PERSONALITY STYLES OF ADOLESCENTS PREVIOUSLY DIAGNOSED WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER

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ABSTRACT

This thesis tests the hypothesis proposed by Liemkuhler (1994) relating to the development of a cluster of personality styles among ADHD adolescents. Liemkuhler suggests that it is a neurobiological dysfunction, through its interaction with psychodynamic and cognitive processes that predisposes the ADHD adolescent to the development of certain personality styles. An absence of appropriate intervention and support increases the risk of these personality styles developing into clinical syndromes.

To determine whether differences in personality styles do exist between ADHD adolescents and adolescents without ADHD, the NEO Five Factor Inventory (NEO FFI) was group administered to a sample of 25 adolescents who were previously diagnosed as having ADHD (referred to as the 'research group') and 25 controls (referred to as the 'control group') who were matched for age and educational level. Five testable hypotheses were formulated for each of the five personality scales.

A comparison of each of the five scales between the research group and the control group yielded no significant result to support Liemkuhler's hypothesis. However, a comparison of the five scales within each group (either the research group or the control group) produced several significant differences. Significant correlations were also found between scales for each group. On the basis of these results it is suggested that specific differences in the facets (traits) that are measured by each of the five personality scales may exist for each group, as opposed to overall group differences in personality styles. It is further proposed that the facets that are tapped may be explained on the basis of assumed differences in the neurobiological and cognitive functioning of both groups.

It is tentatively concluded that the results may provide partial support for Liemkuhler's hypothesis. However, it is acknowledged that the complexity of Liemkulher's argument warrants further and more detailed research.

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DECLARATION

This whole thesis, unless specifically indicated to the contrary in the text, is my own original work.

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NOTE ON TERMINOLOGY

The term Attention Deficit Hyperactivity Disorder (ADHD) is used in this thesis to refer to all attention disorders and all categories of ADHD, unless otherwise indicated.

It is not the author's intention to imply that the ADHD disorder itself is the primary characteristic in identifying those adolescents who display any number of the diagnostic symptoms, especially in view of the problems associated with diagnosis and labelling. As far as possible, care has been taken to limit reference to the research group in a manner than may be offensive. However, given the focus of this research study, there are instances in which the use of diagnostic labels to describe adolescents with this disorder are unavoidable.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ADD	Attention Deficit Disorders
ADD/noH	Attention Deficit Disorder without Hyperactivity
ADDES	Attention Deficit Disorders Evaluation Scale
ADDH	Attention Deficit Disorder with Hyperactivity
ADHD	Attention-Deficit Hyperactivity Disorder
ADHD-HI	Primarily hyperactive-impulsive subtype
ADHD-IA	Primarily inattentive subtype
APA	American Psychiatric Association
ASQ	Abbreviated Symptom Scale
CBL-TRF	Teacher Report Form of the Child Behavior Checklist
CD	Conduct Disorders
CHADD	Children and Adults with Attention Deficit Disorders
CTQ	Connors Teachers Questionnaire
DBRS-SF	Devereux Behavior Rating Scale – School Form
DISC-II	Diagnostic Interview Schedule for Children
DSM	Diagnostic and Statistical Manual of Mental Disorders
ICD-9	International Classification of Disease – 9th edition
MBD	Minimal Brain Dysfunction
NEO PI-R	Revised NEO Personality Inventory
NEO-FFI	NEO Five Factor Inventory
ODD	Oppositional Defiant Disorders
U-ADD	Undifferentiated Attention Deficit Disorder

LIST OF APPENDICES

CHAPTER ONE

INTRODUCTION TO THE RESEARCH PROBLEM

1.1. Introduction to Attention Deficit Hyperactivity Disorder (ADHD)

Despite the protracted process leading to the recognition of Attention Deficit Hyperactivity Disorder (ADHD) as a distinguishable disorder, there has recently been a great impetus in the research undertaken and literature written regarding various aspects of the disorder, to the extent that knowledge of the disorder and its primary characteristics, is not limited to professionals, but includes members of the general public. The experiences of individuals displaying symptoms of ADHD, their families, and other persons interacting with them, are well documented. Hinshaw (1994) argues that the interest and research generated in ADHD is a consequence of the high number of children 'identified' with behavioural difficulties within the compulsory schooling system, that depends on self-contained behaviour in large groups and prolonged periods of sustained attention for its efficient regulation and management.

ADHD is a term used to describe a disorder that includes the following developmentally inappropriate behavioural symptoms: inattention, poor concentration, disorganisation, hyperactivity, and impulsivity. An individual diagnosed with such a disorder need not display all of the above behavioural symptoms, and the diagnosis may fall into one of three subtypes: a predominantly

inattentive type (ADHD-IA), a predominantly hyperactive/impulsive type (ADHD-HI), or a combined type (ADHD/ADHD-C) (American Psychiatric Association, 1994). The diagnostic criteria of these subtypes are described in Chapter Two. For now, it would be useful to explain what is implied by the terms: 'hyperactivity', 'impulsivity', and, 'inattention'. Although the symptoms of the disorder manifest in different behaviours in the various stages of life, the underlying core symptoms described below remain the same.

Hyperactivity refers to the level of gross motor activity and is the most noticeable characteristic of the disorder. Hyperactive children are often described as having boundless energy and are constantly engaged in some activity, usually unstructured. Their inability to conform to behavioural and social norms established within the classroom, at home, and other social contexts implies that they are frequently labeled 'disruptive' (Goldstein and Goldstein, 1990).

Impulsivity refers to the degree to which the individual acts without considering the consequences of his/her behaviour. Impulsive children usually respond to questions before hearing or reading the whole question. They shout out answers and interrupt others without realising the social consequences of their actions (American Psychiatric Association, 1994).

Inattention refers to an individual's inability to attend to or concentrate on a task. Children who are inattentive are usually distracted from the task at hand, and begin more activities than they complete. This does not imply that they are unable to sustain

their concentration for significant periods of time if the task at hand is found interesting enough (Wender, 1995).

Over the years, the amount of research invested in the area of ADHD has generated a plethora of literature. A major part of this literature revolves around childhood functioning since it was initially considered a psychiatric disorder unique to childhood. It is now concluded that ADHD may persist into adolescence and adulthood but manifests in other behavioural symptoms (Wender, 1995). Lerner, Lowenthal, and Lerner (1995) report that studies suggest that this is true for approximately 50% of children diagnosed as having ADHD. Yet there exists a paucity of research in the field of adolescents who display the symptoms associated with this disorder. Much of the information about ADHD and adolescent functioning is inferred from epidemiological studies done on children, and from the research findings on the adult population. It must be noted however, that the findings of some studies are questionable due to issues of methodology and data collection (Barkley & Biederman, 1998). In addition the link between the increased prevalence rate among the adult population and the use of methylphenidate (*Ritalin*™) may compromise research findings, since its action in the neurochemical system may obscure 'true' symptoms or behaviours.

A further problem relates to the lack of consensus regarding the aetiology of the disorder, although current conceptualisation leans toward neurobiological theories. A clearer understanding exists of the behavioural symptoms of the disorder, and importantly, their effects on an individual's functioning within different domains.

Impairment in functioning for an adolescent with this disorder includes difficulties with achievement in school, defiance, aggression, and other antisocial behaviours (Hinshaw, 1994). These factors may contribute to the development of personality styles as proposed by Liemkuhler (1994).

1.2. Rationale for the Present Study

This research study was motivated by an interest in the subject of attention disorders that was heightened by an article by Liemkuhler (1994) who proposed a link between attention disorders and the development of certain personality styles. This hypothesis states:

> ...that a developmental, psychodynamic process interacts with the neurochemical and neurocognitive substrate of ADD to produce a changing, emerging clinical syndrome over time. As some of the more overt behavioral and cognitive symptoms resolve around puberty, the latent impact on personality development may become apparent in the turbulent psychosocial crises of adolescence.

The researcher, who is an educator in a special school with a substantial number of children and adolescents diagnosed with this disorder, was intrigued by the idea of the existence of distinct personality styles. The idea that children and adolescents displaying symptoms of ADHD are more predisposed to the development of clinical syndromes than children without the disorder, coupled with the high statistical

incidence of the disorder prevailing into adulthood suggests that a fair percentage of this group may be at risk to leading dysfunctional lives.[1] School life consumes a large part of adolescent functioning. A better understanding of the 'personality styles' that these adolescents may develop would provide useful information in the formulation of educational policies and strategies that are more supportive of and more conducive to these learners.

1.3 Chapter Outline

The overall aim of this thesis is to determine if adolescents who have been diagnosed as having ADHD exhibit a distinct cluster of personality styles as proposed by Liemkuhler (1994). However, there are many aspects to personality development that are implicated in Liemkuhler's hypothesis, and the actual process of this development is not detailed. Each chapter in the literature review attempts to unravel a particular aspect of this hypothesis, and contributes to a model of ADHD personality development that is proposed in Chapter Four.

The review begins by taking a more in-depth look at the disorder itself. Chapter Two examines the controversy that surrounds it by tracing the history of its diagnostic classification, and by examining the problems encountered in determining accurate prevalence rates. The extent to which the diagnostic classification itself may have contributed to the high prevalence rates is also considered. In presenting the problems

[1] The high prevalence rates reported in the literature are based mainly on studies done in the USA. Nonetheless, the issues that are raised are applicable to the South African context, especially within the educational sphere.

with the definition of ADHD, Chapter Two questions the applicability of the present diagnostic criteria to adolescents. This is an important consideration because it reflects the ongoing debate concerning the extent to which environmental factors (in this instance, the diagnostic criteria as determined by a group of people) influence who and how many are diagnosed with this disorder.

This argument is taken further in Chapter Three where the neurobiological basis of ADHD is considered. Neurobiological theories are not only popular at present, but are implicated in Liemkuhler's argument (1994). This chapter describes possible neurobiological problems that may produce certain behaviours that contribute to the development of the personality styles suggested by Liemkuhler. It begins with a basic overview of brain functioning, with a focus on the sites thought to play a part in the regulation of attention. Current neurobiological theories of ADHD are examined thereafter. Some of the possible aetiologies proposed for the brain dysfunction and ways in which this manifests in observable neuropsychological behaviour as documented in relevant studies are presented.

Chapter Four sets out to determine how certain personality styles may develop in adolescents who display symptoms of the disorder based on the neurobiological impairments described in Chapter Three. Liemkuhler's (1994) hypothesis also emphasises cognitive, psychodynamic and environmental factors. Before considering each of these aspects, a general definition of personality is proposed. Personality development is then considered from three perspectives, each corresponding to one of the aspects listed above. These are Piaget's theory of cognitive development,

Winnicott's psychodynamic theory of the good-enough mother, and contextual theories. Thereafter, the concept of *ADHD personality* or cluster of personality styles as proposed by Liemkuhler is specifically examined. Links between the different theories in relation to personality development in adolescents with ADHD are established, based on the five-factor theory of personality. The author offers a model of personality development that may arise due to the symptoms associated with the disorder. This model provides the basis for the hypotheses that are formulated and listed in Chapter Five.

Chapter Five also describes the process of data collection and outlines the methodological aims. The results are presented in Chapter Six using descriptive and inferential statistics, while Chapter Seven discusses these results in light of the literature reviewed. The limitations of the present study are considered and recommendations are made for future studies. Chapter Eight summarises the main findings and conclusions of this study.

Finally, it must be noted that it is not the author's intention to dismiss the complexity of ADHD, nor simplify the controversy that surrounds it. Many important and interesting issues and debates are only touched upon in the literature review. This lack of emphasis should not be construed as an indication of unimportance, but rather as falling outside the scope of this thesis topic.

CHAPTER TWO

DEFINING ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

"No scientific undertakings or hypotheses are completely divorced from the social values of their time and place."

Barkley, R.A. cited in Diller, 1998, p.312

2.1. The Controversy Surrounding Attention Deficit Hyperactivity Disorder (ADHD)

The past decades have seen numerous changes in the conceptualisation of, the criteria for, and the actual names of, the syndrome currently termed Attention Deficit Hyperactivity Disorder (ADHD). Each change was reflective of the dominant perceptions and understanding of the disorder at the time, and channelled research in corresponding areas that advocated various types of treatment. These changes, which are discussed briefly in the following section, have also been influential in the current conceptualisation of the disorder, and may be at the root of the controversy that surrounds it (Wender, 1995). The lack of consensus among theorists and researchers regarding the aetiology of the disorder adds to the controversy. Suggested aetiologies include genetic, biochemical, neuroanatomical, and environmental factors. At present, the dominant stance is that of a neurobiological basis for ADHD.

This chapter briefly examines the historical nosology of the disorder and highlights the current diagnostic criteria used and the corresponding subtypes. In the year 2000, the National Institute of Mental Health (NIMH) in the US released statistics that indicated an increase in the prevalence rates of ADHD, especially among the adolescent and adult population. Possible reasons for this increase are considered.

2.2. A Brief Nosological History of ADHD

The numerous changes in conceptualisation contained in the various DSM editions epitomise the complexity of the disorder. The changes introduced with each edition sought to bring about some improvement in the understanding of the disorder; and perhaps more importantly, to give clarity to the diagnostic process. Despite these intentions, problems still arise with regard to accurate diagnosis. The appropriateness of the use of the DSM has been questioned, especially in light of the high prevalence rates reported. These debatable issues, and other issues relevant to diagnosis and prevalence, are noted in the latter part of this chapter. However, there is general consensus that the use of established criteria in diagnosis is both necessary and justified. A historical overview of attention deficit disorders is presented in Table 2.1.

Table 2.1. A Historical Overview of Attention Deficit Disorders

Date	Diagnostic Category	Source	Characteristics
1941 1947	Brain damage syndrome	Werner & Strauss	Hyperactivity, distractibility, impulsivity, emotional instability, perserveration
1962	Minimal brain dysfunction (MBD)	Clements & Peters	Soft neurological indicators, learning deficits, hyperkinesis, impulsivity, short attention span
1968	Hyperactive reaction of childhood	DSM-II	Hyperactivity
1980	Attention deficit disorder with hyperactivity (ADDH) Attention deficit disorder without hyperactivity (ADD/noH)	DSM-III	Inattention, impulsivity, motor hyperactivity; onset before age 7; duration of at least 6 months Inattention, disorganization, difficulty completing tasks
1987	Attention deficit hyperactivity disorder (ADHD) Undifferentiated attention deficit disorder (U-ADD)	DSM-III-R	Any 8 of a set of 14 symptoms Marked and developmentally inappropriate inattention
1991	Attention deficit disorder (ADD)	U.S. Dept. of Education	Eligible for services under IDEA or Section 504 of the Rehabilitation Act (U.S.)
1994	Attention deficit hyperactivity disorder (ADHD)	DSM-IV	ADHD (3 subtypes) IA: primarily inattentive subtype HI: primarily hyperactive-impulsive subtype ADHD: combined subtype

Source: Lerner, et al., 1995.

2.2.1. Brain Damage Syndrome

In the early 1900s, George Still, a physician, provided one of the first descriptions of ADHD in medical literature. Children were described as having "morbid defects in moral control" and their behaviour was linked to traumatic brain injury and other childhood central nervous system anomalies (Lerner, et. al., 1995, p. 24). The

research work of Werner and Strauss (1941) and that of Strauss and Lehtinen (1947) involved the use of case studies and neurological examinations of a population of cognitively disabled, institutionalised children, and led to the identification of a behavioural syndrome that included hyperactivity (as cited in Lerner, et al., 1995). They postulated that the symptomatic behaviours were linked to brain damage that was sustained before, during or shortly after birth.

2.2.2. Minimal Brain Dysfunction (MBD)

By the 1950s, the term 'brain damage' lost credibility because of the difficulty in differentiating between children with learning and behavioural problems from those with gross brain damage. Clements and Peters (1962, as cited in Lerner, et al., 1995) used the term *minimal brain dysfunction*, endorsed by the National Institute of Health (USA) in 1966, to imply that children with this condition had a problem with the *way* the brain functioned as opposed to having some form of brain damage. This term appealed to the medical community because it allowed for the observance of subtle neurological deviations. Behavioural symptoms included specific learning deficits, hyperkinesis, impulsivity, and a short attention span.

2.2.3. Hyperkinetic Reaction of Childhood: DSM-II

The concept of MBD became unpopular due to its lack of rigorous diagnostic criteria. To aid the identification and classification of the disorder, the second edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-II) (American Psychiatric Association, 1968) used the term *hyperkinetic reaction of childhood* to

describe the hyperactive child. Characteristic symptoms included overactivity, restlessness, distractibility, and a short attention span (Lerner, et al., 1995).

2.2.4. Attention Deficit Disorder (ADDH and ADD/noH): DSM-III

In keeping with the shift in focus to attentional problems rather than activity problems, the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III) (APA, 1980) introduced the term *attention deficit disorder,* which encompassed two types of attention deficit disorders: (1) attention deficit disorder *with* hyperactivity (ADDH) referred to children meeting the three diagnostic criteria of (i) inattention, (ii) impulsivity, and (iii) motor hyperactivity; (2) attention deficit disorder *without* hyperactivity (ADD/noH) included children who exhibited the symptoms of inattention and impulsivity but not hyperactivity. The improved diagnostic guidelines also stipulated the onset of the problem prior to seven years of age and having a duration of at least six months.

2.2.5. Attention Deficit Hyperactivity Disorder (ADHD): DSM-III-R

The publication of the revised third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III-R) (APA, 1987) documented further changes in the terminology and diagnosis of the disorder. Once again this was reflective of changes in the understanding and conceptualisation of the disorder. This time the term *attention deficit hyperactivity disorder* was used to indicate that although distractibility was a primary symptom, hyperactivity was also an important factor. Furthermore, ADHD was classified as one disorder from a group of three disorders called *Disruptive Behavior Disorders.* The other two disorders were *Conduct*

Disorders and *Oppositional Defiant Disorders*. A diagnosis of ADHD necessitated the presence of at least eight symptoms from a set of fourteen possible symptoms (Table 2.2.). The age of onset and the duration of the symptomatic behaviour remained unchanged. What did change was the status of the ADD/noH subtype. The revised edition introduced a category called *undifferentiated attention deficit disorder* (U-ADD), which referred to children that did not explicitly exhibit the behavioural symptoms of the disorder. Its diagnostic utility may be questioned on the basis of its indistinct quality, especially since diagnosis impacts on decisions about appropriate intervention.

2.2.6. Attention Deficit Disorders: U.S. Department of Education

In 1991, pressured by lobbying by concerned parent groups, in particular, *Children and Adults with Attention Deficit Disorders* (CH.A.D.D.) the U.S. Department of Education gave recognition to attention disorders and their legal implications within the education system (Diller, 1998). Representatives of the Office of Special Education and Rehabilitative Services, the Office of Civil Rights, and the Office of Elementary and Secondary Education achieved this through the signing of a memorandum that clarified state and local responsibility under federal law for addressing the needs of children with ADD. In this document, the term *attention deficit disorders* (ADD) was used to encompass both ADD and ADHD.

Table 2.2. DSM-III-R Diagnostic Criteria for ADHD

Note: Consider a criterion met only if the behaviour is considerably more frequent than that of most people of the same mental age.

A. A disturbance of at least six months during which at least eight of the following are present:

1. often fidgets with hands or feet or squirms in seat (in adolescents, may be limited to subjective feelings of restlessness)
2. has difficulty remaining seated when required to do so.
3. is easily distracted by extraneous stimuli
4. has difficulty awaiting turn in games or group situations
5. often blurts out answers to questions before they have been completed
6. has difficulty following through on instructions from others (not due to oppositional behavior or failure of comprehension), e.g., fails to finish chores
7. has difficulty sustaining attention in tasks or play activities
8. often shifts from one uncompleted activity to another
9. has difficulty playing quietly
10. often talks excessively
11. often interrupts or intrudes on others, e.g., butts into other children's games
12. often does not seem to listen to what is being said to him or her
13. often loses things necessary for tasks or activities at school or at home (e.g., toys, pencils, books, assignments)
14. often engages in physically dangerous activities without considering possible consequences (not for the purpose of thrill-seeking), e.g., runs into street without looking

Note: The above items are listed in descending order of discriminating power based on data from a national field trial of the DSM-III-R criteria for Disruptive Behavior Disorders.

B. Onset before the age of seven.

C. Does not meet the criteria for a Pervasive Developmental Disorder.

Criteria for severity of Attention-deficit hyperactivity disorder

Mild: Few, if any, symptoms in excess of those required to make the diagnosis and only minimal or no impairment in school and social functioning.
Moderate: Symptoms or functional impairment intermediate between 'mild' and 'severe.'
Severe: Many symptoms in excess of those required to make the diagnosis and significant and pervasive impairment in functioning at home and school and with peers.

Source: American Psychiatric Association, 1987

2.2.7. Attention Deficit Hyperactivity Disorder (ADHD): DSM-IV

The most recent modifications to the diagnostic criteria appear in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) (APA, 1994)

and are based on extensive research, field trials and information gathered from parents, teachers, and children[1], using a structured clinical interview, derived from the Diagnostic Interview Schedule for Children (DISC-II). However, some have criticised certain methodological aspects, such as sample size, and organisation of the trials and research studies (Cherkes-Julkowski, Sharp & Stolzenberg, 1997). Diller (1998) questioned the applicability of the DSM-IV criteria to adolescents, despite the fact that the original samples on which the criteria were formulated consisted of adolescents as well. In particular he argued that levels of hyperactivity are likely to decrease in adolescence or/and may be manifested in other behaviours.

Based on the DSM-IV research, two major factors underlying the symptoms were identified: (1) an inattention factor and (2) a hyperactive-impulsive factor (McBurnett et al., 1993, as cited in Lerner et al., 1995). Although the overall diagnostic category of ADHD has been retained, there are now criteria for three different subtypes: ADHD-IA: primarily inattentive subtype; ADHD-HI: primarily hyperactive-impulsive subtype; and, ADHD: combined subtype. The criteria for these subtypes are shown in Table 2.3. It has been argued that the shift in conceptualisation from *hyperactivity* to *inattention* has expanded the definition of ADHD, as it encompasses more symptoms. This may lead to inaccurate diagnosis and may account for the recent increase in prevalence rates in the U.S. (Diller, 1998). It also suggests that adolescents, who do not display high levels of hyperactivity, may be diagnosed as having ADHD-IA, although hyperactivity may manifest in other, less overt behaviours. This may compromise the process of intervention.

[1] This consisted of a national sample of 440 children and adolescents, aged between 4-17 years, who were referred to child clinics.

Table 2.3. DSM-IV Diagnostic Criteria for ADHD

A. Either (1) or (2):

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

Inattention

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

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

Hyperactivity

(a) often fidgets with hands or feet or squirms in seat
(b) often leaves seat in classroom or in other situations in which remaining seated is expected
(c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
(d) often has difficulty playing or engaging in leisure activities quietly
(e) is often 'on the go' or often acts as if 'driven by a motor'
(f) often talks excessively

Impulsivity

(g) often blurts out answers before questions have been completed
(h) often has difficulty awaiting turn
(i) often interrupts or intrudes on others (e.g., butts into conversations or games)

B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present Before age 7 years.

C. Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).

D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.

E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Code based on type:

314.01 Attention-Deficit/Hyperactivity Disorder, Combined Type:
if both Criteria A1 and A2 are met for the past 6 months

314.00 Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type:
If Criterion A1 is met but Criterion A2 is not met for the past 6 months

314.01 Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type:
If Criterion A2 is met but Criterion A1 is not met for the past 6 months

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

Source: American Psychiatric Association, 1994

2.3. The DSM IV Subtypes and Liemkuhler's ADHD Personality Styles

Each of the three subtypes has distinguishing behavioural symptoms (Table 2.3.) based on the two major factors of inattention and hyperactivity-impulsivity. It may be hypothesised that the behavioural symptoms unique to each subtype may influence personality development in distinct ways. A possible personality style for each subtype is suggested below in relation to Liemkuhler's hypothesis.

2.3.1. Liemkuhler's Six ADHD Personality Styles

Liemkuhler (1994) suggested six personality styles that are associated with the cognitive, motoric, and affective manifestations of ADHD. Rather than being exhaustive, these styles present the most common clinical presentations, together with the disorders from which it needs to be differentiated. These six personality styles are presented in Table 2.4.

Based on the DSM IV criteria, it seems plausible that the personality styles suggested by Liemkuhler (1994) may emerge. More specifically, the impulsive/intrusive and the hostile/aggressive personality styles may be associated with the ADHD predominantly hyperactive-impulsive subtype. The inhibited/avoidant and the obsessive/compulsive personality styles may be associated with the ADHD predominantly inattentive subtype. Finally the distractible/disorganised and the irritable/depressed personality styles may be associated with the combined subtype of ADHD.

Table 2.4. Personality Styles Associated with ADHD

Personality Style	Behavioural Features	Differential Diagnosis
Impulsive / intrusive	Restless Impatient Act without thinking Reckless, careless Seeks stimulation	Hypomania Cyclothymia Histrionic personality disorder
Inhibited / avoidant	Quiet, withdrawn Shy Preoccupied Avoids stimulation	Dysthymia Overanxious disorder Avoidant personality disorder
Obsessive / compulsive	Rigid / inflexible Ruminative, indecisive Perfectionistic Controlling	Obsessive – compulsive disorder Overanxious disorder
Distractible / disorganised	Drawn to novel stimuli Difficulty focusing Forgetful Frequently late Overwhelmed, confused	Dysthymia Overanxious disorder Passive-aggressive personality disorder
Hostile / aggressive	Temper outburst Easily provoked Overreacts to stress Blames others	Impulse control disorder Conduct disorder Antisocial personality disorder
Irritable / depressed	Easily annoyed Intolerant of demands Defensive Moody Dysphoric	Dysthymia Overanxious disorder Passive-aggressive personality disorder Unipolar depression

Source: Liemkuhler, 1994, p.195

The interaction of neurobiological dysfunctions, cognitive impairments and psychodynamic processes involved in the development of the above personality styles is described in Chapter Four. As already stated, the role of environmental factors cannot be dismissed in personality development. These environmental factors include the processes of diagnosis and intervention. Although issues relating to diagnosis and

prevalence do not directly impact on personality development, in many ways, decisions relating to these issues determine how ADHD children and adolescents are treated and perceived by society in general. It is suggested by the author that the problems surrounding prevalence rates and the application of the DSM diagnostic criteria itself may indirectly contribute to the development of one of the personality styles described in Table 2.4. Differences in prevalence rates between countries strengthen this argument and are discussed in the ensuing section.

2.4. The Contribution of the DSM Classification to the Controversy Surrounding ADHD and Prevalence Rates

The DSM classification over the years not only mirrors changes in thinking, but also highlights the difficulty in providing a clear definition of the disorder. It has been argued by some that the DSM classification itself has contributed significantly to the problems of diagnosis and prevalence rates (Diller, 1998; Gomez, Harvey, Quick, Scharer, & Harris, 1999; Levin, 1998). Barkley and Biederman (1998) assert that diagnostic criteria must be formulated on strong theoretical or empirical foundations. Although issues of diagnosis and prevalence are inextricably linked, and may be argued to be essentially one and the same thing, for the purpose of theoretical simplicity they are discussed separately in the ensuing sections.

With reference to diagnosis, there are essentially two issues at the core of the controversy. These are the polythetic definition of ADHD, and the comorbidities of the disorder.

2.4.1. The Polythetic Definition of ADHD

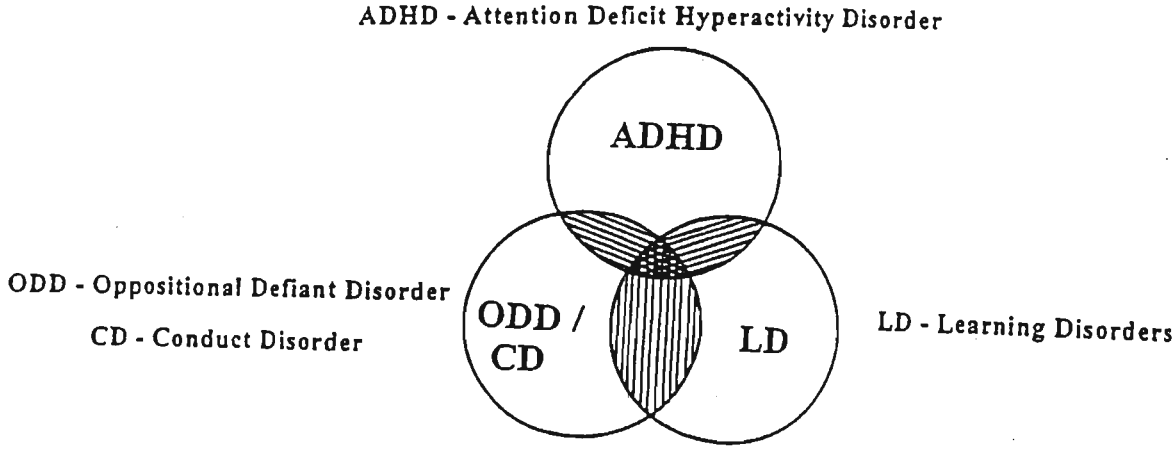
The DSM adopts a *polythetic or categorical* approach, which has its origins in the medical model, to the categorisation and diagnosis of ADHD. Diagnosis is dependent upon the presence of a *minimum* number of symptoms, as opposed to the *nature* of the symptoms. For example, a diagnosis of a particular disease may be made if any required minimum number of symptoms from symptoms A, B, C, D, or E is present. This implies that the same diagnosis may be made for two people who do not exhibit similar symptoms. The same is true for ADHD: two children exhibiting differences in outward behaviour, may both be diagnosed with ADHD if they display the required number of symptoms (Wender, 1995). This problem may be exacerbated by the fact that the required number of symptoms has not remained constant over the various editions of the DSM, and has had consequences for the prevalence rates. In defense of this approach, the DSM task force emphasised that accurate diagnosis depends not simply on the presence of a certain number of symptoms, but rather and perhaps more importantly, on the *frequency* of symptoms and the *extent of impairment in functioning* (Diller, 1998).

2.4.2. The Comorbidities of ADHD

The classification of ADHD under the broad umbrella of *Disruptive Disorders* highlights the difficulty in distinguishing it from other disorders that share similar symptoms. Rutter (1996, as cited in Diller, 1998) believes that the current definition of ADHD compromises the efficacy of diagnosis because there are no clear, distinguishable boundaries between ADHD and other disorders in terms of aetiology, development and treatment. Furthermore, it is common for an individual with ADHD

to also be diagnosed with other disorders such as learning disorders, making a clear diagnosis and appropriate treatment interventions even more difficult. Common disorders that occur concomitantly with ADHD are learning disabilities, and emotional and behavioural disorders, which include Oppositional Defiant Disorder, and Conduct Disorder. This is depicted schematically in Figure 2.1. below.

Figure 2.1. The Comorbidities of ADHD[1]



Source: Wender, 1995, p. 40

Other disorders that have been associated with ADHD are Tourette's Disorder (Spencer, et. al., 1998) and juvenile Bipolar Disorder (BPD) (Biederman, 1998), which is particularly relevant to the ADHD adolescent.

[1] The illustration is qualitative and not quantitative. It indicates frequent comorbidity but not the degree of overlap.

2.5. The Prevalence of ADHD

Prevalence refers to the *frequency* of a condition as diagnosed at a certain time. Prevalence rates are based on epidemiological studies of children with attention disorders. The prevalence rates of adolescents and adults with ADHD are inferred on the basis of the statistical data obtained from epidemiological childhood studies. Lerner et al., (1995) report that a conservative estimate of prevalence rates range between 3 – 5% of the school population in the U.S.A.

However, discrepancies exist between prevalence rates within a single country (Hinshaw, 1994). One is forced to question the reasons for these discrepancies since they impact on the validity of the rates recorded. Furthermore, there are differences in the number of referrals in different countries. Barkley (1981) reports that ADHD is the largest single source of referrals to child mental health centres in the U.S. (as cited in Goldstein and Goldstein, 1990). A recent report by the National Institute of Mental Health (NIMH) (2000) in the U.S. supports this claim. The NIMH reported that one in every ten children in the U.S. is affected by mental disorders severe enough to cause a significant impairment in functioning. Of this statistic, ADHD (although not a mental disorder per se) is the most common diagnosis. This is supported by reports that the U.S. consumes 90% of the world's production of methylphenidate (*Ritalin*™) (Diller, 1998).

In contrast, the U.K. has an ADHD population half the size of that of the U.S., but has a higher diagnosis of Conduct Disorders (Jacobs, 1998; Rutter, 1984, as cited in

Wender, 1995). The use of the International Classification of Disease (9th edition) (ICD-9) in Western Europe, which requires the presence of hyperactivity for a diagnosis of ADHD, may partially account for these differences. Furthermore symptoms must be pervasive in *all* areas of functioning. The author proposes that the difference in prevalence rates across countries suggest that environmental factors may play a significant role in diagnosis and prevalence of the disorder. Furthermore, since diagnosis determines the process of intervention to a large extent, it may be implicated in the development of certain personality styles.

Diller (1998) argues that the popular view that most emotional disorders have a biological basis (in other words, the disorder is conceptualised from a medical model perspective) coupled with the introduction and wide use of psychotropic drugs such as fluoxetine (*Prozac*™) in treating these disorders have had an indirect effect on the prevalence rates of ADHD. In other words, it has become easier and more acceptable for individuals to be diagnosed with ADHD and to use methylphenidate (*Ritalin*™) as a primary treatment option, since it circumvents the consideration of alternate views of aetiologies and intervention.

Wender (1995) reiterates that prevalence rates need to be viewed with caution. When interpreting prevalence rates, cognisance must be taken of the factors listed above.

2.5.1. Conclusions about Prevalence

Like most areas in the study and research of ADHD, numerous contentious and critical aspects characterise the issue of true prevalence. Nonetheless, based on

childhood epidemiological studies, consensus exists with regard to some definite conclusions about the prevalence of the disorder (Wender, 1995).

(i) ADHD and CD are common in childhood.

(ii) Many children diagnosed with ADHD are also diagnosed with CD. Many epidemiological studies indicate that this is true for about half of ADHD children.

(iii) ADHD is more common among males than females. The same applies with respect to the comorbid presence of CD. It would therefore appear that genetic factors play a part.

(iv) Although ADHD and CD decrease with age, a significant percentage of the adult population does not outgrow the disorders.

(v) Prevalence rates cannot be assumed on the basis of distribution and percentile scores.

2.6. Summary

This chapter highlighted the complexity of ADHD by tracing the historical evolution in the recognition of attention disorders from the early 1940s to the current conceptualisation of the disorder. Early perceptions and theories about the disorder were influential in the formulation of current concepts, and one may argue that changes have been cyclic. The *Diagnostic and Statistical Manual of Mental Disorders* (DSM) published by the American Psychiatric Association, is the major reference source for psychiatrists and psychologists.

Current debates and controversial issues are essentially problems of nosology. The most recent publication, the DSM-IV, uses the term attention deficit hyperactivity disorder (ADHD) and notes three subtypes: primarily inattentive (ADHD-IA), primarily hyperactive-impulsive (ADHD-HI), and combined inattentive and hyperactive-impulsive (ADHD). The polythetic approach to diagnosis adopted by the DSM, together with the common occurrence of comorbid disorders have contributed to the problems of inaccurate diagnosis. Prevalence rates for adolescents and adults are based on epidemiological studies of children diagnosed as having ADHD. Prevalence rates in general need to be viewed with skepticism as diagnoses based on rating scales and the DSM criteria may be problematic.

The applicability of the current diagnostic criteria to adolescents with the disorder may be questioned. The author makes two proposals. Firstly, that the underlying factors of inattention, and hyperactivity-impulsivity of each of the three ADHD subtypes may contribute to the development of one of the personality styles proposed by Liemkuhler (1994). Secondly, it is proposed that diagnosis and prevalence determines, to a large extent, the course of intervention. However, problems in these areas may compromise the quality and appropriateness of intervention. Liemkuhler (1994) argues that a lack of adequate support increases the risk of adolescents who display symptoms of the disorder developing into more severe clinical syndromes.

CHAPTER THREE

ADHD: NEUROBIOLOGICAL THEORIES AND NEUROPSYCHOLOGICAL CHARACTERISTICS

3.1. Introduction

Numerous theories regarding aetiologies of ADHD have been proposed. These have included environmental theories that link ADHD to risk factors such as toxins, food additives (Feingold, 1975, as cited in Cherkes-Julkowski et al., 1997), fluorescent lighting, family instability, alcohol consumption (Nichols & Chen, 1981, as cited in Cherkes-Julkowski, et al.), cigarette smoking during pregnancy (Shaywitz, Cohen, & Shaywitz, 1980, as cited in Cherkes-Julkowski, et al.), and lead levels in the body. These theories have either been refuted or questioned on the basis of more recent, methodologically superior studies that fail to prove any correlation between ADHD and the environmental factors listed above.

On the other hand neurobiological theories locate causation within the person. In other words ADHD may be a result of genetic factors or it may be a manifestation of some kind of brain dysfunction. The latter idea is not entirely new or novel. The earliest attempt by Still in 1902 to understand the origins of the disorder also rested on a hypothesis of brain anomalities. Organic theories or neurobiological theories may be categorised into neurochemical models, neuroanatomical models, and genetic

models. Although many studies within each group have generated convincing results, seen individually, the results are insufficient to conclusively prove a particular neurobiological basis for ADHD. However, when viewed collectively as highlighting various aspects of cortical functioning, they provide useful pieces of the whole puzzle.

Although one cannot dismiss the notion that various interacting environmental factors may be implicated in the cause of ADHD, at present neurobiological theories appear more plausible due to supporting evidence from the use of more refined neurological and neuropsychological tests, as well as technological advances such as Positron Emission Tomography (PET scans), X-Ray Computed Tomography (CT scans), Magnetic Resonance Imaging (MRI), and Electroencephalography (EEG).

Diller (1998) believes that the wide acceptance of neurobiological theories may also be attributed to an underlying political motive. He argues that influential support groups such as C.H.A.D.D. (Children and Adults with Attention Deficit Disorders) in the U.S. lobbied for the recognition of ADHD as a biological disorder because such recognition had many benefits for those diagnosed with the disorder and their families: firstly it implied that the costs of assessment and treatment for ADHD could be borne by medical insurance and not the parents; secondly, it gave the child access to special education services; thirdly it took away some responsibility from parents who no longer had to feel guilty for 'causing' this disorder, and fourthly, it was easier for adults to be diagnosed with the disorder and thereafter be treated with stimulant medication such as methylphenidate.

This thesis aims at investigating personality styles of adolescents exhibiting ADHD symptoms as suggested by Liemkuhler (1994). Given that personality expresses and interacts with cognitive, neurobiological and neurochemical processes; this chapter will examine theories that propose a biological basis for the disorder in an attempt to elucidate possible aetiologies of ADHD. Theories that are explored in greater detail do not imply that they are entirely conclusive. Nor does it imply that any one theory is superior to the other, especially in light of the complexity of brain functioning and the fact that much still remains to be conclusively and empirically proven. It is conceivable that a disorder as complex as ADHD will have multiple aetiologies.

Before these theories are examined, it is useful and necessary to firstly provide a brief account of general brain functioning. The complexity of attention is highlighted in a more theoretical analysis of the concept. This is followed by a discussion of the various aetiological theories. Neuropsychological evidence for these theories is presented against the backdrop of the limitations of neuropsychological assessment.

3.2. An Overview of the Organisation of the Nervous System

3.2.1. The Central Nervous System (CNS)

The central nervous system (CNS) comprises the brain and spinal cord. The brain itself is a complex network of neurons. Although the theory of holism in its purest form has long been discarded, it has been established that the right and left hemispheres of the brain; although separate and specialised in certain functions, do not work in isolation, but as a system to ensure smooth functioning in the execution of

all behaviours. The two hemispheres are joined by the corpus callosum, which enables the transmission of messages and the sharing of information between the hemispheres. The execution of even simple behaviours usually requires the simultaneous functioning of many specialised brain areas and the parallel processing of information. The idea that different functions are located in specific areas is referred to as localisation of function. Numerous studies that investigate the neurobiological basis of ADHD use the principle of localisation of function as a basic assumption. Inferences about impairment in the functioning of various cortical sites are founded on observable behaviours in which these sites are thought to play a role.

The outer layer of each hemisphere, the cerebral cortex, is divided into four lobes that perform information processing and executive functions such as thinking, problem solving, sensing, and motor co-ordination. Although certain functions are primarily associated with a particular lobe or cortical sites, it is likely that relationships with other cortical sites are involved. The frontal and parietal lobes in particular, have been implicated in the neural dysfunction of ADHD.

3.2.2. Brain Areas Involved in Attention

Although the frontal cortex has been regarded as the primary site for the attentional network, its multiple and reciprocal interactions with other cortical and subcortical systems implicates these systems in the regulation of attention as well. Furthermore, the frontal lobe is considered to play a vital role in executive function. Executive function encompasses higher-level functions such as planning, and flexible strategy

implementation aimed at goal-directed behaviours. Thus any dysfunction within the frontal areas is likely to result in associated dysregulation in other brain regions.

Posner (1993, as cited in Kolb & Whishaw, 1996) suggests that the posterior parietal cortex plays a role in attention through its role in visual shifting and visuomotor guidance (dorsal stream). However, other systems such as the premotor cortex are also involved. Posner & Peterson (1990, as cited in Kolb & Whishaw, 1996) identified a second type of attentional system, termed the 'executive attentional system', which is located in the frontal lobe. This argument is built on the idea that various frontal lobe sites are active in tasks involving perceptual demands and response selection, an important aspect of which is feature detection (Posner and Raichle, 1993, as cited in Kolb and Whishaw, 1996). They assert that as the attentional effort required in performing a task increases, so too does the number of frontal lobe regions involved. They conclude that the frontal lobe, given its responsibility for programming mental operations, must play a major role in focusing and selectively representing information.

The subcortical nuclei, contained beneath the cortex, include the amygdala (memory, emotion and aggression), the hippocampus (learning, memory and emotion), the thalamus (integration centre for sensory information, also involved in memory), and the hypothalamus (regulates basic biological functions, also involved in emotion) (Goldstein & Goldstein, 1990). Their involvement in functions such as memory, learning and emotion has links to the regulation of attention, and more specifically, risk-taking behaviours in adolescents displaying symptoms of ADHD.

3.2.3. Neurotransmitters Involved in Attention

This system is made up of the neurons that carry nerve or electrical impulses between the brain and other parts of the body. Neurotransmitters are chemical messengers and are stored in the synaptic vesicles in the presynaptic neuron. Approximately fifty different neurotransmitters have been identified thus far, and the *catecholamines norepinephine* and *dopamine* are considered very important in the regulation of attention (Lerner, et al, 1995). These neurotransmitters are concentrated in areas of the frontal lobes and subcortex. Psychostimulant drugs, such as methylphenidate, act by altering the function of the neurons at various stages by increasing the supply of dopamine and norepinephrine in these regions. Neurochemical theories of ADHD are discussed further on.

3.3. The Complexity of the Attention System

In keeping with the DSM-IV's current emphasis on attention, this section attempts to highlight the complexity of the attentional system, in an effort to explain the basis of theories and to better understand how cognitive processes may influence personality development in ADHD. This is done within the parameters of this thesis topic and as such not all aspects of the attentional system may be afforded the same focus and detail.

The concept of attention is an intricate, multifaceted one, permeating nearly all aspects of human functioning. Giving something attention essentially means becoming conscious of it (Kolb and Whishaw, 1996). In the past, attention was

conceptualised as a linear, sequential subcognitive process within the broader, hierarchical cognitive system. In other words, it was thought that the cortical sites responsible for attention filtered in impressions from the environment, which were then decoded or interpreted by other higher-level cortical regions responsible for thinking. However, it is now concluded that the attentional system rather than operating in a hierarchical manner, accesses various cortical areas that are involved in the simultaneous parallel processing of different aspects of the stimuli such as colour, shape and size (Cherkes-Julkowski, et al., 1997).

3.3.1. The Limited Capacity of the Attentional System and Selective Attention

Cherkes-Julkowski, et al (1997) argue that central to understanding the concept of ADHD is an understanding of the limited capacity of the attentional system. The term *capacity* refers to two interlinked concepts: the amount of information that may be consciously attended to at any given time, and the resources that are available to enable conscious attending. The limit in what may be consciously attended to implies the need for effective selection, focus, attentional shift and regulation. A dysfunctional attentional system leads to the behavioural features commonly observed in ADHD such as distractibility, focusing on extraneous detail, and an inability to sustain attention and concentration. This may mean that the adolescent with these problems is likely to fail to detect important social cues that may result in an increase in conflict situations. Negative social experiences are likely to adversely affect personality development.

The efficient and effective ability to selectively focus on a particular aspect of the environment rests on a number of important decisions and choices. Among other factors, choices will be based on the relevance and importance of the stimulus, how much attention to allocate to it, past experiences, anticipated rewards, and novelty.

3.3.2. Attention and its Relationship to Working Memory

Contrary to what it seems, the choices described in the previous section are not based entirely upon careful, conscious deliberation. Rather, the excitatory and inhibitory competition among neural subsystems, which code different properties of external stimuli, determine which aspects of the stimulus environment will be represented in working memory, where they are temporarily stored for further processing (Levine, 1989, as cited in Cherkes-Julkowski, et.al. 1997). Working memory may be defined as a temporary storage space, housing incomplete solutions as more complex information is gradually accumulated. What is attended to is submitted to working memory. However, what is attended to is determined by a paradoxical process.

On the one hand, information that is associated with dominant neural systems is more likely to be attended to. Systems establish their dominance through regular use and their interconnections with other systems. Dominant neural networks with strong associations have a greater chance of being activated simultaneously and determining what gets selected and submitted to working memory. The cost of such patterned excitation is the inhibition of other, related networks of association (Alkon, 1989, as cited in Cherkes-Julkowski).

On the other hand, regardless of dominance, any recently excited subsystem is less receptive to subsequent excitation; making novelty[1] an equally powerful determinant of what is selected and submitted to working memory. It is proposed by the author that individuals with problems in attention regulation, such as those with ADHD, are likely to attend to a wide range of stimuli and focus on novel stimuli more often. This may not only prevent neural systems from establishing and maintaining their dominance, but may also imply that working memory may not accumulate enough information about certain stimuli to enable further processing by other cortical sites (Cherkes-Julkowski, et al., 1997). Instead the increase in incomplete and unrelated solutions may lead to fragmented and generalised interpretations of the environment. This has implications for both school functioning as well as social functioning.

It is the attentional system that determines and provides working memory with the right amount of information to ensure optimal functioning. A dysfunction in working memory is likely to arise if too much or too little information is highlighted by attentional systems. This involves monitoring dominant networks and novel stimuli and submitting this to working memory at an appropriate pace and level (Cherkes-Julkowski, et al., 1997).

3.3.3. Factors Influencing Attention

Cherkes-Julkowski, et al. (1997) provide a very detailed account of the intricate workings of the attentional system. They list several factors that may influence attention. However, the following discussion summarises only those factors that are

[1] The role played by novelty in attention is discussed in more detail further on.

considered relevant to adolescents who display the symptoms of ADHD, especially within the school context, and are based on the reports of Cherkes-Julkowski, et al. (1997). The purpose of this discussion is to highlight the effect that neurobiological problems associated with ADHD may have in areas of functioning such as at school. It is proposed by the author that these problems may in turn have adverse effects on the development of personality. More specifically, they may contribute towards the development of one of the personality styles proposed by Liemkuhler (1994).

3.3.3.1 Experience and Novelty

Knowledge structures are essentially formulated on *experience*. As noted earlier on, neural subsystems establish and maintain their dominance through repetitive experience and interconnections with other subsystems. However, constant changes in the environment present frequent novel information. *Novelty* also plays a key role in the involuntary arousal and activation of attentional systems. Aside from keeping a person aware of changes within the environment, one of the important adaptive functions of attending to novel stimuli is to alert a person to possible danger. However, if a person had to constantly attend to novel stimuli, this would not only exert significant strain on a system with limited capacity, but also prevent more focused and sustained attention.

3.3.3.2. Automaticity

Automaticity refers to non-effortful attentional processing. It occurs when information has been learnt to the extent that it becomes automatic. Automaticity allows attention to be given to more complex tasks. The author suggests that mainstream school

curricula are based on the implicit assumption that learners possess efficient mechanisms of automaticity. For example, reading a comprehension passage firstly requires an automatic understanding of the symbols that are used to form words and sentences; so that attention may be focused on building mental links and representations to understand the ideas or arguments contained in the passage. Likewise, solving a multi-stepped algebraic problem firstly requires automatic access to number facts in arithmetic. Dysfunctions in automaticity and attention are mutually augmenting. Individuals with attention problems have difficulty learning skills and arbitrary associations at an automatic level, yet this forms the necessary foundation upon which more complex problem solving may be initiated. Consequently greater demand is exerted on the total capacity of the attentional system since more attention is given to lower level processing. It is not surprising that many individuals diagnosed with ADHD reportedly also have learning disabilities (Naglieri & Gottling, 1995).

3.3.3.3. Allocation of Attentional Resources

The challenge that faces the attentional/working memory is very much like the economic challenges that face a country. The *allocation of attentional resources* needs to be done in the most cost-effective way among various stimuli in varying amounts, but in a manner that maximises return without disturbing the overall equilibrium of other related systems. This requires constant monitoring of the amount of attention invested in any given stimulus. Efficient attention deployment is particularly crucial whenever there is a need for rapid, responsive attentional shifts, as is characteristic of the school context.

3.3.3.4. Executive Functions

Executive function encompasses the overall orchestration of higher-level cognitive processes. Of the many processes that it regulates, of relevance to this thesis topic, is its role in *goal-related functions* and *inhibition*. The purpose of goal setting is to narrow the relevant information field by restricting any tangential behaviour and attention. The executive function of inhibition serves to manage information so that focus on goal-directed behaviour is not disrupted. What is termed "distractibility" in ADHD is essentially an inability to maintain focus on goal-directed behaviours, and may thus be a manifestation of some problem in executive function (Cherkes-Julkowski, et al., 1997).

3.4. Neurobiological Theories of Aetiologies

Neurobiological theories may be divided into three categories: neurochemical theories, neuroanatomical theories, and genetic theories. There is some evidence to support all theories. Although each category of theories has been dealt with separately in the ensuing sub-sections, a certain degree of overlap in discussion is unavoidable, due to the inextricable link between neurochemistry, neuroanatomy, and genetics.

3.4.1. Neurochemical Theories

Neurochemical research has yielded the most promising results thus far. Neurochemical theories postulate that ADHD arises from an insufficient availability of neurotransmitters in the attentional system. Of specific importance are the

neurotransmitters norepinephrine and dopamine, which belong to the family of neurotransmitters known collectively as the *catecholamines*. The role of dopamine was initially proposed by Shaywitz, et al. in 1977 following an investigation of the dopamine levels contained in the cerebral spinal fluid of ADHD children (as cited in Weiss & Hechtman, 1986). It has been established that these two neurotransmitters act interdependently (McCraken, 1991, as cited in Weiss & Hechtman, 1986) and are considered important in the regulation of arousal, attention, inhibition, and motor activity (Lerner, et al., 1995). A deficiency in these neurotransmitters arise in the brain stem and leads to diminished cortical stimulation and a consequent dysfunction of the neural circuits subserving attention (Hynd, Hern, Voeller, & Marshall, 1991; Riccio et al., 1993, as cited in Lerner, et al.). The use of medication seems to increase levels of these neurotransmitters at the synaptic cleft, thereby stimulating receptors (Laakso, et al., 2003).

The use of medication in the treatment of ADHD rests on the basic assumption of a neurochemical basis for ADHD. *Psychostimulants* and *antidepressants* are the two major classes of drugs used in the pharmacological treatment of ADHD. The use of psychostimulant medication increases the production of the neurotransmitters dopamine and norepinephrine. This is confirmed by studies that show increased levels of norepinephrine in the brain stem area after the use of psychostimulant medication (Zametkin, et al, 1990, as cited in Lerner et al., 1995). Their study also showed that adults diagnosed as having ADHD displayed a significantly lower rate of brain metabolism, especially in the right frontal area, than the normal controls. Antidepressants, such as imipramine, desipramine, and amitriptyline are also used in

the treatment of ADHD should stimulant medication fail to improve behaviour or should it have adverse effects on the person. These antidepressants also target the neurotransmitter norepinephrine.

3.4.1.1. Barkley's Theory of Response Inhibition or Poor Delay of Response

Barkley's (1997, as cited in Rapport, Voorhis, Tzelepis, & Friedman, 2001; Scheres, et al., 2003) theory of *response inhibition* or *poor delay of response* is essentially a neurochemical theory. His theory is based on the work of Bronowski (1967, 1977, as cited in Lerner, et al., 1995) who postulated that as our environment changed, the human brain evolved to allow for the delay of responses to environmental cues.

Barkley argues that behavioural inhibition consists of three executive processes:

a) an inhibition of the prepotent (initial) response,
b) a cessation of the original response, allowing for a delay in which behavioural decisions may be made, and,
c) the protection of the delay period from interference.

A problem in these processes manifest in the observable behaviours of inattention, impulsivity, and hyperactivity in ADHD. A later study by Barkley corroborated this theory. In this study, children diagnosed as having ADHD made more impulsive errors on tasks requiring a choice between competing responses than did normal controls (in Rapport, et al, 2001). A study by Scheres, et al. (2003) sought to determine the effect of methylphenidate on the three processes of response inhibition as outlined by Barkley (1997). The study revealed that medication only had a positive

effect on the first two processes (a. and b. above) and not the third (c.) process. They added further that Barkley's theory was only applicable to the combined and hyperactive/inattentive sub-types of ADHD. This is probably due to the problems in maintaining focus as opposed to inhibiting responses in the inattentive subtype.

3.4.1.2. Denckla's Intention Theory

Denckla (1996, as cited in Rapport, et al., 2001) offers an alternative theory to Barkley (1997, as cited in Scheres, et al, 2003). He views ADHD as a problem of *inattention* and not inhibition. He divides the process of attention into four executive processes:

a). initiating movement (response)

b). sustaining movement (response)

c). inhibition of off-task movement (to allow focus on goal-directed behaviour)

d). shifting behaviour movement (shifting response strategies)

His theory implicates the role of the neurotransmitter dopamine in the above processes, especially those neurons involved in the basal ganglia (Rapport, et al., 2001). The study by Chhabildas, Pennington, & Willcutt (2001) provide some support for Denckla's theory. They hypothesised that ADHD-HI types would be more impaired in measures of inhibition, ADHD-IA types would be more impaired in measures of vigilance and processing speed, while ADHD-C types would show impairment in both measures of inhibition, and vigilance and speed processing. In contrast the results indicated that symptoms of inattention best predicted performance

on all dependent measures. This suggests that symptoms of inattention, rather than symptoms of hyperactivity or impulsivity, are associated with neuropsychological impairment.

3.4.1.3. Comparison of the Two Theories

Evidence exists to support both theories. Coupled with the studies that support the argument of a heterogeneous ADHD population, they lend credibility to the idea that each of the three subtypes of ADHD may present as distinct disorders. In light of this, neither of the above theories should be regarded as being better than the other. Both focus on different aspects of the disorder, and may not only be valid, but also linked. Furthermore, both theories may be used to explain the behavioural symptoms associated with ADHD adolescents.

3.4.2. Neuroanatomical Theories

Neuroanatomical theories of ADHD investigate possible causation within the cortical structures of the brain. Many of these theories are based on comparisons between certain clinical populations, in particular those patients with lesions to particular regions of the brain, and children with ADHD. Evidence for these theories are obtained by recording structural anomalies in the brain using sophisticated technology such as those listed earlier, as well as a battery of neuropsychological tests.

3.4.2.1. Frontal Lobe and Parietal Lobe Theories

The origins of frontal lobe theory can be traced to the 1930s when practitioners and researchers observed behavioural similarities between patients with frontal lobe

lesions and children with ADHD symptoms (Levin, 1938, as cited in Aman, Roberts, & Pennington, 1998). The frontal lobes, in particular the prefrontal regions, not only aid working memory, but are also instrumental in executive functioning. These include developing and implementing cognitive goal-directed strategies for problem solving that are flexible in response to environmental cues, by controlling impulses and inhibiting prepotent responses. For example, Milner (1964, as cited in Kolb & Whishaw, 1996) demonstrated how patients with frontal lobe lesions failed to change response strategies in the Wisconsin Card Sorting Test, despite articulating that they were aware that the requisite for success on the tasks had changed as the task progressed. Another study by Milner also suggested that the impairment in response inhibition tends to increase risk-taking behaviour. Patients ignored the buzzer that signaled when errors were made in tests of stylus-maze learning. Instead of changing their responses upon hearing the buzzer, patients not only continued the test but also made more errors (as cited in Kolb & Whishaw, 1996). This example also demonstrates rigidity in decision-making processes. Frontal lobe patients displayed similar loss of response inhibition when they were unable to inhibit reading the words as opposed to identifying the colour in which the words were written in, in the Stroop Test (Perret, 1974, as cited in Kolb & Whishaw).

The right parietal lobe theory is a more recent theory that is also based on observations of similar attentional deficits in children diagnosed with ADHD and patients with right parietal lobe damage. The parietal lobes integrate sensory input from the somatic and visual regions of the brain as well as from other sensory regions. The posterior parietal cortex plays an important role in accurate visually guided motor

activity, spatial perception and spatial attention (Anderson, 1988, as cited in Aman. et al., 1998). Choosing which utensil to use from an array of cutlery when eating at a restaurant is a simple example of this function. The right parietal lobe appears to be most reliably associated with deficits in these functions, based on the frequency and severity of deficits associated with lesions to the right hemisphere. In addition, problems in this region may lead to visual neglect.

Neurobiological evidence exists to support both frontal lobe and parietal lobe theories. Frontal lobes are functionally asymmetrical (Kolb & Whishaw, 1996). Using high resolution MRI, Hynd, et al, (1990, as cited in Aman, et. al, 1998) found that children with ADHD appear to have symmetrical anterior regions, unlike normal control children who appear to have asymmetrical frontal lobes, with the left anterior region being smaller than the right. In addition, Hynd, et al. (1993, as cited in Aman, et al.) found reversed patterns of asymmetry on the head of the caudate nucleus, a portion of the basal ganglia that is heavily connected to the prefrontal cortex: the left region was smaller than the right in children diagnosed as having ADHD, in comparison to normal controls. Hynd, et al. (1991) have also found that areas of the corpus callosum containing fibres connecting anterior (frontal) and posterior (parietal) cortical regions in the left hemispheres are smaller in ADHD than in normal controls.

3.4.3. Genetic Theories

Parker (1992, as cited in Lerner, et al., 1995) argues that heredity is the most common cause of ADHD. In fact there is strong evidence to suggest that there is a genetic predisposition to ADHD. Three types of studies have been used to determine the role

and extent of genetic factors in the aetiology of ADHD. These are family studies, twin studies, and adoption studies. Wender (1995) provides a very detailed and comprehensive account of major studies done in these three categories. Although Diller (1998) does not negate the existence of a genetic link to ADHD, he cautions against placing too much emphasis on it at the cost of ignoring other contributing aetiologies.

3.4.3.1. Family History Studies

A family history forms part of the initial assessment in the diagnosis of ADHD. It is often found that close family members show similar patterns of attentional problems (Seidman, et al., 1997). In an earlier study by Seidman, et al. (1995) it was found that boys who were diagnosed as having ADHD and with a family history of ADHD performed more poorly on some neuropsychological tasks, than boys who were diagnosed as having ADHD but with no family history of ADHD. This implies that a genetic link may be associated with the disorder. Family studies attempt to find evidence to support this hypothesis. Furthermore they seek to determine if there is an increased frequency in the amount and type of psychopathology in the biological relatives of children with ADHD. Barkley (1990) proposed that up to 32% of parents of children with ADHD also exhibit symptoms of the disorder.

Neurochemical evidence exists to support the genetic theory. Zametkin, et al., found that adults who were diagnosed as having ADHD and who were parents of children who were also diagnosed as having ADHD, displayed abnormalities of cerebral

metabolism in the prefrontal and premotor areas of the frontal lobe (as cited in Seidman, et al., 1997).

Of the many criticisms levied against earlier studies, perhaps the most pertinent relates to the issue of comorbidity. Early studies failed to draw samples from homogenous groups, neither were these groups randomly selected. The existence of comorbid disorders in the research groups was highly probable. As discussed in Chapter Two, comorbid disorders share many similar behavioural characteristics as ADHD. It is possible that retrospective assessments and diagnosis of ADHD among adults may have been based on the presence of other disorders (Wender, 1995).

3.4.3.2. Twin Studies

Twin studies essentially tackle the age-old nature versus nurture debate. These studies are based on the hypothesis that there is likely to be a higher prevalence of the disorder among monozygotic (identical) twins than dizygotic (fraternal) twins because monozygotic twins have identical genetic material. Studies comparing identical and fraternal twins strongly suggest that an 'ADHD personality' is inherited. In a longitudinal study of twins reared apart, Goodman & Stevenson (1989) found that identical twins displayed similar levels of hyperactivity despite being reared apart. Fraternal twins were similar to normal children in the likelihood of displaying hyperactivity.

3.4.3.3. Adoption Studies

Although fraught with methodological problems similar to those contained in other types of genetic studies, adoption studies provide more solid and convincing evidence for a genetic basis for ADHD, thereby suggesting a limited influence of environmental factors. Adoption studies have made significant contributions to the understanding of the aetiologies of the disorder. The finding that the incidence of ADHD in adopted children is higher than for biological children strengthens the genetic theory of ADHD. This implies that the biological parents of the adopted children were likely to have displayed ADHD symptoms as well (Silver, 1992, as cited in Lerner. et al, 1995). Furthermore, these studies suggest that ADHD occurs in clusters within families, affecting certain groups of members, such as fathers and sons (Diller, 1998). This may account for the higher prevalence rate among males.

3.5. Neuropsychological Evidence for ADHD

The field of neuropsychology takes cognisance of the relationship between personality, cognition, and brain function. Neuropsychological studies aim to empirically investigate the above relationships. The usefulness of neuropsychological assessments is not only evident in the tests of cognitive abilities and deficits, but also in its consideration of other important factors by means of structured and unstructured personality tests (Crockett, Clark, & Klonoff, as cited in Filskov & Boll, 1981).

Although information on the neuropsychological correlates of the ADHD subtypes is limited, more is known about the global neuropsychological deficits in children

diagnosed with the disorder (Chhabildas, Pennington, & Willcutt, 2001). They have been found to perform poorly on several neuropsychological tasks purported to assess various aspects of frontal lobe dysfunction. Popular neuropsychological tests include the Wisconsin Card Sorting Test (WCST), the Stroop Test, the Tower of Hanoi, the Controlled Oral Word Test (COWAT), the Trial Making Test (TMT), the Grooved Pegboard Test, the Hand Movements test, and other motor control tasks, such as Go/No-Go Test. As is characteristic of most research studies, neuropsychological assessments and studies are vulnerable to methodological flaws that may confound the results of the studies. It is important to keep these issues in mind when considering and interpreting data.

3.5.1. The Limitations of Neuropsychological Measures and Studies

The general methodological issues discussed in Chapter Two are also applicable to the neuropsychological studies cited in this chapter, and will therefore not be repeated. Rather, this section will consider issues that are of specific relevance to neuropsychological assessment and adolescents who meet the diagnostic criteria for ADHD.

i) Similar to most research on ADHD, neuropsychological studies have mainly been done on children who were diagnosed as having ADHD. Relatively few studies have been done on adolescents who meet the diagnostic criteria for the disorder (Seidman, et al., 1997). As a result, some of the measures used on children have yielded very different and mixed data when used on this group of adolescents.

ii) Different versions of tests may produce contradictory results using the same sample group (Barkley, et al., 2001). This has a bearing not only on the interpretation of results, but also on the understanding of possible aetiologies. In similar vein, the choice of instruments used may influence the results obtained. For example, Barkley, Grodzinksy, and DuPaul (1992) argue that although there is evidence to suggest frontal lobe deficits in children diagnosed with ADHD, results obtained are highly dependent on the measures used. They assert that current neuropsychological tests might produce more accurate and valid results if they included specific measures of focused attention and perceptual-motor speed rather than just measures of the more global frontal lobe functions.

iii) Samples of adolescents are usually drawn from clinic populations. This has two implications: the first relates to group characteristics. Clinic drawn samples are likely to display more severe symptoms and therefore results obtained may present an exaggerated picture. The second effect relates to the context. Clinic settings may be private, teaching based hospitals, or general public hospitals. Each context is likely to employ its own set of assessment procedures that emphasise various diagnostic criteria, which consequently influence the positive rate of diagnosis (Wender, 1995).

3.5.2. Neuropsychological Characteristics of ADHD

3.5.2.1. Neuropsychological Deficits Across all ADHD Subtypes

A significant number of studies have generated neuropsychological evidence in support of frontal lobe theories.

In a study investigating neuropsychological deficits of boys diagnosed with ADHD with a mean age of 12 years, Aman, et al. (1998) found evidence that support the frontal lobe and parietal lobe theories, based on a battery of tests purported to be sensitive to frontal lobe and parietal lobe functions. This supported earlier findings. Children displaying ADHD symptoms make *more errors of omission* and more left-sided errors on the Letter Cancellation Task than children without ADHD. This implicates the right parietal lobe in ADHD (Voeller and Heilman, 1988, as cited in Aman, et al, 1998). Snow (1990) found that the performance of children with ADHD on *mental rotation tasks* were poor, resembling those of patients with right parietal lobe damage.

The *maturational lag hypothesis* predicts that children who display the symptoms of ADHD will perform at a level similar to those of younger children without the disorder (Rapport, et al., 2001). His theory was corroborated by a later study in which it was found that adolescents diagnosed as having ADHD resemble younger normal children in their *executive functioning, temporal discounting*, and *time reproduction.* However, there were no significant differences between the ADHD group and controls with respect to Inhibition scores. This result is different to past research

studies and may be attributed to the use of that particular version of the Continuous Performance Task (CPT), in comparison to other versions of the test that have yielded more commission errors by ADHD groups. Barkley's *unifying* theory that proposes that this group of children catch up cognitively with their peers during adolescence also needs to be considered (Barkley, Edwards, Laneri, Fletcher, & Metevia, 2001).

Unlike past studies that suggest difficulties in tasks evaluating working memory in children with ADHD (Grodzinsky & Diamond, 1992; Mariani & Barkley, 1997, as cited in Barkley, et al., 2001) these adolescents diagnosed with ADHD did not show deficits in *general working memory*. Again this result could be due to age-related improvements. In other words, the working memory tasks may not be of comparable difficulty to the other tasks used in this study in which group differences did emerge.

Impaired temporal reproduction was shown by the poor time reproduction displayed by adolescents diagnosed as having ADHD (Barkley, et al., 2001). This may imply that it is the ability to coordinate a response relative to some temporal standard that is more affected in ADHD rather than time perception itself. These adolescents also showed poorer self-control in temporal discounting tasks in which self-control was measured by the decision to choose a larger delayed response over a smaller immediate one. This may not merely be a reflection of impulsive behaviour due to dysfunctional response inhibition, but an indication that this group of adolescents devalues future consequences more than others, showing a relatively steeper gradient of temporal discounting. It may be linked to risk-taking behaviour among ADHD adolescents.

Brodeur & Pond (2001) noted improved performance in tasks assessing *selective attention* when methylphenidate (Ritalin) was used. This supports the finding of an earlier study by Malone & Swanson (1993, as cited in Brodeur & Pond, 2001) and implies that impairment in selective attention may exist.

3.5.2.2. Neuropsychological Characteristics Specific to Subtypes

As discussed in Chapter Two, the current categorisation of ADHD into distinct subtypes has been a contentious issue. While some researchers argue that such a conceptualisation is valid, others believe that each category may be a distinct childhood disorder, with a common underlying deficit in attention regulation. Neuropsychological evidence to support these theories is mixed.

Carlson, Lahey, & Neeper (1986) found no significant differences between the ADDH and the ADD/noH subtypes, based on DSM-III categorisation. Both groups though, exhibited neuropsychological differences in comparison to the normal control subjects. Another study by Schaughency, et al. (1989) also found no differences between these subtypes, using the Luria-Nebraska Neurological Battery – Children's Revision (LNNB-CR). However, in this instance neither subtypes differed from the normal control group as well (Barkley, et al., 1992).

A study by Trommer, et al. (1988) produced results contrary to those described above, using the Go/No-Go Test (as cited in Barkley, et al., 1992). They argue though that the choice of measures used in each study may have significantly influenced the findings, rendering them all inconclusive. The study by Chhabildas, Pennington, &

Willcutt (2001) indicated definite neuropsychological differences between ADHD subtypes. They found that ADHD-IA and ADHD-C children had similar profiles of impairment with respect to inattention, which was different to the ADHD-HI subtype that showed no impairment in inattention.

3.6. Summary

Despite mixed results in many areas of neuropsychological investigation, useful information has been obtained pertaining to the global deficits of children diagnosed as having ADHD and to a limited degree, adolescents. Generally results suggest a definite neurobiological basis for ADHD. Results may be partially compromised by methodological drawbacks. There is also dissent among researchers in the interpretation of results. Of particular importance to adolescent neuropsychology are issues pertaining to sensitivity of test measures, the use of different versions of tests, comorbidity, contextual factors, and group characteristics, especially those that are age-related. These problems stem in part from a lack of research among adolescents who display the diagnostic symptoms of ADHD. Another reason for the recent differences in results may be attributed to the use of different editions of the DSM. Earlier studies were based on DSM-III diagnostic criteria, while more recent studies employ the DSM-IV diagnostic criteria. This may be viewed in two ways: firstly it may be regarded as an issue of conceptualisation (discussed in detail in Chapter 2) or, and perhaps more importantly, it may be interpreted as emerging evidence for group heterogeneity (Chhabildas, Pennington, & Willcutt, 2001).

Improvements in neuropsychological assessments are needed in the areas listed above. Studies have raised important questions that still need to be answered. For example, the use of medication and its efficacy remains a contentious issue. Medication aims at balancing neurotransmitter levels. But given the complexity of the neurochemical systems, it seems quite unrealistic to expect medication to completely eradicate all problems associated with ADHD. Likewise, neuropsychological studies are bound to have some limitations. As Lezak (1995) points out, although the concepts of attention (including distractibility), concentration and tracking have been treated as distinct theoretical entities, in practice they share interdependent relationships that make the individual study of each concept difficult and challenging. Barkley (1990) is optimistic that the divergent lines of neuropsychological investigation are not only necessary to sufficiently investigate a disorder as complex and multifaceted as ADHD, but are likely to eventually produce results that would indicate a common neurological pathway(s) for the disorder (Barkley, 1990).

The evidence presented in this chapter supports Liemkuhler's (1994) argument of a neural dysfunction and more specifically a neurochemical deficit in ADHD as observed in problems in neuropsychological functioning. The consequent cognitive deficits are relevant to Piaget's theory and to ego development and influence the quality of environmental transactions. Based on these arguments, one could assume that children and adolescents with ADHD are likely to share similar personality traits, which may lead to the development of the personality styles, suggested by Liemkuhler (1994). This hypothesis is explored in greater detail in Chapter Four.

CHAPTER FOUR

ADHD AND THE DEVELOPMENT OF PERSONALITY

4.1. Introduction

In Chapter One, Liemkuhler's (1994) hypothesis relating to the development of ADHD personality styles was stated. In locating personality development within psychodynamic processes, Liemkuhler implicated environmental factors, since the intrapsychic forces characteristic of psychodynamic theory essentially arise from dynamic interactions between the individual (infant) and the environment (mother/caregiver). Liemkuhler also asserted that personality development in individuals with ADHD is linked to the neurobiological basis of the disorder.

Chapter Three explored the neurobiology of the disorder and concluded that there is substantial evidence to support a neurobiological basis for ADHD. Barkley (1990) is more specific and states that the role played by genetics is the most significant. He proposes that children with ADHD inherit the tendency toward deficiencies in the catecholamine neurotransmitters, dopamine and norepinephrine. This means that not all children of parents who were diagnosed as having ADHD will develop the disorder. Rather, the existence of certain factors (probably environmental factors to a large extent) may be needed to trigger or activate these genes, resulting in the development of the disorder.

This chapter sets out to firstly explore the link between neurobiology and the development of personality in children displaying the symptoms of ADHD, and secondly to explore the extent of such a link. The latter implies that the extent of environmental influence on personality development also needs to be considered. (Although these issues are, to a large extent, treated as separate, it is recognised that in reality, interactions between these two systems are multiple, simultaneous and complex). To accomplish this task, personality development is approached as follows: firstly, general theories of personality are presented. These are Piaget's theory of cognitive development, Winnicott's object-relations theory of the 'good-enough' mother and lastly, contextual theories of personality. The rationale for selecting these particular theories is outlined below. Secondly, the concept of a distinct cluster of ADHD personality types as proposed by Liemkuhler (1994) is investigated in relation to the five-factor theory of personality. The author suggests theoretical links between personality development and neurobiological processes, cognitive development, psychodynamic processes, and environmental factors with regard to adolescents who display the symptoms of ADHD.

4.2. Rationale for Choice of Personality Development Theories

Early infant and childhood experiences impact directly on psychological adjustment and the development of ego functions. These psychological processes are important determinants of future personality development and are, to a large extent, shaped by cognitive functioning. It is therefore necessary to consider that the neurally mediated cognitive and behavioural predispositions of ADHD interact with the environment to

shape the development of personality. The view of ADHD needs to be reconstructed to include a set of neurodevelopmental parameters within which psychological development occurs (and to which it must at least in part conform) and not merely a set of behavioural symptoms (Liemkuhler, 1994). Theories chosen are those that describe certain important parameters.

Theories have also been selected to the extent that they highlight the nature-nurture debate of personality development. By virtue of suggesting that neurochemical processes are at the core of ADHD personality types, Liemkuhler (1994) subscribes to the idea that while the environment impacts on personality development to some degree, it is the underlying biological predisposition that essentially determines the course of personality development. Hence theories have been selected for two purposes: firstly, as a way of explaining Liemkuhler's (1994) hypothesis, and secondly, as a way of critically considering the role of genetic and biological factors on the one hand, and environmental factors on the other, in personality development.

Chapter Three described how the neurobiology of attention is dependent upon cognitive development. *Piaget's theory of cognitive development* is not in itself a theory of personality development. Nonetheless it provides a useful starting point from which to consider the development of personality from a cognitive perspective. Although Piaget's theory is popularly acclaimed as a biological epistemology, he recognised the role played by environmental factors as this quote indicates: "The stages of development are far from being just the manifestation of internal organic maturation...Human intelligence is subject to the action of social life at all levels of

development from the first to the last day of life" (Piaget, 1995, as cited in Smith, Dockrell, & Tomlinson, 1997, pp 4-5). His theory remains seminal in the face of considerable criticism. Piaget provides us with a guide to the stages of cognitive development in children and adolescents. His theory has implications for the ADHD child and adolescent, especially in light of the *maturational lag hypothesis* described in Chapter Three. These implications may be extended to personality development.

In considering the effect of contextual factors on personality development, two assumptions are made: firstly the child is an active participant in reciprocal interactions with the environment; secondly, early childhood experiences play an important role in shaping future behaviours. It is proposed that psychodynamic theories are appropriate for two reasons: firstly, they view the child as an active participant in interactions that have a bearing on personality development; and secondly, they are compatible with Liemkuhler's (1994) argument that personality arises from the interaction between psychodynamic processes and neurobiological bases. Retrospective accounts of children who were later diagnosed as having ADHD indicate that they may be considered 'difficult infants'. *Winnicott's object relations theory of the 'good enough' mother* has relevance for the difficult infant who displays ADHD behavioural symptoms (Weiss, & Hechtman, 1986), since it takes into account the dynamic, reciprocal relationship between the infant and the mother/caregiver. Winnicott's ideas allude to contextual theories / general systems theory that recognises inter-relationships between internal and external forces, and more specifically, the action of the environment on the person.

Personality development is also considered from the perspective of contextual theories. *Contextual theories* extend Bronfenbrenner's ecosystemic model to personality development. Contextual theorists argue that not only does personality develop as a result of transactions between the individual and the environment, but that changes in personality development are dependent upon changes in the environment (Srivasta, John, Gosling, & Potter, 2003). This theory challenges the notion of a neurobiological basis for personality development, and as such creates a forum for a critical evaluation of the theory proposed by Liemkuhler (1994). Contextual theories are also relevant to the five-factor model of personality, on which the NEO-FFI (the instrument used in this study) is based. It is useful to consider the three earlier theories under the broad umbrella of the five-factor model of personality.

4.3. Theories of Personality

Theorists vary in their definition of the concept of *personality* and in their points of emphasis, based on their theoretical stance. The author defines personality simply as a dynamic interaction between multiple intrapersonal and interpersonal factors that determine how a person thinks, feels, and acts. This definition recognises the role played by cognition (as arising from neurobiological processes) *and* environmental factors.

The scope of this thesis does not allow for a detailed review of the theories. Hence only concepts that are considered relevant to the thesis topic are expanded upon. Furthermore, because the links between the theories themselves, and to personality

development in ADHD are numerous, they are discussed collectively in a separate section. As such, the following section does not seek to apply the theories to ADHD, but rather to present relevant theoretical concepts.

4.3.1. Piaget's Theory of Cognitive Development

Piaget argued that the newborn infant (organism) is equipped with certain constitutionally determined, though limited repertoire, of reflexes. A child interacts with his/her environment through the co-ordination of his/her motor movements. This interaction facilitates the construction of knowledge. As the baby begins to move himself/herself and things, he/she slowly acquires co-ordination and then schemes. *Schemes* are developed through the dialectic processes of *assimilation* and *accommodation*, while *adaptation* is the result of such interaction.

Assimilation describes the process of adjusting incoming information to fit existing schemes. Accommodation describes the process of adjusting existing schemes in accordance to new information. Hence its role is not merely one of filtering out irrelevant information (Cohen, 1983). Assimilation dictates what is accommodated, in other words, what information is attended to and registered. A person adjusts to the environment through the process of accommodation when existing strategies and schemes have failed to solve a problem. New information must be assimilated, interpreted and existing schemes reconstructed if necessary (Smith, et al., 1997).

The child is constantly engaged in active *adaptation* to the environment (Smith, et al., 1997). *Equilibration* is the process of dynamic interaction between the processes of

assimilation and accommodation, and is directed towards a state of *equilibrium*, at which point the child (organism) has adapted to the environment. In this way existing schemes are expanded or reconstructed, enabling the development of more sophisticated knowledge and skills.

Development is the progression of successive internal states of higher equilibrium through the process of equilibration. Piaget described this development according to four successive stages through which a child progresses. Each stage is characterised by qualitatively different styles of cognition that builds upon the cognitive skills of the previous stage.

Early adolescence coincides with the transition between the concrete operations stage and the formal operations stage. This transition gives rise to *adolescent egocentrism* and includes the creation of an imaginary audience and the perception that their experiences and thoughts are unique, referred to as the *personal fable* (Goldstein, 1994). Cognitive development continues during adolescence and by approximately twelve years of age, there is the important emergence of what Piaget called *formal operations stage*. On a cognitive level, this stage involves the ability to think abstractly, formulate and test hypotheses, develop scientific reasoning, make deductions, and debate controversial topics, including morality. Such development usually occurs during the mid-latter phase of adolescence. These skills are not only of obvious importance to academic achievement, but also to personality development (Hobson, 1985).

Cognitive development is important for many aspects of personality development, especially during adolescence (Graham & Rutter, 1985). The following cognitive deficits (associated with the neurobiological deficits) are frequently observed among adolescents who are diagnosed as having ADHD (Liemkuhler, 1994):

(i) A problem with the consistency of *attention and concentration* that leads to a failure to direct and sustain attention on important, salient features of the environment, and focusing too much on extraneous details. Distractibility is the key attentional problem, and individuals are attracted to novel stimuli.

(ii) Poor *organisation and planning* skills that are in turn based on a poor sense of priorities. Individuals diagnosed with ADHD tend to be unusually dependent on the structure inherent in a task, and have difficulty imposing organisation on complex, unstructured activities or projects.

(iii) The level of *mental activity* decreases during adolescence, but manifests in behaviours such as risk-taking, multiple hobbies, highly competitive careers, and mental restlessness.

(iv) The lack of *inhibition of impulses* becomes apparent in decision-making and in interpersonal interactions. The inability to delay gratification and to reflect on one's actions leads to frequent conflict situations with others,

which may have negative psychological consequences. This failure to control impulsivity also compromises goal-directed behaviour.

(v) Problems with *learning and memory* result in a failure to encode or register new information or a failure to retrieve all or part of the information. Individuals with ADHD symptoms often employ superficial processing and passive encoding strategies.

(vi) *Abstract reasoning* is delayed. Overcompensation for this deficit may lead to rigidity, compulsiveness, and lapses into cognitive ineptitude or regression to earlier levels of concrete thinking. Individuals with ADHD may find it difficult to form opinions about controversial topics.

The effect that these cognitive problems may have on personality development through its effect on social, emotional, and academic functioning is explored when proposing a model for personality development among adolescents who exhibit symptoms of the disorder.

4.3.2. Winnicott's Object Relations Theory of the 'Good Enough' Mother

Donald Winnicott belongs to the object relations group of psychodynamic theorists. Object relations theories are based on the assumption that the infant is responsive and interactive in an adaptation to its own state and the nature of the actual maternal response (Dare, 1985). Similar to other object relations theorists, Winnicott was primarily concerned with the internal representation of the self and the other

(Grolnick, 1990). Development is viewed as an interaction between biologically determined tendencies that interact with the environment. Development is characterised by periods of progression that are almost invariably punctuated by periods of temporary regression. This kind of regression is a necessary and functional aspect of the developmental process because it provides the child with a certain degree of reprieve from the changes that are associated with the developmental process. This spiral approach to development is similar to the neuropsychological theory of Gesel (1954, as cited in Grolnick, 1990).

As a practicing paediatrician, Winnicott interacted regularly with mothers and their children. The relationship between mother (primary caregiver) and child is the central tenet of his theory. He used the term *nursing couple* to refer to and emphasise the highly dynamic, interdependent and interactive relationship that characterise this dyad. The mother-child relationship goes beyond just fulfilling the biological needs of each other (Grolnick, 1990).

Winnicott believed in the natural ability of mothers to mother. Most mothers are *good enough* in the sense that they are able to discern the needs of the infant and meet those needs accordingly. In the initial phase of *primary maternal preoccupation*, the infant's needs take precedence over the needs of the mother (and others), and the mother is able to meet the infant's needs regularly and timeously. The mother's *holding* power in relation to the infant's complete dependence is emphasised. This has a protective function. It forms the basis for a sense of security and self-control that fosters healthy ego development. The mother provides a holding environment within

which the infant is contained and experienced, and is able to begin his/her self-integrating task (Greenberg & Mitchell, 1983).

As the mother begins to recognise her own needs, the infant ceases to be the focus of her attention. The process of *internalisation* ensures that the caring and holding nature of the mother is maintained within the infant during the separation-individuation process. The process of internalisation changes constantly in an effort to maintain equilibrium with external processes and protects the child from *impingement.* which is a disruption of the feeling of *going-on-being.*

By attributing such an interdependent quality to the mother-child dyad, Winnicott introduced literal and metaphoric concepts of space and boundaries. This intermediate space is characterised by a sense of separateness, and it is here that *transitional objects and phenomena* originate. While others (Brody, 1980, Sperling, 1963, as cited in Grolnick, 1990) view transitional objects as representing defects in the mother-child relationship, Winnicott argues that they play an important role in development of the self. They are a source of security during stressful times, such as the separation-individuation process. Transitional objects and phenomena are not specific to childhood but may occur during the turbulent adolescent years, or as a result of a traumatic or stressful event during adulthood.

Winnicott argues that the quality of mother (primary caregiver) child interaction is likely to affect future personality development. Many mothers are good enough for normal infants, being able to not only meet the infant's needs (and thereby

establishing the basis of a secure attachment) but also recognizing that the infant's crying is not due to some inadequacy on her part (Weiss & Hechtman, 1986).

Winnicott's concept of the 'good enough mother' is relevant to the 'difficult infant'. The 'difficult type' of child is impulsive, negativistic, distractible, and labile in their emotional response (Caspi, 2000). Information about the behaviour and temperament of infants and toddlers with ADHD have been obtained from retrospective accounts from their mothers when these children were brought in for assessments (usually due to behavioural problems) during their formal schooling. The bias in reporting cannot be ignored, as mothers tend to 'remember' more negative behaviours and incidents; consequently, the accuracy and validity of such reports may be questioned and therefore viewed with some degree of caution. Nonetheless, the following behavioural patterns are most frequently reported of 'hyperactive' infants:

(i) In an early study by Wolff (Weiss and Hechtman, 1986), it was reported that *colic* is more common among infants and toddlers who are later diagnosed with ADHD than those who are not. However, this study did not differentiate between true colic and *frequent periods of crying* that are unrelated to colic.

(ii) 'Hyperactive' infants were described as being either *excessively sleepy or unresponsive* (perhaps linked to the sluggish cognitive tempo as described by McBurnett, Pfiffner & Frick, 2001) or were *overactive and had difficulty sleeping*. Sleep was usually restless.

(iii) *Feeding difficulties*, due to poor sucking or crying during feeding were common. Some were described as having no regular feeding times and usually grew up to be picky eaters in childhood.

(iv) A *lack of 'babbling'* which is a precursor to speech development was reported. Speech was delayed till over a year old. In a study by Fiedler et al. (1971, as cited in Weiss & Hechtman, 1986) children assessed for the disorder and who had failed a speech screening examination at 3 years of age, were reported to have displayed much atypical behaviour in their first year. When they were evaluated at seven years of age, both behavioural disturbances and neurological dysfunctions were found.

(v) Infants were described as *smiling less*. They were also considered as not being cuddly and did not seem to enjoy being held.

Crying and associated difficulties impact on the quality and amount of mother/caregiver-child interaction, as mothers find it more difficult to soothe and comfort their infants. Mothers reported that as these infants grew older, they were involved in more fights among their peers, which made them less popular. In a longitudinal study of children belonging to the 'difficult type' category, Caspi (2000) found that as adolescents, they scored low on traits measuring constraint (low self control), and high on traits measuring negative emotions (high aggression, and high alienation). By adulthood, they scored low on the Conscientiousness scale of the five-

factor model of personality (not reliable and trustworthy) and were involved in more conflicting relationships.

Ego defense mechanisms and ego functions mature in parallel with the maturation of the self and object representations. One of the functions of the separation-individuation phase of development is to bring ego defense mechanisms, such as the omnipotent self, into accord with reality by phase-appropriate disappointment and frustration (Materson, 1981, as cited in Liemkuhler, 1994). Failure in this stage of development results in faulty development of the self-representation; in other words, the boundaries between mother and self become blurred.

4.3.3. Contextual Theories

Contextual theories argue that personality traits are determined by multiple factors, but that the social environment is probably the most important determinant (Haan, Millsap, & Hartka; Helson, Jones, & Kwan, 2002, as cited in Srivasta, et al., 2003). Further, they predict different changes in personality during different stages in life. Personality changes as the environment changes (Hogan, 1996, as cited in Srivasta, et al., 2003). Similarly the timing of personality change is linked to the timing of role transitions. Personality is viewed as a function of person-environment transactions, in which the person is an active agent in selecting and initiating change within the environment. These environments in turn, shape his/her personality. Such transactions may reinforce earlier dispositions (Caspi & Moffitt, 1993, as cited in Srivasta, et al., 2003).

4.4. Liemkuhler's Hypothesis of ADHD Personality Styles

Problems in the development of the self lead to consequent impairments in the development of ego functions, which include the following:

> ...reality testing, judgment, sense of reality and sense of self; regulation and control of drives, affects, and impulses; object relations; thought processes; adaptive regression in the service of the ego; defensive functioning; stimulus barrier; autonomous functioning; synthetic- integrative functioning; and mastery-competence. (Bellak, 1979, as cited in Liemkuhler, 1994, p193).

Liemkuhler (1994) argues that the combination of neurochemical dysfunction and ego dysfunction in individuals with ADHD may provide the foundation for later development of cognitive and behavioural manifestations of clinical syndromes. Further, although mood disturbances may be present in childhood ADHD, they may become a more prominent part of the clinical picture as the individual matures. To extend the hypothesis outlined in Chapter One, this means that as some of the more overt behavioural and cognitive symptoms resolve around puberty, the latent impact of early traumas to the ego on personality development may become more apparent during the difficult adolescent period, and may result in the development of one of the personality styles outlined in Chapter Two.

4.5. A Model of ADHD Adolescent Personality Development

The author proposes this model, and draws upon the theories discussed above. It is an attempt to detail the possible processes that may contribute to the development of the personality styles proposed by Liemkuhler (1994), since Liemkuhler does not describe how this process unfolds.

Adolescence is a period that is characterised by rapid physical, cognitive, social, emotional, and psychological changes. It may be conceived of as another separation-individuation process wherein the development of self includes the recognition of others. This may prove to be a particularly challenging period for the adolescent displaying symptoms of ADHD, as problems and deficits associated with the disorder exacerbate the transitional problems of adolescence. The theories of Piaget, Winnicott, and the contextualists, provide a useful framework within which to consider the extent to which ADHD deficits may influence personality development. A model of personality development of adolescents exhibiting symptoms of ADHD is proposed based on the theories explored earlier.

The neurobiological and neural deficits indicated in ADHD manifests in interlinked cognitive impairment, neuropsychological impairment and behavioural problems. Problems begin in infancy when the child exhibits behaviours associated with the 'difficult infant'. This infant is characterised by incessant crying, poor feeding, sleep difficulties and poor emotional response (lack of smiling and withdrawal from physical contact) (Weiss & Hechtman, 1986). These behaviours have a negative

impact on the mother-infant interaction in that it prevents the mother from being a good enough mother. The unrewarded mother then develops negative feelings of inadequacy, guilt, anger, helplessness, and lowered self-esteem. Mothers of hyperactive children are less rewarding, more directive, express more disapproval (Edwards, Barkley, Laneri, Fletcher & Metevia, 2001) and are less responsive to their children's requests for attention (Chronis, Pelham, Jr., Gnagy, Roberts & Aronoff, 2003).

Although these feelings may be inhibited to a large extent, they interact with the infant's temperament producing feelings of insecure attachment in the infant (Weiss & Hechtman, 1986). The negative feelings of the mother and the problematic temperament and feelings of insecurity in the infant become mutually reinforcing. Consequently, the separation-individuation process may begin too early. The absence of the holding quality of the mother affects the healthy development of the ego. The restriction in the development of the ego leads to the development of a false self. The early development in ego dysfunction has implications for adolescent functioning. For example, a study by Edwards, et al., (2001) indicated significant levels of conflict between adolescents who were diagnosed with ADHD and their mothers.

The impairments in cognitive functioning as a result of neurobiological deficits suggest that children displaying the symptoms associated with ADHD may not progress through the stages of cognitive development at the same rate or extent as argued by Piaget. The maturational lag hypothesis proposes that such children develop cognitive skills at a slower rate than their peers and supports the idea of

delayed progression through the stages of cognitive development. The DSM IV field trials for ADHD included items that tested the hypothesis of *sluggish cognitive tempo* (sluggishness, drowsiness and apparent day-dreaming). Although these items were later discarded because of poor negative predictive power, they support the idea of delayed cognitive development in ADHD (McBurnett, et al., 2001). This impairment in cognitive development affects emotional development and contributes to the lack of emotional responsiveness characteristic of the difficult infant.

Locomotion is an important milestone during the second year of the sensorimotor period. Retrospective accounts by mothers indicate that hyperactive toddlers begin to walk at an earlier age in comparison to their peers or siblings (Weiss & Hechtman, 1986). The excessive need to move and to run may supercede reality testing. Once again, the separation-individuation process begins too early. The hyperactive toddler may lack the emotional readiness to sustain the premature distancing from the mother. Ego development is adversely affected in the same way as described earlier. The lack of alignment between delayed cognitive ability and precocious motor development makes adjusting to the environment more challenging.

Developing language competence is an important feature of the preoperational stage. Language plays a vital role in infant-mother interactions. Infants learn to reciprocate vocal intonations and begin developing mastery over the environment. Language used by mothers is usually affirming and contributes to secure attachment. However, the use of language may be limited in the interaction between the difficult infant and mother. The lack of babbling characteristic of difficult infants lends credibility to this

argument. Lack of appropriate verbal interaction between infant and mother not only affects other areas of functioning (for example, development of language and appropriate emotional response) but may also lead to mutual withdrawal from each other. This has negative implications for ego development. Language also plays an important function in the development of schemes. Limited language may contribute to the development of impoverished schemes. The neurobiological problems of an inability to sustain attention, means that the child with ADHD may not sustain focus long enough to assimilate enough information from the environment to make necessary accommodations, and consequently adaptation to the environment is compromised. This is applicable for all periods of cognitive development and accompanying emotional and psychological development.

The effects of inattention and impulsivity are perhaps most noticeable during the concrete operational stage and the formal operations stage, because of the implications for school functioning. These periods require well developed executive functioning in the areas of logical thinking, deductive reasoning, problem solving, decision-making, and abstract thinking. However, as indicated by neuropsychological studies, the neural deficits of ADHD result in impaired executive functioning. Consequently, children and adolescents with these deficits are likely to endure academic failure.

The school environment not only places huge academic demands on the child who displays the symptoms of ADHD, but also social demands. At school, such individuals frequently have difficulty meeting the social demands of the classroom,

and receive more negative attention from their teachers and rejection by their peers (Barkley, 1998; Johnston, Pelham & Murphy, 1985, as cited in Ohan & Johnston, 2002). During the formal operations period, adolescents develop a sense of awareness that includes a reflection of their own feelings as well as considering the feelings of others. Consequences of actions are reflected upon. Loney, Frick, Clements, Ellis, & Kerlin (2003) suggest that children with low behavioural inhibition are at risk for impairments in conscience development. Many miss some of the early precursors to empathetic concern that involve emotional arousal evoked by the distress and misfortune of others. The impulsive and uninhibited adolescent may fail to pick up on important social cues that define social boundaries and roles. As a result these adolescents have poor social interactions, frequent arguments and are involved in conflict situations. This may result in peer alienation, lowered self-esteem, and depression. According to contextual theorists, transactions may reinforce earlier dispositions, as would be the case here. The results of a study by Cooper, Wood, Orcutt, & Albino (2003) suggest that dysfunctional styles of regulating emotions and emotionally driven behaviours are core features of risky or problem behaviours during adolescence.

The adolescent with ADHD symptoms employs defense mechanisms to protect himself/herself from further trauma to the ego. The creation of an imaginary audience and adolescent egocentricism may be reflective of a false, inflated self. An imaginary audience and engaging in risky behaviours may also be interpreted as transitional phenomena that serve to protect the ego.

The author uses the above model to suggest how infant-mother interaction may lead to the development of the false self and the consequent employment of other defense mechanisms by adolescents with ADHD. It is quite conceivable that these behaviours may manifest in certain personality styles as proposed by Liemkuhler (1994). Without the necessary support and intervention, these adolescents are at risk to developing more severe forms of psychopathology as illustrated in the differential diagnosis in Table 2.4. in Chapter Two.

4.6. The Five-Factor Model of Personality and Liemkuhler's Six Personality Styles

The aim of this section is to draw upon the previous discussions to formulate operational criteria that may be used in the actual testing of Liemkuhler's (1994) hypothesis. The five-factor theory of personality provides a useful framework within which Liemkuhler's six personality styles may be operationalised. This theory is discussed below.

4.6.1. The Five-Factor Model of Personality

The five-factor theory of personality belongs to the group of theories that locate personality within a biological framework. Although personality is biologically based, perceptual and learning experiences can reshape the developing brain (Kolb & Whishaw, 1998, as cited in McCrae, et al., 2000). The environment provides the concrete and social conditions and parameters within which personality develops.

Consequently, it plays a decisive role in the development of social skills and the formation of values, attitudes and identities.

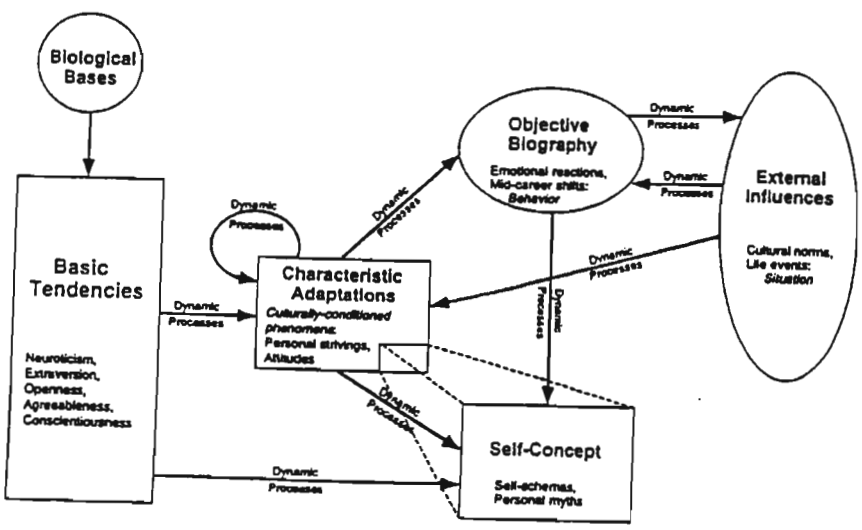
The five-factor model of personality proposes that personality-based variations in behaviour may be explained in terms of the five basic tendencies of Neuroticism (N), Extraversion (E), Agreeableness (A), Openness (O) and Conscientiousness (C). These basic tendencies are described at greater length in Chapter Five when reviewing the NEO FFI.

McAdams (1996, as cited in McCrae, et al., 2000) offers a formulation of the personality system as a whole in terms of three levels. Personality traits are assigned to Level 1 whereas constructs that are contextualised in time, place, or role (such as coping strategies, skills, and values) occupy Level 2. Level 3 includes life narratives that give unity and purpose to the self. A related system has been proposed by McCrae & Costa (1999, cited in McCrae, et al., 2000) based on the five-factor theory of personality. This is depicted schematically in Figure 4.1. This model highlights the distinction between biologically based basic tendencies and culturally conditioned adaptations. They argue that the five basic tendencies are biologically based tendencies. However, the environment plays a crucial role in the development of personality by virtue of it providing the conditions and concrete parameters under which personality develops. In this context for example, parenting is important because it has long-term consequences for the development of characteristic adaptations, including the relationship between parent and child.

4.6.2. The Five-Factor Model of Personality, Environmental Determinants and the ADHD Adolescent

The five-factor model of personality fits in nicely with the development of the ADHD adolescent personality discussed in Chapter Four. Cloninger, Przybeck, Svrakic & Wetzel (1994, as cited in McCrae, et al., 2000) classified Novelty Seeking, Harm Avoidance and Reward Dependence as biologically based basic tendencies. These tendencies have many corresponding and related behaviours in ADHD. One could expect that the neurobiological and cognitive impairments in ADHD will interact psychodynamically with the biologically determined basic tendencies (Neuroticism, Extraversion, Openness, Agreeableness and Consciousness) to produce distinct patterns among these five domains. This would support Liemkuhler's hypothesis.

Figure 4.1. A Five-Factor Model of the Personality System



Source: McCrae, et al., (2000), p. 174

4.7. Summary

Theories of personality, like other areas of debate relating to ADHD, either emphasise a neurobiological or an environmental basis for personality development. There is evidence to suggest that both perspectives are important in personality development. The extent to which either neurobiology or environmental factors are involved in determining personality is an area that necessitates further research. Using the theories of Piaget, Winnicott and contextual theorists, the author proposed a model to expand Liemkuhler's (1994) hypothesis of the development of a cluster of personality styles among adolescents who display the symptoms of ADHD. The model illustrates how early psychodynamic processes; cognitive delays and behavioural problems associated with ADHD may contribute to the development of one of the personality styles outlined by Liemkuhler.

Thereafter, the five-factor model of personality was considered in relation to Liemkuhler's (1994) hypothesis, as an appropriate basis for the operationalisation of the scales to be measured when testing Liemkuhler's hypothesis.

CHAPTER FIVE

AIMS AND METHODOLOGY

5.1. Introduction

The study of personality is as old as psychology itself and may be argued to be at the core of psychology. It has intrigued researchers and theorists alike who have sought to identify the key determinants of personality. Many theories have been proposed to explain the course of personality development and the factors that influence this development. Theorists generally divide personality into two categories, corresponding to innate (nature) or acquired (nurture) characteristics. Numerous studies have attempted to test these theories and there is general evidence to suggest that both innate and acquired characteristics are involved. However, the degree to which each factor is involved in personality development remains a debatable issue.

5.2. The Five Personality Scales of the NEO FFI

The five personality scales of the NEO FFI are based on the five-factor theory of personality that was discussed in Chapter Four. A summary of the five scales are presented below, based on the descriptions provided by Costa, Jr., & McCrae (1992).

i) Neuroticism (N)

This scale contrasts adjustment or emotional stability to maladjustment or instability. There is a general tendency to experience negative feelings, such as those listed in Table 5.1. However, this scale does not merely imply a susceptibility to psychological distress, but rather measures a dimension of normal personality. High scorers may be at risk for some kinds of psychiatric problems, but the scale should not be viewed as a measure of psychopathology. Individuals who score low on the Neuroticism scale are seen to be emotionally stable and able to handle stressful situations.

ii) Extraversion (E)

This scale measures degrees of extraversion and introversion. Those scoring high on this scale are more likely to be sociable, assertive, active and talkative and tend to enjoy excitement and stimulation. Those who score low on this scale may be described as introverted. Introverts are reserved, independent and prefer to be alone. This is not equivalent to being lonely or unhappy.

iii) Openness (O)

Openness to experience implies an active imagination, aesthetic sensitivity, and attentiveness to inner feelings, preference for variety, intellectual curiosity, and independence of judgment. Persons who score high on this scale are usually curious about both inner and outer worlds. They are willing to entertain novel ideas and unconventional values and

they experience both positive and negative emotions more intensely. Openness is especially related to aspects of intelligence, such as divergent thinking that contribute to creativity (McCrae, 1987, as cited in Costa, Jr., & McCrae, 1992).

iv) Agreeableness (A)

Like Extraversion, Agreeableness is a dimension of interpersonal tendencies. The agreeable person is fundamentally altruistic and is sympathetic to others. In contrast, the disagreeable person is antagonistic, egocentric, skeptical of others' intentions and competitive rather than cooperative. While it may be tempting to see high scores on this scale as more socially desirable, survival in a competitive environment may lean towards less agreeable qualities such as competitiveness. Low scores are associated with Narcissistic, Antisocial, and Paranoid Personality disorders whereas high scores are associated with Dependent Personality Disorder (Costa & McCrae, 1990, as cited in Costa, Jr., & McCrae, 1992).

v) Conscientiousness (C)

Conscientiousness is related to self-control and is used to refer to more active processes of planning, organising, and carrying out tasks. The conscientious person is purposeful, strong-willed and determined. High scores are associated with academic and occupational achievement while low scores may indicate fastidiousness, compulsive neatness, or

workaholic behaviours. An individual with poor self-control may score lower on this scale.

5.3. Aims and Research Questions

5.3.1. General Aim

The overall goal of the present study is to objectively assess if certain personality styles are unique to ADHD adolescents as proposed by Liemkuhler (1994). This goal is guided by the following research questions:

5.3.2. Research Questions

i) Is there a significant difference in personality styles between ADHD adolescents (experimental group) and adolescents without ADHD (normal control group) as measured by the NEO FFI? In other words, do the two groups differ in mean scores for each of the particular domains?

ii) Are there any significant relationships between the scales for the ADHD experimental group and the control group? If so, could such relationships be indicative of patterns of personality traits specific to each group?

As a starting point in answering the research questions, the behavioural descriptors of each of the six personality styles described by Liemkuhler (Table 2.4. in Chapter Two) were compared to the descriptors for each of

the five domains contained in the NEO PI-R, of which the NEO FFI is an abridged version (Table 5.1). The following hypotheses are formed on the basis of the above comparison. The author proposes these behavioural characteristics. The ticks indicate characteristics that may be associated with the behavioural symptoms of ADHD, while the question marks indicate characteristics that may be questionable because they may be dependent upon the presence of behavioural symptoms associated with a particular ADHD subtype.

Table 5.1. Domains and Facets Measured by the NEO PI-R

Domains		**O: Openness Facets**	
N: Neuroticism		O1: Fantasy	?
E: Extraversion		O2: Aesthetics	
O: Openness		O3: Feelings	?
A: Agreeableness		O4: Actions	✓
C: Conscientiousness		O5: Ideas	✓
		O6: Values	✓
			✓
N: Neuroticism Facets		**A: Agreeableness Facets**	
N1: Anxiety	✓	A1: Trust	
N2: Angry Hostility	✓	A2: Straightforwardness	
N3: Depression	✓	A3: Altruism	
N4: Self-Consciousness	✓	A4: Compliance	
N5: Impulsiveness	✓	A5: Modesty	
N6: Vulnerability	✓	A6: Tender-mindedness	
E: Extraversion Facets		**C: Conscientiousness Facets**	
E1: Warmth	?	C1: Competence	
E2: Gregariousness	✓	C2: Order	
E3: Assertiveness	?	C3: Dutifulness	
E4: Activity	✓	C4: achievement Striving	
E5: Excitement-Seeking	✓	C5: Self-Discipline	
E6: Positive Emotions	?	C6: Deliberation	

Source: Adapted from McCrae & Costa, 2000

This comparison does not take into account the subtypes of ADHD. It is likely that different scales may be elevated for the different subtypes, for example Extraversion seems more applicable to the ADHD or ADHD-C subtypes as opposed to the ADHD-IA subtype. Likewise ADHD-IA subtypes may score higher on the Agreeableness and Conscientiousness scales, especially since these are related to social interactions.

5.3.3. Hypotheses

Based on the descriptive behaviours of each of the six personality styles proposed by Liemkuhler (1994) and each of the scales of the five domains of the NEO-FFI, the following predictions were made between the two groups. These are based on the theoretical discussions relating to ADHD adolescent neurobiological impairments, behaviour and neuropsychological functioning contained in previous chapters:

i) ADHD adolescents should score significantly higher on the Neuroticism scale.

ii) ADHD adolescents should score significantly higher on the Openness scale.

iii) ADHD adolescents should score significantly lower on the Agreeable scale.

iv) ADHD adolescents should score significantly lower on the Conscientiousness scale.

v) ADHD adolescents should score average to high on the Extraversion scale.

5.4. Methodology

5.4.1. Process of Data Collection

In finding a suitable and adequate sample, some problems were encountered. Some private schools were initially approached, but principals were reluctant for learners to participate in the research study. In retrospect, the author considered this more preferable to the research study since learners attending private schools usually come from upper middle class families that are able to access better resources and support services. In this way, had the study used private school learners as participants, results obtained could have been misleading.

The ADHD support group in Pietermaritzburg was also approached. Although parents were keen on consenting to their children's participation in the study, most of the individuals were younger than ten years old and were considered unsuitable. Those that were eligible were too few in number. Most of these adolescents were also receiving extra tuition in preparation for examinations, which imposed time constraints.

Another approach was then adopted. Permission was obtained from the Department of Education – Kwa-Zulu Natal to carry out research at government schools in Pietermaritzburg. (Appendix 1). Thereafter schools that had a school psychologist were identified. This was done by phoning schools and enquiring if such a school had a school psychologist. There are not many government schools that have a psychologist. Once schools provided an affirmative answer, these psychologists were

contacted and the research study explained. One of these school psychologists indicated that her school had a high number of ADHD learners who might be suitable for such a study. Permission was obtained from the principal of the school to carry out the research study. Convenience cluster sampling was used based on accessibility and ease of selection of participants. The school psychologist, having access to learner files, identified suitable learners for the experimental group. To be selected for this group, learners had to have a diagnosis of ADHD, and had to be between the ages of 13 – 18 years. On the basis of information from learner files, the school psychologist identified thirty-five learners who were suitable for the experimental group. Thereafter another group of thirty-five learners were identified who matched the experimental group according to age and grade, but did not have a diagnosis of ADHD. IQ scores were not considered, although an average level of intelligence was assumed on the basis of having passed previous grades to reach secondary school level.

Letters were sent to the parents of the selected learners, in which general information about ADHD was provided, and the purpose of the study explained. (Appendices 2 & 3). A consent form was attached. (Appendix 4). A letter was also sent to the prospective participants, in which the confidential and anonymous nature of the study was emphasised. (Appendix 5). In addition, it was also emphasised that the focus of the study was on personality and not ADHD itself. This was done as a way of hopefully increasing willingness to participate, and/or to avoid participation in the study leading to problems of labelling. Of the seventy learners (thirty five experimental and thirty five controls) initially identified, twenty-seven experimental

group members and twenty six control group members returned signed consent forms. A date was then set to administer the test.

5.4.2. The Participants

The participants in the study were a selection of learners from a secondary school in Pietermaritzburg during 2002, doing grade eight to eleven. (Grade twelve learners were excluded due to a demanding syllabus and examination preparations). The ages of the participants ranged from 13 – 18 years, with a mean of 15.32 in the experimental group and 15.12 in the control group. The experimental group had a standard deviation of 1.37 and the control had a standard deviation of 1.55. Both groups contained males (n = 45; 24 = experimental group, 21 = control) and females (n = 6; 1 = experimental group; 5 = control group).

5.4.3. The NEO FFI

The NEO Five Factor Inventory (NEO FFI) is a 60–item version of Form S of the Revised NEO Personality Inventory (NEO PI-R), which consists of 240 items. These tests were developed to operationalise the five-factor model of personality used to describe normal-range personality. The NEO FFI provides a brief but comprehensive measure of the five domains of personality. It consists of five 12-item scales that assess each of the five domains. Although the NEO PI-R is a more comprehensive version, the NEO FFI was considered more appropriate in light of the problems of attention that concentration that is characteristic of ADHD. Furthermore, it is reported to have good reliability and validity (Costa, Jr., & McCrae, 2000).

5.4.4. Procedure During Testing

The NEO-FFI was group administered in the school auditorium during the first morning session (9am – 11am). The school psychologist assisted with the initial set up by arranging the seating of the participants according to the groups to which they had been assigned. However, participants were not informed about the rationale for such a division. Participants were required to furnish their age and sex. Due to the anonymous nature of the test, identification letters (E=experimental group, C=control group) were indicated on the top right hand corner of each test booklet once participants were seated. This was done by the school psychologist who could easily identify participants from each group.

Two participants from the experimental group were absent, reducing the number of experimental group members to twenty-five. All twenty six control group participants were present.

Each participant was provided with a NEO-FFI test booklet and a pencil. Standardised instructions were read to participants and although there were no time limits imposed, an approximate time (45-60 minutes) was indicated. Participants were thanked for their participation in the study. While the participants completed the test, the researcher was available to answer any questions. This was an effort to reduce the possibility of response sets or random responding to the items. It was observed that the experimental group as a whole not only took longer to complete the test, but also asked more questions. More errors were made by members of the experimental group as indicated by the number of changed responses (participants were asked to cross out

mistakes and not erase them). Participants were allowed to leave as soon as they had completed the test.

5.4.5. Scoring

Each answer sheet was checked to ensure that responses for each item were given. Thereafter a quick validity check was done by checking the responses of three questions at the end of the test. If a negative answer is provided to any one response, the test is considered invalid and discarded. None of the participants in this study answered no to any of the validity check questions.

Raw scores for each domain were obtained by summing the corresponding values for marked responses. Each item is rated on a 5-point scale from 0-4, with verbal anchors of strongly disagree, disagree, neutral, agree and strongly agree. Raw scores were converted to t-scores using the conversion tables contained in the manual (Coast, Jr., & McCrae, 1992). T-scores were used to plot profiles for each participant on sex specific profile sheets.

The scales of the NEO-FFI measure traits that are said to approximate normal, bell-shaped distributions. Most individuals will score near the average for the scale, with a small percentage at either end. Scales are most conveniently explained by describing characteristics of extremely high or extremely low scorers. Individual scores will usually represent degrees of the personality trait, and more extreme scores mean a higher probability of showing the distinctive features. The characteristics of groups are compared, as opposed to individuals within a group.

5.4.6. Statistical Analysis

Descriptive and inferential statistical procedures were performed using the Statistical Package for the Social Sciences (SPSS), version 11. The mean and standard deviations for each of the five domains in both groups were calculated using raw scores. Frequency counts were done and the results plotted using histograms.

The inferential statistics focused on differences between the ADHD experimental group and the control group. Relationships between scales for the ADHD experimental group and the control group were also examined. Differences were examined using an analysis of variance (ANOVA) to determine significance levels between scales within each group ($\alpha = 0.05$). Mean ratings for both groups were plotted using a line graph. A factorial ANOVA was done to compare significance levels between the two groups using the two groups as independent variables ($\alpha = 0.05$). Bonferroni's multiple comparisons were done for significant results obtained in the oneway ANOVA and the factorial ANOVA. Bar graphs illustrating the variance in the score ranges (very low, low, average, high, and very high) were drawn. Conclusions are drawn from these results and the hypotheses listed in this chapter are either accepted or rejected

Relationships between scales in each group were examined to determine if any scales were correlated, using Pearson's correlation coefficient. Results were plotted on scattergrams.

5.5. Summary

Careful consideration went into selecting a measure that would accommodate the cognitive and behavioural limitations experienced by many ADHD adolescents, yet be adequate enough to assess the various aspects of personality development. A sample of 35 members for each group for was initially hoped for, but the final sample was reduced to 25 members in each group. Although results may be compromised and need to be interpreted with caution, thorough statistical analyses were done to generate results to support of reject the hypotheses stated earlier. The statistical analysis is the focus of the next chapter.

CHAPTER SIX

RESULTS

6.1. Introduction

The results were analysed using the Statistical Package for the Social Sciences (SPSS) version 11 with an alpha of .05 as the significance level. Descriptive statistics were used to examine the characteristics of the sample. It is noted that the small size of the sample decreases the power of the statistical tests used as well as increases chances of Type I and Type II errors. Specific tests were used to assess the likely extent of these problems, and the data met most test assumptions of normality and homogeneity. Pearson's skewness coefficient indicated marked skewness for many of the scales for both groups. Skewed distributions are a common occurrence in biological studies (Allan, 1982). Although this study does not fall into the ambit of biology per se, it does investigate characteristics of a population that is assumed to have significant neurobiological impairments, and hence a skewed distribution may not necessarily suggest statistical weaknesses.

The inferential statistics are presented in relation to the hypotheses that were stated in Chapter Four. Theses hypotheses predict that the adolescents who were previously diagnosed as having ADHD (research group) will score significantly higher on the Neuroticism and Openness scales; and significantly lower on the Agreeableness and

Conscientiousness scales in comparison to the control group. Average scores for the Extraversion are predicted for adolescents previously diagnosed with ADHD.

6.2. Descriptive Statistics

6.2.1. Gender and Age

Frequency counts were done using age and gender as variables.

Table 6.1. Gender Distribution Across Groups

	Research Group		Control Group	
	Frequency	**Percent**	**Frequency**	**Percent**
Male	24	96.0	20	80.0
Female	1	4.0	5	20.0
Total	25	100.0	25	100.0

A chi-squared test would indicate whether there is an association between gender and the experimental and control group. The test was considered inappropriate in this instance however, as the expected count would be less than 5 for 50% of the cells.

It is suggested that the distribution of males and females within the research group is similar to prevalence trends observed in larger populations. According to the DSM IV, the overall prevalence rate for ADHD is 3% - 5% in children, with a male to female ratio of 4:1 to 9:1, depending on whether the sample was drawn from a clinic population or the general population (Gomez, Harvey, Quick, Scharer & Harris,

1999). The research group in this study consisted of 96% males, which may be argued to be similar to prevalence trends observed in the general population.

Although the DSM IV does not provide prevalence rates and gender ratios for the three subtypes, there is increasing evidence to suggest that females have a higher prevalence rate for the ADHD-IA subtype (ratio decreases to 2:1) (Baumgaertel, et al., 1995; Nadeau, 2003, as cited in Crawford, 2003). This implies that females and males are likely to score differently on the NEO FFI domains (assuming different subtypes), and consequently may influence the results of the inferential statistical tests performed. However, no parametric tests could be performed to determine if this is true for this study due to the small percent (only 4%) of females in the research group, and perhaps more importantly, due to a lack of information regarding subtypes within the research group. Because the specific subtypes of each research group member was unknown, for the purposes of this study it was assumed that the research group contained ADHD-C subtypes as this is the most common subtype that is diagnosed, and includes both hyperactivity and inattention factors.

6.2.2. Sample Size

The small sample size (n=25) for each group implies that there is a big margin for error in the statistical analysis. It must be noted however, that the size of the sample is also related to the research topic and accessibility of adolescents previously diagnosed as having ADHD. Prevalence rates of ADHD among adolescents are generally lower than that of children because a significant number of children are reported to outgrow the disorder by adolescence. In defense of the small sample size, it may be considered

'large' enough in relation to the general prevalence rate of adolescents diagnosed as having ADHD in a relatively small city such as Pietermaritzburg. Furthermore, the initial research sample drawn from the school population (and based on information from learner files) was 35, which would have provided more statistically reliable results. However, due to problems of unsigned consent forms and absenteeism; the final sample was reduced to 25 members in each group.

6.2.3. Means and Standard Deviations Across Groups

Table 6.2. Means and Standard Deviations Across Groups

Age	Research Group	Control Group
Mean	15.32	15.2
Standard Deviation	1.37	1.55

Based on the means and standard deviations of age for both groups, one could assume from a cognitive developmental point of view that, that groups are fairly similar. In considering Barkley's (1997) unifying theory, one could also expect adolescents with ADHD to have caught up in any cognitive lags in relation to their peers that may have been present. At least average intelligence was inferred on the basis of attendance at a mainstream secondary level school. It is acknowledged that this is a very broad measure of cognitive development that lacks the rigour of a comprehensive standardised cognitive abilities test; however, time constraints, logistical problems and experimental group characteristics (potential for inattention, poor concentration

skills and distractibility) prevented the inclusion of a more statistically sound measure to assess cognitive functioning.

6.2.4. Distribution of T-Score Ranges Across Groups

T- scores were used to do frequency counts for each of the five scales for the research group and the control group. These T-scores do not refer to t-scores derived from statistical tests. Instead they refer to standardised scores provided in the NEO FFI manual (Costa, Jr., & McCrae, 1992).

Table 6.3. Distribution of T-Scores for the Five Domains Across Groups

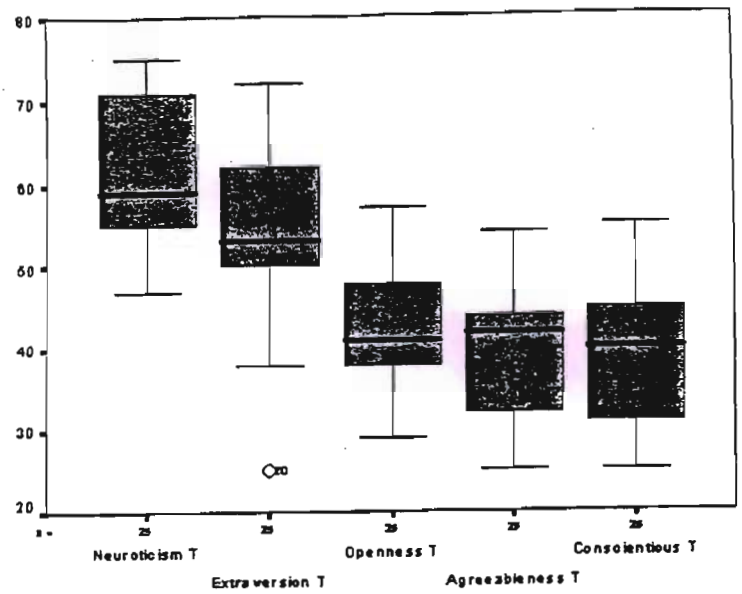
	Research Group					Control Group				
	N	E	O	A	C	N	E	O	A	C
Mean	61.56	53.88	43.00	38.28	38.68	56.48	50.64	41.36	40.28	43.72
SD	9.11	10.90	7.80	8.73	9.47	5.95	9.37	7.92	12.46	8.57

N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness,

C= Conscientiousness

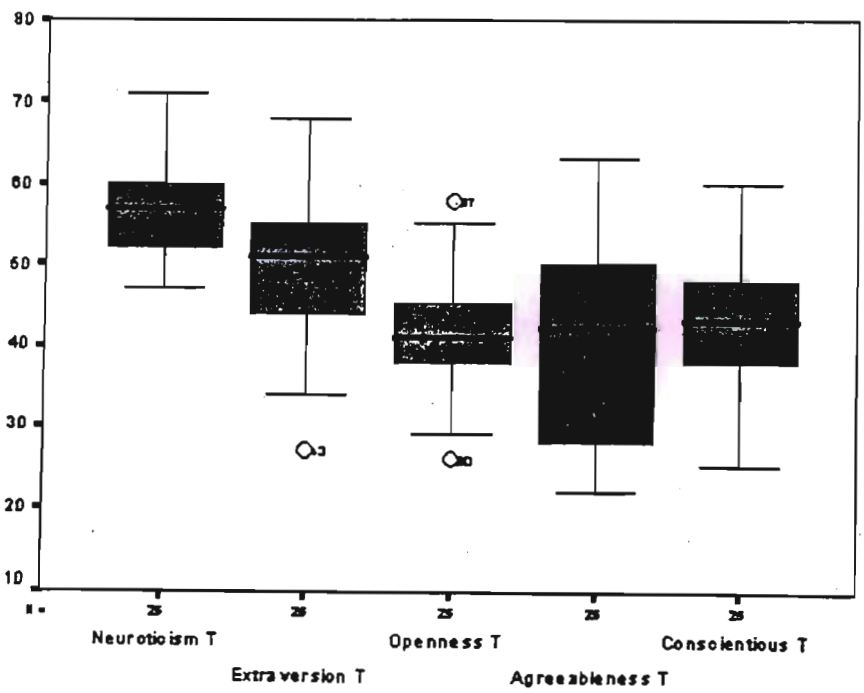
The following box plots show the distribution of standardised scores across all five personality scales for each group. It is useful because it also shows the variance from the mean for each personality scale. The box plots provide an easy way to present the five scale profile of each group.

Figure 6.1. Profile of the Five Domains for the Research Group



It is encouraging to note that there is only one outlier for the Extraversion scale (raw score = 13, standardised T-score = 25 [very low]).

Figure 6.2. Profile of the Five Domains for the Control Group



For the control group, the Extraversion scale contains one outlier (T-score = 34, very low) and the Openness scale contains two outliers (T-score = 30, very low; T-score = 58, high). This may suggest greater variance of scores in the control group than the research group.

A summary of the percentage distribution of T-score ranges across groups is indicated in Table 6.4. It suggests that the research group scored in the high to very high range on the Neuroticism and Extraversion scales, while the control group scored in the high range on the Agreeableness and Conscientiousness scales. There was very little difference in distribution of T-score ranges on the Openness scale.

Table 6.4. Summary of Score Ranges (%) Using Standardised T-Scores

	N		E		O		A		C	
Range of scores	R	C	R	C	R	C	R	C	R	C
Very high	40	4	16	4	0	0	0	0	0	0
High	28	56	24	20	4	8	20	0	20	0
Average	32	40	40	48	32	24	24	28	36	32
Low	0	0	16	20	52	52	40	20	40	32
Very low	0	0	4	8	8	20	36	40	36	20

R = Research group

C = control group

6.3. Inferential Statistics

This section describes three ways in which the data was analysed. Firstly, it examines if there is a difference between the five personality scales for the research group. This is schematically depicted in Table 6.4. (1). Secondly, it examines if there is a difference between the five personality scales for the control group (Table 6.4., no. 2). The oneway ANOVA was used to do the above two analyses.

Table 6.5.1. A Schematic Description of the Oneway ANOVA

Research Group		Control Group	
Neuroticism	1	Neuroticism	2
Extraversion		Extraversion	
Openness		Openness	
Agreeableness		Agreeableness	
Conscientiousness		Conscientiousness	

Thirdly, each scale was compared across the research group and the control group. This is the interaction effect of the factorial ANOVA and is shown schematically below.

Table 6.5.2. A Schematic Description of the Factorial ANOVA

Research Group		Control Group
Neuroticism	↔	Neuroticism
Extraversion	↔	Extraversion
Openness	3	Openness
Agreeableness	↔	Agreeableness
Conscientiousness	↔	Conscientiousness

Each of the above three ways of analysing the data is considered below.

6.3.1. Differences

6.3.1.1. Oneway ANOVA

A oneway analysis of variance (ANOVA) was computered to determine if any significantly statistical difference exists between groups and within groups using the means of the five personality scales firstly from the research group and secondly from the control group. A significance level of .05 % was used.

6.3.1.1.1. The Research Group

Table 6.6. ANOVA Summary for Research Group

	Sum of Squares	Df	Mean Squares	F	Significance
Between Groups	543.248	4	135.812	3.885	.005
Within Groups	4194.640	120	34.955		
Total	4737.888	124			

The Levene test of homogeneity of variance for the research group indicated a significant difference in the variance of the five personality scales in this group (p = .004). The ANOVA is a fairly robust measure to withstand slight departures from normality and homogeneity of variance. The ANOVA for the research group produced a significant result ($F = 3.885 > F\alpha = .005$) that suggests that the five personality scales have different means. However, the result does not specify which personality scales are significantly different. Bonferroni's multiple comparison was

then computered to determine which personality scales for the research group is significantly different. This indicated that Extraversion is significantly higher than Openness (mean difference = 6.5200, sig. = .002) (See Table 6.6.).

6.3.1.1. 2. The Control Group

The Levene test for homogeneity of variance for the control group was not significant (p = .389). The ANOVA for the control group produced a significant result (F = 8.287 > Fα = 0.000). ANOVA summary computations are shown below.

Table 6.7. ANOVA Summary for Control Group

	Sum of Squares	df	Mean Squares	F	Significance
Between Groups	1076.992	4	269.248	8.287	.000
Within Groups	3898.880	120	.32.491		
Total	4975.872	124			

Once again, Bonferroni's multiple comparison was computered to determine where the significance differences in the control group lay. Results indicated that the mean difference is significant at the .005 level between the following personality scales: Neuroticism and Extraversion (mean difference = -4.6400, significance = .047), Neuroticism and Conscientiousness (mean difference = -6.6000, significance = .001), Extraversion and Openness (mean difference = 5.7600, significance = .005), Openness and Agreeableness (mean difference = -5.3600, significance = .012) and

Openness and Conscientiousness (mean difference = -7.7200, significance = .000). The mean plots for the research group and the control group based on the results of the ANOVA is depicted in Figure 6.3.

Figure 6.3. Mean Plots for Research Group and Control Group

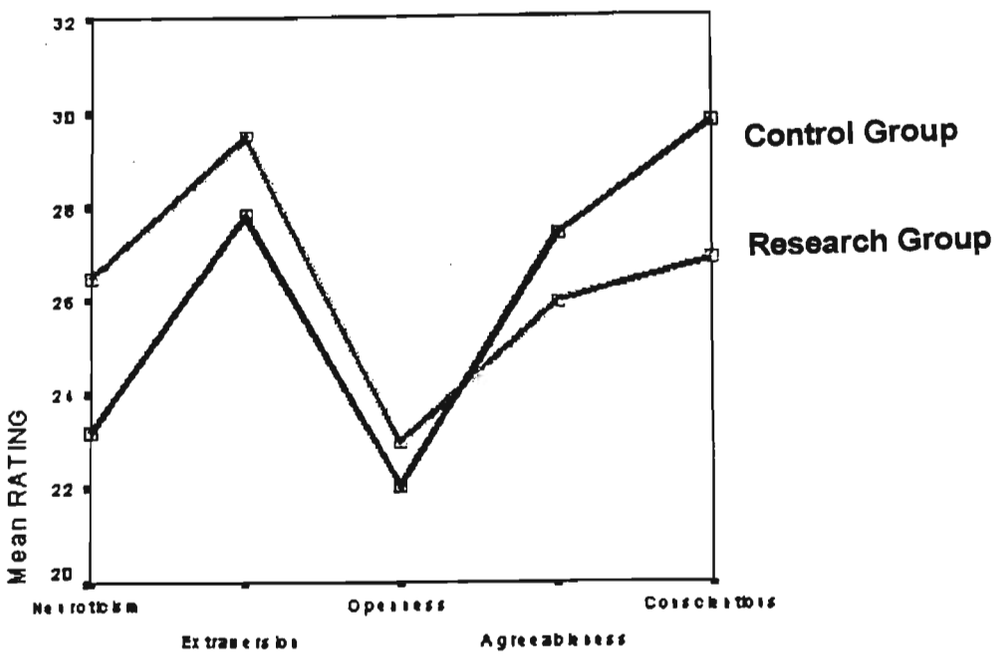


Figure 6.3. indicates that although the mean ratings for both groups indicate similar profiles overall for both groups, a difference is noted for the Agreeableness and Conscientiousness scale, where the line graph for the control group lies above that of the research group. Although not statistically significant, this change in profile may be indicative of subtle group characteristics relating to the facets measured by each scale. This idea is discussed in Chapter Seven.

6.3.1.2. The Factorial ANOVA

The factorial ANOVA has two main effects and an interaction. It was used to firstly compare all experimental data to the control data. Secondly, each personality scale was compared to all other four scales, regardless of which group the data came from. Lastly, the interaction compared the research group to the control group across the five scales.

The factorial ANOVA produced a significant main effect for the research group (sig. = .000), implying a significant difference between scales. The factorial ANOVA was also used to compare the interaction between the research group, the control group and the personality scales. The significance level was marginally higher than the alpha level of .05 and therefore implied no statistical significance overall between the groups for the five scales. However, the small sample size may have contributed to this result. It is possible that a larger sample may have generated a significant result for the interaction between the groups and personality scales. Table 6.7. summarises the results.

Table 6.8. Tests of Between-Subject Effects

Source	Type I Sum of Squares	Df	Mean Squares	F	Significance
Model	173026.480(a)	10	17302.648	513.082	.000
NEOAC	172708.880	5	34541.776	1024.279	.000
GROUP	5.776	1	5.776	.171	.679
NEOAC*GROUP	311.824	4	77.956	2.312	.058
Error	8093.520	240	33.723		
Total	181120.000	250			

a = R Squared = .955 (Adjusted R Squared = .953)

NEOAC compares all scores from a particular personality scale to the four other personality scales, regardless of whether the scores belong to the research group or the control group. This would be able to indicate if scores for any particular personality scale was significantly different in relation to the four other personality scales, and may be suggestive of some trend in personality development.

GROUP compares scores from all five personality scales of the research group to scores from all five personality scales of the control group. This is obviously important to determine if any significant differences in personality styles exist between the research group and the control group.

NEOAC*GROUP refers to the interaction.

Non-parametric (distribution free) tests, such as the t-test, were done but have not been included in the results for two main reasons. Firstly, there were problems encountered with the sample size. Secondly, besides being less stringent than parametric tests, there may be virtually no chance of finding a significant difference even if such a difference exists, since the family use error rate increases each time a T-test is done. For this particular study, 5 T-tests were done, in comparison to one ANOVA. The ANOVA may not only be considered statistically more powerful, but decreases the chance of statistical errors confounding the results. The results of the T-tests produced no significant results. These results are however, included in the Appendix for the interested reader.

Bonferroni's multiple comparisons were used to determine which interactions between groups were significant. Results indicated significant interactions between groups for the following scales: Extraversion and Neuroticism (significance = .012), Extraversion and Openness (significance = .000), Agreeableness and Openness (significance = .004) Conscientiousness and Neuroticism (significance = .030) and Conscientiousness and Openness (significance = .000).

6.3. 2. Relationships

Pearson's correlation coefficient (r) was used to determine if any relationships existed between scales within each group. A significant positive correlation was indicated between Agreeableness and Conscientiousness (r = .413, significance = .040) in the research group. A significant negative correlation was also found between the

Openness and Conscientiousness scales in the control group (r = -.439, sig. = .028). Scatter-plots for each of these correlations are included in the Appendix.

6.4. Summary

All results obtained must be considered within the limits of the sampling error. The small size of the sample means that results need to be interpreted with caution. No significant result was found to indicate a difference in personality styles between the research group and the control group. However, significant differences were found between the five personality scales for the research group and the control group separately. Significant correlations between some of the five personality scales were also found for the research group and for the control group. The author proposes that these results may be interpreted in two ways. Firstly, it may be indicative of differences that exist between the research group and the control group for certain *facets* that are measured by each of the five personality scales, and hence provide partial support for Liemkulher's (1994) hypothesis. Secondly, the results may be suggestive of mechanisms within the environment that act as protective buffers, resulting in a decrease in the likelihood of adolescents who display symptoms of ADHD developing one of the six personality styles proposed by Liemkuhler. The second interpretation does not dismiss Liemkuhler's argument; instead it considers the extent to which environmental factors may play a role in influencing personality development. Both of these interpretations are discussed in more detail in Chapter Seven in which the results are considered in relation to the hypotheses stated in

Chapter Five and the model of personality development among adolescents who display symptoms of ADHD proposed in Chapter Four.

CHAPTER SEVEN

DISCUSSION

7.1. Introduction

This chapter reviews the results presented in Chapter Six. The research questions and hypotheses are then addressed. A general discussion follows, which includes a discussion of factors that may decrease the likelihood of personality styles of adolescents exhibiting ADHD symptoms developing into more severe clinical syndromes. The discussion also considers the extent to which the present study supports Liemkuhler's (1994) general hypothesis. The implications of this study for educational practice and future research are considered. Finally the limitations of this study are presented.

7.2. Review of the Descriptive Results

7.2.1. Comparison of T-Scores for Each Scale

Distribution of T-scores across the five scales (Figure 6.1. and Figure 6.2.) indicate the following trend: the research group scored higher on the Neuroticism, Extraversion and Openness scales, and lower on the Agreeableness and Conscientiousness scales in comparison to the control group. This trend is more obvious in Figure 6.3., which depicts the mean scores for each scale. Furthermore the

distribution of scores among the various ranges indicates that a higher percentage of the research group scored in the high to very high range of scores on the Neuroticism and Extraversion scales. It is proposed by the author that these descriptive statistics are suggestive of group characteristics relating to facets measured by each personality scale. These facets are indicated in Table 5.1. Each scale is briefly discussed below.

Forty percent of the research group as opposed to only four percent of the control group scored in the very high range on the Neuroticism scale. Firstly, it must be remembered that the NEO FFI measures normal functioning. Thus scores in the very high range does not imply pathology but may be suggestive of a risk factor to developing more severe forms of pathology. The Neuroticism scale measures the following facets: anxiety, anger, hostility, depression, self-consciousness, impulsiveness, and vulnerability. The underlying impairments in neural and cognitive functioning in ADHD is likely to impact negatively in other areas of functioning such as social interactions, family relationships, and academic performance. Adams, Kelly & McCarthy (1997) argue that children diagnosed as having ADHD are at risk for numerous adjustment difficulties in adolescence. It is suggested that this may result in a higher number of conflict situations. In this sense, it is seems plausible that the adolescent with ADHD symptoms may experience higher levels of anger, hostility, anxiety and depression. A study by Finch, Saylor and Edwards (1985), using the Children's Depression Inventory, showed that children with ADHD displayed significantly more depressive symptoms than normal controls (as cited in Adams, Kelly & McCarthy, 1997). Negative feedback from others may also make them more

self-conscious as they become sensitive to ridicule and experience feelings of inferiority.

On the other hand, 56% of the control group scored in the high range as opposed to 28% of the research group. This may be a reflection of the challenges and difficulties that are associated with adolescence generally. Overall the scores of the research group may suggest poor coping skills in stressful situations, which puts them at risk to developing the personality styles described by Liemkuhler (1994).

More members of the research group scored in the high range of scores than the control group members on the Extraversion scale. Sixteen percent of the research group scored in the very high range as opposed to only four percent of the control group. It was expected however, that the research group would score in the average range for this scale, because the facets it measured included many positive facets such as warmth, assertiveness and positive-emotions, which may not be associated with the adolescent who exhibits ADHD symptoms, assuming increased conflict situations and poor social interactions. There was a marginal difference between groups in the high range of scores. Once again, this may be interpreted as being characteristic of adolescent functioning generally. On the other hand, this may imply that the research group was not as problematic as assumed.

There is very little difference in scores between the two groups on the Openness scale. Neither groups scored in the very high range. Only four percent of the research group and eight percent of the control group scored in the high range. This may be due to

the varied facets measured by the scale. It includes openness to ideas, actions, feelings, aesthetics, and values. In terms of ADHD impairments, one may expect adolescents with ADHD to score high on a limited number of facets such as action and fantasy. Cognitive impairments and associated difficulties in learning may have a negative effect on openness to new learning experiences that includes ideas, values, and aesthetics. In addition, frequent conflict situations may make the adolescent with ADHD more skeptical and less trusting of other's intentions although, it is acknowledged that this may not always be the case. It is suggested by the author that low scores on Openness scale may be associated with low scores on Agreeableness facets such as trust and compliance.

Although the research group scored lower overall on the Agreeableness and Conscientiousness scales in comparison to the control group, the margin of difference was not as large as anticipated. There were no scores in the high to very high range on the Agreeableness scale in the research group, as opposed to twenty percent of the control group. Based on the assumption that adolescents who exhibit ADHD symptoms are more likely to be involved in more conflict situations, the higher scores on the Neuroticism scale may result in lower levels of Agreeableness. Although the score ranges between the two groups support this argument, the margin of difference is not as large as was expected.

The *self-protective hypothesis* may be one way of explaining the smaller than expected differences between the two groups on the Agreeableness and Conscientiousness scales. Milich (1994, as cited in Ohan & Johnston, 2002) proposes

that children who display ADHD symptoms are motivated by performance goals, and not learning goals when faced with a challenging task. This means that they are motivated to present themselves in a positive light, and challenging tasks are perceived as a threat to their self-esteem. A study by Diener and Milich (1997, as cited in Ohan & Johnston. 2002) found support for this hypothesis in the area of social performance. On the basis of the self-protective hypothesis, and the assumption that the Agreeableness scale is a measure of social desirability, it is possible that the ADHD experimental group may have presented themselves in a more positive light in order to protect their self-image.

Although the control group scored higher on the Conscientiousness scale (twenty percent scored in the high range as opposed to zero from the research group), as predicted, once again the overall margin of difference was not as large as expected. It was reasoned that the research group would be less focused and goal-directed than the control group because of their cognitive and neurobiological impairments.

Ohan & Johnston (2002) may provide an explanation for this. In testing the utility of the self-protective hypothesis in academic performance, Ohan & Johnston (2002) found no evidence to support this hypothesis. The performance of the ADHD group in academic tasks closely paralleled the normal controls, despite in reality fairly worse than normal controls. Rather than using the self-protective hypothesis, this may be explained using the idea that children with problems associated with ADHD are poor judges of their ability. They genuinely believe that they are better or more competent than their true performances. Also, it implies that children and adolescents with

ADHD attach greater value to social interactions than academic tasks. In the present study, Conscientiousness may be associated with academic performance since its facets measure competence, organisation, orderliness, diligence, achievement striving, self-discipline and deliberation. It is possible that the higher than expected scores on this scale reflect the research group's poor judgment of their academic competence.

7.3. Review of the Inferential Results

7.3.1. Differences

There is no significant difference in overall personality styles between the research group and the control group.

The result of the oneway ANOVA produced significant results for differences between personality scales for the research group (significance = .004) and the control group (significance = .000) separately.

Bonferroni's multiple comparisons indicated that in the research group Extraversion is significantly higher than Openness. This supports the inference made when the five scales were compared to the behavioural characteristics associated with the six personality styles listed by Liemkuhler (1994) (see Table 5.1.). Adolescents who exhibit ADHD symptoms meet more descriptive criteria for the Extraversion scale than for the Openness scale. The facets measured in the Openness scale do not seem applicable to these adolescents, although it is tempting to assume a relationship between Extraversion and Openness. Openness as measured by the NEO FFI only

includes two facets (Action, and Feelings) that may be associated with impulsivity, hyperactivity and risk-taking behaviours of ADHD. The other facets measure openness to ideas and are cognitively linked. However, in light of the cognitive impairments associated with ADHD, one could expect a low score in these facets.

Bonferroni's multiple comparisons indicated the following for the control group: Extraversion is significantly higher than Neuroticism and Openness (mean difference = 4.6400, significance = .047; mean difference = 5.7600, significance = .005, for each scale respectively), Conscientiousness is significantly higher than Neuroticism and Openness (mean difference = 6.6000, significance = .001; mean difference=7.7200, significance = .000 respectively), Agreeableness is significantly higher than Openness (mean difference = 5.3600, significance = .012). Similar to the research group, the control group scored significantly higher on the Extraversion scale than on the Openness scale. Although not statistically significant, a difference in mean scores (Extraversion and Openness) does exist between the two groups, with the research group having higher scores on these scales. The fact that both groups scored higher on the Extraversion scale in comparison to the other scales may be attributed to general adolescent behaviours and the tendency to explore new areas and engage in risky behaviours.

7.3.2. Relationships

The correlations found between personality scales for both groups also highlight differences between groups. Different scales were correlated for the two groups. The research group has a positive correlation (r = .413, significance = .040) between

Agreeableness and Conscientiousness. This may mean that as social relationships improve, adolescents exhibiting symptoms of ADHD may be motivated to perform better in other areas where favourable responses from others may be received.

On the other hand a negative correlation exists between Openness and Conscientiousness (r = -439, significance = .028) in the control group. It is suggested by the author that as normal controls become more open to novel, stimulating, or unconventional ideas, actions and values, less emphasis may be placed on organisation, task efficiency and thoroughness. It must be noted that while organisation and task efficiency may be intentional and conscious actions for normal controls, the problems in the attentional system of adolescents with ADHD, together with cognitive impairments make purposeful organisation difficult

7.3.3. Research Questions and Hypotheses

The results indicate no statistically significant difference in personality styles between the research group and the normal controls. On the basis of this result, there is no evidence to support the first research question or any of the five hypotheses. It is suggested that other factors may account for the differences found between personality scales for each group independently. Correlations between scales within each group suggest that differences in the facets measured by each personality scale may exist. In this sense, the results may provide limited support for specific aspects that are implicated in Liemkuhler's (1994) hypothesis.

It is also suggested that the differences found within groups (as opposed to between groups) may hint at other differences that were not picked up due to methodological issues. One important issue relates to the test used. Chapter Five stated the reasons for the choice of the NEO FFI as opposed to the choice of the NEO PI-R. The main reason for choosing the NEO FFI, was to accommodate problems in attention and concentration that the research group was assumed to have. However, it is possible that the NEO FFI, in lacking detailed scale indicators such as those contained in the NEO PI-R, may not have been sensitive enough to pick up differences between the groups that may in fact exist. As subsets of the NEO PI-R domain scales, the NEO FFI scales carry with them some proportion of the demonstrated validity of the full scales. The major question is how much of a reduction in validity is to be expected, given the shortening of the scales. The NEO FFI scales are not equivalent to the full domain scales of the NEO PI-R and as such correlations are smaller (Costa, Jr., & McCrae, 1992). In addition, there is growing recognition that personality assessment at the level of the five factors themselves may be inadequate in providing a comprehensive description and understanding of an individual's personality (Briggs, 1989; Mershon & Gorsuch, 1988, as cited in Costa, Jr., & McCrae, 1992).

7.4. General Discussion

As stated in Chapter Seven, the author proposes that one way of interpreting the results of this study, is to consider other factors that may protect the adolescent, and in so doing, decrease the likelihood of the development of one of the personality styles described by Liemkuhler (1994). This may account for the similarities in personality

styles between the research group and the control group. Possible contributing factors are discussed below.

7.4.1. Characteristics of Adolescence

ADHD personality development may be considered in the context of general adolescent development. In early adulthood, personality-relationship transactions become increasingly proactive, thereby enabling young adults to actively shape the quality and course of social interactions, although this does not always imply a perfect fit. Increasing personality and environmental stability coupled with genetic factors that maintain stability and identity consolidation in early adulthood may be mechanisms that stabilise the goodness of fit between personality and social relations. Hence personality changes that take place in the transition from being an adolescent to becoming an adult reflect a growth in the direction of greater maturity. Many adolescents become more controlled and socially more confident, less angry and less alienated. The change in personality toward maturity may imply a decrease in Neuroticism and an increase in Conscientiousness (Neyer & Asendorpf, 2001).

The five-factor model of personality views personality traits as influencing how individuals organise their behaviour to meet environmental demands and new developmental challenges (Finder, 1991 as cited in Roberts, Caspi, & Moffitt, 2001). The facets contained in each personality scale of the NEO FFI are a measure of these traits. The results of this study may be suggestive of some level of maturity in the research group as measured by the facets.

7.4.2. Barkley's Unifying Hypothesis

One of the theories that may be used to explain the similarities between the research group and the control group is Barkley's (1997) *unifying hypothesis*, which assumes that the developmental processes of children with ADHD converge with those of their peers as they enter adolescence or young adulthood (Rapport, et al., 2001). For example, Brodeur & Pond (2000) argue that selective attention is developmentally determined, and is likely to have a positive influence on performance in other related areas of functioning, as a child gets older.

This implies that some tests may not be sensitive enough in accommodating age-related improvements, resulting in tasks becoming relatively easier. In another words, cognitive development that occurs as the brain matures may be a factor that needs to be considered. A ceiling effect is likely to be created that would present data in a manner that indicates no significant impairment in deficits, even if they did exist (Barkley, et al., 2001). In this study it is possible that as adolescents, the research group as a whole may have caught up with any cognitive impairments that they may have had in comparison to the control group. Although the research group took longer to complete the test, and made more errors, as a whole, they may not have found the test more difficult than the control group. Although the test does not measure cognitive functioning, cognitive ability does have a bearing on some of the scales in the NEO FFI. For example, improved cognitive ability may result in a higher score on the Agreeableness and Conscientiousness scales. As adolescents with problems associated with ADHD improve cognitively, they may have more success in tasks that require more developed executive functioning. Success in these areas may result in

more favourable responses from others, and these adolescents may become more agreeable in their interaction with others.

The same argument may be proposed for Conscientiousness. Improvements in cognitive functioning may result in greater success in cognitive tasks, which may serve as a motivating factor for adolescents displaying the behavioural symptoms associated with ADHD to adopt a more conscientious and diligent approach to their academic work for example.

In terms of Piaget's theory of cognitive ability, it would be expected that most of the research group should fall into the formal operations stage. Although it is highly unlikely that these adolescents have mastered the skills associated with this stage, some progress in the development of decision-making skills and logical reasoning. may have a positive impact in academic performance at school. Again, these may have positive ripple effects in other areas of social functioning.

7.4.3. The School Environment

The school environment itself is a very structured environment. Success at school requires learners to conform to this routine and structure. It is likely that as the adolescent progresses through school, certain behaviours are reinforced and through the process of assimilation and accommodation, the adolescent is able to adjust, to a fair degree at least, to the school environment.

7.4.4. Family Stability

Family instability may be considered one of the factors that put adolescents at risk to developing clinical syndromes. Family instability may be measured as an accumulation of multiple forms of disruptive events in the family (Bergman & Magnusson, 1997; Cicchetti, 1984; Cicchetti & Cohen, 1995; Sroufe & Rutter, 1984, as cited in Forman & Davies, 2003). A difficult infant may be considered to be disruptive not only to mother-child interaction but also to family functioning as a whole. However, such a disruption may only significantly contribute to family instability if it is one of the many other disruptions within the family. This implies that families of children and adolescents diagnosed as having ADHD may offer some support in the absence of other disruptions. This support may have a positive impact on personality development.

Forman & Davies (2003) cite studies that have shown that a single disruption decreases the risk for children's adjustment problems (Capaldi & Patterson, 1991) and adolescent psychological problems (Kurdek, Fine, & Sinclair, 1995). Low parental attachment may not prove to be a big risk factor if not part of a range of other risk factors (Krohn, et al., 1992 as cited in Storvoll & Wichstrom, 2002). Thus although mothers of children with ADHD are reported to experience lower parenting self esteem, considerable stress, and a higher prevalence of depression (Chronis, et al., 2003) this may not prove to be a significant risk factor to develop other clinical syndromes in the absence of other disruptions. However, comprehensive developmental histories of participants would need to be obtained before any tentative conclusions may be drawn.

7.4.5. Medication

Pharmacologic treatment has been highly successful in adults and adolescents with ADHD (Wender, 1985) and its efficacy is based on the neurobiology of the disorder. By far the most commonly prescribed drug for ADHD is methylphenidate. It acts by increasing the levels of dopamine and norepinephrine in the frontal lobes. Use of the drug has shown improvements in behavioural features such as impulsivity, motor restlessness, poor concentration, and focusing difficulty, as well as decreased irritability and greater frustration tolerance. A study by Kestler, et al., (2000, as cited in Laakso, et al., 2003) demonstrated a positive correlation between the D2 dopamine receptor and social desirability. A low uptake of fluorodopa (a radioactive dopamine precursor) in the caudate was associated with high scores on the anxiety related scales and on the irritability scale of the Revised NEO Personality Inventory (NEO PI-R).

A high fluorodopa uptake in the right putamen was associated with a positive correlation with social desirability. These findings suggest that low dopamine neurotransmission may be associated with some personality characteristics. It also alludes to the idea that medication, in normalising neural functioning, indirectly alleviates some of the social, emotional and psychological problems associated with ADHD.

The consequent improvements in various areas of functioning are likely to have positive effects on personality development. For example, there may be a deepened capacity for insight, social skills and interpersonal relationships. This supports the

argument of contextual theories that suggest changes within the environment may bring about changes in personality development.

Depression has been identified as one of the resulting emotional problems associated with ADHD. Tricyclic antidepressants, especially desipramine, are effective in individuals with ADHD with a history of depression, or who display less hyperactivity and impulsivity but more irritability, anxiety, and dysphoria (Kane, et al, 1990, as cited in Liemkuhler, 1994). Cognitive theories suggest that biases in information processing lead depressed individuals to make unrealistically negative judgments about themselves and the world (Harmer, Hill, Taylor, & Cowen; 2003). In terms of Piaget's theory the assimilation of negative information and experiences imply that schemes are developed accordingly. Accommodation that is congruent to reality is poor, resulting in poor adaptation to the environment.

However, the use of medication may target the corresponding neurobiological sites responsible for appropriate or happy affect. Harmer, et al., (2003) demonstrated the effectiveness of the antidepressant reboxetine in increasing the recognition of basic emotions such as the recognition of happy facial expressions. Results suggest the convergence of psychological and neuropharmacological theories of depression in reducing negative biases in information processing.

Thus it is likely that medication may play an indirect but significant role in personality development by decreasing negative behaviours in the ADHD individual. There is a positive correlation between use of medication and the quality of ADHD

adolescent-mother interaction (Chronis, et al., 2003). The same may hold true for social interaction with other groups. Medication may be regarded as a means of counteracting the risk factors that may lead to the development of clinical syndromes in adolescents who exhibit ADHD symptoms.

Unfortunately, this study did not ascertain how many of the research group members were on medication or had taken medication in the past. Medication treatment may increase the adolescent's chance of academic success and positive social interactions (DuPaul, Barkley, & Connor, 1998) possibly altering his self-perception.

7.4.6. Cultural Issues

Certain cultures may provide more support to the adolescent with ADHD, based on social perceptions and values. In a 1995 study by Mueller, et al., teachers from five countries rated videotaped disruptive behaviours. On the whole, American and Japanese teachers considered these behaviours not as disruptive in comparison to teachers from the three other countries. In other words, they were more tolerant of disruptive behaviours. This raises the issue of cross-cultural epidemiological estimates of disruptive behaviour.

A study by Bauermeister, Berrios, Jimenez, Acevedo & Gordon (1990) highlights how certain behaviours may be considered either in a more negative or in a more positive light by different cultures. Based on teacher ratings using the Gordon Diagnostic System (GDS), an exceedingly high number of Puerto Rican learners (aged between 5-13 years) met the qualifying criteria for ADHD. Behaviours

encouraged by the Hispanic cultures may be considered disruptive or lacking in focus in Western cultures. For example, Puerto Rican children are encouraged to be more physical in their interactions. In addition, activities tend to be organised in a more polychronic manner, that is, more than one activity is done at a time, as opposed to western cultures that employ a more sequential and linear (monochronic) arrangement of activities. Western cultures may view a polychronic approach to tasks and activities as being disruptive and a manifestation of hyperactivity.

7.4.7. ADHD Subtypes

Many clinicians believe that in comparison to children with ADHD, those with ADD/noH are at a far greater risk for long-term academic, social and emotional problems because they are less noticeable and consequently go undetected, receiving no form of intervention or support (Epstein, Shaywitz, Shaywitz, & Woolston, 1991, as cited in Lerner, et. al., 1995). Nadeau (2003, as cited in Crawford, 2003) argues that girls with ADD usually fall into this category and suffer significant social and emotional distress because they do not receive an appropriate diagnosis. Others argue further that children with ADD/noH or U-ADD represent a unique type of ADD and propose including it as a distinct clinical diagnosis (Barkley, et. al., 1991; Lahey & Carlson, 1991; Schaughency & Rothlind, 1991; as cited in Lerner, et.al., 1995).

Studies comparing children with ADDH and ADD/noH or U-ADD, indicate that those in the latter category display less serious conduct problems, are less impulsive, and are more likely to be considered as lethargic, drowsy and passive. Although they are

more likely to enjoy greater social acceptance, they tend to be socially withdrawn, and are more likely to exhibit depressed moods and symptoms of anxiety disorders (Nadeau, 2003, as cited in Crawford, 2003). Subtypes such as the ADHD-IA type, may encourage more favourable reactions from others because of the absence of the hyperactivity factor. Nadeau argues that girls are more vulnerable in this regard because they usually display symptoms of the ADHD-IA subtype. The absence of hyperactivity and impulsivity makes detection and diagnosis of the disorder difficult. Studies have suggested that girls with ADHD-IA are more at risk for developing psychiatric disorders due to lower self-esteem and higher levels of depression.

It is proposed that depending on the subtype of ADHD, adolescents would differ in their self-perceptions, as those with the inattentive subtype have more academic and cognitive difficulties, and those with the combined or hyperactive-impulsive subtype tend to have more difficulties socially (Cantwell & Baker, 1992). Nevertheless, it is important to point out that adolescents with all subtypes of ADHD are at risk for displaying some academic and social problems and this may mitigate differences in self-perceptions across subtypes.

7.4.8. Gender and Socialisation

Genetic studies suggest that boys are more likely to inherit the disorder from their fathers. This is supported by the significantly higher prevalence rate of the disorder among males. Gender is an interesting area because it considers both neurobiological arguments (genetics) and environmental effects (the role of socialisation). From a contextual perspective, it may argued that while males with ADHD may be

genetically predisposed to certain behaviours, socialisation may play a strong role in how behaviours are shaped. Through the transactions of socialisation, males may model typical male behaviours that have the effect of reducing the risk of developing clinical syndromes later. For example, patriarchal societies encourage males to be both more aggressive and assertive in their approach to problem solving, while females are encouraged to more emotional in their problem solving. In a highly competitive modern society, qualities of assertiveness and aggression may be more favourable for survival than qualities of a more emotional nature.

A study by Patterson & McCubbin (1984, as cited in Renk & Creasy, 2003) supports this argument. Results indicated that males employ a greater repertoire of psychological and adaptive coping strategies that females. In addition, they were more assertive and problem-focused in their approach in comparison to females.

Gender-related behaviours based on sex stereotyping may also be relevant to specific ADHD subtypes. Males usually fall into the ADHD-HI or ADHD-C subtypes. The key behavioural features of hyperactivity and impulsivity associated with these subtypes correspond to a large extent with the high activity levels associated with stereotypical male behaviours. It is possible that the behaviours of males belonging to the ADHD-IA and ADHD-C subgroups may not be considered to be significantly different from social norms. This may result in higher levels of social support (particularly during adolescence) and lower levels of disapproval and negative feedback, based on established social boundaries. In this way, males displaying

ADHD symptoms may be more protected and at less risk to developing clinical syndromes than their female counterparts.

7.5. Implications for Educational Practice

There is no formal recognition of ADHD as a disability in South Africa, as there is in the USA. However, given the possibility of significant impairments in all areas of functioning for ADHD children and adolescents, it seems warranted that educators need to be aware of these impairments. Knowledge about the disorder and possible personality styles associated with ADHD, may be helpful in formulating educational programmes that not only address the neurobiological and cognitive impairments associated with ADHD; but may also inform social interactions between educators and adolescents that may influence personality development in a positive way.

7.6. Recommendations for Future Research

Given the complexity of Liemkuhler's (1994) hypothesis, it would be interesting to re-test this hypothesis on a larger scale, using a battery of tests that assess the different aspects related to personality development, such as cognitive and social functioning. This may include tests that are specifically designed for adolescents.

Furthermore, different informants may be more effective than others at certain developmental stages; for example, peers may be better informants during

adolescence (Loeber, Green, & Lahey, 1990). Accounts from other sources may also be useful in accurately predicting the extent of personality differences between adolescents who display the symptoms of ADHD and those that don't.

7.7. Limitations of the Study

Aside from the small sample size, the main limitation of this study may relate to inadequate information about the research group that may have implications for the results of this study. For example, it is reported that about 50% of children outgrow the disorder by adolescence. In selecting a sample for this study, the age at which a diagnosis was made was not determined for any of the research group members. It is possible that a diagnosis was made during childhood and that some participants may have actually outgrown the disorder at the time of testing.

During the course of the statistical analysis it became clear that access to more detailed demographic information; in particular information relating to ADHD subtypes, may have revealed other specific differences in personality, using gender and ADHD subtypes as independent variables. This is an interesting area of research that is receiving more attention in recent years (Nadeau, 2003, as cited in Crawford, 2003). It is also relevant to Liemkuhler's (1994) prediction that adolescents with ADHD are more likely to develop clinical syndromes stemming from their personality styles, in the absence of appropriate support and intervention.

7.8. Summary

While the conclusions that are offered are tentatively drawn, it is important to acknowledge that such differences may exist and that the limited group size restricted the statistical power to detect them.

Although the results of the statistical analysis are incompatible with Liemkuhler's hypothesis, the descriptive statistics suggest that subtle differences relating to personality facets may exist between the two groups.

It is proposed by the author that one way of interpreting the results is to consider it in terms of characteristic adaptations (including self-concepts) and not just biologically based basic tendencies. This suggests that the role of environmental and cultural factors may be more relevant than what is acknowledged in Liemkuhler's (1994) hypothesis. In other words, although the primary deficits are cognitive and neurobiological in nature, the social and psychological effects may be important determinants of personality development.

CHAPTER EIGHT

CONCLUDING REMARKS

This study sought to determine if differences exist between adolescents previously diagnosed as having ADHD and their peers, based on the hypothesis proposed by Liemkuhler (1994). It is acknowledged that the scope of this study may not have been adequate to fully explore all the aspects of personality development that are implicated in Liemkuhler's hypothesis. Nonetheless, despite generating no significant result to support this hypothesis, some important issues have been raised with regards to ADHD functioning and personality development.

Perhaps, most importantly, the results may emphasise the role that society plays in influencing the experiences of children and adolescents who display the various symptoms associated with ADHD. The model of personality development that is proposed in Chapter Four and Liemkuhler's (1994) hypothesis may be considered as worst-case scenarios of the possible outcome of adolescent with ADHD in the absence of adequate support structures. The extent to which society contributes to the development of clinical symptoms is an important consideration. The author argues that educators have an important role and task in this regard.

Further research is warranted in the area of functioning of adolescents who display the symptoms of ADHD. There are few studies that have investigated ADHD and the

development of psychopathology and associated difficulties in adolescence (Brown & Borden, 1986, as cited in Adams, et al., 1997). At most, studies suggest that children with ADHD are at risk for developing clinical disorders (Weiss & Hechtman, 1986). Research findings may contribute to a better understanding of supportive mechanisms within the environment.

Diller (1998), in considering the extent to which ADHD may be a product of society, wonders whether he would diagnosis Huckleberry Finn or Tom Sawyer as being ADHD if they were to walk into his office in this present time. The author is left wondering, that if such a hypothetical diagnose were to be made, what 'kind' of Huckleberry Finn or Tom Sawyer might be produced?

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APPENDIX 1: Letter from Department of Education & Culture-KZN

(PGSES)

DEPARTMENT OF EDUCATION & CULTURE
UMNYANGO WEMFUNDO NAMASIKO
DEPARTEMENT VAN ONDERWYS & KULTUUR
Province of KwaZulu Natal Isifundazwe saKwaZulu Natal Provinsie KwaZulu Natal

Psychological, Guidance and Special Education Services
Sielkundige Voorligting en Spesiale Onderwysdienste

Street Address / Ikheli ehlala kulo / Straatadres:
220 Prince Alfred Street, PIETERMARITZBURG

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Telephone / Ucingo / Telefoon: (0331) 451 343

Fax / Isikhahlamezi / Faks: (0331) 451 318

29 July 1999

PIETERMARITZBURG REGION

Attention :

Principals
Pietermaritzburg High Schools

Permission is herby granted for Ms A V Stephens to visit schools in the Pietermaritzburg region and to conduct interviews with the school counsellors re her research programme.

Thanking you for your co-operation.

H J MYBURGH

(ACT - CEA) - PGSES

APPENDIX 2: Informative letter to parents and potential participants

ATTENTION DEFICIT HYPERACTIVITY DISORDER – A COMMONLY MISUNDERSTOOD DISORDER

Attention Deficit Hyperactivity Disorder (ADHD) is a disorder that affects approximately 5% of all school children. It is primarily characterised by inattention, impulsivity, and hyperactivity, although the latter symptom may not always be present. Other problems such as learning disabilities, emotional or behavioural problems, or social problems, often coexist with ADHD, while some children may be gifted. Children with this disorder are often described as fidgety, rash, easily distracted, easily frustrated, and aggressive, if they are hyperactive.

The disorder affects all areas of functioning: school, family life, social relationships, and work. Until recently it was assumed that children would outgrow the symptoms of this disorder. However, research has indicated that ADHD may persist through adolescence into adulthood, affecting individuals in distinctive ways at different age levels. Children may resist adhering to instructions and routines such as going to bed and eating; they may be destructive when playing; at school their behaviours may be seen to be disruptive and inconsiderate of others, while in reality, these children often miss important information due to their poor attention and concentration levels. In the playground, their behaviours often make them unpopular playmates. Problems experienced at school may intensify with age, as the school environment exerts greater pressure to perform. Adolescents are especially vulnerable to low self esteem, behavioural disorders and even depression. These problems may lead to substance abuse. Adults with ADHD may have problems keeping a job, being organised, and maintaining steady relationships. Again substance abuse may be turned to as a means of coping.

Clearly, ADHD affects not just those with the disorder, but also those who interact with them. Parents, siblings, teachers and peers may find living with this disorder just as frustrating, difficult and challenging as the sufferers themselves.

Although a vast amount of research has been invested in this area, the complexity of the disorder warrants further research, especially in less researched areas such as adolescent and adult functioning. Research examining the self-esteem levels and personality styles of adolescents with ADHD or those who exhibit one or more of the behaviours associated with the disorder, is currently underway in the School of Psychology at the University of Natal, PMBurg. In Order to produce results that would be both valid and beneficial to those affected by the disorder either directly or indirectly, participation by adolescents who meet the behavioural criteria is urgently required. Participation by adolescents who don't meet any of the criteria is also required to ensure valid results. If you would like to contribute to this process of increasing awareness about the disorder, and are willing to give consent to your child/ward (aged 14 - 19 years) to participate in this research study, please read and sign the enclosed consent form. If you would like more information about the research study, please contact Angeline Stephens on 033 - 3964109 (H) . Your participation in this research is highly appreciated.

APPENDIX 3: Cover letter to parents

C/o School of Psychology
University of Natal
PIETERMARITZBURG
3200

Dear Sir / madam

LETTER OF INFORMED CONSENT

I am presently studying for a Masters degree in Educational Psychology at the University of Natal, Pietermaritzburg. For my research dissertation, I am undertaking a study of personality styles and self-esteem levels of adolescents who have been diagnosed with Attention Deficit / Hyperactivity Disorder (AD/HD) or adolescents who display one or more of the following behaviours: difficulty concentrating or attending to a task, and/or, hyperactivity and restlessness, and/or, impulsivity. An overall aim of this study is to increase understanding and awareness of the issues that are pertinent to adolescents with AD/HD, particularly within the school context. Based on the data collected, this research also aims to propose classroom strategies and policies that may aid in creating an environment that is more conducive to fostering positive self-concepts and acceptance.

As an adolescent with AD/HD or who meets one or more of the behavioural criteria listed above, your child's / ward's participation in this study would be greatly appreciated. Such participation will entail one session of approximately 30 – 45 minutes during which he/she will be required to complete three psychological tests, either at home or at school under the supervision of the school counsellor. All tests are self-report questionnaires and there are no right or wrong answers. Your child / ward may withdraw from participation at any stage. All information is confidential and anonymous.

If you are willing to allow your child / ward to participate in this research, please complete and sign the enclosed form.

I thank you for your co-operation.

Yours sincerely

Angeline Stephens

APPENDIX 4: Letter of informed consent

VERIFICATION OF INFORMED CONSENT

I, _____(full name)

voluntarily give my consent for my child/ward:

_____(full name)

to participate in the research study being conducted by Angeline Stephens. I have received a satisfactory explanation of the purpose of the study, as well as what participation entails. I understand that I may terminate participation in this study at any time.

_____

SIGNATURE OF PARENT/GUARDIAN

_____

DATE

APPENDIX 5: Letter to participants

Dear Participant,

Thank you for participating in this research project – your involvement is highly appreciated. Before you begin, please note the following points:

- You are only required to write your age and sex for statistical purposes. Please do not write your name.
- All information is confidential.
- You are required to complete ONE personality test (NEO FFI), which consists of 60 items. Please answer ALL questions, including the three at the bottom of page 3.
- There are no right or wrong answers. Choose the answer that best describes you.
- There is no time limit, although completion of this test should take between 30 – 45 minutes.
- Please use a pencil when completing the questionnaires. If you make a mistake, cross out the incorrect option, and then fill in the most suitable one.
- Please read the notes on page 1 of the test.
- If you have any questions while completing the questionnaires, please ask the person administering the questionnaires.

Thank you for your co-operation.

APPENDIX 6: NEO FFI

Name_____ Age____ Sex____ Date_____

1. I am not a worrier.
2. I like to have a lot of people around me.
3. I don't like to waste my time daydreaming.
4. I try to be courteous to everyone I meet.
5. I keep my belongings clean and neat.

6. I often feel inferior to others.
7. I laugh easily.
8. Once I find the right way to do something, I stick to it.
9. I often get into arguments with my family and co-workers.
10. I'm pretty good about pacing myself so as to get things done on time.

11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
12. I don't consider myself especially "light-hearted."
13. I am intrigued by the patterns I find in art and nature.
14. Some people think I'm selfish and egotistical.
15. I am not a very methodical person.

16. I rarely feel lonely or blue.
17. I really enjoy talking to people.
18. I believe letting students hear controversial speakers can only confuse and mislead them.
19. I would rather cooperate with others than compete with them.
20. I try to perform all the tasks assigned to me conscientiously.

21. I often feel tense and jittery.
22. I like to be where the action is.
23. Poetry has little or no effect on me.
24. I tend to be cynical and skeptical of others' intentions.
25. I have a clear set of goals and work toward them in an orderly fashion.

26. Sometimes I feel completely worthless.
27. I usually prefer to do things alone.
28. I often try new and foreign foods.
29. I believe that most people will take advantage of you if you let them.
30. I waste a lot of time before settling down to work.

31. I rarely feel fearful or anxious.
32. I often feel as if I'm bursting with energy.
33. I seldom notice the moods or feelings that different environments produce.
34. Most people I know like me.
35. I work hard to accomplish my goals.

36. I often get angry at the way people treat me.
37. I am a cheerful, high-spirited person.
38. I believe we should look to our religious authorities for decisions on moral issues.
39. Some people think of me as cold and calculating.
40. When I make a commitment, I can always be counted on to follow through.

41. Too often, when things go wrong, I get discouraged and feel like giving up.
42. I am not a cheerful optimist.
43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
44. I'm hard-headed and tough-minded in my attitudes.
45. Sometimes I'm not as dependable or reliable as I should be.

46. I am seldom sad or depressed.
47. My life is fast-paced.
48. I have little interest in speculating on the nature of the universe or the human condition.
49. I generally try to be thoughtful and considerate.
50. I am a productive person who always gets the job done.

51. I often feel helpless and want someone else to solve my problems.
52. I am a very active person.
53. I have a lot of intellectual curiosity.
54. If I don't like people, I let them know it.
55. I never seem to be able to get organized.

56. At times I have been so ashamed I just wanted to hide.
57. I would rather go my own way than be a leader of others.
58. I often enjoy playing with theories or abstract ideas.
59. If necessary, I am willing to manipulate people to get what I want.
60. I strive for excellence in everything I do.

Enter your responses here—remember to enter responses *across the rows*.

SD = *Strongly Disagree*; D = *Disagree*; N = *Neutral*; A = *Agree*; SA = *Strongly Agree*

1 (SD) D N A SA	2 SD (D) N A SA	3 SD D (N) A SA	4 SD D N (A) SA	5 SD D N A (SA)
6 SD D N A SA	7 SD D N A SA	8 SD D N A SA	9 SD D N A SA	10 SD D N A SA
11 SD D N A SA	12 SD D N A SA	13 SD D N A SA	14 SD D N A SA	15 SD D N A SA
16 SD D N A SA	17 SD D N A SA	18 SD D N A SA	19 SD D N A SA	20 SD D N A SA
21 SD D N A SA	22 SD D N A SA	23 SD D N A SA	24 SD D N A SA	25 SD D N A SA
26 SD D N A SA	27 SD D N A SA	28 SD D N A SA	29 SD D N A SA	30 SD D N A SA
31 SD D N A SA	32 SD D N A SA	33 SD D N A SA	34 SD D N A SA	35 SD D N A SA
36 SD D N A SA	37 SD D N A SA	38 SD D N A SA	39 SD D N A SA	40 SD D N A SA
41 SD D N A SA	42 SD D N A SA	43 SD D N A SA	44 SD D N A SA	45 SD D N A SA
46 SD D N A SA	47 SD D N A SA	48 SD D N A SA	49 SD D N A SA	50 SD D N A SA
51 SD D N A SA	52 SD D N A SA	53 SD D N A SA	54 SD D N A SA	55 SD D N A SA
56 SD D N A SA	57 SD D N A SA	58 SD D N A SA	59 SD D N A SA	60 SD D N A SA

Have you responded to all of the statements? _____Yes _____No

Have you entered your responses in the correct boxes? _____Yes _____No

Have you responded accurately and honestly? _____Yes _____No

APPENDIX 7: Oneway ANOVA – Research group

Oneway

Descriptives

DATA

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Neuroticism	25	26.4800	6.8503	1.3701	23.6523	29.3077
Extraversion	25	29.4800	6.3713	1.2743	26.8501	32.1099
Openness	25	22.9600	4.5137	.9027	21.0968	24.8232
Agreeableness	25	25.9200	4.8898	.9780	23.9016	27.9384
Conscientious	25	26.8400	6.5554	1.3111	24.1341	29.5459
Total	125	26.3360	6.1813	.5529	25.2417	27.4303

Descriptives

DATA

	Minimum	Maximum
Neuroticism	15.00	38.00
Extraversion	13.00	40.00
Openness	15.00	31.00
Agreeableness	15.00	34.00
Conscientious	12.00	37.00
Total	12.00	40.00

Test of Homogeneity of Variances

DATA

Levene Statistic	df1	df2	Sig.
2.532	4	120	.044

ANOVA

DATA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	543.248	4	135.812	3.885	.005
Within Groups	4194.640	120	34.955		
Total	4737.888	124			

APPENDIX 8: Bonferroni multiple comparisons – Research group

Multiple Comparisons

Dependent Variable: DATA
Bonferroni

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Neuroticism	Extraversion	-3.0000	1.6723	.753	-7.7824	1.7824
	Openness	3.5200	1.6723	.374	-1.2624	8.3024
	Agreeableness	.5600	1.6723	1.000	-4.2224	5.3424
	Conscientious	-.3600	1.6723	1.000	-5.1424	4.4224
Extraversion	Neuroticism	3.0000	1.6723	.753	-1.7824	7.7824
	Openness	6.5200*	1.6723	.002	1.7376	11.3024
	Agreeableness	3.5600	1.6723	.353	-1.2224	8.3424
	Conscientious	2.6400	1.6723	1.000	-2.1424	7.4224
Openness	Neuroticism	-3.5200	1.6723	.374	-8.3024	1.2624
	Extraversion	-6.5200*	1.6723	.002	-11.3024	-1.7376
	Agreeableness	-2.9600	1.6723	.793	-7.7424	1.8224
	Conscientious	-3.8800	1.6723	.220	-8.6624	.9024
Agreeableness	Neuroticism	-.5600	1.6723	1.000	-5.3424	4.2224
	Extraversion	-3.5600	1.6723	.353	-8.3424	1.2224
	Openness	2.9600	1.6723	.793	-1.8224	7.7424
	Conscientious	-.9200	1.6723	1.000	-5.7024	3.8624
Conscientious	Neuroticism	.3600	1.6723	1.000	-4.4224	5.1424
	Extraversion	-2.6400	1.6723	1.000	-7.4224	2.1424
	Openness	3.8800	1.6723	.220	-.9024	8.6624
	Agreeableness	.9200	1.6723	1.000	-3.8624	5.7024

*. The mean difference is significant at the .05 level.

APPENDIX 9: Oneway ANOVA – Control group

Oneway

Descriptives

DATA

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Neuroticism	25	23.1600	4.8449	.9690	21.1601	25.1599
Extraversion	25	27.8000	5.4467	1.0893	25.5517	30.0483
Openness	25	22.0400	4.6590	.9318	20.1168	23.9632
Agreeableness	25	27.4000	6.3246	1.2649	24.7894	30.0106
Conscientious	25	29.7600	6.8998	1.3800	26.9119	32.6081
Total	125	26.0320	6.3347	.5666	24.9106	27.1534

Descriptives

DATA

	Minimum	Maximum
Neuroticism	16.00	33.00
Extraversion	14.00	38.00
Openness	13.00	32.00
Agreeableness	14.00	38.00
Conscientious	9.00	40.00
Total	9.00	40.00

Test of Homogeneity of Variances

DATA

Levene Statistic	df1	df2	Sig.
1.042	4	120	.389

ANOVA

DATA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1076.992	4	269.248	8.287	.000
Within Groups	3898.880	120	32.491		
Total	4975.872	124			

APPENDIX 10: Bonferroni multiple comparisons – Control group

Multiple Comparisons

Dependent Variable: DATA
Bonferroni

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Neuroticism	Extraversion	-4.6400*	1.6122	.047	-9.2507	-2.9269E-02
	Openness	1.1200	1.6122	1.000	-3.4907	5.7307
	Agreeableness	-4.2400	1.6122	.097	-8.8507	.3707
	Conscientious	-6.6000*	1.6122	.001	-11.2107	-1.9893
Extraversion	Neuroticism	4.6400*	1.6122	.047	2.927E-02	9.2507
	Openness	5.7600*	1.6122	.005	1.1493	10.3707
	Agreeableness	.4000	1.6122	1.000	-4.2107	5.0107
	Conscientious	-1.9600	1.6122	1.000	-6.5707	2.6507
Openness	Neuroticism	-1.1200	1.6122	1.000	-5.7307	3.4907
	Extraversion	-5.7600*	1.6122	.005	-10.3707	-1.1493
	Agreeableness	-5.3600*	1.6122	.012	-9.9707	-.7493
	Conscientious	-7.7200*	1.6122	.000	-12.3307	-3.1093
Agreeableness	Neuroticism	4.2400	1.6122	.097	-.3707	8.8507
	Extraversion	-.4000	1.6122	1.000	-5.0107	4.2107
	Openness	5.3600*	1.6122	.012	.7493	9.9707
	Conscientious	-2.3600	1.6122	1.000	-6.9707	2.2507
Conscientious	Neuroticism	6.6000*	1.6122	.001	1.9893	11.2107
	Extraversion	1.9600	1.6122	1.000	-2.6507	6.5707
	Openness	7.7200*	1.6122	.000	3.1093	12.3307
	Agreeableness	2.3600	1.6122	1.000	-2.2507	6.9707

*. The mean difference is significant at the .05 level.

APPENDIX 11: Tests between research and control groups

Between-Subjects Factors

		Value Label	N
Trait	1.00	Neuroticism	50
	2.00	Extraversion	50
	3.00	Openness	50
	4.00	Agreeableness	50
	5.00	Conscientious	50
Group	1.00	Control	125
	2.00	Experimental	125

Tests of Between-Subjects Effects

Dependent Variable: DATA

Source	Type I Sum of Squares	df	Mean Square	F	Sig.
Model	173025.460[a]	10	17302.646	513.082	.000
NEOAC	172708.880	5	34541.776	1024.279	.000
GROUP	5.776	1	5.776	.171	.679
NEOAC * GROUP	311.824	4	77.956	2.312	.058
Error	8093.520	240	33.723		
Total	181120.000	250			

a. R Squared = .955 (Adjusted R Squared = .953)

Multiple Comparisons
Dependent Variable: DATA

	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper
Bonferroni	Neuroticism	Extraversion	-3.8200(*)	1.1614	.012	-7.1106	-.5294
		Openness	2.3200	1.1614	.469	-.9706	5.6106
		Agreeableness	-1.8400	1.1614	1.000	-5.1306	1.4506
		Conscientious	-3.4800(*)	1.1614	.030	-6.7706	-.1894
	Extraversion	Neuroticism	3.8200(*)	1.1614	.012	.5294	7.1106
		Openness	6.1400(*)	1.1614	.000	2.8494	9.4306
		Agreeableness	1.9800	1.1614	.895	-1.3106	5.2706
		Conscientious	.3400	1.1614	1.000	-2.9506	3.6306
	Openness	Neuroticism	-2.3200	1.1614	.469	-5.6106	.9706
		Extraversion	-6.1400(*)	1.1614	.000	-9.4306	-2.8494
		Agreeableness	-4.1600(*)	1.1614	.004	-7.4506	-.8694
		Conscientious	-5.8000(*)	1.1614	.000	-9.0906	-2.5094
	Agreeableness	Neuroticism	1.8400	1.1614	1.000	-1.4506	5.1306
		Extraversion	-1.9800	1.1614	.895	-5.2706	1.3106
		Openness	4.1600(*)	1.1614	.004	.8694	7.4506
		Conscientious	-1.6400	1.1614	1.000	-4.9306	1.6506
	Conscientious	Neuroticism	3.4800(*)	1.1614	.030	.1894	6.7706
		Extraversion	-.3400	1.1614	1.000	-3.6306	2.9506
		Openness	5.8000(*)	1.1614	.000	2.5094	9.0906
		Agreeableness	1.6400	1.1614	1.000	-1.6506	4.9306

		Neuroticism	Extraversion Raw	Openness Raw	Agreeableness	Conscientious
Neuroticism Raw	Pearson	1	low .270	low . .245	low ⊖ -.387	low ⊖ -.025
	Sig. (2-tailed)	.	.191	.239	.056	.905
	N	25	25	25	25	25
Extraversion Raw	Pearson	.270	1	.228	-.142	-.059
	Sig. (2-tailed)	.191	.	.273	.499	.780
	N	25	25	25	25	25
Openness Raw	Pearson	.245	.228	1	-.051	-.134
	Sig. (2-tailed)	.239	.273	.	.808	.523
	N	25	25	25	25	25
Agreeableness	Pearson	-.387	-.142	-.051	1	.413(*)
	Sig. (2-tailed)	.056	.499	.808	.	.040
	N	25	25	25	25	25
Conscientious Raw	Pearson	-.025	-.059	-.134	.413(*)	1
	Sig. (2-tailed)	.905	.780	.523	.040	.
	N	25	25	25	25	25

* Correlation is significant at the 0.05 level (2-tailed).

		Neuroticism	Extraversion	Openness	Agreeableness	Conscientious
Neuroticism Raw	Pearson	1	-.332	.216	-.265	-.087
	Sig. (2-tailed)	.	.105	.300	.201	.678
	N	25	25	25	25	25
Extraversion Raw	Pearson	-.332	1	-.001	.109	-.143
	Sig. (2-tailed)	.105	.	.995	.604	.495
	N	25	25	25	25	25
Openness Raw	Pearson	.216	-.001	1	-.170	-.439(*)
	Sig. (2-tailed)	.300	.995	.	.416	.028
	N	25	25	25	25	25
Agreeableness	Pearson	-.265	.109	-.170	1	.334
	Sig. (2-tailed)	.201	.604	.416	.	.103
	N	25	25	25	25	25
Conscientious Raw	Pearson	-.087	-.143	-.439(*)	.334	1
	Sig. (2-tailed)	.678	.495	.028	.103	.
	N	25	25	25	25	25

* Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 14: Independent samples test – Research group

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
RATING	Equal variances assumed	8.746	.005	-1.978	48	.054	-3.3200	1.67809	-6.69403	.05403
	Equal variances not assumed			-1.978	43.205	.054	-3.3200	1.67809	-6.70374	.06374

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
RATING	Equal variances assumed	.472	.495	-1.002	48	.321	-1.6800	1.67642	-5.05068	1.69068
	Equal variances not assumed			-1.002	46.866	.321	-1.6800	1.67642	-5.05279	1.69279

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
RATING	Equal variances assumed	.154	.697	-.709	48	.482	-.9200	1.29738	-3.52856	1.68856
	Equal variances not assumed			-.709	47.952	.482	-.9200	1.29738	-3.52863	1.68863

APPENDIX 15: Independent samples test – Control group

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
RATING	Equal variances assumed	1.850	.180	.926	48	.359	1.4800	1.59887	-1.73475	4.69475
	Equal variances not assumed			.926	45.139	.360	1.4800	1.59887	-1.74003	4.70003

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
RATING	Equal variances assumed	.119	.731	1.534	48	.132	2.9200	1.90347	-.90718	6.74718
	Equal variances not assumed			1.534	47.875	.132	2.9200	1.90347	-.90744	6.74744