1 x month	2	2	2
Regular, more than once a month	3	3	3

4. **CRUELTY TO ANIMALS**

HAVE YOU EVER BEEN CRUEL TO ANIMALS, LIKE TORMENTING THEM OR TRYING TO HURT THEM? *(Note detail)*

USUAL SEVERITY	Last Year	Prior 18 yrs	Post 18 yrs
None	0	0	0
Minor (no injury)	1	1	1
Marked (some injury)	2	2	2
Severe (serious injury)	3	3	3

USUAL FREQUENCY	Last Year	Prior 18 yrs	Post 18 yrs
Not at all	0	0	0
Once or twice	1	1	1
Regular, on average 1 x month	2	2	2
Regular, more than once a month	3	3	3

5. **DRINKING**

DO YOU DRINK ALCOHOL? DO YOU GET DRUNK, HOW OFTEN? HAVE YOU EVER HAD ANY BAD EXPERIENCES? *(Note detail)*

USUAL SEVERITY	Last Year	Prior 18 yrs	Post 18 yrs
No drinking	0	0	0
Mild, never drunk	1	1	1
Marked (drunk, but no violence or serious illness)	2	2	2
Severe (drunk, with violence or serious illness)	3	3	3

USUAL FREQUENCY	Last Year	Prior 18 yrs	Post 18 yrs
Not at all	0	0	0
Once or twice	1	1	1
Regular, on average 1 x month	2	2	2
Regular, more than once a month	3	3	3

6. SUBSTANCE ABUSE

HAVE YOU EVER USED DRUGS OR INHALED GLUE? WHAT DID YOU USE? *(Note detail)*

Cannabis.....Cocaine.....Heroin.....Speed.....

Glue.....LSD.....E.....Other.....
(Tick each substance used)

USUAL SEVERITY	Last Year	Prior 18 yrs	Post 18 yrs
None	0	0	0
Mild (no impairment)	1	1	1
Marked (some impairment)	2	2	2
Severe (major impairment)	3	3	3

USUAL FREQUENCY	Last Year	Prior 18 yrs	Post 18 yrs
Not at all	0	0	0
Once or twice (gave up)	1	1	1
Intermittent (will try again)	2	2	2
Regular user	3	3	3

7. POLICE INVOLVEMENT

HAVE YOU EVER BEEN IN TROUBLE WITH THE POLICE? *(Note detail)*

USUAL SEVERITY	Last Year	Prior 18 yrs	Post 18 yrs
No involvement	0	0	0
Mild, (eg. petty driving offenses)	1	1	1
Marked (questioned, cautioned)	2	2	2
Severe (charged)	3	3	3

USUAL FREQUENCY	Last Year	Prior 18 yrs	Post 18 yrs
Not at all	0	0	0
Once or twice	1	1	1
Regular, on average 1 x month	2	2	2
Regular, more than once a month	3	3	3

SOCIAL FUNCTIONING

1. **ACTIVITIES** - I WOULD LIKE TO TALK TO YOU ABOUT THE SORTS OF THINGS YOU LIKE TO DO.

   HOW DO YOU USUALLY SPEND YOUR SPARE TIME? WHO WITH?

   WHAT IS YOUR FAVOURITE PASTIME?

   DO YOU....*(Note each activity)*...

   Have a hobby .....

   Take part in sport .....

   Play a musical instrument .....

   Belong to any clubs .....

   Attend sports events .....

   Visit theatres, museum, concerts .....

   Listen to music .....

   Other .....

   Total number of activities:.....

   WHO DO YOU USUALLY SPEND YOUR SPARE TIME WITH?

Alone	0
Family (including cohabiting partners)	1
Friends (including non-cohabiting partners)	2
Acquaintances	3

2. FRIENDSHIPS

DO YOU HAVE ANY FRIENDS YOU MEET REGULARLY? WHAT ABOUT IN THE PAST? HAS THIS CHANGED AS YOU HAVE GOT OLDER?

Number of friends .....

Do you make friends easily? .....

Do you often fall out with your friends? .....

Have you got any long-standing friends? .....

3. ROMANTIC/SEXUAL RELATIONSHIPS

How many important relationships have you had? .....

How long did each last? .....

Why did they break down? .....

At what age did you become sexually active? .....

Do you currently have a partner/spouse? .....

Are you satisfied with your current relationship? .....

PRESENTATION TO SERVICES

Have you or your parents ever made use of the following services? *(Use space to make notes)*

EXTRA PROFESSIONAL TEACHING IN SCHOOL - *(hours per week, duration in months)*

PRIVATE EXTRA PROFESSIONAL TEACHING - *(hours per week, duration in months)*

EDUCATIONAL PSYCHOLOGIST - NO. OF CONTACTS

CHILD GUIDANCE CLINIC (NHS) - NO. OF CONTACTS

SOCIAL SERVICES - NO. OF CONTACTS *(social worker)*

GENERAL PRACTITIONER (NHS) - NO. OF CONTACTS

HOSPITAL DOCTOR *(referrals to psychiatric/psychological services - note number of contacts)*

PRIVATE PRACTITIONER *(Not GP or tertiary referrals - include allergist, acupuncturist, homeopathy etc.)*

Appendix C

AFI

MANUAL FOR

THE ADULT ADHD FUNCTIONING INTERVIEW

HOW TO USE THE MANUAL

The manual is intended as a guide only. No interviews should be carried out without training by an interviewer already experienced in using the AFI. Formal reliability checks also need to be undertaken.

This interview and manual has been adapted from the Parental Account of Childhood Symptoms [PACS] developed by Eric Taylor and Russell Schachar and revised in 1993 by Ellen Heptinstall for use with adolescents.

This manual describes the principles of the AFI interview as well as the various types of behaviour contained within it. Drawing from considerable experience of administering the interview both in the clinic and in the community, it highlights many aspects that might otherwise lead to uncertainty or insufficient insight. The manual also contains descriptions of situations commonly encountered. However, it is impossible to cover all possible situations or dilemmas that individual interviewers may come across. Whenever there is doubt about how to rate a particular behaviour, it is advisable to obtain the view of colleagues and arrive at a shared decision.

The manual and the interview schedule should be used so as to complement each other. Instructions regarding questioning are mostly contained in the manual, although the interview schedule provides some guidance too.

CONTENTS

CHAPTER 1

INTRODUCTION

At the beginning of the interview the individual should be asked some general questions such as why they are attending the clinic, what symptoms they have, how they view their difficulties and problems and how these impact on their life. They should also be asked about the strategies they adopt to cope with or compensate for their problems. They are then asked about their family history, in particular about any problems within their family of origin and creation (including psychopathology). It is important to acknowledge the problems and difficulties the individual describes, and any underlying distress they cause in order to put the individual at ease at this stage.

The front page of the interview records **general information** relating to the interview, e.g. the date, study number, name of interviewee, date and place of birth, age, present living arrangements and a space for either diagnostic classification and/or assignation to research group.

An area is provided to record test scores and summarise relevant information from questionnaires/interviews. For a comprehensive assessment of ADHD in adulthood it is recommended that the following areas are evaluated: cognitive functioning, personality, mood and affect, core symptomatology in childhood and adulthood, and a birth/developmental history. It is recommended that childhood symptoms are recorded using the Conners 10-Symptom Abbreviated Parent Questionnaire. This should be completed by an informant, preferably a parent or a family member who was familiar with the interviewee as a child.

There then follows a **blank page for notes** and description of the problem and a page to record **family information and history** of relevant family psychopathology. Family information pages should be viewed as prompts for relevant information relating to the individuals family of origin and family of creation.

CHAPTER 2

SCHOOL HISTORY

In this section information relating to the individual's school history should be explored, relating to academic achievement, attitude and behaviour problems and the individual's interaction with peers and teachers. If individuals can provide objective reports of childhood problems and behaviours (e.g. school reports, educational psychologist reports, Statement of Special Educational Needs reports, probationers reports) then information from these reports should be prioritised to make the ratings.

1. SCHOOL TYPE

1 State
2 Public/private
3 Special

Rate **state** if the person went to a regular state-run school including comprehensive and secondary modern schools. Rate **public/private** if the person went to a grammar or fee paying school (including boarding school). Rate **special** if the person went to a remedial or special school for children with learning and/or behavioural difficulties.

2. ACADEMIC PROBLEMS

0 No problems
1 Trivial
2 Definite but slight
3 Definite and marked

Rate **no problems** if the person reports not to have experienced any real difficulty in school subjects. Rate **trivial** if the person reports to have been weak in some subjects but was able to keep up with course work and had a conceptual understanding of the subject, such a person would still be passing in the subject but not find it as easy compared to other subjects. Rate **definite but slight** if the person reports to have experienced some difficulty in some subjects compared to others and this cause him/her to to struggle in this subject and fall behind in course work or exams in these subjects. Rate **definite and marked** if the person was failing in subjects to the extent that he/she needed remedial help and/or additional coaching provided by the school.

3. ATTITUDE PROBLEMS

0 No problems
1 Trivial
2 Definite but slight
3 Definite and marked

Rate **no problems** if the person reports that his/her parents did not get complaints about his/her attitude at school. For example he/she did not routinely break school rules or refuse to work. Rate **trivial** if the person reports that the school did periodically make complaints to parents for reasons such as being talkative, not wearing school uniform, hair being too long. Rate **definite but slight** if the teachers complained to parents about him/her working below ability because of his/her attitude to work, e.g. not handing in homework or coursework on time. Rate **definite and marked** if teachers had more serious complaints to make to parents for reasons such as refusing to work, playing truant or deliberately behaving in a disruptive or oppositional way.

4. BEHAVIOUR PROBLEMS

Tick whether there were specific complaints by teachers to parents regarding the child's behaviour relating to **disruptive behaviour** in class, **fighting; stealing** and/or **destroying things; daydreaming; withdrawal** and **playing the clown**. The total number of items should also be recorded.

5. PEER PROBLEMS

This refers to how the person got along with other pupils. Tick whether the individual reports he/she was **bullied or excessively teased; bullied other children; was excluded from activities by peers; did not mix with others at all** or did mix with others but **was part of a "bad" crowd** frequently getting into trouble and mischief. The total number of ticked items should also be recorded.

6. TEACHER PROBLEMS

Tick how the person got along with his/her teachers at school, particularly with respect to whether **he/she disliked or deliberately set out to annoy teachers**; **felt he/she was disliked and/or was victimised by teachers**; **was uncooperative with teachers** by not doing what he/she was told to do; or **threatened and/or swore at teachers**. The total number of items should also be recorded.

7. TRUANCY

3 Never
4 Some lessons only
5 Whole days
6 Whole weeks

These periods are given as guidelines only and the interviewer needs to question the person carefully and make sensible interpretations as to the amount of school missed overall. Rate **never** if the person reported never to have truanted from school. Rate **some lessons only** if on average in each year the person would miss lessons only rather than being away from school for whole days. If the person reports to have missed one or two days of school in his/her entire school history then this should also be rated as some lessons only. Rate **whole days** if the person would report to truant for one day at a time on a regular basis, this would include missing up to three lessons a week or one whole day each month. Rate **whole weeks** for major persistent truancy involving over one full day a week or 4 or more lessons per week on a regular basis.

8. SCHOOL REFUSAL

0 Never
1 Days only
2 As long as one week
3 Periods longer than one week

These periods are given as guidelines only and the interviewer needs to question the person carefully and make sensible interpretations as to the amount of school missed overall. School refusal does not include children staying at home and pretending to parents that they are too ill to attend school. School refusal is only rated in cases where the child categorically refused to go to school to parents or guardians. Rate **never** if the person reported never to have refused to go to school. Rate **days only** if on average in each year the person refused to go to school on the occasional day, for example it may have been the child's birthday, or the child may only have refused to attend school once or twice in their entire school history. Rate **as long as one week** if the person would report to refuse to go to school for seven days in the academic year. Rate **whole weeks** for major persistent school refusal resulting in the child regularly missing over one week's schooling each academic year.

9. CONTACT WITH THE EDUCATION AUTHORITY

It should be noted whether the school made **contact with the education authority** because of truancy or missing school.

10. SUSPENSIONS/EXPLULSIONS

0 Never
1 Suspended once
2 Suspended more than once
3 Any explusion

of suspensions and expulsions from school should be recorded here, including reasons for exclusion. Rate **never** if the person has never been expelled or suspended from school. Rate **suspended once** if the person has been suspended from school on one occasion only. Rate **suspended more than once** if the person has been suspended from school on more than one occasions and rate **any expulsion** if the person has been expelled or asked to leave a school on one or more occasions. The reason for suspensions and explusions should be noted.

11. AGE ON LEAVING SCHOOL

The **age** the person officially left school should be recorded here. If this was after completing GCSE's or their equivalent then this will usually be 16 years. If this was after completing 'A' levels at school then this will usually be 18 years. If the person left school after taking GCSE's (or their equivalent) and took 'A' levels at a college of further education, then the actual age they left school should be recorded and not the age they finished the 'A' level course at college. If a person was expelled or asked to leave prior to taking examinations, then the age they left school should be recorded.

12. FURTHER EDUCATION OR OCCUPATION ON LEAVING SCHOOL

0 Re-taking GCSE's or other (school or college)
1 Preparing for 'A' levels (school or college)
2 Other full-time education
3 Vocational training
4 Apprenticeship
5 YTS scheme
6 Job
7 Unemployed

What the person did on leaving school should be recorded here, including a description of full-time education. Rate **re-taking GCSE's** if the person returns to either school or college to re-take or do additional GCSE examinations (or their equivalent). Rate **'A' levels** if the person returns to school or goes to college to study 'A' levels. Rate **other full-time education** if the person goes to college or university or equivalent to do other full-time education studies. This will include sandwich courses. Rate **vocational training** if the person continues to do vocational training such going into the forces, or training to be a nurse (but not via a university course). Rate **apprenticeship** if the person becomes apprentice to a trade, such as carpenter or plumber. Rate **Youth Training Scheme [YTS]** if the person joins a government sponsored training

scheme or its equivalent. Rate **job** if the person is in full-time constructive employment (or part-time employment and not on income support). Rate **unemployed** if the person is not in constructive employment, regardless of whether he/she is drawing unemployment benefit, income support or invalidity benefit.

13. QUALIFICATIONS OBTAINED

The number of qualifications obtained both on leaving school and on subsequent study should be recorded here. It should also be noted whether an individual has not completed any further-education courses and, if so, the reasons for dropping out of study.

CHAPTER 3

OCCUPATIONAL HISTORY

Individuals should be questioned about the type of work they do and their employment history. Specifically it is aimed to get an idea of individuals' attitudes towards work, their level of motivation and interest in their job and amount of effort they put into their work. If dissatisfied with their job, then this should be explored as well as how they spend their time. Individuals should also be questioned about whether they are actively seeking a job. Questions should include their aims and ambitions for the future. If unemployed, they should be asked about the jobs they had in the past.

CURRENT EMPLOYMENT

1. JOB

A description of the person's current employment status should be recorded. **Unemployed** includes housewife or husband, people in prison, regional secure units or other institutions, and those people unable to work through invalidity. **Employed** includes people in full-time and part-time employment. If in part-time employment, and receiving benefits for low income, then **unemployed** should be recorded (e.g. for individual's working a few hours per week and includes work not impacting on state benefits). **Students** are in full-time education.

2. DESCRIPTION OF JOB

A detailed description of current employment, and the work this entails, should be described and rated as follows:-

777 people in full-time education (i.e. students) should be rated as "not applicable"
1 professional/managerial (business executives, lawyer, doctor)
2 vocational (teacher, nurse)
3 skilled non-manual (secretary, hairdresser)
4 skilled manual (carpenter, welder)
5 semi-skilled manual (general labourer, apprentice)
6 unskilled (shop assistant)
7 unemployed (houseperson, invalidity benefit, institution – such as prison or in a regional secure unit).

People working or studying part-time, but still receiving state benefits, should be coded as **unemployed.** If employed, a record should be made of whether this work is **full-time, part-time** or **other**.

3. TYPE OF OCCUPATION

The number of different types of full-time gainful employment should be recorded here. Jobs such as drug dealing or helping out a friend on a street market would not be included. The number of types of occupation are recorded, for example an individual may have been a lorry driver, worked in retail sales as a shop assistant, worked as a buyer for a retail store and been employed in a pub as bar staff. This would count as four different types of employment. Where an individual has been employed in different types of retail sales, i.e. fast food, supermarkets and chain stores, this would count as one type of employment. People need to be questioned carefully about their types of employment as a carpenter, hod carrier and scaffolder would for example count as three types of employment, whereas several periods of employment in general building work would count as one.

4. NUMBER OF JOBS

The number of full time jobs in which the person has been employed since leaving school should be recorded in months. If an individual gives an estimated number then the mid-point should be recorded. If this falls on an odd number, then this should be rounded up, e.g. 15-20 = 18.

5. LONGEST PERIOD EMPLOYED

The longest period a person was in full-time gainful employment should also be recorded in months. The mid-point should be taken for estimated periods. If this falls on an odd number, then this should be rounded up, e.g. 19-22 = 21.

6. PERIODS OF UNEMPLOYMENT

The number of periods of unemployment, for which an individual claimed unemployment benefit, should be recorded here. Individuals who are unable to work due to disability or invalidity (and who claim the appropriate respective benefit) should be included e.g. a person who is unemployed due to having back problems, and who receives benefit for these problems, should include this as a period of unemployment. The mid-point should be taken for estimated periods. If this falls on an odd number, then this should be rounded up, e.g. 16-21 = 19.

7. LONGEST PERIOD OF UNEMPLOYMENT

The longest single period a person has been unemployed should be recorded. In addition, the number of independent episodes of unemployment should be recorded in months. The mid-point

should be taken for estimated periods. If this falls on an odd number, then this should be rounded up, e.g. 9-12 = 11.

8. CURRENT UNEMPLOYMENT

0 Unemployed
1 Disability/invalidity
2 Children
3 Institution

A description of the person's reason for unemployment should be recorded. Rate **unemployed** if a person has chosen to be unemployed or who has been unsuccessful in getting a full-time job. Rate **disability/invalidity** if the person has some form of impairment which prevents them from working. Rate **children** if the person is a housewife or husband and looks after children at home. Rate **institution** if the person is unable to work because they are being held in prison or a regional secure unit.

9. OCCUPATION OF FAMILY MEMBERS

Individuals should be asked about the type of employment of family members, i.e. partner, parents, and siblings. Individuals should be asked for the job title in addition to a general description of what this work entails. For example, 'working in the travel industry' could be managerial, skilled or unskilled work. It may help to ask about the education of the target person e.g. someone working in the travel industry with a degree in marketing is more likely to be in professional/managerial category. Similarly, self-employed people should be rated according to the business they have and the type of work they do. Retired family members should be coded for their prior occupational status. **Unemployed** includes categories of housewife/husband, people claiming benefits as described previously, and individuals in institutions such as regional secure units and prison establishments. Full-time students should be coded as **777** ('not applicable').

777 Student
1 Professional/managerial
2 Vocational (teacher/nurse)
3 Skilled non-manual (secretary/hairdresser)
4 Skilled manual (carpenter/welder)
5 Semi-skilled manual
6 Unskilled (shop assistant)
7 Unemployed (house wife/husband, invalid, institution)

CHAPTER 4

ANTI-SOCIAL BEHAVIOUR

This section of the AFI focuses on a developmental perspective of conduct and substance abuse problems and provides three scales of anti-social behaviour:-

1) **In childhood (defined as prior to 18 years of age)**
2) **in adulthood (defined from 18 years of age)**
3) **during the past year**

If individuals have supplied objective reports relating to childhood conduct problems and/or later anti-social behaviour then priority should be given to this source of information for ratings (e.g. school reports, probationer reports, police/court reports).

Individuals are questioned about **frequency** and **severity** of antisocial behaviour **in childhood (prior to 18 years), in adulthood**, and **the past year**. Questions relate to verbal and physical aggression; use of a weapon, vandalism and fire-setting; theft (including shoplifting, joyriding, breaking and entering); mental cruelty toward others; cruelty to animals; and trouble with the police. Individuals are encouraged to describe specific incidents that come to mind and, through discussion and probing, an estimate of the average frequency and severity of behaviour in a typical year is made. Thus, ratings are made on four degrees of severity and frequency, **'0'** representing no problem behaviour, **'1'** representing mild or infrequent behaviour, **'2'** representing marked and regular behaviour (once a month), **'3'** representing severe and repetitive problem behaviour (more than once a month).

Severity – the most severe episode or incident for the year or in an average, typical year are recorded.

Frequency – the average number of episodes or incidents for the year or in an average, typical year are recorded.

The interviewer rates the individual's answers using an estimate of the average frequency and severity of such behaviours. If incidence of behaviour varies, e.g. the person reports that they fought on average once a month as a child of 6 years but only two or three times in a year as a child of 13 years, then the most frequent incidence should be rated i.e. rate **regular – on average 1 x month** for usual frequency, prior to 18 years of age. Details should be noted of specific incidents mentioned.

Questioning can take the following format:-

"How many fights have you had in the past year?". If the reply is "around seven" then this would be coded as **'2'** (regular, about 1 x month). If they replied "around four" then this would be coded as '**1**' (once or twice). The person is then asked "as an adult (since 18 years of age), would you say you have been involved in about the same number of fights per year?....more?....fewer?". Thus, through discussion and probing, an estimate of frequency of fights can be ascertained. For severity, the interviewer could say "Can you tell me about the kind of fights you got into? Did you ever sustain any injury? Did you cause injury? Was it just bruises and minor cuts to face and hands, or did the injury require visiting a doctor or hospital? What is the worst outcome from a fight you can remember?

1. AGGRESSION

VERBAL AGGRESSION

0 None
1 1 or 2 isolated episodes
2 3 or more episodes
3 At least monthly

Episodes of verbal aggression in which the person has engaged in serious arguments with other people outside the home ie. not family members, should be rated in this section. Examples might include occasions in which the person was abusive or threatening towards another person. Shouting, abuse and/or threatening behaviours must involve loss of temper and not be in the context of joking or bantering. Rate **none** if the person indicates that they have not engaged in any verbal aggression in the last year, during childhood or in adulthood. Rate **1 or 2 isolated episodes** where the person reports isolated incidents occurring in the last year, during childhood or in adulthood. Rate **3 or more episodes** if the person indicates that they have engaged in such acts on three or more separate occasions. Rate at least **monthly** if the frequency reached this level on average for the whole of the past year, prior to 18 years of age and post 18 years of age.

PHYSICAL AGGRESSION

Episodes of physical aggression outside the home i.e. not family members, should be recorded according to their usual severity and frequency. Specific incidents reported should be noted. It may be helpful to note aggressive acts toward family members but these should not be included in the rating system.

otherwise intimidate another person but has never used it. Rate **used weapon** if the person has used a weapon in a fight; either a weapon carried for this purpose, like a knife, or a weapon that comes to hand (like a piece of wood, a baseball-bat or a stone) on at least one occasion.

2. VANDALISM

Severity

0 No vandalism
1 Minor (little damage)
2 Major (serious damage)
3 Fire setting

This scale is concerned with episodes of vandalism (including grafitti) and/or fire-setting. Rate **none** if the person reports never having engaged in vandalism in the past year, prior to 18 years of age and post 18 years of age. Rate **minor (little damage)** if the person reports having engaged in some destructive acts. These might include damaging fences or hedges, letting down people's tyres, knocking over estate agents boards and a whole range of minor vandalism and trouble-making of a kind often seeming to arise from persistent boredom and as a by-product of irresponsible behaviour or other activities. Rate **major (serious damage)** if the person reports having engaged in more serious acts of vandalism, such as window breaking, scratching cars, breaking car windscreens or other acts of deliberate destruction. Rate fire-setting if the person indicates episodes of **fire-setting**, regardless of whether these episodes resulted in serious damage, in the past year, prior to 18 years and post 18 years of age.

Frequency

0 Not at all
1 Once or twice
2 Regular, on average 1 x month
3 Regular, more than once a month

The average frequency of vandalism is recorded. So, for example, if the person reports committing acts of vandalism or fire-setting on average once a month as a child of 8 years, but only two or three times a year as a child of 16 years, rate the overall frequency for prior to 18 years as **regular, more than once a month**. Rate **not at all** if the person reports not to have engaged in any vandalism. Rate **once or twice** if the person reports isolated incidents of vandalism. Rate **regular, on average 1 x month** if the person indicates that they have engaged in acts of vandalism once a month. **Rate regular, more than once a month** if the person reports committing acts of vandalism at least once a month or more in the past year, prior to 18 years of age and post 18 years of age.

SHOPLIFTING, JOY-RIDING, BREAK-INS

0 Not at all
1 Once or twice
2 Regular, on average 1 x month
3 Regular, on average more than once a month

Rate **none** if the person reports that they have never engaged in shoplifting, joy-riding or break-ins, in the past year, prior to 18 years of age and post 18 years of age. Rate **once or twice** if the person reports isolated incidents of shoplifting, joyriding or break-ins (including derelict or otherwise unoccupied property). It should also be noted that many children engage in some petty pilfering (for example, sweets from the local shop) during childhood and so the interviewer should question the person closely regarding episodes of shop-lifting prior to 18 years of age. Rate **regular, on average 1 x month** if the person reports shoplifting, joy-riding or break-ins in on average once a month. Rate **regular, on average more than once a month**, if the person reports regularly shoplifting, joy-riding or breaking into property at least once a month in the past year, prior to 18 years of age or post-18 years of age.

3. CRUELTY TO PEOPLE

Severity

0 None
1 Minor (no injury)
2 Marked (some injury)
3 Severe (some injury)

This scale is concerned with episodes of mental cruelty to people, other than in the context of a fight. For example, bullying or tormenting someone. Rate **none** if the person reports never having engaged in such acts of cruelty towards another person. Rate **minor (no injury)** if the person reports some isolated episodes of cruelty although no upset of injury was sustained by another person. Rate **marked (some injury)** if the person reports committing acts of cruelty to another person which resulted in some form of injury being inflicted on the other person (e.g. provoking the other person to become tearful and/or distressed). Rate **severe (some injury)** if the person admits to committing serious acts of cruelty to another person which resulted in injury being sustained (e.g. leaving school or job).

Frequency

0 Not at all
1 Once or twice
2 Regular, on average 1 x month
3 Regular, on average once a month

It is important to rate the average frequency of mental cruelty to other people is recorded. For example, if the person reports being cruel to an another person on average more than once a

month as a child of 8 years, but only two or three times a year as a child of 16 years, rate the overall frequency for prior to 18 years as **regular, more than once a month**. Rate **not at all** if the person reports not to have engaged in any cruelty to another person in the past year, prior to 18 years of age or post-18 years of age. Rate **one or twice** if the person reports isolated incidents cruelty. Rate **regular, on average 1 x month** if the person indicates that they have been cruel on average once a month. **Rate regular, more than once a month** if the person admits to acts of cruelty more than once a month in the past year, prior to 18 years of age and post 18 years of age.

4. CRUELTY TO ANIMALS

Severity

0 None
1 Minor (no injury)
2 Marked (some injury)
3 Severe (serious injury)

Rate **none** if the person reports no cruelty to animals. Rate **minor, (no injury)** if the person reports a single incident in which the person has caused some, but not serious, hurt or injury to an animal through, for example, unintentional, excessive use of force. Rate **marked (some injury)** if the person reports deriving pleasure from tormenting or hurting animals in such a way as to cause minor, but definite, pain or distress to an animal. Rate **severe (serious injury)** only for those cases in which the person reports gaining malicious and sadistic pleasure from inflicting pain and suffering on animals.

Frequency

0 Not at all
1 Once or twice
2 Regular, on average 1 x month
3 Regular, more than once a month

The average frequency of cruelty to animals is recorded. For example, if the person reports being cruel to an animal on average more than once a month as a child of 8 years, but only two or three times a year as a child of 16 years, rate the overall frequency for prior to 18 years as **regular, more than once a month**. Rate **not at all** if the person reports not to have engaged in any cruelty to animals. Rate **one or twice** if the person reports isolated incidents of cruelty. Rate **regular, on average 1 x month** if the person indicates that they have been cruel to animal approximately once a month. **Rate regular, more than once a month** if the person admits to acts of cruelty at least once a month in the past year, prior to 18 years of age and post 18 years of age.

5. ALCOHOL

Severity

0 No drinking
1 Mild, never drunk
2 Marked (drunk, but no violence or serious illness)
3 Severe (drunk, with violence or serious illness)

Rate **none** if the person reports not drinking alcohol in the past year, prior to 18 years of age or post 18 years of age. Rate **mild, never drunk** if the person reports having had the occasional drink. Rate **marked (drunk, but no violence or serious illness)** if the person reports drinking enough to make them feel drunk or 'merry', but not to cause them to be violent or seriously ill. **Rate severe (drunk, with violence or serious illness)** if the person reports episodes in which they drank enough to feel drunk and, as a result behaved in a way they would not normally behave (and possibly regretted later). For example, they may have became violent (even if no injury to themselves or another person was sustained, or property damaged), seriously ill or performed criminal and/or reckless acts.

Frequency

0 Not at all
1 Once or twice
2 Regular, on average 1 x month
3 Regular, on average more than once a month

Rate **not at all** if the person reports never drinking in the past year, prior to 18 years of age or post 18 years of age. Rate **once or twice** if the person reports drinking alcohol on one or two occasions – for example, they may have tried drinking prior to 18 years of age but did not engage in drinking regularly until they were post 18 years of age. Rate **regular, on average 1 x month** if the person reports drinking more than once in a month. Rate **regular, on average more than once a month** if the person indicates they drink regularly – for example, on a weekly basis.

6. SUBSTANCE ABUSE

No/Yes Cannabis
No/Yes Cocaine (including crack cocaine)
No/Yes Heroin
No/Yes Speed/Amphetamine
No/Yes Glue & Solvents
No/Yes LSD
No/Yes E – Ecstasy
No/Yes Other

Individuals are asked about the drugs they have ever used (regardless of whether this was experimental or regular use). 'Other' may include drugs such as magic mushrooms, morphine,

amyl nitrate, or any prescribed medication used as a drug of abuse. It may be helpful to question the person closely regarding their use of amphetamines – for example, how it made them feel, changes in behaviour, ability to concentrate etc.

Severity

0 None
1 Mild (no impairment)
2 Marked (some impairment)
3 Severe (major impairment)

Rate **none** if the person indicates they have never taken any illicit drugs, even experimenting, in the past year, prior to 18 years of age or post 18 years of age. Rate **mild (no impairment)** if the person reports occasionally taking drugs, or experimented with them, but suffers no obvious impairment. Rate **marked (some impairment)** if the person reports taking any drugs that cause them to be in some way either cognitively or physically impaired (e.g. taking days off sick from work; poor concentration; spending a disproportionate time in bed). Rate **severe (major impairment)** if the person reports suffering major impairment (either cognitive or physical) including, for example, withdrawal symptoms or dependency. Impairment is defined as causing personal, social and/or occupational handicap. In such cases an individual may not be able to engage in normal daytime activities, they may have poor motivation and need to take drugs to function normally.

Frequency

0 Not at all
1 Once or twice (gave up)
2 Intermittent (will try again)
3 Regular user

Rate **not at all** if the person reports never having taken any illicit drugs in the past year, prior to 18 years of age or post 18 years of age. Rate **once or twice (gave up)** if the person reports having experimented with some drugs, perhaps as a youngster, but did not continue (because they didn't like the effect etc.). Rate **intermittent (will try again)** if the person reports occasional drug use that is ongoing but not regular. Rate **regular user** if the person reports regularly using drugs e.g. on a monthly basis, regardless of whether they report suffering impairment or not.

7. POLICE INVOLVEMENT

This scale is concerned with both the frequency and nature of police contact the person has experienced – in the previous year, prior to 18 years of age and post 18 years of age. Details should be noted of any specific incidents reported by the person and outcome of police involvement.

Severity

0 No involvement
1 Mild (e.g. petty offences)
2 Marked (questioned, cautioned)
3 Severe (charged)

Rate **none** if the person reports having had no contact with the police in the previous year, prior to 18 years of age or post 18 years of age. Rate **mild (petty offences)** if the person reports occasional incidents such as speeding offences. Rate **marked (questioned, cautioned)** if the person has had police contact resulting in them being questioned or cautioned about an offence (whether petty or serious), even if they were not subsequently charged. Rate **severe (charged)** if the person reports police contact that has resulted in charges being brought against them (regardless of the nature of the offence).

Frequency

0 Not at all
1 Once or twice
2 Regular, on average 1 x month
3 Regular, more than once a month

Rate **not at all** if the person reports never having any police contact in the previous year, prior to 18 years of age or post 18 years of age. Rate **once or twice** if the person reports that they have had occasional contact with the police (regardless of the nature of the offence and including being questioned by the police). Rate **regular, on average 1 x month** if the person reports regular contact with the police, regardless of whether this is for serious or petty offences. Rate **regular, more than once a month** if the person reports contact with the police occurring several times a month, regardless of the nature of the offences.

CHAPTER 5

SOCIAL FUNCTIONING

This section is concerned with the person's social functioning. The individual should be asked about how they like to spend their spare time and with whom, and what is their preferred leisure activity.

The friendship section focuses on the nature of the person's friendships, and their ability to make and sustain friendships. Family members (e.g. cousins, siblings) are NOT included in this section. Some information relating to childhood friendships may have already been explored within the section relating to school history and it should be noted if a person reports that they found it difficult to make friends at school but experience no such problems in adulthood. Conversely, the opposite may also be true. The person should therefore be questioned closely as to the precise nature and developmental course of their friendships.

The intimate relationships section deals with the person's romantic and sexual relationships with other people. A tendency toward disorganisation, poor motivation and aggressive impulsive behaviour is likely to negatively impact on family dynamics and the aim of this section is to assess the impact of the individual's difficulties/problems on their intimate relationships. For example, an individual may have a consistent pattern of dysfunctional intimate relationships. This could be for many reasons - relationships may be volatile; a person may become violent and flash in and out of mood states; the individual may have low self-esteem, and lack confidence. It is interesting to know who usually ends the relationships and whether these are mutually negotiated. They may engage in a frequent number of intense relationships that break down after a few weeks' duration.

1. ACTIVITIES

The interviewer asks questions about how they spend their leisure time, and with whom. Details should be noted of particular hobbies, activities and interests in which the person regularly participates. It is intended to ascertain whether individuals engage in constructive leisure activities, e.g. sports, club memberships, as opposed to non-constructive activities (e.g. watching television, staying at home listening to music). It is also of interest whether they mix with others or tend to engage in lone pursuits (e.g. listening to music alone, playing solitaire). Some interests could be either social or lone pursuits, such as horseriding or playing golf, as these can be performed in a group setting and/or with individual friends. They can also be solo interests.

Yes/No	Have a hobby
Yes/No	Take part in sport
Yes/No	Play a musical instrument
Yes/No	Belong to any clubs
Yes/No	Attend sports events
Yes/No	Visit theatres, museums, concerts
Yes/No	Listen to music
Yes/No	Other

Other might include activities such gardening, playing on a computer ('surfing the net' etc.). The total number of activities should also be recorded.

SPARE TIME

0	Alone
1	Family (including cohabiting partners)
2	Friends (including non-cohabiting girlfriends/boyfriends)
3	Acquaintances

Rate **none** if the person reports that they spend most of their spare time alone. Rate **family** if the person indicates that they spend most of their spare time with cohabiting partners and/or other family members. Rate **friends** if the person indicates that they spend most of their spare time with friends (including girlfriend/boyfriend with whom they do not cohabit) and rate **acquaintances** if the person reports that they spend time with people whom they know but do not regard as close friends, such as social events with a football team, team sports, meeting people at the local pub but with whom they have made no prior arrangement to meet.

2. FRIENDSHIPS

The individual should be asked about the **number of friends** they have. This refers to how many *close friends* the person has and with whom they are in *regular contact*. Family members (e.g. cousins, siblings) are not included. Regular contact is defined as either telephone contact or face-to-face meetings on at least on a monthly basis. Friendships that are generated and maintained only via electronic sources are not included, e.g. a friend made on the internet and with whom they are in daily contact but with whom they have never met. In cases when individuals give a high number of close friends (say 15-20), the interviewer should probe for further information to assess the quality of these relationships e.g. a person may be nominating members of a football team as all close friends because he plays with them once a week. The interviewer should then probe for how much contact there is with team players outside of the weekly game in order to differentiate between acquaintances and close friends. If the person insists that they are all close friends then it is the interviewee's rating that is recorded. If the person claims to have no close friends, reasons why should be examined to establish whether the individual is a loner by choice or because he has difficulty sustaining friendships.

The interviewer should also establish the degree to which the person **easily makes friends** and **falls out with friends**. In this way, the interviewer aims to ascertain turnover of friendships and whether a person finds it hard to make friends in the first place, or whether a person finds this aspect easy but finds it hard to maintain reciprocal friendships. For example, does the person readily make friends but seem unable to sustain friendships over any period of time. If so, why? Why do friendships end? Is it because their friends move on, breaking the friendship? Is it because of their behaviour toward other people?

The interviewer then asks whether the person has any **long-standing friends.** It is important that the longest-standing friend is nominated from *the number of friends the person is in regular contact with* (i.e. the first question). Thus, a friend of 20 years, with whom the person meets infrequently, is not included here. For example, the interviewer may ask "How many friends do you consider yourself to have, with whom you are in regular contact, you may meet or speak with on the phone, at least monthly".....this would be followed by...."Of those friends, who is the longest-standing friend? How long have you been friends for?".

3. ROMANTIC/SEXUAL RELATIONSHIPS

The person should be questioned about how many **significant or important relationships** they have had (other than family members or platonic friends). It is important to emphasise that this is their perception of 'significant' and not a temporal measure. For example, the person may consider a relatively intense, but short-term, relationship to have been significant. The **duration** of each relationship, and the **reason they broke down** should also be clarified.

The interviewer should ask at **what age the person became sexually active**. Individuals, especially girls, may have engaged in intimate relationships at a young age (say 12/13 years) and continue to behave in a promiscuous way in an attempt to make friends and attract the interest of others. A lack of confidence in relationships may alternatively be expressed as avoiding intimate and sexual relationships – they may not commence sexual relationships until they are in young adulthood, say in their mid-twenties. The person should be asked whether they have a **current partner or spouse** and, if so, whether they are **satisfied with this relationship**. This may be a sensitive area and the interviewer should carefully explore with the person sources of dissatisfaction.

CHAPTER 6

PRESENTATION TO SERVICES

This section focuses on the individual's presentation to clinical and education services since childhood. Information should be elicited from referral notes, as well as direct questioning of the person.

Details are recorded for **extra professional teaching provided by the school** and/or **extra private professional teaching** paid for by parents. For each, the number of subjects should be recorded, as well as the number of episodes of teaching e.g. reading (age 7 years), maths (age 10 years), English (age 10 years), maths (age 15 years). The number of interventions involving an **educational psychologist** should also be recorded (including privately requested assessments).

Whether an individual has had contact with **child guidance clinics** should be detailed, as well as contact with **social services** (either as a child and/or as an adult).

A person is asked on how many occasions they have visited their **NHS GP** for non-physical reasons, such as stress, anxiety, depression. Also included here are times they may have visited their GP for physical reasons, e.g. migraine, fatigue, and been told by the GP that the underlying problem is due to psychological problems (e.g. stress, anxiety, depression). Each separate episode is recorded and not the actual number of appointments per episode.

Non-physical contacts with **hospital or community services** should be recorded, such as referrals to psychiatric/psychology services (either primary or tertiary referrals). Thus for every contact recorded here, one contact is potentially recorded in the prior GP section (e.g. four GP referrals to hospital and/or community psychiatric services should be also recorded as four GP presentations). Private GP referrals to psychiatric/psychology services should also be included here. Treatment in primary care is also included here.

Consultation with a **private practitioner** refers to visits to professionals that are <u>not</u> referred by GP or tertiary services. These include private psychotherapy and counselling sessions that are funded by the individual. Also included are visits to allergists, homeopathists, acupuncturists, Chinese herbalists, cranial osteopaths etc.

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Appendix D

DSM-IV CHECKLIST OF SYMPTOMS

In the past 6 months, do you think you have had the following problems:-	Never	Sometimes	Often
INATTENTION			
1. Fail to give close attention to details or made careless mistakes in studying, work or other activities?			
2. Have difficulty sustaining attention in tasks or leisure activities?			
3. Do not seem to listen when spoken to directly?			
4. Do not follow though on instructions and fail to finish studies. chores or duties in the workplace (not due to oppositional behaviour or failure to understand instructions)			
5. Have difficulty organising tasks and activities			
6. Avoid, dislike, or reluctant to engage in tasks that require sustained mental effort (e.g. studying, homework, chess)			
7. Lose things necessary for tasks or activities (e.g. pens, books, tools, study papers)			
8. Are easily distracted by outside events and stimuli			
9. Forgetful in daily activities			
A. Six or more inattention items rated often			**yes....no**
HYPERACTIVITY			
1. Fidget with hands or feet or squirm in seat			
2. Leave seat in situation in which remaining seated is expected (e.g. classes, cinema)			
3. Feelings of restlessness, especially in situations in which it is inappropriate			
4. Have difficulty playing or engaging in leisure activities quietly			
5. Feel "on the go" or often act as if "driven by a motor"			
6. Talk excessively			
IMPULSIVITY			
7. Blurt out answers before questions have been completed			
8. Have difficulty waiting turn			
9. Interrupts or intrudes on others (e.g. butts into conversations)			
B. Six or more hyperactivity/impulsivity items rated often			**yes....no**
SYMPTOM CRITERIA MET (items A and B rated yes)			**yes....no**

For ADHD diagnosis, the following criteria must be met:-

A.	Symptom criteria met	YES.....NO
B.	Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.	YES.....NO
C.	Some impairment from the symptoms is present in two or more settings (e.g. at school/work and at home)	YES.....NO
D.	There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.	YES.....NO
E.	The symptoms do not occur exclusively during the course of a Pervasie Developmental Disorder, Schizophrenia or other Psyhcotic Disorder and are not better accounted for by another mental disorder (e.g. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).	YES.....NO
	DIAGNOSIS OF ADHD (A, B, C, D and E are rated yes)	YES.....NO

Appendix E

CONNERS 10-SYMPTOM ABBREVIATED PARENT QUESTIONNAIRE

Please tick one box in each row indicating the degree of activity **AS A CHILD** (by age 7).

	Not at all	**Just a little**	**Pretty much**	**Very much**
1. Restless or always up and on the go				
2. Excitable, impulsive				
3. Disturbed other children				
4. Failed to finish things				
5. Restless in the squirmy sense				
6. Distractible, or attention span was a problem				
7. Easily frustrated in errors				
8. Cried often and easily				
9. Mood changed quickly and drastically				
10. Temper outbursts, explosive and unpredictable behaviour				

Appendix F

BIRTH AND DEVELOPMENTAL HISTORY QUESTIONNAIRE

If birth and developmental history are reported to be atypical, then note what the problems were:

	YES	NO
1. Did the pregnancy go to term? (If the baby was born before term, i.e. early, then yes should be ticked)		
2. Was the delivery normal? If not normal please indicate whether delivery was:- Ceasarian section birth Breech birth		
3. Did the baby have to be resuscitated at birth?		
4. Was the baby born with the cord around his/her neck?		
5. Did the child suffer from any serious childhood diseases, such as meningitis, septicaemia, encephalitis?		
DEVELOPMENTAL MILESTONES	**Early or on time**	**Late**
6. Sitting (6 months)		
7. Crawling (9 months)		
8. Walking (12 months)		
9. Talking (24 months)		

Appendix G

CONNERS 10-SYMPTOM ADULT QUESTIONNAIRE

Please tick one box in each row indicating the degree of activity **AS AN ADULT**

	Not at all	Just a little	Pretty much	Very much
1. Restless or overactive				
2. Excitable, impulsive				
3. Disturbs other people				
4. Fail to finish things started - short attention span				
5. Constantly fidgeting				
6. Inattentive, easily distracted				
7. Demands must be met immediately, easily frustrated				
8. Cry often and easily				
9. Mood changes quickly and drastically				
10. Temper outbursts, explosive and unpredictable behaviour				