

**THE PERFORMANCE OF CHILDREN WITH ATTENTION
DEFICIT HYPERACTIVITY DISORDER ON THE
GRIFFITHS MENTAL DEVELOPMENT SCALES –
EXTENDED REVISED**

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF FIGURES	ix
LIST OF TABLES	x
ABSTRACT	xiii
CHAPTER ONE: INTRODUCTION	1
1.1 Attention Deficit Hyperactivity Disorder	1
1.2 Early Child Development and Education	3
1.3 Griffiths Mental Development Scale-Extended Revised	4
1.4 Problem Formulation/Specific Aims of the Study	5
1.5 Chapters of the Study	6
CHAPTER TWO: ATTENTION DEFICIT HYPERACTIVITY DISORDER	8
2.1 Introduction	8
2.2 Attention Deficit Hyperactivity Disorder (ADHD)	8
2.3 History of Classification Advancements in ADHD	13
2.4 Three Types of ADHD	16
2.5 Etiology	17
2.6 Prevalence and Course of ADHD	19
2.7 Co-morbidity	22
2.8 The Developmental Picture of a Child with ADHD	26
2.9 The Main Approaches Used to Treat ADHD	28

2.9.1	The Pharmacological Approaches	29
2.9.2	The Psychological Approaches	31
2.9.3	The Educational Approaches	31
2.9.4	Specific Psychological Approaches	33
2.9.5	A Comprehensive Approach to Treating ADHD in the Early Years	34
2.10	ADHD in the South African Schools' Context	37
2.11	Principles of Outcomes Based Education (OBE) and the Revised National Curriculum Statement (RNCS)	39
2.12	Demands of the RNCS on a Child with ADHD	42
2.13	Chapter Overview	44
CHAPTER THREE: EARLY CHILD DEVELOPMENT AND EDUCATION		45
3.1	Introduction	45
3.2	Early Child Development	45
3.3	Developmental Domains	46
3.3.1	Physical and Motor Development	47
3.3.2	Cognitive Development	49
3.3.2.1	A Neuropsychological View of Cognitive Processes in Early Childhood	49
3.3.2.2	Cognitive Processes in Early Childhood	52
3.3.3	Language Development	54
3.3.4	Social-Emotional Development	55
3.3.4.1	Social Development	56
3.3.4.2	Emotional Development	57
3.4	Developmental Assessment	58

3.4.1	Issues Surrounding Assessment Measures	63
3.4.2	Overview of Assessment Measures for Young Children	65
3.4.2.1	Weschler Intelligence Scale for Children (WISC)	66
3.4.2.2	Weschler Pre-school and Primary Scale of Intelligence Revised (WPPSI-R)	67
3.4.2.3	McCarthy Scales of Children's Abilities (McCarthy Scales)	67
3.4.2.4	The Junior South African Individual Scales (JSAIS)	68
3.4.2.5	The Griffiths Scales of Mental Development (GSMD)	69
3.7	Chapter Overview	69
CHAPTER FOUR: GRIFFITHS SCALES OF MENTAL DEVELOPMENT		70
4.1	Introduction	70
4.2	Background to the Griffiths Scales of Mental Development (GSMD)	70
4.3	Description of the Griffiths Scales	71
4.4	Administration and Scoring of the Griffiths Scales	76
4.5	The Interpretation of Performance on the Griffiths Scales	78
4.6	Standardisation of the Original Griffiths Scales	80
4.7	Research on, and Psychometric Properties of, the Original Griffiths Scales	81
4.7.1	Significant Research on the Original Griffiths Scales	81
4.7.2	Psychometric Properties of the Original Griffiths Scales	86
4.7.2.1	Reliability Studies	86
4.7.2.2	Item Reliability	87
4.7.2.3	Validity Studies	88
4.7.2.4	Correlation Between the Original GSMD and	

other measures	89
4.7.2.5 Intercorrelations and Factorial Validity	90
4.7.2.6 Predictive Validity	92
4.7.3 Comparative Studies	93
4.8 Revision of the Griffiths Scales	95
4.8.1 Concerns Raised Regarding the Original Scales	95
4.8.2 The Revision of the Scales	98
4.9 Research Conducted to Date on the GMDS-ER	102
4.9.1 Conclusion	103
4.10 Chapter Overview	104
 CHAPTER FIVE: METHODOLOGY	 106
5.1 Introduction	106
5.2 Problem Formulation	106
5.3 Primary Objective/Specific Aims	108
5.4 Research Method	108
5.5 Participants	115
5.5.1 Sampling Procedure	115
5.5.2 ADHD Sample	116
5.5.3 Normal Sample	122
5.6 Assessment Measures	123
5.6.1 Biographical Questionnaire	123
5.6.2 Conners 39 Item Teacher Rating Scale	124
5.6.3 GMDS-ER	124
5.6.4 Measures Used in Collecting the Normal Sample	125
5.7 Procedure	126

5.8	Data Analysis	127
5.9	Ethical Considerations	129
5.10	Chapter Overview	131
CHAPTER SIX: RESULTS AND DISCUSSION		132
6.1	Introduction	132
6.2	Overall Performance of the ADHD Sample on the GMDS-ER	132
6.3	Performance of the ADHD Sample on each of the Six Subscales of the GMDS-ER	136
6.3.1	Performance of the ADHD Sample on the Locomotor Subscale (Subscale A)	136
6.3.2	Performance of the ADHD Sample on the Personal-Social Subscale (Subscale B)	137
6.3.3	Performance of the ADHD Sample on the Hearing and Speech Subscale (Subscale C)	138
6.3.4	Performance of the ADHD Sample on the Eye and Hand Co-ordination Subscale (Subscale D)	139
6.3.5	Performance of the ADHD Sample on the Performance Subscale (Subscale E)	140
6.3.6	Performance of the ADHD Sample on the Practical Reasoning Subscale (Subscale F)	142
6.4	Comparison of the Performance of the ADHD Sample to the Normal Sample	143
6.4.1	Locomotor Subscale	145
6.4.2	Personal-Social Subscale	146
6.4.3	Hearing and Speech Subscale	148

6.4.4 Eye and Hand Co-ordination Subscale	150
6.4.5 Performance Subscale	152
6.4.6 Practical Reasoning Subscale	155
6.5 Chapter Overview	156
CHAPTER SEVEN: LIMITATIONS, RECOMMENDATIONS AND CONCLUSIONS	157
7.1 Introduction	157
7.2 Limitations	157
7.2.1 Limitations of the Research Approach	157
7.2.2 Limitations Regarding the Sampling Procedure	158
7.2.3 Limitations Regarding the Sample being on Medication for the Disorder	159
7.2.4 Limitations Regarding the Availability of Items for Older Children on the GMDS-ER	159
7.2.5 Limitations Regarding the Lack of South African Norms for the GMDS-ER	160
7.2.6 Limitations Regarding the Lack of South African Research conducted on Children with ADHD Profiling their General development	160
7.3 Recommendations for Future Research	161
7.4 Conclusions and Contributions	162
References	164
APPENDIX A	181
APPENDIX B	183

APPENDIX C	185
APPENDIX D	187
APPENDIX E	189

LIST OF FIGURES

Figure 1: The PASS Model of Ability	51
Figure 2: Sample breakdown in terms of year groups	119
Figure 3: Sample breakdown in terms of gender	120
Figure 4: Sample breakdown in terms of cultural groups	121
Figure 5: Sample breakdown in terms of socio-economic status	121
Figure 6: Sample breakdown in terms of type of ADHD	122
Figure 7: Griffiths developmental profile of the ADHD sample on the GMDS-ER	136
Figure 8: The developmental profiles of the ADHD sample and the normal sample	144
Figure 9: A comparison of the ADHD sample and the normal sample on the Locomotor Subscale (N = 38)	145
Figure 10: A comparison of the ADHD and the normal sample on the Personal-Social Subscale (N = 38)	147
Figure 11: A comparison of the ADHD and the normal sample on the Hearing and Speech Subscale (N = 38)	149
Figure 12: A comparison of the ADHD and the normal sample on the Eye and Hand Co-ordination Subscale (N = 38)	151
Figure 13: A comparison of the ADHD and the normal sample on the Performance Subscale (N = 38)	153
Figure 14: A comparison of the ADHD and the normal sample on the Practical Reasoning Subscale (N = 38)	155

LIST OF TABLES

CHAPTER 4

Table 1: An illustration of the developmental quotients of the Griffiths Scales	77
Table 2: Types of diagnoses for which the Extended Scales were most often used	85
Table 3: Correlations between Subscales A to F and GQ for 285 Children in their Fifth Year on the Griffiths Scales	91
Table 4: Comparison of the 1960 norms and the performance of 5-year-old White South African children	96

CHAPTER 5

Table 5: Matched sample breakdown of the ADHD and normal sample in terms of age, gender and socio-economic class	110
Table 6: Riordan's classification of breadwinner's education	113
Table 7: Riordan's classification of breadwinner's occupation	113
Table 8: Riordan's classification of socio-economic status	114
Table 9: ADHD sample breakdown in terms of age, gender, cultural group, socio-economic status and type of ADHD	118
Table 10: Matched sample breakdown of the ADHD and normal sample in terms of age, gender, cultural group and socio-economic status (N = Number)	123
Table 11: Subquotient categories for the general quotient and the six subscales	125

CHAPTER 6

Table 12: The General Quotient of the ADHD sample in terms of descriptive categories	133
Table 13: Mean developmental subquotients for the ADHD sample	133
Table 14: Differences between the highest and lowest scores for the British and South African samples studied by Lister (1981) Luiz (1988d) respectively, expressed as percentage	135
Table 15: Performance of the ADHD sample on the Locomotor Subscale in terms of category breakdown	136
Table 16: Performance of the ADHD sample of the Personal-Social Subscale in terms of category breakdown	137
Table 17: Performance of the ADHD sample on the Hearing and Speech Subscale in terms of category breakdown	139
Table 18: Performance of the ADHD sample on the Eye and Hand Co-ordination Subscale in terms of category breakdown	140
Table 19: Performance of the ADHD sample on the Performance Subscale In terms of category breakdown	141
Table 20: Performance of the ADHD sample on the Practical Reasoning Subscale in terms of category breakdown	142
Table 21: A comparison of the ADHD and normal sample's mean performance in terms of GQ and subquotients	144

Abstract

Research has shown that Attention Deficit Hyperactivity Disorder (ADHD) is one of the commonest neurodevelopmental disorders which has a negative impact on a child. However, to date limited research has been conducted on learners, and specifically those learners with ADHD, within a National Education stream. Furthermore, running concurrently with this are new developments in education in South Africa. An inclusive educational policy favours the incorporation of all children into a mainstream scholastic setting, regardless of their diverse needs. In addition to educational changes for children with ADHD, many parents are presently unable to afford the medication commonly used to treat the disorder, resulting in both parents and teachers having to manage these children with limited professional support.

It is widely accepted that early assessment and intervention are necessary in order to maximise a child's potential. For this reason, the primary aim of this study was to explore and describe the developmental profile of children with ADHD on the Griffiths Mental Development Scales-Extended Revised (GMDS-ER). Further aims were to compare the performance of the clinical sample to a normal South African sample. In order to achieve these aims, a quantitative, exploratory-descriptive research design was employed. The sample (N = 38) of ADHD were selected by means of a non-probability, purposive sampling procedure, from various pre-school and primary schools in the Nelson Mandela Metropole. The normal sample (N = 38) was drawn from an existing database created during the revision of the Scales. Information was collated using the Conners 39 Item Teacher Rating Scale, biographical data, as well as the results of an assessment from the GMDS-ER.

In this study the general performance of the ADHD sample on the GMDS-ER was found to be above average. Furthermore the performance of these children on the six Subscales of the GMDS-ER ranged from average to superior, with the poorest performance being on the Eye and Hand Co-ordination Subscale, and the best performance being on the Performance Subscale. Significant differences between the ADHD and normal sample were found on the General Quotient (GQ) as well as three of the six Subscales, namely, the Hearing and Speech, Eye and Hand Co-ordination and Performance Subscales.

Generally, the results of the study suggest that a specific developmental profile for children with ADHD exists. Additionally, the study highlighted the success with which the GMDS-ER can be utilised on a specific clinical population.

Key words: Attention Deficit Hyperactivity Disorder (ADHD), Child Development, Developmental Assessment, Griffiths Scales of Mental Development, Griffiths Mental Development Scales-Extended Revised (GMDS-ER), Developmental Profile

CHAPTER ONE: INTRODUCTION

This introduction aims to contextualise the present study, specifically with regards to the assessment of children with Attention Deficit Hyperactivity Disorder (ADHD) on the Griffiths Mental Development Scales – Extended Revised. To aid this purpose, the nature of ADHD, including diagnostic considerations, prevalence, etiology, and co-morbidity with other disorders, is discussed. The need for the developmental assessment of children with ADHD is highlighted, with specific reference to exploring the educational difficulties unique to this population. The problem formulation and aims of the study are presented, followed by an outline of the chapters of the study.

1.1 Attention Deficit Hyperactivity Disorder

Attention Deficit Hyperactivity Disorder (ADHD), a disorder usually first diagnosed in childhood, is a neuropsychological disorder characterised by considerable difficulty in the areas of attention span and/or impulse control and hyperactivity (Barkley, 1998; Benn, Venter, Aucamp & Benn, 2003; Hunt, 1995). ADHD comprises four core characteristics, namely inattention, distractibility, impulsivity and hyperactivity. Some or all of these characteristics may be present in an individual with ADHD. ADHD thus has three subtypes, as set out by the Diagnostic and Statistical Manual of Mental Disorders (DSM – IV – TR). These are: a) ADHD – Predominantly Inattentive Type; b) ADHD – Predominantly Hyperactive – Impulsive Type; and c) ADHD - Combined Type.

Statistics regarding the prevalence of the disorder in South Africa may not be an accurate representation of the rates of people affected with ADHD, due to the fact that poverty stricken families often cannot afford to seek help for their children with ADHD,

with the result that many children go undiagnosed and untreated. However, in a South African study sponsored by Novartis South Africa (Pty) Ltd, it was found that ADHD affects between 3% and 5% of children, with nearly three times as many boys affected than girls (Benn, et al., 2003).

Additionally, ADHD may occur in association with other disabilities such as Oppositional Defiant Disorder, Conduct Disorder, Tourette's Syndrome, specific learning difficulties which could be a result of visual and auditory perceptual problems, delays in fine motor development and/or emotional difficulties. These problems are commonly associated with ADHD (Benn, et al., 2003). According to Szatmari, Offord and Boyle (1989), approximately 44% of the total percentage of children diagnosed with ADHD have a co-morbid disorder, as many as a third have two co-morbid disorders and about one tenth have three co-morbid disorders.

With regards to the course of the disorder, it was once thought that children 'outgrow' ADHD as they reached adolescence and adulthood. However, research has indicated that as many as two thirds of children with ADHD continue to have some problems attributed to their disorder as adults, and may require treatment throughout their lives (Benn, et al., 2003; Resnick, 2000).

Despite prolific research on ADHD, its etiology is still debated. However, it is widely accepted that ADHD has no single, specific cause (Barkley, 1998). Recent research has contradicted earlier suggestions that ADHD results from bad parenting, and has suggested a strong biological/neurological basis for the disorder (involving an imbalance of neurotransmitters in the brain), as well as a strong genetic component to

ADHD (Benn, et al., 2003; Kaplan, Sadock & Grebb 1994; Smith & Strick, 1997; Tannock, 1998). It is thus with a neurodevelopmental perspective in mind that ADHD is explored in the present study, with specific focus being placed on the developmental strengths and weaknesses of these children and how knowledge of this sort may assist in the education of these children in South Africa.

1.2 Early Child Development and Education

The need for developmental assessment of infants and young children is crucial for the early identification of any possible disability. Information gained from assessments serves both as a tool for the correct diagnosis of the disability, as well as assisting in the construction of appropriate intervention programmes (Aldridge-Smith, Bidder, Gardner, & Gray, 1980; Griffiths, 1984). Furthermore, early identification of problems, together with early intervention, has a positive effect on the educational future of children.

However, assessing the skills of a child with a disability is not always easy. An important challenge in this process involves finding the most reliable means of assessing the child's skills, with the least penalty to the child for his/her disability. The goal of test selection is thus to maximise the child's opportunity to perform, using his/her most intact modalities, whilst sufficiently maintaining the content and focus of the test, in order to allow the most accurate assessment possible (Brooks-Gunn, 1990). Brooks-Gunn goes on to say that whilst most developmental tests focus specifically on the cognitive development of a child, the Griffiths Scales of Mental Development tap into all the main aspects of a child's development, namely, physical, cognitive, social and emotional aspects.

1.3 Griffiths Mental Development Scales – Extended Revised

An instrument widely used to assess and identify special needs is the Griffiths Scales of Mental Development (Luiz, 1994). Research on the Griffiths Scales has been conducted in two main domains, namely, technical and clinical studies. Technical studies regarding the reliability and validity of the Griffiths Scales have found the Scales to be a reliable and valid assessment tool (Aldridge-Smith, Bidder, Gardner & Gray, 1980; Beail, 1985; Hanson, 1982; Ramsay & Piper, 1980). South African research related to the clinical use of the Scales has provided evidence that the Scales are useful in the clinical assessment and diagnosis of children from normal, as well as diverse special population groups, for example, children with physical or mental disabilities (Allan, 1988, 1992; Bhamjee, 1991; Heimes, 1983; Luiz, 1988a, 1988b, 1988c, 1994a; Luiz, Oelofsen, Stewart, & Mitchell, 1995; Mothuloe, 1990; Sweeney, 1994; Tukulu, 1996; Worsfold, 1993).

However, recent studies have recognised that the populations on which the Infant and Extended Scales were standardised are no longer contemporary and that some of the items in the Original Griffiths Scales are outdated, indicating a need for a revision of the Scales (Allan, 1988, 1992; Hanson, Aldridge-Smith & Humes, 1985; Hanson & Aldridge-Smith, 1987; Huntley, 1996). The process of revising and standardising the Scales has been an ongoing project since 1994, with the revised version of the Scales, known as the Griffiths Mental Development Scales – Extended Revised (GMDS – ER) being launched in the United Kingdom in 2004. The revision and standardisation of the GMDS-ER has contributed to enhancing the contemporaneous nature of the Scales, making them an even more valuable assessment tool. The present study aims to further

contribute to the value of the GMDS-ER, as an instrument used to assess the clinical population of children with ADHD.

1.4 Problem Formulation/Specific Aims of the Study

To date, no South African research has been conducted on children with ADHD using the GMDS-ER. The lack of available information in terms of specific developmental trends for children with ADHD becomes problematic for clinicians, educators and parents who manage and teach children with ADHD. For this reason, it was deemed necessary to accumulate knowledge about their cognitive, psychological and personal-social growth as well as their motor development, in order to identify their developmental profile, which in turn could be helpful in specifying areas of weakness which may require remediation. Findings of the study, which will highlight the children's developmental strengths and weaknesses, will be made available to the children's parents and schools. This information may be used in the development of therapeutic and academic programmes, which will allow for appropriate intervention and stimulation in the developmental areas of concern.

The specific aims of the study are:

- a) To describe the performance of the ADHD sample on each of the individual Scales of the GMDS-ER as well as on the overall scale.
- b) To compare the performance of the ADHD sample with that of a normal sample on all Scales of the GMDS-ER, so as to enhance the description of the performance of the ADHD sample.

1.5 Chapters of the Study

Chapter 2 introduces the reader to ADHD, clarifies the terminology surrounding this disorder and delineates the subtypes of ADHD. Additionally, the prevalence and course of ADHD is discussed, as well as its etiology and co-morbidity with other disorders. The typical developmental picture a child with ADHD is outlined as well as some of the effects of the disorder on a school-going child, and the approaches used to treat the disorder are introduced. The reader is introduced to the basic principles of the Revised National Curriculum Statement (RNCS) currently being implemented in schools, and which is replacing the existing curriculum. Furthermore the demands of the RNCS on learners with ADHD are also explored.

Chapter 3 focuses on the holistic development of young children, specifically those in the pre-school and foundation phase of their education. The normal developmental path as well as the developmental path followed by a child with ADHD is explored. The concept of developmental assessment is also elaborated upon, and the developmental measures frequently used to assess young children are discussed.

Chapter 4 describes the instrument of developmental assessment employed in the present study, namely the Griffiths Mental Development Scales – Extended Revised. Chapter 5 presents the research problem, highlights the problem formulation and specific aims of the present study, the methodology employed, the analysis of the data, as well as the ethical considerations relevant to the present study. In Chapter 6 the results and discussions of the findings are provided according to the specific aims of the study. Finally, Chapter 7 comprises a critical evaluation of the study, addressing its

limitations, recommendations for future research, as well as the contributions of the study. This is followed by a conclusion.

CHAPTER TWO: ATTENTION DEFICIT HYPERACTIVITY DISORDER

2.1 Introduction

This chapter conceptualises Attention Deficit Hyperactivity Disorder (ADHD). A clarification of the terminology of this disorder is provided, along with an introduction to the various subtypes of ADHD. Various arguments with regard to the etiology of ADHD are discussed, and the prevalence and course of ADHD are outlined. The co-morbidity of ADHD and other disorders is examined, followed by a description of the developmental picture which a child with ADHD might present. The main approaches used to treat the disorder are delineated, including pharmacological, psychological, educational and non-traditional approaches. ADHD is briefly contextualised in the context of South African schools, followed by an explanation of the basic principles of the Revised National Curriculum Statement (RNCS) currently being implemented in schools, and which is replacing the existing Outcomes Based curriculum. The cognitive and emotional skills required of a young child by the RNCS will be briefly outlined, followed by the implications of the demands of the RNCS on learners with ADHD.

2.2 Attention Deficit Hyperactivity Disorder (ADHD)

The construct 'attention' comprises three major components, namely, alertness, selectivity and processing capacity (Kirby & Das, 1989). 'Alertness' refers to the ability to maintain attention for a required period of time, whilst 'selectivity' refers to the ability to focus on and select specific aspects of a stimulus whilst ignoring other aspects of the stimulus. 'Processing capacity' refers to the ability to focus simultaneously on more than one stimulus (Kirby & Das, 1989). With regard to the brain mechanisms of attention, it

has been found that the frontal lobes are primarily responsible for this ability, and if these areas of the brain are dysfunctional or less maturely developed in some way, a person may experience difficulties with attention (Kirby & Das, 1989).

Attention Deficit Hyperactivity Disorder (ADHD), a disorder usually first diagnosed in childhood, is a neuropsychological disorder characterised by considerable difficulty in the areas of attention span and/or impulse control and hyperactivity (Barkley, 1998; Benn et al., 2003; Hunt, 1995). Although most children display these behaviours, with an ADHD child the behaviours are in excess of the norms of children of his/her age. Motor restlessness is often the most obvious symptom of ADHD, but other maturational deficiencies of sustained attention, impulse control, concentration and planning also characterise the disorder and are usually severe enough to interfere with the child's general and scholastic functioning (Barkley, 1998; Rudel, 1988). ADHD is the most commonly diagnosed disorder amongst children visiting mental health professionals, and its effects are far reaching, as ADHD can often result in significant academic underachievement, emotional and familial stress, and social isolation for the child and his/her immediate family (Cantwell, 1996; Rabiner, 2001).

The four core characteristics of ADHD are: a) inattention; b) impulsivity; c) hyperactivity; and d) distractibility. Varying degrees of some or all of these characteristics are found in children with ADHD (Benn et al., 2003; Hunt, 1995; Root & Resnick, 2003; Tannock, 1998). These core characteristics will be briefly described.

a) Inattention

Attention is a complex construct which has many components. It includes: a) focussed attention, which is the most basic form of attention and involves the child's ability to respond; b) sustained attention, which is the ability to maintain attention until a task is completed; c) selective attention, which is the ability to maintain a cognitive mindset of attention against competing distractions; d) alternating attention, which is mental flexibility or the ability to shift attention to various aspects of one task; and e) divided attention, which is the ability to simultaneously divide one's attention between two tasks (Tannock, 1998). Specifically, 'inattention' in children with ADHD refers to a lack of sustained attention, as the child battles to stay task-orientated. Typically, a child with ADHD will also struggle with tasks requiring selective attention. Such children tend to attend to everything and not be able to 'filter out' the essential from the non-essential incoming information. This results in their being easily distracted by unimportant stimuli and drifting from the task at hand (Tannock, 1998).

b) Impulsivity

Impulsivity is another core characteristic of ADHD, and reflects a general lack of self-control. Children with ADHD tend to act without thinking first. They may shout out the answers to a question in class before the teacher has finished asking it, or take action before clearly understanding a problem in the classroom. This may lead to careless errors in academic work. Children with ADHD also have a tendency to be socially inept, as they blurt out things inappropriately, and experience difficulties with rule-governed behaviour, for example, waiting their turn in interactive situations. This impulsivity sometimes results in aggressive behaviour, for example hitting another child impulsively, because a frustrated child with ADHD is not likely to think through his/her actions before responding to a situation (Benn et al., 2003). These children often seem to be genuinely

remorseful for their actions after having had time to think through their responses. This may be accounted for by the fact that it was impulsivity, rather than malevolent intentions, which led to the aggression. They tend to be accident-prone, as they often engage in dangerous activities without consideration of the consequences (Tannock, 1998).

c) Hyperactivity

Hyperactivity is also a core characteristic of the disorder, and is perhaps the most obvious characteristic to detect. ADHD children have often been active from birth, and parents report that they were difficult babies who were always 'on the go'. They are often restless and unsettled, and move from one task to another fairly quickly in their search for new stimulation (Hunt, 1995). They may be restless in situations where that is inappropriate, and struggle to sit still for any length of time. They may also talk more than other children and be more fidgety. They tend to be engaged in several activities at once, rather than tackling things one step at a time (Root & Resnick, 2003).

d) Distractibility

Children with ADHD may not appear to be listening when one speaks to them, since, owing to their high levels of distractibility, the focus of their attention flits from one stimulus to another (Root & Resnick, 2003). They struggle with tasks requiring sustained attention and consequently often do not finish tasks which they are given. They often struggle to work independently, and have a tendency to daydream.

Other associated characteristics of ADHD that are common in many of these children include disorganisation and poor peer relations, which may result in aggressive or sensation-seeking behaviour, daydreaming, memory difficulties and poor motoric coordination. Inconsistency in the way in which a child with ADHD responds to a situation

is another common tendency of children with the disorder (Hunt, 1995; Rabiner, 2001, Root & Resnick, 2003). It is important to remember, however, that these characteristics are generalisations of symptoms that many children with ADHD experience. Each child will present slightly differently, with a number of different symptoms interacting with the child's unique personality.

One of the biggest secondary problems for a child with ADHD is poor self-esteem (Barkley, 1998; Hallowell & Ratey, 1995). Children with ADHD usually experience academic difficulties. They may battle to finish tasks or be labelled as 'stupid' by their classmates. If group work is involved, the child with ADHD may be ostracised, as nobody wants a person in their group who cannot focus or get things done in time. Socially, children with ADHD are also inept (Barkley, 1998; Hallowell & Ratey, 1995). They may be loud, hyperactive, impulsive, bossy or aggressive. They may also be daydreamers, who are so wrapped up in their own world that they do not take into account those around them. All these things may lead to ridicule and/or rejection by the child's peers, and even to criticism from significant adults in the child's life, who may not understand the intricacies of the disorder. This can have significant implications for the child's self-esteem, as he or she grows up feeling rejected and inferior. These feelings may also last into adulthood, long after the symptoms of hyperactivity, impulsivity or inattention may have lessened in intensity and are no longer as debilitating as they were (Hallowell & Ratey, 1995; Resnick, 2000).

There are to date no laboratory tests, neurological assessments or specific assessment measures that can diagnose ADHD (Barkley, 1998; Levy & Hay, 2001; Tannock, 1998). It is diagnosed based on data from multiple sources, including parent and teacher rating scales, clinical observations of the child, and interviews with the

parents, child, teacher and significant others in the child's life. A medical evaluation and/or neurological examination should also have been done to rule out the possibility of organic impairment (Hotz, 1998). This evaluation is done to rule out the differential diagnoses which often present in a similar fashion to ADHD. Examples include: a) epilepsy; b) movement disorders such as Huntington's disease; c) thyroid dysfunction; and d) Tourettes Syndrome. A detailed clinical interview is carried out in order to exclude the possibility of various psychiatric disorders which may also present in a similar way to ADHD (Rabiner, 2001). These disorders include: a) adjustment problems; b) depression; c) anxiety; d) bipolar mood disorder; e) mental retardation; f) pervasive developmental disorders; g) learning difficulties; and h) behavioural disorders such as conduct disorder and oppositional defiant disorder (Rabiner, 2001). Although, as mentioned above, no specific test can unequivocally diagnose ADHD, children suffering from the disorder typically perform worse on tests that require sustained mental effort (such as carrying out instructions or persisting at a task) than their unaffected peers do. This information can aid the clinician in making a diagnosis, but cannot provide one (Tannock, 1998). The following section will look more closely at the label 'ADHD', and examine the changes in terminology that this disorder has undergone.

2.3 History of Classification Advancements in ADHD

Today, ADHD falls under the broad category of Attention Deficit and Disruptive Behaviour Disorders, in the DSM IV-TR (American Psychiatric Association [APA], 2000). Other disorders in this category include: a) Conduct Disorder; b) Oppositional Defiant Disorder; and c) Disruptive Behaviour Disorder Not Otherwise Specified. In South Africa, the DSM-IV-TR diagnostic criteria are the criteria commonly used by mental health professionals to diagnose children with ADHD. There are four main features of ADHD,

namely: a) inattention; b) hyperactivity; c) impulsivity; and d) distractibility (Benn et al., 2003; Hunt, 1995; Root & Resnick, 2003; Tannock, 1998). These are common features of the disorder but may not all be present in every case. Although this classification of ADHD seems fairly clearcut, the classification of ADHD has undergone many changes and advancements since the disorder was first conceptualised.

The problems of over-activity and attention first drew clinical interest when George Still delivered lectures to the Royal Academy of Physicians in 1902. He described a group of children manifesting a deficit in 'volitional inhibition', or a deficit in moral control. Barkley (1997) found Still's observations astute in describing many associated features of ADHD which have now been corroborated by research more than 50-90 years later. Some of the features Still described include: a) an overrepresentation of males in the ADHD population; b) an association between alcoholism, criminal conduct and depression amongst biological relatives; c) a familial predisposition to the disorder; and d) the possibility of the disorder manifesting as a result of a trauma to the nervous system (Levy & Hay, 2001). Since then, many theories have been postulated about the nature of similar syndromes. Following the pandemic of Encephalitis Lethargica that swept Europe in 1917 and 1918, the term 'Minimal Brain Dysfunction' (MBD) was proposed, to describe the symptoms of overactivity and distractibility that manifested in these patients post-infection (Hotz, 1998; Kessler, 1980). The term Minimal Brain Dysfunction was used up until the 1960s to describe the associated features of ADHD (Benn et al., 2003). In the 1950s and 1960s, poor impulse control and hyperactivity were thought to be a result of poor thalamic filtering of stimuli entering the brain (Kessler, 1980).

A continuing divergence between North American and United Kingdom clinicians exists with regard to the way ADHD is viewed. North American clinicians view ADHD as a developmental disorder with substantial biological origins, whilst United Kingdom clinicians place greater emphasis on the conduct problems associated with ADHD as originating from poor parental management (Levy & Hay, 2001). The shift to the emphasis the North American clinicians took began with the work of Virginia Douglas (1972), who hypothesised that symptoms of hyperactivity and impulse control were due to a deficit in the ability to sustain attention.

Douglas' (1972; 1983) work influenced the re-categorisation of ADHD in the third edition of the Diagnostic and Statistical Manual (DSM III; APA, 1980) as Attention Deficit Disorder (ADD) with or without Hyperactivity. The DSM III conceptualised ADD with Hyperactivity as being a three-dimensional disorder characterised by inattention, impulsivity and hyperactivity, which was developmentally inappropriate, and included cut-off descriptions in order to operationalise the diagnosis. When the DSM III was revised, the updated edition (DSM III – R, APA, 1987), listed 14 symptoms, relating to attention, impulsivity and hyperactivity, in descending order of discrimination according to the field trials conducted. A total of eight symptoms were required for diagnosis. The fourth edition and subsequently revised fourth edition of the Diagnostic and Statistical Manual i.e., the DSM IV and the DSM IV – TR now include separate diagnostic criteria for the symptoms of inattention and hyperactivity/impulsivity. ADHD is thus diagnosable as three subtypes: a) Predominantly Inattentive; b) Predominantly Hyperactive/Impulsive; and c) Combined type (Levy & Hay, 2001).

However, Barkley (1997) criticised the DSM IV approach to classifying ADHD. He maintained that it was unclear whether ADHD Predominantly Inattentive type was in

reality a subtype of ADHD, or whether it mostly shared common attention deficit symptoms with the other types. He was of the opinion that the Inattentive subtype manifested greater stability over time, and tended to be more predictive of scholastic difficulties and reading problems. He also questioned whether young children diagnosed with Predominantly Hyperactive/Impulsive type, and who do not require inattention symptoms for diagnosis, eventually move into the Combined type, owing to the decline in hyperactive/impulsive symptoms, and if so, why that was the case. Barkley suggested that ADHD may rather need to be redefined as a developmentally relative disorder found at the extreme end of a normal psychological trait, undergoing a process of developmental maturation as other traits do. He described the DSM diagnostic criteria for ADHD as being descriptive and atheoretical, and stated that they do not assist the clinician in making predictions about associated features or the life course.

2.4 Three Types of ADHD

According to the American Psychiatric Association (2000), three types of ADHD can be distinguished. These are: a) ADHD – Predominantly Inattentive Type; b) ADHD – Predominantly Hyperactive/Impulsive Type; and c) ADHD – Combined Type.

According to the American Psychiatric Association, each of the three types is distinguished by the number of criteria for inattention, and hyperactivity-impulsivity, respectively, met by the child. The specific criteria for inattention, hyperactivity/impulsivity and impulsivity are described in Appendix A. In addition to meeting these specific criteria, some of the symptoms must have caused noticeable impairment before the age of seven, for a diagnosis to be made. Furthermore, impairment from these symptoms must have been evident in at least two settings (e.g.,

home and school). There must also have been clear evidence of impairment in the person's social, academic or occupational functioning, and these symptoms must not have occurred during the course of a Pervasive Developmental Disorder, Schizophrenia or another psychotic disorder. They must also not be better accounted for by another mental disorder (American Psychiatric Association, 2000).

2.5 Etiology

The exact cause of ADHD is unknown (Benn et al., 2003). However, it is widely accepted that ADHD has no single, specific cause (Barkley, 1998). Recent research has contradicted earlier suggestions that ADHD results from bad parenting, and has suggested a strong biological/neurological basis for the disorder (involving an imbalance of neurotransmitters in the brain), as well as a strong genetic component (Benn et al., 2003; Kaplan, Sadock & Grebb 1994; Smith & Strick, 1997; Tannock, 1998).

Rudel (1988) described the importance as a mechanism of attention of the frontal lobe, which monitors what a person chooses to attend to from the outside world (through the cognitive exteroceptive system) and what the person chooses to attend to from his/her inner world (through the limbic interoceptive system). Rudel maintained that a balance between these two attentive systems is vital for academic and social functioning. A child with ADHD lacks balance between the two attentive systems and consequently experiences difficulties in determining what information is important enough to attend to (Rudel, 1988).

According to Levy and Hay (2001), twin studies have supported the fact that ADHD comprises a genetic etiological component. However, despite the extensive research that has been done on the topic, no single specific gene has been linked to the disorder. Interestingly, some studies suggest that children whose biological parents have ADHD are twice as likely to develop the disorder than the average person without a family history of ADHD (Kaplan et al., 1994; Smith & Strick, 1997; Tannock, 1998). Neurological research into the etiology of ADHD has failed to find any gross structural damage in the brains or central nervous systems of children with ADHD. Research has, however, identified some irregularities in the brains of some children with ADHD. One such theory postulates that children with ADHD have inadequately developed frontal lobes – which, it is argued, leads to a lack of inhibition.

Other theories maintain that it is the imbalance of neurotransmitters in the brains of children with ADHD that underlies the disorder (Kaplan et al., 1994; Smith & Strick, 1997; Tannock, 1998). Specifically, the neurotransmitter catecholamine has been found to exist in particularly low levels in children with ADHD. Catecholamines regulate various neural systems in the brain, including those that direct attention, motivation and motor movement. This theory proposes that low levels of catecholamine reduce the child's ability to moderate attention, activity levels, emotional impulses and environmental reactivity (Kaplan et al., 1994; Smith & Strick, 1997; Tannock, 1998).

However, Barkley (1997) maintained that the etiology of ADHD is more neuropsychological in nature, and comprises a deficit in behavioural inhibition. This behavioural component of impulse control interrupts certain normal neuropsychological functions which impair the child's ability to control emotions, motivation, and goal-

directed behaviour in response to arousal. A child with ADHD often struggles to stay task-orientated unless there is constant feedback and reward. Interestingly, it is in these structured conditions that the child is able to function quite well. Barkley thus views a child with ADHD as being able to pay attention to more cues than the average person (rather than having an inability to pay attention to cues), but also having a subsequent inability to distinguish between relevant and irrelevant cues or incoming information (Barkley, 1997).

Whilst various factors such as psychosocial practices and dietary intolerances have been shown to exacerbate ADHD symptoms, these factors have not been proven to cause ADHD (Levy & Hay, 2001). Furthermore, various factors such as prenatal exposure to toxins, prematurity and birth complications are also unlikely to be the sole cause of ADHD, although they may cause a person with a genetic and or biological predisposition to develop the disorder (Cantwell, 1996).

2.6 Prevalence and Course of ADHD

In a South African study sponsored by Novartis South Africa (Pty) Ltd, it was found that ADHD affects between 3% and 5% of children, with nearly three times as many boys affected than girls (Benn et al., 2003). The American Psychiatric Association estimates that this disorder affects between 37% of school-age children in the United States alone and estimates that more boys are affected than girls with a ratio of about 7:1. (American Psychiatric Association, 2000). Researchers tend to agree that ADHD is considered to be relatively more common in males than in females (American Psychiatric Association, 2000; Benn et al., 2003; Gingerich, Turnock, Litfin, & Rosen,

1998). This ratio may be misleading, however, as some experts believe the disorder to be equally prevalent in both sexes. They argue that males are more likely to be diagnosed with ADHD than females, as their behaviour is often more destructive and therefore more noticeable. It is also thought that the hyperactive/impulsive type of ADHD is diagnosed more frequently than the inattentive type, owing to the extreme behavioural symptoms with which these children present (Barkley, 1998; Desgranges, Desgranges & Karsky, 1995).

Unfortunately, accurate detailed statistics regarding the prevalence of ADHD in South Africa is lacking, because many children with ADHD are not diagnosed appropriately. This may happen because: a) the parents are not aware that the symptoms their child is exhibiting are actually part of a disorder and the child goes undiagnosed; or b) the parents are aware that something is wrong with their child but cannot afford the expensive medical treatment; or c) the parents take their child to community health/psychiatric clinics where he/she may be accurately assessed and effectively treated, but the overworked clinics fail to keep accurate statistics regarding the number of children seen.

Although ADHD affects boys, girls, men and women of all ethnic groups, countries, levels of education and socioeconomic class, it has been found to be more prevalent amongst people of a lower socioeconomic class (Gingerich et al., 1998). Various explanations for this have been proposed, including restricted access to health care facilities for proper prenatal and postnatal care, and a higher incidence of maternal substance abuse during pregnancy (Barkley, 1991; Gingerich et al., 1998; Hallowell & Ratey, 1995; Smith & Strick, 1997). Barkley also postulated that the higher incidence of ADHD in the lower socioeconomic classes was due to social drift. The term 'social drift'

implies that children with ADHD will be less likely to benefit from the school system and will therefore be more likely to be underemployed as adults. They will also tend to have a lower income and therefore consequently drift towards a lower socioeconomic class (Barkley, 1998).

In recent years, the number of children being diagnosed with ADHD has increased, and the words 'ADD' and 'ADHD' have become household terms. The question remains whether or not an increase in prevalence has occurred, or whether people are simply more aware of, and sensitive to, the behavioural symptoms of ADHD. It has been reported that many people have made a preconceived diagnosis of ADHD when they bring children to mental health professionals (Desgranges, Desgranges & Karsky, 1995). These trends of over-identification of ADHD have a negative impact on the child concerned if the real disorder goes undiagnosed and untreated. Some of the reasons for the increase in prevalence in recent years include an increased public awareness of the disorder, and better diagnostic procedures. Various behaviour rating scales are now commonly used by mental health professionals as tools for gathering collateral information about the child's functioning from significant others, as well as assessing the child's behaviour in the classroom and at home. However, Reid and Maag (1994) cautioned against the use of behavioural rating scales as the sole means of assessing ADHD in a child, and expressed their concern that some clinicians may inaccurately diagnose a child with ADHD based on the child attaining a cut-off score on a behaviour rating scale. The authors commented on how cut-off scores are arbitrarily defined, and emphasised that the use of one's clinical judgement is of utmost importance in diagnosing ADHD. They stressed the fact that rating scales should be viewed as tools which can be used in the diagnostic process (Reid & Maag, 1994).

With regard to the course of ADHD, recent research has contradicted the historical beliefs that ADHD is 'outgrown' in adolescence, and has shown that as many as two thirds of children with ADHD continue to have some problems attributed to their disorder as adults, and may require treatment throughout their lives (Benn et al., 2003; Resnick, 2000). A 1996 study by Hill and Schoener recently sparked controversy as to whether or not an age-dependent decline of ADHD occurs in adolescence or adulthood (Levy & Hay, 2001). A follow-up data analysis of a number of ADHD studies in which diagnoses were made in childhood, revealed a decline in symptoms with age (Hill & Schoener, 1996). Barkley (1997) questioned the conclusions of this study on the grounds of unreliability of measurement of the disorder across time, as well as the insensitivity of the DSM criteria with increasing age (Barkley, 1997). Whether changes in the expression of ADHD occur with development, or whether compensatory mechanisms minimise the expression of the disorder, remains a controversial issue (Levy & Hay, 2001).

2.7 Co-morbidity

Co-morbidity with ADHD is very common. According to Szatmari, Offord and Boyle (1989), approximately 44% of children diagnosed with ADHD have a co-morbid disorder, as many as a third have two co-morbid disorders, and about one tenth have three co-morbid disorders. These include Oppositional Defiant Disorder, Conduct Disorder, Tourette's Syndrome, specific learning difficulties, visual and auditory perceptual problems, delays in fine motor development and emotional difficulties. These problems commonly associated with ADHD will be briefly discussed below.

Oppositional Defiant Disorder (ODD)

Children with ODD tend to say 'No' on principle, refusing to do things that they are told to, regardless of whether they want to do the activity or not (Benn et al., 2003). They are defiant, and deliberately do things to annoy others. Though ODD is a diagnosable disorder on its own, it often exists co-morbidly with ADHD (Hechtman, 1996). According to Benn et al., when ODD is combined with the impulsivity associated with ADHD, children tend to be very volatile, and even dangerous. If parents confront this behaviour in a hostile manner, they run the risk of increasing the ODD behaviour.

Conduct Disorder

Benn et al. (2003) describe Conduct Disorder as the most worrying disorder associated with ADHD. Whilst children with ADHD are often regarded as being naughty, Conduct Disordered children also lack remorse for their wrongful deeds. Children with Conduct Disorder may plan their hurtful deeds, and tend to be angry, rather than sorry, when they are caught (Hectman, 1996). They may blame others for their actions, and also tend to be malicious, to tell lies, cheat, steal, destroy property and act in a cruel way towards others. Benn et al. (2003) state that managing children with ADHD, who have a co-morbid Conduct Disorder, is often difficult for parents and professionals.

Tourette's Syndrome

Tourette's Disorder or Tourette's Syndrome is relatively less common. This disorder involves both motor and vocal tics (Cantwell, 1994b). It is important to identify the presence of this disorder in a child with ADHD and to establish whether he or she has a family member with the disorder, as the drugs that are used to treat ADHD can cause tics and even trigger Tourette's Syndrome in a patient who is predisposed to developing the disorder (Benn et al., 2003).

Specific learning difficulties

Approximately 50% of children with ADHD also exhibit some learning difficulty (Benn et al., 2003; Tannock, 1998). Usually, these children are of average intelligence or above-average intelligence, but they experience problems in processing information (Barkley, 1990). Learning difficulties as a co-morbid condition with ADHD will be expanded upon in a subsequent section.

Visual perceptual problems

A child with visual perceptual problems may have normal eyesight, but lack the ability to interpret what he sees. Typically, a child with these problems will mix up letters and numbers that look the same (Tannock, 1998). The recognition of shapes such as the letters of the alphabet, and the ability to arrange those shapes in space are prerequisites to learning to read (Benn et al., 2003). Many children with visual perceptual problems memorise their readers for the first few years of school, thus appearing to be able to read. However, as the work becomes more difficult and the readers more lengthy, their reading problems become evident.

Auditory perceptual problems

A child with an auditory perceptual problem may be able to hear perfectly, but be unable to interpret or remember what he or she hears (Tannock, 1998). Parents may report that the child is unable to follow complex instructions, and usually only carries out the first step. It is important for the clinician to determine whether this is as a result of not being able to process auditory information correctly, or whether the child struggles to attend to the instruction in the first place, which may be related to ADHD. Delays in fine motor development

Children with ADHD often find it difficult to colour in, draw, and write, and consequently may express reluctance to partake in these activities (Benn et al., 2003; Tannock, 1998). Their reluctance to perform these activities is often incorrectly assumed to be the cause of their poor performance. The children may be seen as untidy and careless, even though they may be trying hard.

Emotional difficulties

Emotional difficulties, such as poor self-esteem, are commonly associated with ADHD (Benn et al., 2003; Hechtman, 1996). These develop through the problematic interactions the child with ADHD faces with his/her environment on a daily basis. Whilst they often have the best intentions, these children seldom manage to produce good work or to behave well. They are often in trouble, or are being criticised for something. In some cases, the child may even develop a psychiatric disorder such as Generalised Anxiety Disorder or Depression (Hallowell & Ratey, 1995).

Mental retardation associated with brain damage is also reported as being a co-morbid disorder, although ADHD is found to a similar extent amongst intellectually gifted children (Barkley, 1990; Root & Resnick, 2003). Damage to the various structural units of the brain will be expanded upon in the following section.

There are many serious implications for a child with ADHD and a co-morbid condition. One cannot simply treat the ADHD and hope that the co-existing problem, such as a learning difficulty, will disappear (Tannock, 1998). A co-morbid condition often requires a different treatment approach to the treatment of ADHD, as treatment for one is seldom effective for the other (Benn et al., 2003). On the positive side, treating the

ADHD may have some positive implications for other difficulties, as attention is the first step in the processing of new information, and if this mechanism is functioning correctly, the processing of incoming information and the subsequent planning of what to do with the information can take place more effectively (Root & Resnick, 2003).

2.8 The Developmental Picture of a Child with ADHD

Locomotor Functioning

The locomotor domain is probably one of the most noticeably affected domains when it comes to ADHD. Parents of children with ADHD often notice increased levels of activity from a very young age and may describe their children as being 'on the go since he could walk' (Benn et al., 2003). As preschoolers, children with ADHD tend to be noticeably more active than their peers. They usually enjoy outdoor activities and sport, and often shun activities such as puzzles and construction-type games, which require sitting down and concentrating. As a result, by the time the child gets to school-going age, he or she may experience backlogs in fine motor co-ordination skills, as these have not been practised much in earlier years (Swanson, 1992). Interestingly, despite the amount of time spent on action-packed activities, ADHD children tend to be clumsy with more refined motor skills such as skipping (Barkley, 1991). They also tend to be more accident-prone than their peers, probably as a result of their impulsivity and failure to think through their actions before doing them.

Personal/Social and Emotional Functioning

The young, preschool-aged child with ADHD will probably already be displaying signs of interpersonal problems (Pelham & Bender, 1982). Parents may comment that their child is very demanding, gets frustrated easily, and fights with other children (Benn

et al., 2003). As children reach school-going age, they begin to play games with more rules, such as turn taking. Children with ADHD may struggle to follow the rules of these games, as they tend to be impulsive and bossy at times and to lose their temper easily. This may lead to peer rejection or ridicule, which may negatively affect the self-esteem of the child with ADHD (Pelham & Bender, 1982).

Cognitive Functioning

Luria (1966; 1973; 1980) divided the brain up into three functional units. He proposed that the first functional unit is responsible for arousal and attention, and it is here, in the brainstem, that incoming information is attended to or overlooked. The second functional unit involves the posterior region of the brain. This area is responsible for receiving information that arrives from the first unit, and processing it. The third functional unit is situated in the frontal lobes of the brain and is responsible for complex thinking and carrying out plans. According to Luria, in each of the three units there are hierarchically organised primary, secondary and tertiary areas, which are respectively responsible for the receiving, coding and planning of information.

Luria (1966; 1973; 1980) proposed that the brain develops in five stages and that injury or problems with one of these developmental stages will affect development of subsequent stages. During the first stage of development, the arousal unit develops. Damage to the brain at this crucial stage can lead to hyperactivity and attention deficits, which in turn may lead to learning problems when the child goes to school. During the second stage of development, the primary sensory and motor areas (i.e., touch, sight, hearing and movement) develop. Injuries to these areas during development will have different implications depending on the child's age as well as the severity of the injury. During the third stage of development, the secondary areas develop and become the

prime site for learning. The right side of the brain becomes responsible for functions such as the recognition of shapes, copying, drawing and storing visual images, whilst the left side becomes responsible for learning, writing, spelling, speaking and understanding language. The fourth and fifth stages of development see the development of the tertiary or higher-order processing areas (Luria, 1966; 1973; 1980).

Thus, it seems that the cognitive deficits which a child with ADHD manifests stem from a problem within the first functional unit of arousal and attention (Reardon & Naglieri, 1989). In a child with ADHD, his/her arousal and attention levels are not conducive to learning in a structured way, and as a result he or she experiences difficulty in attending to incoming information, and in making decisions regarding what information to attend to and what to overlook. Consequently, he or she is likely to have a poorer general knowledge than his/her peers. In addition, he or she may display poorer problem-solving skills than other children, as the units which are responsible for problem solving do not receive adequate information from the arousal and attention unit. Consequently, parents may often complain that their child fails to think before acting or speaking (Benn et al., 2003).

2.9 The Main Approaches Used to Treat ADHD

ADHD and its associated features have been the focus of intensive investigation throughout the last few decades. The focus on treatment of these children has become an important issue (Hotz, 1998). Whilst cognitive behavioural approaches to treatment have been implemented by the discipline of psychology, pharmacological compounds to control the symptoms of ADHD have been identified as the treatment of choice by the

psychiatric and paediatric disciplines. According to Hotz (1998), four main approaches have come to be widely used in the treatment of ADHD: a) pharmacological approaches; b) psychological approaches; c) educational approaches; and d) specific psychological approaches. These approaches will now be elaborated on.

2.9.1 The Pharmacological Approaches

The pharmacological treatment of ADHD is a somewhat contentious issue, with many parents initially being reluctant to try pharmacological treatment. Some parents are even reluctant to acknowledge that their child has ADHD, and, not liking the report they get from the psychologist or paediatrician who diagnosed their child, will go from professional to professional, 'shopping' for someone who will provide them with a more acceptable way of conceptualising their child. Many parents are strongly 'anti-medication' and prefer to try homeopathic remedies, special diets, and the provision of essential fatty acids to supposedly replace enzymes which are absent in children with ADHD (Benn et al., 2003). According to Benn et al., there is not much research which supports any of these remedies, and parents usually find that the desired results are not forthcoming. In some of these cases, the parents may then resort to using medication.

Since the 1970s, stimulant medication has been successfully used to control the symptoms of ADHD. One of the most well-known stimulant medications is Methylphenidate, and a significant number of children diagnosed with ADHD are treated with it. Much research has been undertaken on the effects of stimulant medication on hyperactive children (DuPaul & Barkley, 1994). These researchers argue in favour of stimulant medication as the treatment of choice in ADHD. Further, they note that major doses of Methylphenidate are an effective means of improving behavioural, social and

academic functioning on a short-term basis. Whilst the benefits of using stimulant medication have been extensively documented, some researchers have criticised the general tendency to prescribe stimulant medication in the absence of an objective evaluation of a diagnosis. Solomons (1973) reported on the prevalence of inappropriate prescription of stimulant medication, and criticised approaches to the monitoring and prescribing of it. Gadow (1981) also noted that improper evaluation and follow-up was commonplace. Essentially, whilst many research investigations support the prescription of stimulant medication to treat the symptoms of ADHD, an argument can also be made about the inadequate and inappropriate use of the drugs (Desgranges et al., 1995).

Greater public awareness has also highlighted the short- and long-term side effects of stimulant medication. Side effects include physiological and psychophysiological effects as well as cognitive, academic, behavioural and emotional effects (Cantwell, Hanna, Lerner & Swanson 1991). Specific side effects which may be experienced with stimulant medication such as Methylphenidate include headaches and abdominal discomfort, decreased appetite, increased heart rate, sedation and confusion (Benn et al., 2003). These side effects are usually transient, however, and disappear after a week or two. Specifically, in terms of long-term side effects, concern has been raised regarding the addictive potential of stimulant medication, as levels of tolerance seem to increase. Little evidence corroborates this concern, however, and researchers generally agree that with a sound diagnosis, use of psychopharmacological therapy is effective in assisting with the child's school behaviour, academic performance and social behaviour (Evans & Pelham, 1991; Swanson et al., 1991).

2.9.2 The Psychological Approaches

Barkley (1990) commented that the social interactions between ADHD children and normal children tend to be weak, and that ADHD children are often rejected by their peers because they lack natural social skills. Barkley (1998) also documented the tendency for ADHD children lacking peer relationships to wane socioeconomically in later life, becoming addicts, alcoholics or people with an antisocial nature. The possibility exists that early childhood problems lead to this maladjustment later in life.

Swanson (1992) reported that observational studies in classrooms portrayed ADHD children as not 'fitting in', being aggressive and often being involved in solitary play. Peer rejection is also commonplace. As a result, social training programmes have been developed over the past 15 years and continue to be upgraded as additional diagnostic criteria becomes available (Barkley, 1990; Braswell & Bloomquist, 1994; Brown & Cantwell, 1976). These programmes teach skills such as problem solving, anger management, conversation skills and social-entry skills. Long-term programmes which use parents and peers to change maladaptive behaviour patterns seem to be more meaningful and have longer-lasting effects than short-term skills training programmes (Barkley, 1990; Braswell, Bloomquist & Pederson, 1991; Braswell & Bloomquist, 1994; Hechtman, 1993, 1996; Johnston, 1996; Mash & Johnston, 1990).

2.9.3 The Educational Approaches

More recently, behavioural and cognitive behavioural interventions have been used in the classroom as a way to manage ADHD. This approach relies heavily on the teacher being adequately trained in these techniques. An awareness of the diagnostic

issues of ADHD is also essential. This approach should emphasise the implementation of rule sets and consistently remind the ADHD child of the rules and the consequences of non-compliance. This is because ADHD is primarily an impairment in the ability to regulate behaviour by its consequences (Barkley, 1990; Cantwell, 1996; Hallowell & Ratey, 1994).

Numerous investigators have developed or reviewed intervention strategies of management for children with ADHD (Barkley, 1990; Conners, 1994; Pelham & Bender, 1982; Swanson, 1992). These approaches tend to be multimodal in nature. Cantwell (1996) postulated the multimodal approach to be a sound treatment method. Teacher-administered intervention strategies include both positive and negative consequences. Positive consequences aim to increase the frequency of a certain behaviour, and include attention, rewards or tokens, and star charts for good, controlled behaviour, which, when full, may be exchanged for an agreed-upon reward or privilege. Negative consequences aim to decrease the frequency of certain behaviours and include ignoring, reprimanding or time-out strategies for poor behaviour or careless work. Peer strategies attempt to train the ADHD child's peers to ignore silly remarks and to praise the child's appropriate actions, but these strategies are effective only if peers learn to use the programme effectively. Other educational approaches to managing ADHD include classroom restructuring (so that the number of distractions the ADHD child is faced with are minimal) and managing academic programmes to cater for the ADHD child's special needs (Benn et al., 2003).

The current inclusive education policy in South Africa advocates the inclusivity of all types of learners into the mainstream environment. Consequently, there are fewer special schools and special classes within schools, to cater for special educational

needs. This policy of inclusivity means that educators need to be equipped with as much knowledge as possible on how to manage children with diverse educational needs.

2.9.4 Specific Psychological Approaches

Recently the home setting has become an area of focus for the treatment of children with ADHD (Mash & Johnston, 1990). The Home Situations Questionnaire (HSQ) was developed for mothers to rate their ADHD children's behaviour problems in the home environment (Barkley, 1990; DuPaul & Barkley, 1992). Parents often have difficulties with discipline, as their ADHD children tend to struggle to fit into the daily norms and rules of home life. As a result, intervention strategies based on the behavioural model have been developed (Barkley, 1990; Brown & Cantwell, 1976; Pelham & Bender, 1982). The parents and children partake in a number of therapy sessions to teach them new ways of dealing with their problems. Although this approach has been relatively successful in the short term, further research is needed to evaluate its long-term efficacy.

The Family Systems Approach to Parent Training is a parent training programme developed to increase the functionality of the family as a whole (Barkley, 1990). Parent questionnaires such as the Child Behaviour Checklist (Achenbach & Edelbrock, 1983) and the Home Situations Questionnaire (Barkley & Edelbrock, 1987) are used. Sessions aim to identify, evaluate and correct the issues of parenting where friction occurs. Coping, problem solving, positive and negative reinforcement tactics and other behavioural modification strategies are taught to the parents. The programme, though widely used, shows a limited degree of success, and further clinical testing to assess its efficacy is needed.

The four approaches commonly used to treat ADHD have been delineated above, for the purpose of clarity. However, it is important to note that one approach used in isolation to treat ADHD is likely to be less effective than a multimodal approach to the treatment of the disorder. This is because ADHD impacts on many different facets of the child's life – for example, his/her academic, behavioural, social and familial functioning (Hechtman, 1996). Intervention is therefore most effective when it is aimed at addressing deficits in all the various areas in which they manifest. For example, psychopharmacological intervention may assist in allowing the child to be in the best frame of mind he or she can be in order to learn. Yet, unless it is used in conjunction with behavioural intervention, social skills training, or familial education and support depending on what intervention is required for the specific child's circumstances, the child's overall level of functioning and quality of life may still be impaired (Barkley, 1991). A holistic, balanced approach to the conceptualisation of each child and the interventions he or she requires is therefore necessary. Treatment regimes therefore tend to be individualised rather than generalised.

2.9.5 A Comprehensive Approach to Treating ADHD in the Early Years

ADHD affects many aspects of a child's functioning and therefore, as mentioned above, one needs to approach the problem holistically with regard to treatment. Optimally, a multidisciplinary team should be involved with the treatment of a child with ADHD (Benn et. al., 2003). This is a medical model approach to treating ADHD. Examples of professionals comprising this team include occupational therapists, remedial teachers, speech and language therapists, psychologists, paediatricians and/or psychiatrists. It is important to note, however, that these specialised professionals are not readily available in the school system, and many parents seek this assistance from

the private sector. This is a very expensive route, and one which is often out of reach financially for many South Africans. Aspects of the roles each of these team members play in treating ADHD in the early years is briefly introduced below.

Occupational therapist

Occupational therapists (OT) play an important role in the diagnosis of ADHD and in the treatment of the specific deficits these children manifest. Some aspects of an occupational therapist's expertise in working with children who have ADHD is to treat the visual perceptual disturbances, sensory defensiveness, and gross and fine motor coordination difficulties they experience (Benn et al., 2003). The OT will then work with these areas of deficit, which are important to correct in order to facilitate the learning process. It is important to note that not all children who have ADHD will require the services of an occupational therapist.

Remedial teacher

The remedial teacher's role begins once a clear diagnosis has been made and specific problem areas have been identified, such as the identification of poor visual perceptual abilities. The remedial teacher will then work with the problem areas, making sure that the child's basic foundation or conceptual grounding in the problem area is correct and that the child has been taught the proper ways of approaching a task. This may involve the remedial teacher taking the child through exercises in order to re-train the brain into processing information correctly. Sometimes, the child is taught alternative learning methods to compensate for deficits which impede learning (Swanson, 1992). One aspect of a remedial teacher's work with children with ADHD may be to build up the child's ability to concentrate. Often, the remedial teacher and occupational therapist will work together to assist and adapt the child's methods of learning.

Speech and language therapist

A speech and language therapist evaluates a child's linguistic abilities, is the best person able to identify and quantify disorders of language processing and other language difficulties, and to provide corrective therapy (Benn et al., 2003). Speech and language therapists also assess auditory perception, processing and discrimination. As learning difficulties are most often language-based, the speech and language therapist is often an important team member. Speech-related difficulties are generally noticed earlier than language-related learning problems, and will probably be dealt with earlier too. Language-related learning problems may receive remediation once the child starts school and the problem is identified.

Psychologist

The psychologist is one of the team members who assists with the assessment of a child for the existence of ADHD, as well as determining the child's intellectual and academic abilities by using Intelligence Quotient (IQ) and scholastic measures. This team member can also evaluate a child's emotional status and the view he or she has of his/her environment, through the use of projective testing, questionnaires from the parents, teachers' reports and clinical observations. Psychologists may assess children from as young as three years old or even younger. Very young children are usually brought to a psychologist because of excessive levels of hyperactivity, whereas children who manifest inattentive-type behaviour are often noticed only once this becomes a problem at school. Whilst the psychologist may be able to label the disorder, he or she is not permitted to prescribe medication, and must therefore liaise with a paediatrician or child psychiatrist.

Paediatrician or child psychiatrist

The paediatrician and psychiatrist are both medical professionals who have specialised training in the fields of childhood disorders and psychiatric disorders respectively. Both are able to assess and diagnose a child with ADHD and both are able to prescribe medication for the disorder. Their role in the team is usually to monitor and manage the child's medication, whilst other team members identify and correct associated deficits of the disorder. They may become role players at any stage at which a disorder that requires medication is noticed.

2.10 ADHD in the South African Schools' Context

South Africa's current educational curriculum is outlined in the Revised National Curriculum Statement (RNCS). The RNCS is based on a number of principles, which will be elaborated on in the following chapter. One of the salient principles of the RNCS, concerning children with ADHD, is that of inclusivity (Unisa, 2004). The RNCS has phased out schools and classes for learners with special educational needs, and instead promotes the incorporation of these learners into the mainstream schools. The implications of this can be quite problematic. For a start, teachers are put under extra pressure to try to direct lessons at children with a wide range of abilities, as well as children with barriers to learning (Unisa, 2004). Problems arise as many teachers in mainstream education are not geared to cope with the demands of children with special needs and accompanying co-morbid disorders. The implications for the child with special educational needs, such as a child with ADHD, are that there is less attention focussed on his/her individual needs, and he or she is forced to 'sink or swim' in a demanding and varied environment. An ADHD child, whose attention may drift periodically, is likely to

lose the content of the lesson that was taught, as there is no time to go back and re-teach it (Unisa, 2004).

A further pressure on these children is that the RNCS allows a learner to repeat a grade only twice in the primary phase of his/her schooling, and if the learner is unable to master the expected learning outcomes in that time, he or she will be promoted to the next grade regardless. This leads to bigger problems for the child, as he or she has not mastered the foundation of the material being taught and has to build future knowledge on an unstable foundation. The child is unlikely to progress satisfactorily, as the basic building blocks of knowledge are not in place as a result of inattentive behaviour and possible learning difficulties. There are also fewer specialised people in the school settings who can be of assistance to a child with barriers to learning (Unisa, 2004). There is also very limited psychological and therapeutic support within the schools, and any assistance a child may require will most probably necessitate intervention from sources outside of the school, which may take longer, or be more costly to implement. In addition, the RNCS emphasises the importance of group work in learning. Group work is often very difficult for children with ADHD, who need structure and minimal distractions in order to work effectively. Children with ADHD are also often shunned by their peers, especially when it comes to being a group member who will be depended on to pull his/her weight in order to contribute to the group's mark. This type of educational curriculum therefore places unique stressors on children with ADHD, who may be shunned or get 'lost' in a group-work method of instruction. The RNCS and the implications of this curriculum for a child with ADHD will be discussed below, and will look at early childhood development from an educational point of view. The basic philosophies and principles underlying Outcomes Based Education (OBE) and the Revised National Curriculum Statement (RNCS) will be outlined, including the skills a

child needs to cope with the demands and expectations of OBE and the RNCS. This will be followed by a discussion of the implications of this educational system for children with ADHD.

2.11 Principles of Outcomes Based Education (OBE) and the Revised National Curriculum Statement (RNCS)

In 1997, South African schools were introduced to Outcomes Based Education (OBE), and Curriculum 2005 was the envisaged educational system of the future. However, whilst most employers and educators agreed on the need for an ongoing, outcomes-based system of education and training, there was disagreement about Curriculum 2005 being a vehicle for such a system (Unisa, 2004). A Ministerial Committee accordingly reviewed its implementation in 2000, and the result of this review was the Revised National Curriculum Statement (RNCS). The implementation of the RNCS in the Foundation Phase (Grades 0 – 3) took place in 2004 (Unisa, 2004).

Before the introduction of the RNCS and OBE, learners were passive recipients in the learning process. Assessment was by formal examinations, which often involved rote learning. The syllabus was content-based and broken down into subjects. The work was textbook-bound and tended to be teacher-centred. The teacher was responsible for the learning, and the emphasis on the work was on whatever the teacher hoped to achieve. The syllabus was non-negotiable and placed into rigid time frames (Unisa, 2004).

With OBE, learners are more active in the learning process and they are assessed on an ongoing basis. Rote learning is replaced with critical thinking, reasoning, reflection, and the ability to integrate knowledge. It is a learner-centred approach, and the teacher is merely the facilitator (Unisa, 2004). Group work and teamwork are primarily used to consolidate new material, and learners take responsibility for their learning. The emphasis is on outcomes, and learners are allowed flexible time frames to work at their own pace.

The RNCS is based on a number of principles, namely:

- a) Social justice, a healthy environment, human rights and inclusivity.
- b) Outcomes based education.
- c) A high level of skills and knowledge for all.
- d) Clarity and accessibility.
- e) Progression and integration (Unisa, 2004).

‘Social justice’ refers to the responsibility to care for others and the common good of society (Unisa, 2004). A healthy environment is emphasised as it cannot be attained without the effort of people, their lifestyles and choices, their rights and social justice. Human rights are stressed as an important focus to avoid infringement of rights owing to ignorance. The principle of inclusivity, in turn, deals with human rights issues and also taps into the rich diversity of learners and communities. Schools are encouraged to create practices that ensure the full participation of all learners irrespective of their cultures, race, language, economic background or ability (Department of Education, 2003). This means that learners with unique strengths and experiences, as well as barriers to learning, all need to be accommodated in a mainstream setting. In practice, the principle of inclusivity has the potential to be problematic, as special schools and

special classes in mainstream schools are phased out, as an attempt is made to accommodate all learners within the mainstream setting. Some children, with barriers to learning or physical disabilities, may struggle to cope academically and socially in a mainstream setting. Consequently, problems may arise owing to a lack of specialised resources to cope with these needs.

Outcomes Based Education is one of many educational approaches, and forms the foundation of the curriculum followed by South African schools. Outcomes Based Education considers the process of learning to be as important as the content that is learnt, and strives to enable learners to achieve to their full potential. The content and process of learning are delineated by specific outcomes which need to be achieved at the end of the process (Unisa, 2004). The outcomes encourage a learner-centred and activity-based approach to education.

Descriptions of the knowledge, skills and values which learners should know, demonstrate and be able to do at the end of a grade or phase, are known as 'Learning outcomes'. Learning outcomes describe what the learners should know and be able to do. Assessment standards are grade-specific and describe the minimum level at which learners should demonstrate their achievement of the learning outcomes. Learning outcomes tend to remain the same from grade to grade, whilst assessment standards change with each grade. Having learning outcomes and assessment standards ensures a high level of skills and knowledge for all – another key principle underlying the RNCS (Unisa, 2004).

In accordance with the RNCS principles of progression and integration, the assessment practices that are encouraged through the RNCS are continuous, planned and integrated processes of gathering information about the performance of learners measured against the learning outcomes (Unisa, 2004). The RNCS also emphasises the importance of carefully planning the assessment of learners who experience barriers to learning (Unisa, 2004). The RNCS has taken learners with special needs into account by providing, for example, alternative methods of assessment for these learners, whilst keeping them in a mainstream scholastic environment. Whilst certain measures such as extended examination times for children with physical disabilities are put in place to assist children with special educational needs, this does not necessarily translate into attaining success in a mainstream scholastic environment. For example, the child will still be required to participate in group work, where the mark of the group is dependent on his/her input. Poor performance when compared to the normal children will result in the child with learning difficulties bringing down the mark of the group and subsequently the child may be ostracised by his/her peers.

2.12 Demands of the RNCS on a Child with ADHD

The fact that the new curriculum encourages children to work in groups, relies on continuous assessment, and is generally less structured, has many negative implications for the child with ADHD. These children need as much structure as possible in order to accomplish tasks (Tannock, 1998). Group activities often require social skills and planning abilities that an ADHD child lacks. Impulsivity and inability to complete tasks may result in the child with ADHD being shunned by the group, as including them in the group may negatively influence the marks obtained by the other group members. This in

turn may lead to emotional problems for the child with ADHD, who may feel incompetent and rejected (Pelham & Bender, 1982).

Classes also tend to be larger in number than previously, which makes it difficult for the teacher to cope with children with special needs, who by the principle of inclusivity, are included in mainstream classes (Unisa, 2004). Psychologists and support centres in the school system have also been radically reduced, making it more difficult for teachers to manage children with unique needs. Larger classes also mean more distractions from classmates for children with ADHD. As maintaining attention on a single topic is also extremely difficult for these children as they find it difficult to filter out background noise, larger classes exacerbate their problems. Additionally, the flexible time frames outlined in the RNCS may result in the ADHD child becoming distracted and not accomplishing anything, as these children tend to struggle to finish tasks even when time frames are given. In this type of environment, the ADHD child is unlikely to thrive academically, and emotional implications are likely to arise.

It has been mentioned that the RNCS principle of inclusivity means that learners with various disabilities need to be accommodated in mainstream schools, and as a result building special schools and remedial schools is not deemed a priority. In practice, this means that the teachers, parents and private sector are left to assist the child with special needs within the mainstream setting. The present study aims to provide these role players with a developmental profile of a child with ADHD. With the child's strengths and weaknesses as a starting point, the professionals involved with the child can formulate an intervention to assist him or her in the best way possible, or implement teaching strategies better suited to the child's style of learning.

2.3 Chapter Overview

This chapter reviewed Attention Deficit Hyperactivity Disorder, from its terminology to its subtypes, etiology, prevalence and course, as well as its co-morbidity with other disorders. The typical developmental picture of a child with ADHD was described, as well as the main approaches used to treat the disorder. The professionals involved in the treatment of ADHD in the early years were briefly introduced. Finally, the topic of ADHD and the schooling system in South Africa was discussed, including the demands of the current schooling system on children with ADHD. The following chapter will look at early child development and the education of children in these early years.

CHAPTER THREE: EARLY CHILD DEVELOPMENT AND EDUCATION

3.1 Introduction

Whilst the previous chapter focused specifically on ADHD, this chapter broadens the focus to the holistic development of young children, specifically those in the pre-school and foundation phase of their education. The developmental path for normal children, as well as the developmental path followed by a child with ADHD, will be explored. For the sake of clarity, this exploration will take place in separate domains, namely, the cognitive, personal-social and emotional domains. However, development within one these domains affects and is affected by concurrent development in other domains. The developmental process therefore needs to be viewed holistically. The concept of developmental assessment will also be discussed, followed by a brief description of the developmental measures frequently used to assess young children.

3.2 Early Child Development

Human development has been defined by Mussen, Conger, Kagan and Huston (1984) as the 'orderly and relatively enduring changes over time in physical and neurological structures, thought processes, and behaviour of people' (p. 4). There are many reasons to study human development. One reason is to understand changes that appear to be universal (Mussen et al., 1984). Explaining individual differences among children and understanding how their behaviour is influenced by the context or situation in which they live are further reasons. Another important reason to study human development is the early identification of possible developmental delays (Kotras, 2002; Mussen et al., 1984; Schröder, 2004). With the early identification of developmental

delays, treatment regimes may be timeously implemented to address the identified defects (Griffiths, 1984; Schröder, 2004). Snow (1998) described developmental assessment, a means by which information is obtained about the abilities of the infant or child, as a process comprising certain steps. These steps of the assessment process will be more thoroughly discussed under the section on developmental assessment.

The development of the young child is never static, as development takes place continuously as the child interacts with his/her environment (Kotras, 2002). Biological, psychological and socio-cultural forces all play a role in the development of the young child, and these formative years lay the foundation for what a child will become. Developmental problems, which are first evident in infancy or early childhood, interfere with the future development of the child and may cause a lifetime of lowered, untapped potential (Schröder, 2004). It is for this reason that most professionals feel that the early identification of problems and early implementation of interventions are crucial, and enhance the child's chances for social, communicative and academic development (Calderon, 1999). Developmental assessment to detect problems should be holistic, and should focus on all domains of a child's development.

3.3 Developmental Domains

Hook (2002) conceptualised development as occurring within three broad domains, namely: a) physical; b) cognitive; and c) psychosocial (Hook, 2002). These areas of development are interrelated, as they influence and are influenced by one another. It was also with these domains in mind that Ruth Griffiths developed the Griffiths Scales of Mental Development (GSMD), which assess a child's development

across the motor, cognitive, social and emotional domains (Griffiths, 1970). Understanding the development of young children in these specific domains assists in the interpretation of test results, and in the understanding of children's general behaviour and functioning. However, whilst these domains will be divided up in the sections that follow, it is important to remember that development across these domains is interactive and cannot in reality be separated.

3.3.1 Physical and Motor Development

Early physical and motor development follows a predictable pattern in terms of the age at which an infant sits, crawls and can walk unaided. Early child development is characterised by a more stable, slow increase in height, weight and muscle tone, than is seen in the rapid growth during the first year-and-a-half of life (Craig, 1996; Trawick-Smith, 2000). The pre-school years are characterised by dramatic changes in the development of gross motor skills. 'Gross motor skills' refer to capabilities involving large body movements such as running, jumping and throwing. Fine motor skills, on the other hand, involve the refined use of hands, fingers and thumb, and these skills tend to develop more slowly as neuromuscular mechanisms mature (Craig, 1996).

It has been found that boys tend to be more competent with gross motor skills than girls, as they lose baby fat and acquire muscle tone more quickly than girls do. Girls, in turn, are more competent than boys at fine motor activities during this period, owing to the accelerated development of the areas in the brain responsible for perceptual-motor abilities (Santrock, 2001). By the age of seven, gross motor skills acquired by normal children include the following. They are able to: a) walk up and down

stairs and climb ladders alternating their feet; b) balance; c) run with both feet leaving the ground; d) stop or change direction quickly whilst running; e) hop on one foot for ten or more repetitions; f) ride tricycles with pedals; g) throw and kick objects using whole body effectively; and h) swing unaided on a swing. Lateralisation is fully established and the child's preferences for using one hand and foot over the other are noticeable (Trawick-Smith, 2000).

Fine motor skills acquired by normal children by the age of seven include the ability to: a) eat competently with a knife and spoon; b) dress and undress independently; c) work zips and buttons; d) finger paint; e) cut with scissors; f) manipulate small objects such as puzzle pieces with accuracy; g) grasp a pencil with the thumb and forefinger; h) create representational drawings of people; and i) the ability to write primitive letters or their own name (Trawick-Smith, 2000).

Whilst children with ADHD are often hyperactive and may display motor skills beyond their developmental age, they are often clumsy as well. This results in their struggling with more refined gross motor movements and especially with fine motor skills and manipulation of small objects. A lack of ability to sustain attention at a task that is not continuously stimulating or rewarding may also cause children with ADHD to find activities such as drawing difficult, with the result that they tend to avoid such activities. These children often have poor fine motor development and perceptual spatial difficulties, which discourage them from participating in these activities, which for them, are challenging rather than enjoyable. This may lead to delays in fine motor skill development, as these skills are not practised very often.

3.3.2 Cognitive Development

Cognitive processes are a broad category of development, and refer to the processes involved in attention, memory, planning and language. Once again, these processes are mutually dependent with regard to their development, with milestones accomplished in one area paving the way for progress in another.

3.3.2.1 A Neuropsychological View of Cognitive Processes in Early Childhood

According to Luria (1966; 1973; 1980), human cognitive processing involves three functional systems or units, namely: a) the arousal and attention unit; b) the information coding unit; and c) the planning unit. Luria's perception is that these units operate in a highly interrelated manner, and that their co-ordinated cooperation is vital for all forms of complex cognitive functioning or behaviour. The PASS (Planning, Attention, Simultaneous and Successive Processing) model developed by Kirby and Das (1989) and Naglieri and Das (1987; 1988) succinctly describes the cognitive processes identified in Luria's (1966; 1973; 1980) theory. These processes are elaborated on below.

a) Attention

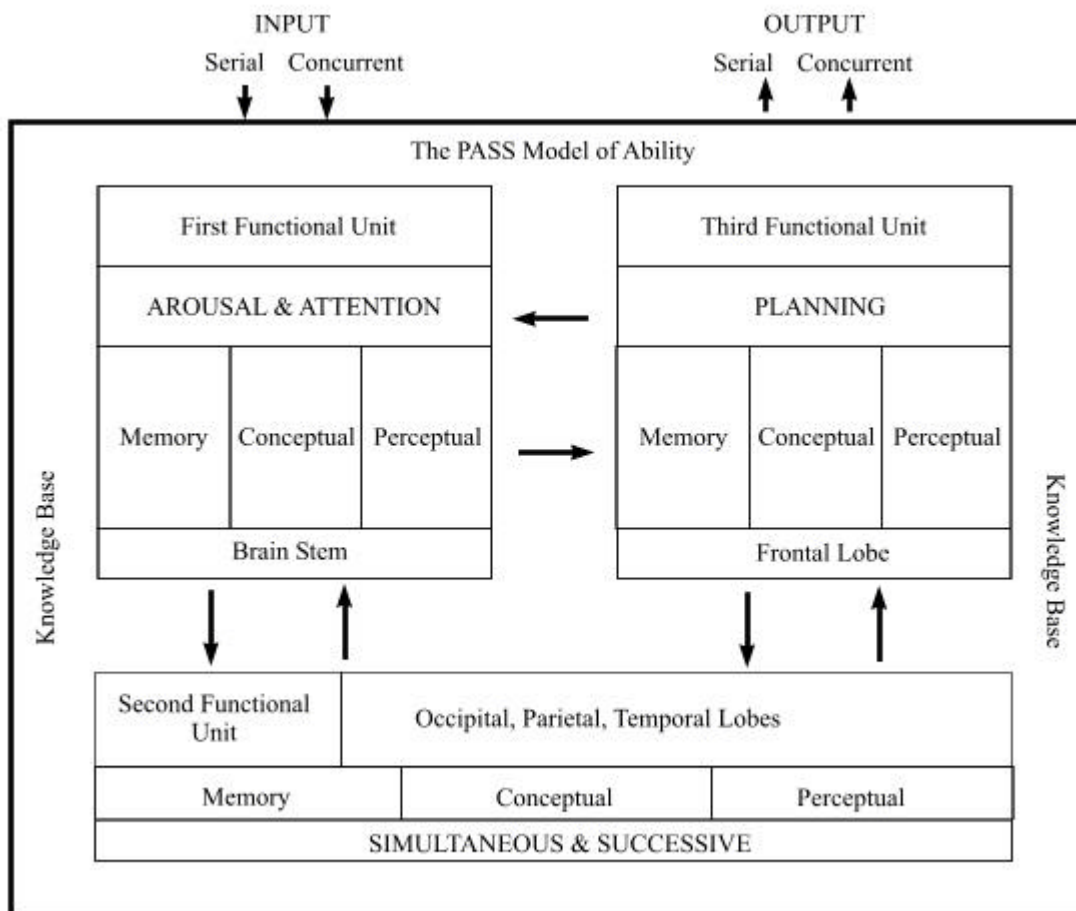
The first step in the processing of information is for sensory input to be registered in the cortex. For this to occur, an appropriate level of arousal and attention must be maintained. Furthermore, sustained attention, which refers to specifically directed arousal, is vital for the effective processing of information and for formulating competent plans of action (Luria, 1966; 1973; 1980).

b) Information Coding (Simultaneous and Successive Processing)

Once input from the senses has reached the cortex, this information needs to be coded. Information coding entails the processing of the sensory input into units of information that can be stored and related to previously learned knowledge. Two modes of information processing exist, namely; simultaneous and successive processing. Simultaneous processing organises input relationally by synthesising separate units of information into simultaneous groups so that each element is related to every other one. Successive processing integrates discrete information into a temporally organised linear series (Luria, 1966; 1973; 1980).

c) Planning

Planning involves higher order cognitive functioning. Based on the information that has been coded, a plan of action must be generated. Before this plan of action can be carried out, it must be modulated and regulated to maximise the possibility of attaining its aims. Finally, after the action has ensued, feedback regarding its success is important, so that a modified plan may be applied to a similar problem in the future, if necessary (Luria, 1966; 1973; 1980). The following diagram illustrates the above description.

Figure 1: The PASS Model of Ability

(From: Kirby et. al. 1989, p. 52)

The three functional units proposed by Luria (1973) are dynamic and interactive. They respond to the experiences of the individual and are subject to developmental changes, and whilst the units are physiologically and functionally distinct, they form an interrelated system. In addition, the units rely on and influence the individual's base of knowledge which has been accumulated from prior learning. All information passes through this base of knowledge before processing can occur. A 'knowledge base' refers to all the information an individual has available at the time of processing, which includes

information just received, as well as past knowledge or memory. Effective processing is accomplished through the integration of knowledge with planning, attention, and simultaneous and successive processes, as demanded by the particular task to be accomplished (Luria, 1973).

3.3.2.2 Cognitive Processes in Early Childhood

Piaget (1977), a prominent cognitive developmental theorist, conceptualised these early years as a transitional period in cognitive development. In the early thought processes of infancy, cognitive processes are tied to the immediate, concrete world. Piaget found that subsequent to this, the early childhood years are characterised by an ability to think beyond objects and people that are in the immediate environment, and an ability to reflect on things that cannot necessarily be seen, heard, touched or acted upon. Young children are able to imagine objects or people not present, contemplate future events, and recall past ones. However, their reasoning is still hampered by mental limitations, the most pronounced being a reliance on perception and action (Trawick-Smith, 2000). Piaget called this cognitive stage 'preoperational thought'. As the participants in the present study fell into this age range, this particular cognitive stage will be the primary focus. This stage lasts from approximately 2 to 7 years, and is highlighted by an increasing use of symbols, symbolic play and language, which provides the mind with greater flexibility (Craig, 1996).

Children in the preoperational stage of thinking are limited by five important characteristics. Firstly, their thinking is concrete, or confined to the here and now, and physical as opposed to abstract things. Secondly, their thinking is irreversible and they

tend to perceive events as occurring in one direction. Thirdly, their thought is egocentric, as they focus on their own perception and cannot take another person's point of view into account. Fourthly, children in this stage tend to be centred on a single, particular aspect of an object or situation. Lastly, they focus on and judge things according to present appearances, not on how they evolved to be that way. It is important to note that whilst Piaget's views are widely accepted and acknowledged, they have received some criticisms. One such criticism is that children have been found to be cognitively more advanced for their age than Piaget originally proposed (Louw, van Ede & Louw, 1998). In addition, Louw, van Ede and Louw, (1998) have disagreed with Piaget's idea regarding cognitive development taking place in clearly defined stages stages.

Whereas Piaget viewed children as solitary figures involved in constructing knowledge, other theorists have conceptualised cognitive development differently. Vygotsky (1962) believed that a child's social environment plays a pivotal role in his/her cognitive development and moulds the child's ever-increasing knowledge according to wider culture (Keenan, 2002). Vygotsky's concept of the zone of proximal development (ZPD) suggests that children develop through participation in activities which are slightly beyond their level of competence, with the assistance of more skilled individuals. Vygotsky (1962) used the ZPD to refer to the difference between the child's actual developmental level and his/her potential level when guided by adults or peers.

In keeping with his emphasis on the role the environment plays in the development of cognitive skills, Vygotsky (1962) believed play to be a primary means of promoting more advanced levels of social and cognitive skills. He believed that pretend play stimulates development by assisting children to understand that objects can be

separated from their normal referents and can symbolise other things. Play also helps children to learn about the social norms expected of them. Play is thus an important context in which children learn about the social world (Keenan, 2002). When thought processes are stimulated and the environment is conducive to cognitive development, children will experience growth in their information processing abilities.

In accordance with Luria's (1966; 1973; 1980) three functional units and the PASS model, ADHD may be viewed as a deficit specifically, if not predominantly, in the arousal and attention unit. Logically, it follows that if a child experiences problems with arousal, and attending to sensory input, inadequate information will be available for coding (be it simultaneous or successive), which will result in poor plans being made. Thus a deficit in one unit has consequences for all resulting cognitive processing. A study by Reardon and Naglieri (1989) which examined the effects of ADHD according to the PASS model, found deficiencies in children with ADHD on attention tasks, as well as planning and successive processing tasks. Thus, the ADHD group tested evidenced substantial cognitive deficits in three of the four processes.

3.3.3 Language Development

Early childhood is a crucial time for the development of language skills. On average, children demonstrate comprehension of single words between 8 and 10 months of age (Schröder, 2004). Children learn language from the moment they are born through interactions with people who talk to them. During these early years, language is easily learned if it is consistently used by significant others in communicating with the child.

By the age of 5, a child talks in sentences of ten or more syllables, has mastered the basic grammar of his/her culture, can use pronouns correctly, and has a vocabulary consisting of about 2000 words (Hurlock, 1981). Early childhood is thus a time where rapid expansion in children's vocabularies takes place. Craig (1996) stated that this is also the time that children expand their use of grammatical form, and come to understand language as a social act. The child takes the listener into consideration and directs language towards others (Hurlock, 1981). Between the ages of 5 and 7, the child learns to use language to plan activities with others and to co-ordinate group activities. Conversational skills become refined, vocabulary increases, and grammar and syntax become more complex (Hurlock, 1981).

3.3.4 Social-Emotional Development

Craig (1996) maintains that early childhood is a formative period for the development of positive feelings towards oneself, others, and the world in general. If children are nurtured, accepted and encouraged during this time by those around them, both adults and peers, they will tend towards emotional health, whereas if these early years are a time of neglect or abuse, social difficulties and mental health problems may arise. A prominent theorist in the area of emotional development is Erik Erikson, whose work has been widely accepted and used to guide teachers and mental health professionals for many years. Erikson (1965) believed that humans need to develop through eight stages of emotional growth if they are to feel self-fulfilled and competent.

At each developmental stage there is an emotional struggle between two polar internal states, one negative and one positive (Erikson, 1965).

According to Erikson (1965), the key emotional struggle that characterises the pre-school years is the struggle for initiative versus guilt. Children who have previously developed a healthy and strong sense of autonomy will wish to take action and be assertive. They will wish to create, invent, pretend, take risks and engage in lively and imaginative activities with their peers. When these activities are encouraged by important adults who are not overly critical or restrictive, a child's sense of initiative will grow. On the other hand, if children are overly criticised or restricted, they will see these activities as wrong and will develop a sense of guilt. Erikson believed that although guilt may at times play a positive role in development, in terms of encouraging children to assume responsibility for their behaviour, excess feelings of guilt may inhibit emotional growth.

3.3.4.1 Social Development

'Social development' refers to the acquisition of the ability to behave in accordance with social expectations. Three separate processes are involved in becoming socialised, namely: a) learning to behave in socially approved ways; b) playing approved social roles; and c) the development of social roles (Hurlock, 1981). Even though these stages are distinct, they are closely interrelated, and therefore failing in one of them will lower the child's level of socialisation. Since social or unsocial patterns of behaviour are established during childhood years, early social experiences will largely determine what sort of adult the child will become (Hurlock, 1981). Predominantly happy experiences encourage the child to become a social person, whilst unhappy experiences are likely to lead to unwholesome attitudes toward society and people in general (Hurlock, 1981).

From the age of 3, children begin to learn how to make social contacts and how to get along with people outside of the family home, especially with children of their own age. They learn to adapt to others and how to cooperate in play activities. They understand the need for rules in games as well. By the age of 7, the child is more confident and independent and moves away from adult dependence. Children of this age can also play alone for a long period of time and are aware of socially acceptable behaviours and manners (Hurlock, 1981).

3.3.4.2 Emotional Development

As mentioned above, children go through key emotional struggles and stages at various ages. At the age of 5, children are usually fairly independent and can cope with some challenges, although they need praise in order to do so. They have self-confidence and a desire to perform and learn new skills. They are sensible and friendly, and have good control over their emotions. The range of emotions include tenderness, sympathy, guilt and sensitivity towards others' feelings (Hurlock, 1981). At the age of 6 children tend to be less emotionally stable than at 5. They may be hesitant, indecisive or frightened at times, more dependent on adults for guidance and direction, and they tend to experience more extremes in mood than 5-year-old children do, and find it more difficult to accept frustration and failure (Hurlock, 1981). However, by the age of 7, children regain their sense of emotional stability and are able to be more independent and spend short periods of time alone. Their personality development is quite well established and they have a growing sense of what is right and wrong. They tend, however, to be poor losers in games, and to be more self-critical and fearful in new situations (Hurlock, 1981).

Children with ADHD tend to be socially inept. The hyperactivity and impulsivity which characterise the disorder often lead to children with ADHD being shunned by their peers, as they blurt out whatever is on their minds without thinking, are disruptive in games, clumsy, and sometimes bossy and overbearing. The distractibility aspect of the disorder may make academic group work difficult for the child with ADHD. This results in the child with ADHD being shunned by his/her peers in the classroom as well as on the playground. These social difficulties are likely to lead to emotional problems for the child with ADHD. He or she is likely to experience disapproval, reprimands and even rejection. This, in turn, negatively affects the child's self-esteem, which may result in the child with ADHD losing confidence in him or herself, and becoming despondent or depressed.

3.4 Developmental Assessment

McReynold (1968) defined assessment as 'the systematic use of a variety of special techniques in order to better understand a given individual, group or psychological ecology' (p. 2). This definition emphasises that there is more to assessment than psychological tests alone. Assessment encompasses a comprehensive psychological investigation into one's abilities. Developmental assessment assesses whether or not a child is performing at an age-appropriate level. Developmental assessment, for the purpose of this study, therefore refers to a comprehensive psychological investigation of a child's abilities. This includes an investigation of his/her motor, personal-social and cognitive (including language, memory, reasoning and problem-solving) abilities by means of direct observation, psychological tests, medical reports and biographical information.

Holt (1979) comprehensively summarised the necessity for assessment in childhood as follows: 'Any child who is suspected of having a congenital defect or deformity, a medical disorder, an impediment to educational progress or social activities or any deficiency of opportunities, is a potentially handicapped child and should be assessed' (p.151).

He added that "Handicap is not a medical, educational or social problem to be treated, trained or counselled, but it is a burden which is impeding a child's development. Our task is to ease this burden and so promote the development of the person. Comprehensive assessment is the cornerstone of this work' (p.161).

Therefore the developmental assessment of infants and young children is crucial in the early identification of any possible disabilities. Information gained via assessment serves both as a tool for correct diagnosis of the disability, and in assisting in the construction of appropriate intervention programmes to address the backlogs in development that may have occurred, and to ensure that the child is able to function at an age-appropriate level (Alridge-Smith, Bidder, Gardner & Gray, 1980; Griffiths, 1984). Contemporary research provides evidence that early identification and early implementation of intervention enhance a child's social, communicative and academic development (Calderon, 1999). Alternatively, leaving children with special needs or developmental delays unattended may exacerbate original disabilities and elicit secondary disabilities such as emotional, social and cognitive problems (Lister, 1981).

Using official assessment measures to explore child development is vital, as structured assessment aids the evaluative process. Meisels (1996) stated that data gained from such assessment can be used in various ways including: a) identification; b) screening; c) in-depth assessment; d) programmes and intervention; and e) evaluation. These constructs are expanded upon below.

Identification

'Identification' refers to the process of locating infants, toddlers, pre-schoolers and their families, who might be in need of assistance through early intervention (Wilderstrom, Mowder & Sandall, 1997). Identification involves a variety of activities relating to defining the target population, increasing public awareness of services, encouraging referrals, and canvassing the community for children and facilities who may be in need of services (Peterson, 1997).

Screening

Screening allows for many children to be assessed in a group, in order to identify those who may require a more comprehensive assessment. Brooks-Gunn (1990) regarded the following to be requisite characteristics of screening measures:

- a) The test should be short.
- b) It should be designed in such a manner as to allow for its use in post-natal clinics, paediatricians' offices, outpatient hospital clinics, and community health services.
- c) Various professionals should be able to administer the test with a minimal amount of training.

- d) The test should be tailored to the constraints of busy clinical practice, in order to ensure its proper implementation.
- e) The test should be so constructed as to discourage personnel from administering only parts of the test (as this will reduce the test's validity and reliability).
- f) Scoring systems should be simple and not time-consuming.
- g) The test should minimise the number of false negatives (suspect children placed in a non-suspect group), as children will not be retested.

During the screening stage of the assessment process, the child's skills are examined, to provide a widespread representation of his/her overall functioning. Screening sifts out indications of developmental concerns, through analysing patterns of peaks and lows, and identifies areas that require closer examination (Bondurant-Utz & Luciano, 1994).

In-depth Assessment

Conversely, in-depth assessment or diagnosis involves a comprehensive assessment to verify or identify the existence, severity and nature of a disability or developmental delay, so that appropriate interventions can be planned (Bondurant-Utz & Luciano, 1994). Wilderstrom, Mowder and Sandall (1997) describe diagnosis as the determination of the cause of a delay or disorder, in order to prescribe treatment that will result in a cure. During the screening stage of assessment, the cause of a developmental problem is difficult to determine or still unknown, and appropriate interventions, which are based on the cause, cannot be planned. On the other hand, in-depth assessment provides more detail, that can be employed for diagnostic and

intervention purposes. According to Bondurant-Utz and Luciano (1994), in-depth assessment should include:

- a) A detailed and comprehensive analysis of child-developmental abilities that determines the goal of the interventions.
- b) A product or score, and more importantly, qualitative information regarding the child's approach to achieving that score.
- c) A synopsis of strengths and weaknesses with recommendations regarding the best way in which a child learns.
- d) An analysis of the child's development, focussing on the problem areas which were identified during the screening stage, as well as the factors influencing the developmental areas which require intervention.

Programmes and Intervention

The process of programming and intervention involves determining the intervention objectives and outcomes, as well as identifying appropriate and effective intervention strategies, to provide support and services required by the child (Wilderstrom, Mowder & Sandall, 1997). Treatment options may include planning individualised activities, providing practical guidelines to parents, making appropriate referrals to other professionals, and planning adaptive strategies for teaching (Barnard, 2000).

Evaluation

In order to conform to best practices, it is imperative, as part of the assessment process, to continuously determine the effectiveness of the intervention activities and

strategies, and to monitor the child's progress. Regardless of the widely supported notion of multiple methods to collect data in the in-depth assessment process, the importance of official and standardised assessment instruments cannot be neglected. 'Standardisation' refers to the uniformity of the procedure in administering and scoring the test, thereby allowing for meaningful comparisons of children (Anastasi, 1982). If the measures which are used are not standardised for the group on which they are applied, are not appropriate for the context, are not reliable and valid, and are not relevant for the problem that is being explored, the positive aspects of official testing can be outweighed by the disadvantages. It is therefore necessary to continuously evaluate the use, contemporarity and statistical properties of clinical instruments that are currently being employed both nationally and internationally (Barnard, 2000).

3.4.1 Issues Surrounding Assessment Measures

When psychological tests are used as part of an assessment, it is imperative to ensure that the measures being used to make decisions and interpretations are comprehensive, reliable and valid, as an unreliable or invalid measure will not add any additional information regarding developmental milestones (Kotras, 2002). Barnard (2000) also cautioned against using measures with norms that are not valid for the population one is assessing or for contemporary society, as norms become outdated.

South Africa consists of various cultural groups and by virtue of the country's past political history, the socio-cultural and educational system for each group has been developed independently from each other, leading to cultural and educational discrepancies between the various population groups (Kotras, 1998). Utilising

instruments which have neither been developed nor standardised in a particular culture can prove to be biased, and thus have long-term implications for the individual being assessed (Kotras, 1998).

It has consistently been found that an individual's cultural group has an influence on test performance (Allan, 1988, 1992; Heimes, 1983; Mothuloe, 1990; Tukulu, 1996). It is generally accepted that there is no such thing as a 'culture-free' test or task, as psychological tests are samples of behaviour which are affected by the cultural milieu in which the individual is reared (Jansen, 1991). A more realistic approach to developing a culture-free test is to develop a test with content that is based on experiences which are common across cultures and is thus 'culture-fair'.

Since constructing new tests for every cultural group in South Africa is impractical, it seems appropriate to take an existing culture-fair test and adapt it for use in all the South African population groups. It is in this regard that the Griffiths Scales play an important role (Schröder, 2004). Though the Scales were developed and standardised in Britain, the test was developed by observing children in their natural environments whilst walking, talking and playing. This neutralises the possible effect of cultural influences on the test, as it was based on activities common to most, if not all, cultures. Research has shown that culture is not a crucial variable which affects performance on the Griffiths Scales, and that other variables, for example socioeconomic status, play a much larger role in test performance (Knoesen, 2003).

In addition, the instrument is used and researched world-wide (Allan, 1992). It has also been used in Third World societies such as Columbia (Cobos, Rodrigues, & De Venegas, 1971) Another positive reason for using the Griffiths Scales in a multicultural context is that the guidelines for test administration are not rigid, and the tester demonstrates a number of the items, making the testing process more understandable to children with limited experience with psychometric assessment. The language component of the Griffiths Scales is also smaller than that of some other psychometric measures, which enables the tester to assess aspects of a child's development without having to rely on proficient verbal skills.

It is important for members of diverse cultures to have access to appropriate assessment instruments, and similarly, children with various disabilities and clinical diagnoses also need to be assessed on a suitable, contemporaneous measure. The Griffiths Scales of Mental Development (GSMD) is one of the few measures that can be used across various South African populations with confidence (Bhamjee, 1991; Knoesen, 2003; Kotras, 2002; Schröder, 2004). With the revision of the GSMD, it is important to collect data on clinical populations in order to assess the utility of the GMDS-ER on these populations. The present study aims to explore the typical developmental profile of children with ADHD on the GMDS-ER.

3.4.2 Overview of Assessment Instruments for Young Children

Knoesen (2003) outlined many of the shortcomings in assessment measures used with children and emphasised the urgent need to find an assessment measure that is able to accurately identify the strengths and weaknesses in young children so as to

predict future scholastic performance. Some of the shortcomings of existing measures outlined by Knoesen (2003) include the following:

- a) Existing developmental measures are not comprehensive enough and exclude aspects of development (e.g., screening measures).
- b) Certain tests are standardised for specific ethnic groups to the exclusion of others, with only a limited number of tests available to assess the development of Black pre-school children.
- c) Certain psychometric tests are standardised for specific age groups to the exclusion of others.

The following section will provide a brief overview of the various psychological measures used in South Africa on young children. As the focus of this study is on the GSMD, it will be discussed in more depth in Chapter 4.

3.4.2.1 Weschler Intelligence Scale for Children (WISC)

The Weschler Intelligence Scale for Children was developed in 1949 and was replaced by a standardised version known as the Weschler Intelligence Scale for Children-Revised (WISC-R) in 1974 (Weschler, 1974). The WISC-R assesses the cognitive and intellectual abilities in children aged 5 to 15 years old. The Weschler Scales changed from being an age-linked scale of intelligence to a point scale. Despite the fact that the WISC-R is said to be technically superior in terms of its construction procedures and reliability, validity studies have been insufficient and inconclusive (Anastasi, 1982). Recently the WISC-R has undergone another revision and has been replaced with the WISC-III. The WISC-III is a useful instrument as it enables the comparison of verbal and

non-verbal ability. The revision process aimed to improve the contemporaneous nature of the norms as well as updating the content coverage.

3.4.2.2 Weschler Pre-school and Primary Scale of Intelligence Revised (WPPSI-R)

The WPPSI-R was constructed as an extension of the WISC in 1989 (Weschler, 1967; 1974). It is suitable for use with children between the ages of 4 years to 6 years and 7 months. The twelve subtests are grouped into a verbal and performance scale. Though fairly easy to administer with its simple administration procedure, the WPPSI-R has been criticised for its inability to estimate the IQ of severely retarded children, as well as ethnic minority children from low socioeconomic backgrounds (Groth-Marant, 1984).

3.4.2.3 McCarthy Scales of Children's Abilities (McCarthy Scales)

The McCarthy Scales are an individually administered intelligence test. The McCarthy Scales were published in 1972 to assess the cognitive development and motor skills of children between the age of 2 years 6 months and 8 years 6 months. The test consists of 18 tests which are grouped into six subscales, and include a verbal, perceptual performance, quantitative, general cognitive, memory, and motor subscale. The General Cognitive Index (GCI), based on 15 of the 18 subtests, indicates the child's level of functioning at the time of assessment.

Anastasi (1982) regards the scales as a well constructed, psychometrically sound instrument. However, Nutall, Romero and Kalesnik (1992) caution that the McCarthy Scales are not appropriate for use with children who are mentally retarded,

gifted, or younger than 5 years old because of its inadequate floor and low ceiling levels. The McCarthy Scales have also been adapted for use in South Africa, and normative information is available for certain groups of children (Foxcroft & Roodt, 2001).

3.4.2.4 The Junior South African Individual Scales (JSAIS)

The JSAIS was developed in 1979 for White South African children between the ages of 3 years and 7 years 11 months (Madge, 1981). It was developed at a time when separate measures were developed and used for the different population groups in South Africa. The main objective of the battery is two-fold, namely, a) to establish the general intellectual level of children between the ages of 3 years and 7 years 11 months, and b) to evaluate a child's relatively strong and weak areas of functioning (Madge, 1981). The complete test consists of 22 subtests, of which 12 constitute the General Intelligence Quotient (GIQ). In addition, the test yields a Verbal (VIQ Scale) and Performance (PIQ Scale) Intelligence Scale. The usefulness of these scales is ascribed to the assessment of a wide spectrum of abilities from which the child's general intellectual level is obtained.

Swart (1987) adapted and standardised the JSAIS for use with Asian children. In addition, norms for Coloured children between the ages of 6 years and 7 years 11 months were also published (Robinson, 1989). However, the JSAIS has been criticised for, amongst other things, a lack of appropriate norms. Van der Berg (1987) argued that Black children may be included in the norm population only once parallel forms of the test have been developed for South African Black languages. Thus, the major limitations of the JSAIS are its lack of norms for the South African population, as well as the fact

that the test is language-loaded and not always a true reflection of overall cognitive ability.

3.4.2.5 The Griffiths Scales of Mental Development (GSMD)

The original Griffiths Scales were developed for use with infants from birth to 2 years of age. The Scales comprised five Scales measuring locomotor development, personal-social adjustment, hearing and speech, hand and eye co-ordination and performance. In 1970 the Griffiths Extended Scales were published to cater for children between the ages of 3 and 8 years of age (Griffiths, 1970; 1984). The Extended Scales also included a sixth scale which measures practical reasoning abilities. Recently, the Extended Griffiths Scales have been revised in order to make the items more contemporary. As the focus of the present study is on the GMDS-ER, it will be discussed in more depth in Chapter 4.

3.7 Chapter Overview

This chapter focussed on the holistic development of young children in the foundation phase of their education. In addition, the impact of ADHD on this developmental path was explored. Various psychometric measures used to assess child development were introduced and discussed. The following chapter discusses the GMDS-ER at length, as it was the measure of choice used in the present study.

CHAPTER FOUR: GRIFFITHS SCALES OF MENTAL DEVELOPMENT

4.1 Introduction

This chapter provides an overview of the measuring instrument employed in the present study, namely, the Griffiths Mental Development Scales – Extended Revised (GMDS – ER). The development and content of the original Scales will be explored, followed by a section on the administration, scoring and interpretation of performance on the Scales. The standardisation of the original Scales will be outlined, and a brief overview of the research studies conducted on the original Scales will be included. This will be followed by a description of the revision and standardisation processes that the Revised Scales underwent following a decision to revise the original Scales in order to make them more contemporaneous.

4.2 Background to the Griffiths Scales of Mental Development (GSMD)

The concept of ‘developmental assessment’ is synonymous with the name Ruth Griffiths (Allan, 1992), and to date, Griffiths continues to be one of the pioneers of the psychology of early child development in the United Kingdom. Ruth Griffiths developed the Scales in 1954, to assess the development of children from birth to 2 years of age (Griffiths, 1954; 1970; 1986). The Griffiths Infant Scales are still regarded as one of the most carefully constructed infant Scales and one of the best-known tests developed in England (Thomas, 1970).

Griffiths (1970; 1984) adhered to the following five criteria/guidelines when developing the Griffiths Scales:

- a) The development of the Scales was based on detailed systematic observation of children in the United Kingdom. Children were observed in their natural environments – at home, at play, in the streets, on trains and buses and in school playgrounds – and their behaviour was recorded. From these formal and incidental observations, material for the test items emerged.
- b) Previous existing test methods and tests were taken into account and items from relevant tests were included in the Griffiths Scales.
- c) The Scales had to fulfil stringent statistical requirements in terms of reliability and validity.
- d) The Scales took the special needs of both disabled and normal children into account.
- e) The Scales were based on a study of: (i) trends that appeared significant for mental growth; and (ii) the origins and interrelations amongst the basic avenues of learning, namely, physiological or locomotor, eye and hand, voice and hearing, which are influenced by environmental factors and social factors (Griffiths, 1984, p. 5).

4.3 Description of the Griffiths Scales

The Griffiths Infant Scales consisted of five subscales, namely, the Locomotor (A), Personal-Social (B), Hearing and Speech (C), Eye and Hand Co-ordination (D), and Performance (E) Subscales. Griffiths received numerous requests for the extension of the Infant Scales for use in clinical practice with older children. In order to meet this need, the Subscales were expanded during the 1960s to cover ages from birth to 8

years 4 months (Griffiths, 1970). In addition, a sixth subscale, namely Practical Reasoning (F) was added to the extended Griffiths Scales for use with children aged 2 years and older, in order to provide more comprehensive coverage of the young child's emerging problem-solving and practical reasoning skills (Griffiths, 1970). The construction of this extra subscale resulted in the development of the Griffiths Extended Scales.

Whilst most developmental tests focus on the cognitive development of the child, the GSMD provides a comprehensive developmental profile. According to Brooks-Gunn (1990), the items are diverse and tap the main aspects of a child's development, namely, physical, cognitive, social, and emotional. It is a norm-referenced test, and the items are placed in order of gradually increasing difficulty (Griffiths, 1984). Many of the items are based on natural activities such as walking, talking, and playing.

Because the Griffiths Scales are constructed according to universal activities, they may be seen as potentially 'culture-fair'. Gregory (2000) notes that tests are never accurate samples of innate intelligence or culture-free knowledge. He maintains that all knowledge is based on culture and is acquired over time, and that there is no such thing as a culture-free test. A culture-fair test, on the other hand, is one that poses questions or problems that are equally familiar (or unfamiliar) to all cultures (Gregory, 2000). Although in the real world this may also be difficult to achieve, because the meaning of a test and assessment may differ amongst cultures, it is a more realistic ideal than that of a culture-free test. Worldwide research into the Griffiths Scales since the 1970s, as well as its adaptation for use in several countries, strengthens the view that the Scales are 'culture-fair'.

Griffiths (1970) stated that each of the subscales was devised to be a separate and complete scale in itself. In practice, this means that any one process of development may be measured independently and comprehensively. The six subscales are equal in difficulty at each age level, and together comprise a General Quotient (GQ). A histogram is used to plot a child's performance across the subscales, which allows his/her performance to be compared to the norm. This developmental profile demonstrates the child's range of abilities and relative disabilities and allows for a comparison of these at different times. The resulting mental age is compared against the child's chronological age in order to identify possible strengths and/or weaknesses. A brief description of the subscales follows.

a) Locomotor Subscale (A)

This subscale allows the examiner to assess the child's gross motor skills including his/her ability to balance, and to co-ordinate and control movements (Luiz, Barnard, Knoesen, Kotras, McAlinden & O'Connell, 2004). It also provides the opportunity to observe certain physical weaknesses or disabilities, or more definite inadequacies of movement. Items include walking up and down stairs, hopping, throwing and kicking a ball, and jumping over a rope. The items challenge a child's regular physical strength, skill in speed and movement, rhythm, and poise at a level compatible with the child's age. The ability to focus and concentrate on the task, as well as the emotional determination to succeed, further influence a child's performance.

b) Personal-Social Subscale (B)

This subscale assesses the child's proficiency in the activities of daily living, his/her level of independence, and the ability to interact with other children (Luiz et al., 2004). At a level which corresponds with the child's age, a degree of self-help is

required from the child in terms of personal cleanliness, efficiency at the dinner table, the ability to wash his/her hands and face, to dress and undress and the like. Information such as the child's name, home address and surname, can be gleaned through a casual conversation with the child. A degree of social interaction is also necessary from the child, as is cooperation in play with other children. Whilst emotional factors affect performance on all subscales, they affect this subscale in particular. Griffiths (1984) stated that the overprotected child and the neglected child usually do rather poorly on this subscale. However, sometimes scores on this subscale have been found to be elevated. This may be because parents are asked to assist in answering questions about their child on this subscale, and they may be inclined to present their child in a more positive light than is accurate.

c) Hearing and Speech Subscale (C)

This subscale is considered to be the most intellectual of all the subscales. It assesses the development of both receptive and expressive language. This subscale necessitates the comprehension of language, as well as specific verbal expressive skills in terms of vocabulary, the use of different parts of speech, the use of sentences and paragraphs, and the use of auditory memory. Items include the naming of colours, the naming of similarities and opposites, the repetition of sentences with a varying number of syllables, and the naming of stimulus picture cards. With older children, the gradual enhancement of expressive vocabulary, the use of different parts of speech, and learning to use sentences and to develop paragraphs of description in relation to pictures is assessed. Relatively poor performance on this subscale is a possible indicator of speech and/or language deficits, a possible hearing loss, or environmental deprivation, as these tend to have a negative impact on children's cognitive development.

d) Eye and Hand Co-ordination Subscale (D)

This subscale assesses the child's fine motor skills, manual dexterity, and visual perception skills. This subscale is thus comprised of items relating to eye co-ordination and perceptual ability. The child is required to demonstrate co-ordination between the hands and eyes, accuracy, and persistence at a task. Items include the threading of beads, both formal and informal drawings, writing and using scissors to cut paper. From the child's drawings, one can also obtain information about his/her emotional state, as well as his/her conception of space and form relations.

e) The Performance Subscale (E)

This subscale assesses a child's skills in manipulation, speed and precision of work requiring manual manipulation within time limits. Spatial perception and visual perceptual abilities are required for completion of the tasks. Items correspond with those on the Eye and Hand Co-ordination Subscale, as a certain degree of manual performance is required of the child. Items on this subscale include building stairs and bridges with blocks, the use of form-boards, and pattern making – such as threading beads according to a prescribed pattern.

f) Practical Reasoning Subscale (F)

This subscale is only introduced to children over the age of 2 years, and focusses mainly on assessing the most primitive indications of arithmetical comprehension and the realisation of the most basic practical problems. It is of value in indicating a child's ability to benefit from formal schooling, as it assesses basic skills necessary for success with regard to formal learning. As with the other subscales, attention and concentration span play a role in the child's performance. Items include, *inter alia*,

the repetition of digits (an indicator of short-term auditory memory) as well as the differentiation of objects in terms of size, weight, length and height.

4.4 Administration and Scoring of the Griffiths Scales

The Extended Griffiths Scales, which assess children from birth to 8 years 4 months, consist of 468 items. In the five subscales of the Infant Scales (0 – 24 months), there are two items provided for each month. Thus a half-month's credit is awarded for each item. From the third to the eighth year, there are six items per year in each subscale, as well as two extra items for the ninth year in each of the subscales. Thus two months' credit is awarded for each correct item in each subscale.

The tester begins the administration with items approximately four months below the child's chronological age. A 'basal' of six consecutive passes is required on each subscale before the tester may continue with the administration of the remainder of the items on that subscale. If a child fails any of the first six items which are administered in that subscale, earlier items are administered until a basal of six consecutive passes has been achieved. Once a basal is established, the tester continues to administer items on each subscale until the child fails six consecutive items on a particular subscale. This represents the ceiling level as well as the maximum level of development of the child as measured on that particular subscale.

The sum of the credits awarded for all the items below the basal of six consecutive passes, and for all the items passed over the basal, provides a separate mental age (M.A) for every subscale. Developmental quotients are calculated for each subscale by means of the following formula:

$$QX = \frac{M.A. \times 100}{C.A.}$$

C.A.

where C.A. refers to the child's chronological age in months and X represents the subscale for which the developmental quotient is being evaluated (Griffiths, 1984).

Table 1 illustrates how Griffiths (1984) named the developmental quotients of each of the subscales.

Table 1: An illustration of the developmental quotients of the Griffiths Scales

QA	Locomotor Quotient
QB	Personal-Social Quotient
QC	Verbal Quotient (Hearing and Speech Scale)
QD	Eye and Hand Quotient
QE	Practical Quotient (Known as Practical Reasoning)
GQ	General Intelligence Quotient, which is derived by taking the average of the child's performance on each of the six subscale quotients.

For a quick overall assessment, the total number of items passed is divided by three in years 3 to 8. This calculation is made because the test consists of 36 items for each year of life from years 3 to 8. The total M.A. credit is calculated by adding the M.A. credit for the first two years of life to the M.A. credit that the child achieved in the rest of the subscales. The G.Q. is derived by taking the average of the child's performance on each of the six subscale quotients. As each subscale has been standardised separately, each may be used and scored individually. Using quotients instead of mental ages makes it feasible to compare children of different chronological ages and also to compare a child's performance at different stages of his/her development.

4.5 The Interpretation of Performance on the Griffiths Scales

Diagnostic interpretations using the GSMD are possible because the Griffiths Scales are a diagnostic tool. Griffiths (1984) studied the profiles of a large number of children and identified certain patterns of performance that aided in the interpretation of an individual child's performance. Children showing poor performance on the Locomotor Subscale have been shown to possibly suffer from a physical defect or some degree of muscular weakness (e.g., cerebral palsy), or a neurological syndrome. It was found that overly protected or socioeconomically deprived children usually do not perform at an age-appropriate level on the Personal-Social Subscale. This may be due to a lack of exposure to learning self-help activities and thus ensuring their own personal care. A low score on the Hearing and Speech Subscale may be attributed to a hearing or language impairment, or a lack of environmental stimulation (Griffiths, 1984). Children from mixed-language families who are exposed to more than one language and therefore may not be as proficient in one particular language, may also perform poorly on this subscale. Children who obtain low scores on the Hand and Eye Co-ordination Subscale may exhibit visual perceptual problems or other neurologically based learning problems, which include ADHD. Drawings in the Eye and hand Co-ordination Subscale can provide valuable information on the child's emotional state. Bhamjee (1991), in her study on South African Indian children, stated that unusually small or constricted drawings are indicative of possible depressed mood, whilst very rapid or very slow execution of drawings could suggest anxiety. Rapid or immature drawing may also be the result of poor hand-eye co-ordination, poor concentration, or a lack of stimulation.

Poor performance on the Performance Subscale may be due to a lack of stimulation with construction-type tasks and cognitive games such as puzzles. This may

indicate an inability to sustain the attention required to complete these tasks, if the child's environment has allowed access to these sorts of materials. A low score on the Hearing and Speech Subscale is often accompanied by poor performance on the Practical Reasoning Subscale and Personal-Social Subscale. Luiz (1988a) confirmed this pattern of development in a longitudinal case study conducted on a child with a hearing loss. A low score on the Practical Reasoning Subscale may be indicative of future scholastic weaknesses, as this subscale assesses a child's arithmetical concepts and logical reasoning abilities. However, a low score could also be indicative of a deprived environment where stimulation has been lacking, as some of the items on this subscale tap learned knowledge. If a child displays consistently low performance on each subscale, it tends to be indicative of general developmental delay, with the level of performance indicating the degree of the delay (Schröder, 2004).

The developmental profile of a child yielded by the Griffiths Scales provides useful information that can be used for:

- a) the identification of abilities and difficulties;
- b) decisions about further investigations and treatment such as speech therapy, occupational therapy, remedial tuition or specialised education;
- c) the construction of treatment programmes to address skill deficits;
- d) evaluation the effect of treatment;
- e) decisions about placement that will allow the child to develop to his/her fullest potential – although alternative placements in the new educational system are becoming limited; and
- f) determining how to assist children in the new, inclusive education system (Griffiths, 1970, 1984; Hall, 1971a; Hanson, 1982; Lister, 1981).

4.6 Standardisation of the Original Griffiths Scales

With regard to the standardisation of the GSMD, the British samples utilised for the development and extension of the GSMD were selected to be as representative as possible of the entire British community (Griffiths, 1960). The sample consisted of 2260 children from the first to the eighth year of life, and comprised the following:

- a) approximately equal number of boys and girls;
- b) children from congested urban areas as well as secluded country and coastal areas, and from diverse geographical areas of the country (England, Wales and Scotland);
- c) children from different institutions, for example, schools, play centres and child guidance clinics, and
- d) children in each group of the sample who corresponded significantly to the most recent available population census (1960) regarding parental occupation and educational level, which gave an idea of the child's socioeconomic status.

In the standardising and equalising of the original Scales, the number and percentage of children passing each item were calculated for each two-month age group, commencing with the first two months of the first year, and continuing to the 96th month. In the definitive format of the GSMD, each item was positioned as closely as possible to the point where it was passed by 50% of the children in a two-month age group (Stewart, 1997). The progressive deterioration in the percentage of children passing the successive items in every scale demonstrated that the items were indeed arranged in order of increasing difficulty (Griffiths, 1960).

The Griffiths Scales were introduced to South Africa in 1977, and to date there are approximately 400 registered South African users. The Griffiths Scales have been translated using Brislin's (1970) back-translation technique, into Afrikaans (Allan, 1988) and Xhosa (Tukulu, 1996) and have also been administered on different South African cultural groups, namely, Black, Setswana-speaking children (Mothuloe, 1990) and Indian children (Bhamjee, 1991).

4.7 Research on, and Psychometric Properties of, the Original Griffiths Scales

4.7.1 Significant Research on the Original Griffiths Scales

The clinical merit of the Griffiths Scales is ever-increasing. Research on the Scales has been generated from as far afield as Canada (Ramsey & Fitzharding, 1977), Columbia (Cobos, Rodriques & De Venegas, 1971), China (Collins, Jupp, Maberly, Morris & Eastman, 1987), Norway (Sletten, 1977), Australia, Greece, France, Lebanon, Germany, and the United States of America. The Scales have also been successfully used in South Africa on a wide range of populations (Allan, 1988, 1992; Bhamjee, 1991; Mothuloe, 1990; Schröder, 2004; Tukulu, 1996).

Research on the Griffiths Scales initially consisted of case studies (Krige, 1988; Luiz, 1988a, 1988b) and correlational studies which investigated the relationship between the Griffiths Scales and other measures (e.g., Heimes, 1983; Lombard, 1989; Luiz, 1988c; Mothuloe, 1990; Worsfold, 1993). Such studies preceded normative studies using larger samples of Black, White, Asian and Coloured children (e.g., Allan, 1988, 1992; Bhamjee, 1991, Mothuloe, 1990; Tukulu, 1996). These studies were followed by validity studies (e.g., Stewart, 1997; Luiz, Foxcroft & Stewart, 1999; Povey, 2002). Recent research has focussed on the overall revision process of the Griffiths Extended

Scales (e.g., Barnard, 2000; Kotras, 2003) and on clinical populations (Kotras, 2002; Schröder, 2004).

Research on the Griffiths Scales has been conducted in two domains, namely, clinical and technical studies. Research relating to the clinical utility of the Scales has provided evidence that the Scales are useful in the clinical assessment and diagnosis of children from normal as well as diverse special population groups. The Scales have been administered to a wide range of children, including a hearing-impaired child (Luiz, 1988a), a battered child (Luiz, 1988b), borderline mentally handicapped pre-schoolers (Houston-McMillan, 1988), Black South African HIV+ infants (Kotras, 2002), hearing impaired children (Schröder, 2004), and a physically disabled child (Krige, 1988).

Various longitudinal and/or case studies were conducted on the Original Griffiths Scales. Krige (1988) conducted a longitudinal case study of a physically disabled child, whilst Luiz (1988a) completed a longitudinal case study on a boy with a hearing loss. Luiz (1988b) also conducted an 18-month follow up study with an assaulted child, and Houston-McMillan (1988) completed a study with borderline mentally handicapped pre-schoolers.

These studies revealed that the GSMD made a significant contribution, firstly in the initial diagnosis of the children, and then also in the appraisal of their progress in the instances of longitudinal case studies (Houston-McMillan, 1988). The GSMD also gleaned information which could be construed within the terminology of many different disciplines. Such findings provided the team members working with children with ADHD with an opportunity to communicate their findings within a common developmental framework. In the present study, the GSMD could make a significant contribution in the

initial diagnosis or profiling of children with ADHD. It could also contribute to the appraisal of the children's progress.

Lister (1981) proposed the value and significance of using graphically presented profiles. Lister found that substantial numbers of developmental profiles were characterised by marked irregularity. Luiz (1988d) confirmed Lister's study, and verified the usefulness of developmental profiles for identifying specific developmental delays, in a clinical population of South African children. In both Lister's and Luiz's studies, the difference between the highest and lowest developmental quotients was approximately 16 points or more. Moreover, through profile analysis, a vulnerable child could be identified when compared with an established subtype profile.

By studying the profiles of a number of children, Griffiths (1984) identified prominent patterns which could be used for diagnostic purposes. Griffiths stated that a deep trough on the Hearing and Speech Subscale could, for example, be associated with a hearing loss. Luiz (1988a) conducted a South African study on a 30-month-old child who was moderately hearing-impaired. Her results confirmed Griffiths' (1984) findings, namely, that prominent developmental patterns could be used for diagnostic purposes. Sweeney (1994) conducted a further study with pre-schoolers and young scholars to determine whether certain profile typologies could be derived from the Griffiths Scales in the South African context. Sweeney's findings indicated that clinical typologies can be generated for South African pre-schoolers and early scholars.

The above studies show that profile analysis can be used to identify vulnerable children, and that areas of risk can be identified by means of profile analysis, and hence

referral to the appropriate resources for assistance with the skills deficit could be sought. The present study aims to explore whether there is a pattern in the performance of children with ADHD on the GMDS – ER. It also hopes to identify the scales on which children with ADHD will have problems, and on which scales they will fall within the average range.

Luiz, Oelofsen, Stewart, and Mitchell (1995), conducted an international survey of the extended GSMD and explored the clinical utility of the Scales. Table 2 reflects the diverse nature of the various problems the Scales have been used to identify. The present study will contribute further to the clinical research domain by focussing on the clinical population of children with ADHD.

Table 2: Types of diagnoses for which the Extended Scales were most often used

Problem	<u>F</u>
General developmental delay	105
Delayed speech	92
Environmental deprivation	50
Locomotor delay	43
Behavioural disturbance	43
Eye and hand co-ordination	43
Down Syndrome	37
Clumsiness	35
Cerebral Palsy	34
Birth complications	33
Prematurity	33
Convulsions	14
Hearing impaired	12
Hydrocephalus	10
Visually impaired	8
Spina bifida	5
Developmental milestones	3
Phenylketonoria	3
Learning problems	3
Hypothyroidism	2
ADHD	2
Encephalocele	1
Emotional	1
Hypercalcaemia	0
Other	10

(From: Luiz, Oelofsen et al., 1995, p. 23)

As is evident in Table 2, research regarding the performance of children with ADHD on the GSMD in South Africa has not been conducted, thus highlighting the value of the present study. This study will also contribute towards research about ADHD taking the background of the new teaching method and a revised curriculum into account. In

this new approach to teaching, many paradigm shifts to rectify the segregated nature of South Africa's past educational system are made.

Research relating to the technical studies involves the studies relating to the reliability and validity of the Scales. Technical research studies show that the Griffiths Scales are a reliable and valid instrument (e.g., Beail, 1985; Griffiths, 1984; Luiz, 1988c; Mothuloe, 1990; Stewart, 1997; Worsfold, 1993). Technical research has also provided information on the normal performance of children of different ages and population groups on the Griffiths Scales.

4.7.2 Psychometric Properties of the Original Griffiths Scales

4.7.2.1 Reliability Studies

'Reliability' is simply defined as the consistency of test scores over time (Smit, 1996). Griffiths (1984) used the test-retest method in order to determine the reliability of the Extended Scales. Data from a sample of $N=270$ children from various regions in the United Kingdom was collected by Griffiths. The ages of the children ranged between birth and 7 years old, and the interval between assessments varied between 3 and 62 months. A test-retest reliability of .77 was obtained. Honzik, McFarlane and Allan (1966) found reliability coefficients of between .71 and .76 for test-retest periods of 6 to 12 months for a sample of 3- to 5-year-old children. These studies indicated that the Griffiths Scales are a stable measure of development (Barnard, 2000).

Aldridge-Smith, Bidder, Gardner and Gray (1980) also investigated the inter-rater reliability of the Griffiths Scales. Each rater was asked to score a video recording of eight normal children (four boys and four girls of similar socioeconomic backgrounds) in the

age group 6 months to 7 years 3 months. They reported an overall reliability level of between .6 and 1.0 for 78% of the cases. The inter-rater reliability was satisfactory for the Eye and Hand Co-ordination, the Performance, and the Practical Reasoning Subscales. With regard to the separate subscales, greater agreement was found between all raters (reliability coefficients of between .6 and 1.0) on the Practical Reasoning Subscale (95%), the Performance Subscale (91%) and Eye and Hand Co-ordination Subscale (84%), than on the Locomotor, Personal-Social and Hearing and Speech Subscales. Therefore, it was hypothesised that the latter three subscales might be more sensitive to interpretation, and that the small sample size, few scorers, and scoring based on the mother's report might be responsible for the lower inter-rater reliability of the latter three subscales. It was thus recommended that a comprehensive item analysis with a larger sample be conducted to examine which of the items were responsible for the greatest discrepancies in the ratings (Aldridge-Smith et al., 1980).

4.7.2.2 Item Reliability

Hanson (1982) conducted a study focussing on item reliability in terms of inter-observer agreement. This study was an expansion of Aldridge-Smith et al.'s (1980) reliability study. The sample consisted of $N=30$ children whose ages ranged from 2 months to 7 years. Five panels, comprising nine or ten trained Griffiths test users, scored the video recordings of the Griffiths assessments. Hanson reported that the Griffiths test users disagreed on the scoring of one third of the items.

Hanson (1982) found that the Practical Reasoning Subscale produced high item agreement, but found similar levels of agreement or disagreement across the other five subscales. For 303 of the 441 items examined, there was no disagreement. For 21 of the items, two panels disagreed, and for one item, one panel disagreed. Thus, Hanson

was unable to replicate the findings of Aldridge-Smith et al. (1980) and questioned the conclusions of their study. She criticised Aldridge-Smith et al.'s contention that a small sample, few scorers and scoring based on the mother's report, might be responsible for the discrepancies in terms of inter-observer agreement on the separate subscales. Furthermore, Hanson encouraged the scorers to write down their comments about difficulties they encountered with the scoring of the test items. These comments were used to identify which of the items in the instruction manual 'The abilities of young children' (Griffiths, 1970, 1984) were misleading.

4.7.2.3 Validity Studies

Aiken (1997) defines 'construct validity' as the extent to which an instrument measures a particular construct. Evidence for construct validity may be found in expert judgement of the contents of the measure, analysis of the internal consistency of the measure, studies on the relationships between the measure and naturally occurring groups, and correlations between the measure and other measures which measure similar constructs.

To establish the construct validity of the original Extended Griffiths Scales, they were compared to the Termin-Merrill Scale. The Termin-Merrill was administered to 534 of the 2260 children used in the standardisation sample. The children were aged between 3 and 6 years. Results revealed that the General Quotient (GQ) of the Griffiths Scales ranged from 99.45 to 101.92 for the different age groups, while the Termin-Merrill Intelligence Quotient (IQ) ranged from 102.77 to 106.87. Satisfactory correlations between the GQ and IQ were calculated, varying from $r = 0.79$ to $r = 0.81$ for the different year groups.

Povey (2002) conducted a construct validity study of the original Griffiths Scales, examining the underlying dimensions tapped by the six subscales for children in years 5 to 7. A sample of 180 children between the ages of 48 and 84 months was drawn from an existing database. The sample (N=60) for each year group (Years 5, 6 and 7) consisted of boys and girls from the four cultural groups, namely, White, Black, Coloured and Asian (n=15 in each subgroup). A factor analysis was conducted separately for each year group and subscale. Povey (2002) concluded that, with the exception of the Performance Subscale (for years 5 and 6), all other subscales tapped complex skills such as spatial and manipulation skills. This suggests that more than one construct is being tapped per subscale, and that these constructs seem to vary with these different age groups.

4.7.2.4 Correlations Between the Original GSMD and Other Measures

Studies by Beail (1985), Ramsay and Fitzharding (1977), and Ramsay and Piper (1980) have found high positive correlations of between $r=.73$ and $r=.98$ for the Griffiths Scales and Bayley Scales and Cattell Infant Intelligence Scale (Povey, 2002). Luiz and Heimes (1994) researched the construct validity of the Griffiths Scales on a South African sample. They compared the GQ of the Griffiths Scales with the General Intelligence Quotient (GIQ) of the Junior South African Intelligence Scale (JSAIS) and found high positive correlations, suggesting that the Griffiths Scales and the JSAIS tap similar constructs. The study was, however, conducted on a White South African population and therefore cannot be generalised to other population groups.

Luiz (1988c) compared the performance of 32 White children with possible developmental delays on the Griffiths Hearing and Speech Subscale (Subscale C) with the Reynell (1977) Verbal Comprehension Scale and found no significant difference in

age scores for each age range. A significantly high correlation of $r=.92$ was reported between the two scales.

Mothuloe (1990) administered the Griffiths Scales and the Aptitude Test for School Beginners (ASB) to a sample of 45 Black Setswana-speaking Grade 1 children between the ages of 5 years 9 months and 7 years 3 months. Significant correlations were found between the assessment measures, ranging from $r=.32$ to $r=.62$.

Similarly, Luiz, Folsher and Lombard (1989) correlated the performance of 64 White 5- and 6-year-old South African children on the School Readiness Evaluation by Trained Teachers (SETT) with the Griffiths Scales. They found correlations of $r=.68$ for Afrikaans-speaking children and $r=.48$ for English-speaking children. The researchers hypothesised that the reason for the low correlations was that the Griffiths Scales are a diagnostic measure, whilst the SETT is a screening measure.

Tukulu (1996) completed a correlational study using the Denver II Scales, a screening measure, and the GSMD, with Xhosa-speaking pre-school children. Tukulu (1996) concluded that the GSMD is a relevant diagnostic measure for use with South African Xhosa-speaking children.

4.7.2.5 Intercorrelations and Factorial Validity

In addition to correlations with other measures, during the original standardisation research, the interrelationships amongst the individual subscales were examined. Griffiths (1970) reported on a correlational study in which the quotients of

each subscale were correlated with the General Quotient. Positive and moderate correlations were obtained. The results are reported in Table 3 below.

Table 3: Correlations between Subscales A to F and GQ for 285 Children in their Fifth Year on the Griffiths Scales.

Subscale	Quotient	r	Quotients Correlated
A. Locomotor Development	101.38	.6419	A.Q and G.Q
B. Personal-Social Development	101.04	.6537	B.Q and G.Q
C. Hearing and Speech	99.72	.7776	C.Q and G.Q
D. Eye and Hand Co-ordination	99.96	.7551	D.Q and G.Q
E. Performance Tests	100.08	.7265	E.Q and G.Q
F. Practical Reasoning	99.36	.7793	F.Q and G.Q

(From: Griffiths, 1970, p. 7)

Griffiths (1970) suggested that, given the moderate correlations found, it could be reasoned that a common factor of general intelligence underlies performance on each subscale. Griffiths (1970) further recognised that the Locomotor Subscale had the lowest correlation with the General Quotient. She nonetheless felt that the inclusion of this subscale in the measure was legitimate as it provided a measure of an important developmental domain. The higher correlations for subscales C, D, E and F were understood by Griffiths as providing an indication of the general intelligence factor. Griffiths hypothesised that the remaining variance could be accounted for by the specific factors or abilities which the individual subscales purported to measure. She acknowledged that further research would be needed to confirm this.

Recently, Luiz et al. (1999) used common factor analysis to examine the underlying dimensions of the Griffiths Scales. A sample of 430 South African children

between the ages of 54 and 83 months was used. The sample comprised 90 White children, 78 Coloured children, 167 Asian children and 95 Black children. Data analysis was conducted for each cultural group separately and then factor solutions were compared to determine whether the Griffiths Scales measured similar or different constructs for the various groups. The correlation coefficients obtained for the South African groups were also compared to those of the British standardisation sample (Griffiths, 1970). Luiz, et al. found that the Griffiths Scales tended to measure one factor and that the factor appeared to be similar for all cultural groups. The pattern of inter-correlations for South African and British children was also found to be similar. This confirmed that the subscales largely measure one construct and that this construct is consistent across cultures and through time (Stewart, 1997; Luiz et al., 1999).

4.7.2.6 Predictive validity

Predictive validity is concerned with how accurately scores on a psychological measure predict scores on a criterion measure (Aiken, 1997). In order to investigate the predictive validity of the Griffiths Scales, Worsfold (1993) correlated the Griffiths Scales GQ and its six subscales with the Grade 1 performance of $N=124$ pre-school (Grade 0) children (aged 5 years 6 months to 7 years). Equal numbers of boys and girls, as well as equal numbers of Black, White, Coloured and Asian children were included in the sample. Worsfold found a contingency coefficient of $C=.51$ between the Griffiths GQ and Grade 1 performance and contingency coefficients ranging from $C=.22$ to $C=.44$ for the six subscales and Grade 1 performance. All coefficients were statistically significant at the $p=.05$ level, thus supporting the predictive validity of the Griffiths Scales in identifying scholastically and developmentally 'at risk' children.

Conn's (1993) study evaluated the performance of 107 children aged 4 years 0 months to 4 years 11 months on the Griffiths Scales and compared this with their performance at the end of Grade 1. The results revealed that the Griffiths results related to educational outcomes two or more years beyond the assessment, thus supporting the predictive validity of the Griffiths Scales in relation to educational outcomes at the age of seven years.

4.7.3 Comparative studies

Allan (1988) completed a study aimed at exploring whether the British norms (1960) of the Griffiths Scales were suitable for South African (SA) children. The sample (N = 60) comprised 5-year-old English- and Afrikaans-speaking White South African children. In addition, the degree to which the subject variables of gender, language, and socioeconomic status (SES) influenced performance, was investigated. The principal conclusions of the investigation were that 5-year-olds in the SA and British standardisation samples differed significantly on the General Quotient (GQ) and in their performance of four of the six subscales, namely the Locomotor, Personal-Social, Hearing and Speech, and Performance Subscales.

Children in the different SES groups differed significantly on the GQ, and in their performance on four of the six subscales, namely the Hearing and Speech, Eye and Hand Co-ordination, Performance, and Practical Reasoning Subscales. On the Hearing and Speech, Eye and Hand Co-ordination, and Practical Reasoning Subscales, children from the upper SES group performed significantly better than those from both the middle and lower SES groups. On the Performance Subscale and GQ, the upper SES group scored significantly higher than the middle and lower SES groups, and the middle SES

group scored significantly higher than the lower SES group. Allan (1988) was therefore of the opinion that socioeconomic status be considered in the interpretation of the GSMD. This was therefore a factor which was taken into account in the present study.

Mothuloe's (1990) study aimed at investigating the potential use of the GSMD as an assessment instrument for Black, Setswana-speaking South African children. Mothuloe examined the concurrent and predictive validity of the GSMD, and compared the Griffiths Scales performance of Black school beginners with that of their counterparts in the British standardisation sample. The author also explored the influence of certain subject variables on the Griffiths Scales performance of Black South African children. Mothuloe made a valuable contribution in the translation of the Griffiths Scales to Setswana. Mothuloe used a sample of 45 Black Setswana-speaking children aged between 5 years 9 months and 7 years 3 months. He correlated their GQ's on the GSMD with the Aptitude Test for School Beginners (ASB) scores, and the end-of-year academic results. The findings demonstrated that the mean performance of Black South African children was similar to the British (1960) standardisation sample. A significant positive relationship was found between the GQ of the GSMD and the ASB total. However, a correlation of the GQ with the mean score of the subjects on each of the ASB Subscales showed that only the Spatial and Verbal Comprehension subtests of the ASB correlated significantly with the GQ scores.

4.8 Revision of the Griffiths Scales

4.8.1 Concerns Raised Regarding the Original Scales

Though there is extensive research which supports the Griffiths Scales, recent research has indicated a clear and urgent need for the revision of the Scales. Studies completed by Hanson (1982, 1983), Hanson and Aldridge-Smith (1982, 1987), Allan (1988, 1992), Bhamjee (1991) and Povey (2002) have suggested that the 1960 norms are no longer valid. Some of the items are outdated and several of the items are culturally biased and ambiguous (Kotras, 2003).

Recent studies have recognised that the populations on which the Infant and Extended Scales were standardised are no longer contemporary (Allan, 1988, 1992; Hanson, Aldridge-Smith & Humes, 1985; Hanson, & Aldridge-Smith, 1987; Huntley, 1996). Hanson and Aldridge-Smith (1987) reported large increases in the quotients for each of the subscales except the Eye and Hand Co-ordination Subscale. Hanson and Aldridge-Smith explained that the low scores on the Eye and hand Co-ordination Subscale may be a result of changes in educational policies and child-rearing practices. Physical activities may be encouraged more than skills requiring quietness and concentration (Barnard, 2000).

Allan (1988) investigated the applicability of the 1960 norms to White South African children (Table 4). Allan's (1988) sample of 5-year-old South African children differed significantly on the GQ as well as on four of the six subscales (Locomotor, Personal-Social, Hearing and Speech and Performance). No significant difference was found when Allan compared the South African sample to a more contemporary British

sample (Hanson & Aldridge-Smith, 1987). Allan reported that socioeconomic status (SES) was a factor in performance, with children from a higher SES performing better on the Griffiths Scales.

Table: 4: Comparison of the 1960 norms and the performance of 5-year-old White South African children.

Subscale	South African	British - 1960	British - 1980
A. Locomotor Development	121.30	100.70	116.10
B. Personal-Social Development	109.20	100.40	112.60
C. Hearing and Speech	108.20	100.90	111.80
D. Eye and Hand Co-ordination	104.90	102.30	112.90
E. Performance Tests	112.30	101.40	113.30
F. Practical Reasoning	102.80	100.60	109.90
General Quotient	109.70	101.40	112.80

(From: Griffiths, 1984, p. 21)

Mothuloe (1990) compared the Griffiths GQ of 45 Setswana-speaking children, and found that the mean scores for the South African Black children were similar to the means established in the 1960 normative sample. Bhamjee (1991) completed a study which examined the relevance of the GSMD for South African Indian children. The results demonstrated that the South African Indian children performed significantly better than their British counterparts, with respect to the General Quotient (GQ) at each age level, and on at least three of the six subscales. Bhamjee concluded that SES is a significant factor which impacts on performance of children on the GSMD. Bhamjee's findings regarding socioeconomic status are coherent with those of preceding researchers, namely, that significant differences in the performances of children from the different socioeconomic groups exist, with the children from the upper group performing better (Allan, 1988; Heimes, 1983; Hindley, 1960).

Allan (1992) conducted a comparative study on the performance of normal South African pre-school children on the GSMD. With regard to the Hearing and Speech Subscale (Scale C), Allan's findings indicated that no consistent, significantly higher scores were found for children from a specific cultural group. There were no significant differences between the cultural groups with respect to the General Quotient (GQ), or on their performance on the Personal-Social Subscale (BQ) and the Practical Reasoning Subscale (FQ). With respect to the other four individual subscales, the Coloured and Black groups did not differ significantly from one another. However, their performance differed significantly from that of the Indian and White groups. There were also significant differences in the performance of the Indian and White groups when considering the latter four individual subscales.

There were no significant differences in the test performance of English- and Afrikaans-speaking Coloured children. The only subscale on which White English-speaking children scored significantly higher, was on the Hearing and Speech Scale. Allan (1992) once again confirmed the results from her prior study (1988), finding that the SES was an important co-variant influencing performance on the Griffiths Scales.

Huntley (1996) compared the scores of infants (N= 665) living in urban areas (n=488) and rural areas (n= 177) on the Griffiths Scales. Results revealed that the children living in rural areas scored significantly lower than those who lived in urban areas, across all areas of development. The Personal-Social and Hearing and Speech Subscales were the most highly significant.

The above studies consistently found that SES, rather than culture, was an important variable in determining performance on the GSMD. They also found that the norms were outdated, and indicated a need to revise the GSMD. The following section will look at the revision process that the GSMD has undergone.

4.8.2 The Revision of the Scales

In March 1994, the Association for Research in Infant and Child Development (ARICD) held a conference for Griffiths Scales Tutors in Manchester, England. At the conference the need to expand and co-ordinate efforts to revise the Extended Griffiths Scales of Mental development was highlighted. Professor Dolores Luiz of the University of Port Elizabeth (UPE) was appointed as the project director to revise and restandardise the Griffiths Extended Scales. A research proposal was submitted to the Executive Committee of the ARICD (Luiz, 1994b) resulting in the following objectives being established for the revision process:

- a) The basic qualities of the Griffiths Scales should be preserved: Throughout the revision process, the 'child friendly' nature of the Scales should be preserved.
- b) The age range of the Griffiths Scales should remain. The revision of the Infant Scales should be brought to finality. The revision of the Extended Scales should concentrate on the age range 2 years to 5 years, and then on the age range 5 years to 8 years.
- c) The revision should involve international consultation of all tutors and interested members of the ARICD – a survey should be conducted of all ARICD members inviting them to identify the strengths and weaknesses of the Scales.
- d) The revision should improve the content coverage of the Scales: The Scales should represent current theoretical and empirical work and the items should be

- relevant and contemporaneous. Statistical procedures such as cluster and factor analysis should be employed in the attainment of this objective.
- e) Updating the normative data on the Scales is imperative: standardisation of the Scales on a contemporary sample that reflects the United Kingdom population in terms of ethnicity, gender and socioeconomic status of the parents.
 - f) Updating the psychometric quality of the Scales is a necessity: Conduct reliability and validity studies, employing statistical procedures such as cluster and factor analysis.
 - g) Finally, enhancement of the clinical utility of the Scales by collecting data on children with a clinical diagnosis was an important goal.

Since this large-scale project was introduced to revise the Griffiths Extended Scales, many of the above-mentioned objectives have already been met. Studies have been completed to improve the content coverage of the Scales (Luiz, Collier, Stewart, Barnard & Kotras, 2000). Additionally, studies have focussed on the identification of problematic items, the writing of new items, the testing of the new items on a number of different samples, reviewing the children's performance on the new items, and re-testing the new items once more.

Users of the Scales have found certain items to be culturally biased and outdated. Changes in the social world of children in the 1990s, when compared to that of children during the 1960s when the Extended Scales were originally standardised, may account for some of the unsuitability of the items. Clinicians have also become sensitised to items that measure culture-bound social practices, such as letting children help lay the table or eating with cutlery (Luiz et al., 1995).

These examples supported the idea that the revision process of the Extended GSMD could not be removed from the broader social context in which children were growing up. The test is used in diverse settings in both first- and third-world contexts (Allan, Luiz & Foxcroft, 1988; 1992; Hanson & Aldridge Smith, 1982; Victoria, Victoria & Barros, 1990)), and In order to ensure the correct conducting of developmental assessment of children from these diverse backgrounds, the test items need to be modified for the different contexts in which the test is used (Luiz et al., 1995).

Once the problematic items had been identified, a plan to develop new items and to modify existing items had to be established. The following procedure was adhered to:

- a) Creation of new items: For each item selected as problematic, a number of possible new items were written. Various experts in the field of child development were requested to submit items for consideration as new items.
- b) Revision of new items: Once a sufficient number of new items had been suggested, they were submitted to a panel to check for culture and gender fairness.
- c) Piloting the new items – phase one: New items that were established to be culture- and gender-fair were administered to a small sample of children in South Africa and analysed. Only White children were included in the sample, as research has suggested that they match the performance of United Kingdom children on the Griffiths Scales (Allan, 1988), thereby allowing international comparisons to be tentatively made.
- d) Piloting the new items – phase two: Items with superior item characteristics identified in phase one were included, along with additional experimental items for re-testing on a new sample of South African children. The results were once

- again statistically analysed. As in phase one, only children from the White cultural group were represented in the sample.
- e) Piloting the new items – phase three: Finally, the most superior items derived from the two pilot tests, along with the old experimental items of the Extended Griffiths Scales, were administered to a large sample of South African children. A biographical questionnaire was included to collect information on the children's developmental history, socioeconomic status, and personal and social development. In addition, a neurological checklist was completed to aid in the screening of children whose development was classified as not within the normal range.
 - f) Lastly, the new experimental version of the Extended Scales was submitted to the Association for Research in Infant and Child Development (ARICD) for their comments and approval.

Many items on the Hearing and Speech Subscale (Scale C) were identified as being problematic (Hanson, 1982; Luiz et al., 1995). With these findings in mind, Kotras (1998) revised the small pictures and large picture of the Hearing and Speech Subscale in South Africa. Kotras' study resulted in the development of twenty new small pictures and two new large pictures (one with a contemporary British/European/Australian focus, and one with a contemporary South African focus).

Barnard (2000) revised the Practical Reasoning Subscale of the Griffiths Extended Scales. The total sample in her study represented six age groups (years 3 to 8) and four cultural groups (Asian, Black, Coloured, and White), as well as developmentally normal and abnormal children. Following the analysis and critical consideration by the research team, 10 of the experimental items and 11 adapted original items were included in the

revised subscale. This revision improved the content covered by the subscale and served to make the items more contemporaneous in nature.

4.9 Research Conducted to Date on the GMDS – ER

In 2003, Kotras explored the construct validity of the Language Subscale of the GMDS – ER. The sample consisted of 325 English-speaking children throughout the British Isles and Eire. The ages of the children in the sample ranged between 24.3 and 95.7 months. The results of Kotras's (2003) study confirmed that the subscale measures comparable constructs in individuals of different socioeconomic and gender groups.

Knoesen (2003) completed a predictive validity study involving the assessment of 93 urban pre-school children between the ages of 5 years and 6 years 11 months on the Revised GSMD, in order to determine whether the Scales could be used to predict the scholastic performance of Grade 1 learners. The children were tested towards the end of their final year at pre-school, and were then followed up a year later by gathering their school reports and learner profiles at the end of their Grade 1 year. Results suggested that the Revised Griffiths Scales may be used to identify strengths and weaknesses in Grade 1 learners in the outcomes-based system of education in South Africa. The study added support to the value of using the Revised Griffiths Scales to predict the scholastic performance of Grade 1 learners (Knoesen, 2003). Currently, a comparative study involving the developmental profiles of South African and British children on the GMDS-ER is in progress.

Using the Revised Infant Scales, Kotras (2002) conducted a profile research which aimed at exploring the developmental profile of Black HIV+ infected children in the Eastern Province of South Africa. Her sample comprised 74 infants in years 1 and 2. The infants were not on medication and came from the low socioeconomic strata. Kotras' (2002) results indicated that the general performance of the infants was low to below average on the Revised Infant Scales. The mean GQ, and the mean subquotients on each of the five subscales were lower for the infants in year 2 than those in year 1. Although the overall profile of the infants was generally average, the high range values 'normalised' the profile. Currently, a follow-up study is being conducted on the HIV+ infected sample utilised in Kotras' (2002) study.

In 2004, Schröder explored the performance of a clinical population, namely, hearing-impaired children, on the GMDS – ER. Schröder's findings illustrated that the mean quotient for the hearing impaired sample on the GMDS – ER was average. The hearing-impaired children performed on average on the Locomotor, Personal-Social, Eye and Hand co-ordination and Performance Subscales, whilst they performed below average on the Hearing and Speech and Practical Reasoning Subscales. Furthermore, Schröder found a significant difference between the performance of the hearing-impaired sample and the normal, control sample on the four subscales mentioned above. Building on Schröder's study, a case study is currently in progress focussing on a hearing impaired child with a cochlear implant.

4.9.1 Conclusion

The standardisation of the Revised Extended Scales has been the responsibility of a team of international researchers, the Griffiths Research Team (GRT). This team

was multifaceted, and included an international director of research, assisted by two researchers in South Africa (SAGRT), regional co-ordinators, and examiners. Regional researchers were appointed for England, Wales, Scotland, Northern Ireland and Southern Ireland. England was further separated into five regions, namely, Northern, Central, Eastern, South Western and South Eastern England.

The standardisation of the GMDS – ER was conducted on a stratified random sample of 1100 children between the ages of 2 years and 8 years from various socioeconomic groups. Proportional representations of children were gathered from England, Scotland, Wales, Northern and Southern Ireland in order to complete the restandardisation process. In May, 2004, following the completion of the revision and restandardisation process, the GMDS – ER was officially launched in England. Now that the restandardisation process has been completed in the United Kingdom, and the GMDS – ER is being implemented world-wide, researchers will begin work on restandardising the Scales for the South African population.

4.10 Chapter Overview

This chapter has provided an overview of the history, development and nature of the Griffiths Scales of Mental Development. A discussion of the standardisation of the Scales, as well as their clinical utility, followed. The need for the revision of the Scales and the process of standardisation of the GMDS – ER was elaborated upon. It can be concluded from this chapter that the revision and standardisation of the GMDS – ER will contribute to enhancing the contemporaneous nature of the Scales, making them an even more valuable assessment tool. The present study aims to contribute further to the

value of the GMDS – ER as an instrument used to assess the clinical population of children with ADHD.

CHAPTER FIVE: METHODOLOGY

5.1 Introduction

This chapter presents the problem formulation and primary objective of the present study. Furthermore, it outlines the methodology employed in conducting the study, which includes the research design, the participants, sampling procedure, assessment measures utilised and the procedure followed in the collection of the data. This is followed by a description of the statistical analysis and the ethical considerations.

5.2 Problem Formulation

Research has shown that ADHD is one of the commonest neurodevelopmental disorders which has a negative impact on a child and all concerned with his/her well-being (Barkley, 1990). However, to date limited research has been conducted on learners, and specifically those learners with ADHD, within the educational system. Furthermore, running concurrently with this are new developments in education. An inclusive educational policy which not prioritizing remedial and special schools, and which diminishes special aid classes within schools, favours the incorporation of all children into a mainstream scholastic setting. These are new developments in educational provisioning in South Africa together with the reduction of educational support staff. Furthermore, not all teachers have adequate teaching qualifications nor have they been trained in the RNCS, and teaching resources are scarce. In addition to educational changes for children with ADHD, many parents are presently unable to afford the medication commonly used to treat ADHD, resulting in both parents and teachers having to manage these children with limited professional support. This is

despite the fact that ADHD is a relatively chronic disability and that children with ADHD require ongoing professional assistance throughout their school career.

To date, no South African research has been conducted on children with ADHD using the GMDS-ER. As ADHD is a common disorder, it was deemed necessary to accumulate knowledge regarding the motor development, personal-social growth, psychological and cognitive development of children with ADHD. In identifying their developmental profile, areas of strengths as well as areas of weaknesses requiring assistance can be identified. To this end, findings of the present study will be used to assist children with ADHD to develop in a manner that will allow them to reach their full potential within the paradigm shifts within the educational setting. Furthermore, it is envisaged that the findings of the study will highlight the children's developmental weaknesses. This information which will be made available to the children's parents and schools can then be utilised in the development of therapeutic and academic programmes which will allow for the appropriate intervention and stimulation in the developmental areas of concern. Additionally, any developmental strengths of children with ADHD that are highlighted by the present study, can be used to promote their well-being.

This study will therefore assist both parents and professionals in acquiring the necessary developmental knowledge and skills to promote and assist with the academic development of these children and to facilitate the timeous implementation of therapeutic programmes to assist children with specific deficits. More specifically, this study will also contribute to the body of research regarding the general development of children with ADHD in the Nelson Mandela Metropole.

5.3 Primary Objective/Specific Aims

This study forms part of an ongoing investigation into the utility of the GMDS-ER in South Africa. Specifically, the focus will be on using the GMDS-ER to assess a clinical population of young South African children with ADHD, in the pre-school and foundation phase of their education. The primary objective of this study will be to explore and describe the developmental profiles of these children (ages 5-to-7 years old) utilising the GMDS-ER. The specific aims of this study are:

- a) To describe the performance of the ADHD sample on each of the individual Scales of the GMDS-ER as well as on the overall scale.
- b) To compare the performance of the ADHD sample with that of a normal sample on all Scales of the GMDS-ER, so as to enhance the description of the performance of the ADHD sample.

5.4 Research Method

In order to achieve the aims of the current study an exploratory descriptive research design was employed. The study is primarily quantitative in nature as the analysis of the results are numerically presented. As the study is one of the first South African studies which aims to explore the developmental profile of children with ADHD on the GMDS-ER, an exploratory design has been employed.

Exploratory-descriptive research sets out to observe, record and describe behaviour of interest (McGuigan, 1990). It is thus a primary and necessary goal for the development of scientific knowledge (Cozby, 1993). Exploratory-descriptive research involves providing an accurate and detailed description of a given phenomenon or

construct (Christensen, 1997), and involves the systematic examination and organisation of carefully observed information about that specific phenomenon or construct (Cozby, 1989; 1993; Dane, 1990). In the present study, a detailed description of the developmental profile of children with ADHD on the GMDS-ER will be provided. The sample's performance on each of the subscales of the GMDS-ER will be examined and compared with the normal sample's performance. Since the study is descriptive no prior research hypothesis will be stated. Inferences from the numerical data will therefore be excluded as the researcher merely wants to describe the developmental profile of the sample. The numerical data obtained will be statistically summarised in order to make it easily interpretable.

South African research on the Griffiths Scales has indicated that numerous variables such as age, gender and socioeconomic status (SES) may affect test performance (Allan, 1988; 1992; Bhamjee, 1991, Knoesen, 2003, Schröder, 2004). These variables which could have affected the interpretation of the test results therefore had to be controlled for in this study. This could either have been achieved by holding the extraneous variables constant or by building them into the research design (Graziano & Raulin, 2000). In the present study, the variables of age, gender and SES were held constant by matching the ADHD sample with the normal sample according to these variables. Modification of a matched group design was used to compare the performance of similar children on the GMDS-ER. In this study the two groups were matched according to age, gender and socioeconomic class. In practise, this related to the researcher matching a six year old, middle class, male with ADHD with a six year old, middle class, male without attention deficit or disruptive behavioural problems. By matching this sample to a 'normal' sample in terms of age, socioeconomic class, and gender, a meaningful comparison could be made of the general development of children

with ADHD. Table 5 below depicts the matched sample breakdown in terms of age, gender and socioeconomic class.

Table 5: Matched sample breakdown of the ADHD and normal sample in terms of age, gender and socioeconomic class

	Normal Sample (N = 38)	ADHD Sample (N = 38)
Mean Age	84.62 months	84.56 months
Gender:		
Male	22	22
Female	16	16
Socioeconomic class:		
Upper	16	16
Middle	10	10
Lower	12	12

Possible extraneous variables which could have affected the outcome of the present study, and the manner in which they were controlled, are discussed below.

a) Urban-rural Residence

Jansen (1991) stated that large differences exist between the rural and urban South African population. This variable has been found to have a differential effect on cognitive test performance (Allan, 1992). In the present study, this variable was controlled for by building it into the design and selecting only subjects for the clinical sample who resided in urban areas in and around Port Elizabeth and who attended pre-school or primary schools in urban areas.

b) Culture

Cultural norms have been found to influence the pattern of development in children (Allan, 1992). What is considered to be appropriate behaviour for a young child in one culture, may be considered inappropriate in another culture. Different

developmental experiences across the cultural groups may lead to differences in the behaviour of children from different cultural backgrounds (Jansen, 1991).

However, South African studies have generated results which indicate that the extent to which culture influences an individual's performance on the Griffiths Scales is not as significant as the extent to which other variables affect an individual's performance on this measure (Allan, 1988, 1992; Barnard, 2000; Bhamjee, 1991; Knoesen, 2003, Schröder, 2004). Whilst culture may influence test performance to some extent, studies have found that there are factors other than culture, such as SES, which play a much greater role on the performance of children on the GSMD (Allan, 1988, 1992; Barnard, 2000; Bhamjee, 1991; Knoesen, 2003, Schröder, 2004).

The present study therefore did not discriminate between cultural groups in the inclusion criteria, as this variable has not been found to have as profound an impact on test performance on the GSMD as other variables. The present study did however, only include children in the clinical sample who were on medication for ADHD, and as a result, some children were excluded from the sample as many South African families cannot afford the medication used to treat the disorder.

As a purposive sampling procedure was employed in the present study, it was difficult to include equal numbers of White, Black, Coloured and Asian children in the sample, and in the present study the sample was predominantly from the White cultural group. However, this was not of importance, as an exploratory descriptive study of the developmental profiles of children with ADHD did not necessitate any

comparisons between cultural groups, but rather, comparisons between a clinical and a normal population.

c) Socioeconomic Status (SES)

Research has found that SES differences influence performance on a variety of measures for children from all cultural groups (Allan, 1988, 1992; Barnard, 2000; Bhamjee, 1991; Knoesen, 2003, Schröder, 2004). This is due to the fact that children from the different SES groups have different opportunities and access to both social and educational facilities (Schröder, 2004). Consequently, this variable was controlled for in the present study and was used when matching the two samples.

The SES of the subjects was determined by using Riordan's (1978) socioeconomic classification system. Riordan (1978) set boundaries for upper, middle and lower classes for South African White, Black, Coloured and Asian population groups, based on the family breadwinners' educational achievements and occupational status. Foxcroft (1985) suggested that educational level provides a far more reliable indicator of socioeconomic status than does the level of income, since the former is less likely to evoke the emotional responses that questions concerning income might.

The first variable, education, is considered important, as a high correlation is reported between the education of the head of the house, family income and occupational status of the head of the house (Dohrenwend, 1973). The primary caregivers of the children with ADHD were required to record their highest educational standard on the biographical questionnaire, and this was then converted to a numerical value according to the system devised by Riordan (1978). This is presented in Table 6. It should be noted that although Riordan's (1978) classification system is fairly dated, it is

the only classification system of its kind available in South Africa, and was therefore the most useful way of obtaining the necessary information.

Table 6: Riordan's classification of breadwinner's education

Breadwinner's education	<i>Score</i>
University attendance	7
Post-matric training (not university)	6
Matric	5
Apprenticeship	4
Junior certificate	3
Primary school	2
None at all	1
No response	0

The second variable, occupation, was determined by assigning Riordan's (1978) numerical value to each occupation. This occupational scale is presented in the table below.

Table 7: Riordan's classification of breadwinner's occupation

Occupational classification	<i>Score</i>
Top professional, executive, administrative and technical occupations	9
Professional, administrative and managerial workers	8
Independent commercial	7
Lower grade administrative, technical, clerical with limited supervisory and administrative responsibility	6
Artisans and skilled workers with trade qualifications	5
Routine clerical and administrative workers, service and sales workers	4
Semi-skilled production and manual workers	3
Unskilled production and manual workers	2
Not economically active or productive	1
No response	0

The boundaries set by Riordan (1978) for the upper, middle and lower socioeconomic levels were set arbitrarily since the Population Consensus of 1970 yielded a vastly discrepant representation of the different cultural groups in terms of occupational, educational and income categories. Since there seemed to be no other way of establishing social class boundaries in the cultural groups involved in the present study, Riordan's cut-off points for determining socioeconomic class were used. These are presented in the table below.

Table 8: Riordan's classification of socioeconomic status

	Lower	Middle	Upper
Black	2-5	6-10	11-16
Coloured	2-6	7-10	11-16
Indian	2-6	6-10	11-16
White	2-10	11-13	14-16

The SES was controlled for in the present study by matching the mean numeric values assigned to the parental educational and occupational levels of both the ADHD and the normal samples.

It is however difficult to identify all the variables that may influence a child's development. Variables such as the type and severity of ADHD, the existence of co-morbid conditions and the type of intervention received, all impact on the outcome of the child's development. These factors could not practically be controlled for in the present study, and therefore need to be acknowledged as limitations to the study. However, certain variables, as outlined in this section, were held constant and therefore contributed to the validity of the study.

5.5 Participants

5.5.1 Sampling Procedure

A non-probability, purposive and convenience sampling method was employed in identifying children to be tested. In non-probability sampling, the probability of any particular member of the population being selected is not known (Cozby, 1989). The disadvantage of non-probability sampling is that due to the fact that the probability that an individual will be selected is not known, the researcher cannot generally claim that the sample is representative of the larger population. This information limits the researcher's ability to generalise the research findings beyond the specific sample being studied. Furthermore, the researcher cannot estimate the sampling error. On the other hand, the advantage of non-probability sampling is that it is far less complicated, more economical, and can be conducted so as to take advantage of available subjects without the statistical complexity of a probability sample.

A purposive sampling method was also applied to identify suitable children to be assessed. Purposive sampling is "where the procedures are directed towards obtaining a certain type of element", for example, structuring the sample so that only certain populations or groups are included in it (Dane, 1990, p. 12). Purposive sampling was employed, as the researcher's own judgement was used regarding which subjects to select and only those who met the objectives of the study were selected to partake in the study (Siraj-Blatchford & Siraj-Blatchford, 2002). In the present study, this related to the researcher selecting children between the ages of 5 and 7, who had been diagnosed with ADHD and were on medication for the disorder, and excluding those children who did not meet these inclusion criteria.

The advantage of the above-mentioned sampling is that the researcher's skill and knowledge in selecting subjects is employed. The disadvantage of such sampling on the other hand, is that external validity is not obtained, as the sample may not be representative of the population and the results may therefore be biased (Graziano & Raulin, 2000). However, as this study is descriptive and exploratory in nature, external validity was not of key importance and purposive sampling was utilised. The sample in the present study comprised 76 children, namely, 38 children diagnosed with ADHD and 38 'normal' children. A definition of the two groups follows.

5.5.2 ADHD Sample

The ADHD sample comprised 38 South African children with ADHD (ages 5-to-7 years old) who were on stimulant medication for the disorder and who attended pre- or primary schools in the Nelson Mandela Metropole. The age group (5-to-7 years old) was chosen, as children are more likely to have been diagnosed by this age, as they have been observed in a formal setting for the first time. The researcher's decision to assess the sample whilst on stimulant medication for ADHD was made in order to gain a more realistic profile of the children's optimal performance, as medication is, for these children, a part of their every school day.

At the outset of the study, it was assumed likely that the sample would comprise more males than females, due to the incidence of ADHD being higher amongst males (Barkley, 1998). It was also anticipated that these children would be from a middle to upper socioeconomic class. This assumption was made because these children are often identified and diagnosed earlier than children having a lower socioeconomic class as they have easier access to health care services and medication. These assumptions

were confirmed, as 58% of the ADHD sample comprised males, whilst only 42% were female. Furthermore, 68% of the ADHD children in the sample were from a middle or upper socioeconomic background as specified by Riordan's (1978) classification system, whilst only 32% were from a lower socioeconomic background.

The formal inclusion criteria for the subjects in this study were as follows.

- a) A child (aged 5-to-7 years old) who had received a diagnosis of ADHD by a medical professional. Children younger than this were not selected, as it was less likely that an accurate, confirmed diagnosis of ADHD would have been made with younger children who had not yet started formal schooling.
- b) All children included in the sample were on medication for this disorder. The decision to assess children whilst on medication was made so that the children had optimal concentration during the assessment and consequently a higher level of performance, which was a more accurate reflection of their abilities, as the children in the sample use medication for each school day. To assess the children if medication was withheld, would not constitute an accurate assessment of their performance and would negatively affect the results they obtained. In order to eliminate a potentially confounding variable, the decision was made that only children being pharmacologically treated for ADHD would be included in the sample. The type of medication used was specified by the parents in the biographical questionnaire.
- c) Evidence of ADHD had to be noted on the Conners 39 Item Teacher Rating Scale. This checklist completed by the teacher, was done in order to ensure that the children being tested actually had a diagnosis of ADHD, and not a behavioural problem. These additional measures were put in place because as was discussed in Chapter 2, though children are born with ADHD, medication is

- often only administered at school-going age, and some children in the sample were in pre-school.
- d) The child had to be attending an urbanised, institutional setting such as a pre-school or primary school.
- e) The child could have any subtype of ADHD but the suspected type had to be specified by the paediatrician after a thorough history had been gathered from the parents, and by the researcher after marking the Conners 39 Item Teacher Rating Scale.

Table 9 below depicts the ADHD sample breakdown in terms of age, gender, cultural group, socioeconomic status and type of ADHD.

Table 9: ADHD sample breakdown in terms of age, gender, cultural group, socioeconomic status and type of ADHD

	ADHD Sample (N = 38)
Mean Age Range	84.56 months
Gender:	
Male	22 (57.9%)
Female	16 (42.1%)
Cultural Group:	
Black	2 (5.3%)
White	33 (86.8%)
Coloured	3 (7.9%)
Asian	0 (0%)
Socioeconomic status:	
Upper	16 (42.1%)
Middle	10 (26.3%)
Lower	12 (31.6%)
Type of ADHD:	
Inattentive Type	8 (21.1%)
Hyperactive-Impulsive Type	10 (26.3%)
Combined Type	20 (52.6%)

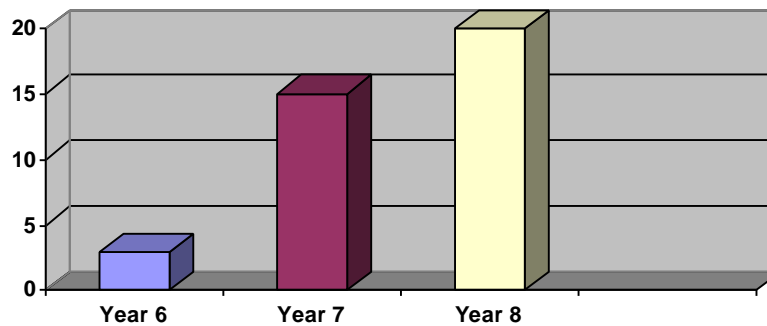
The following graphs illustrate the demographic breakdown of the sample in terms of age, gender, cultural group, socioeconomic status and type of ADHD.

a) Age

The mean age of the ADHD sample was 84.57 months (standard deviation of 8.09 months), with a minimum age of 68.9 months and a maximum age of 95.1 months.

The graph below depicts the breakdown of the sample into the various year groups.

Figure 2: Sample breakdown in terms of year groups

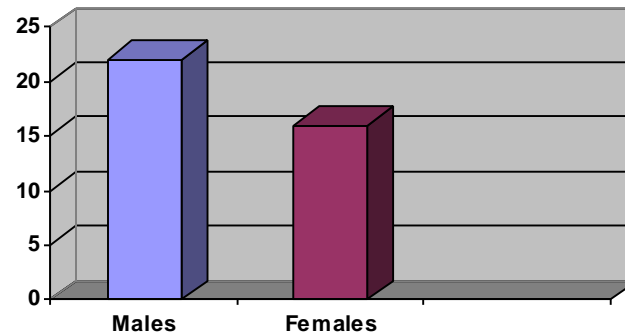


A possible reason for this kind of spread, with few young children in the sample, is that children are often only diagnosed with ADHD when they start formal schooling. Another possible reason that there were so few children in the 6 year age group, is that pharmaceutical companies seldom take responsibility for administering stimulant medication to children with ADHD under the age of 6 years old. As stimulant medication is used to assist in the learning process, many parents prefer not to give their young children who are not of school going age, this type of medication.

b) Gender

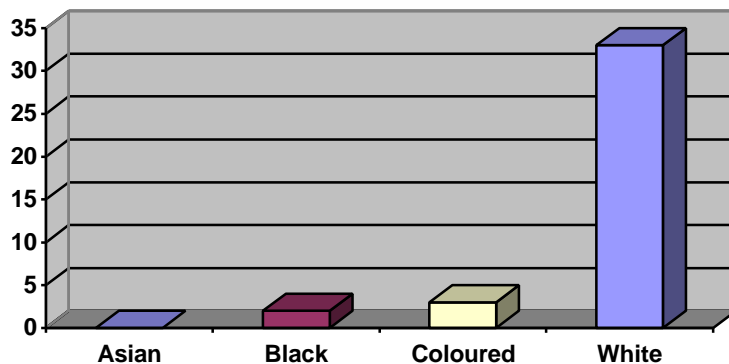
More males (N = 22) than females (N = 16) were included in the sample. Figure 3 graphically illustrates the sample breakdown in terms of gender.

Figure 3: Sample breakdown in terms of gender



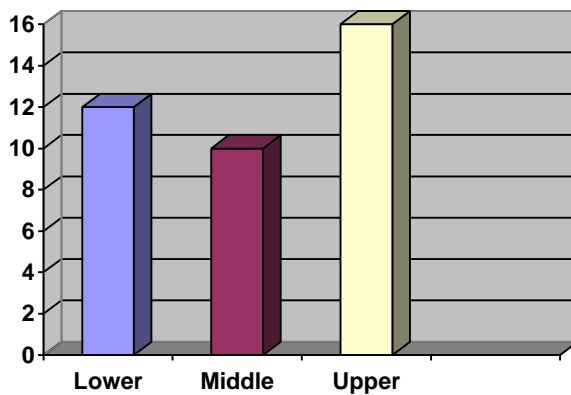
c) Cultural Group

Achieving an equal distribution for the cultural groups proved to be difficult, as a purposive and convenient sampling method was employed and all children who met the inclusion criteria were included in the sample regardless of cultural group. Though no comparisons between cultural groups were made in the present study, and though culture has not been found to be a variable which significantly affects performance on the GSMD, the unequal distribution of cultural groups will have to be taken into account when interpreting or generalising the results, as the majority of the sample consisted of White children. Figure 4 depicts the sample in terms of cultural groups.

Figure 4: Sample breakdown in terms of cultural groups

d) Socioeconomic status

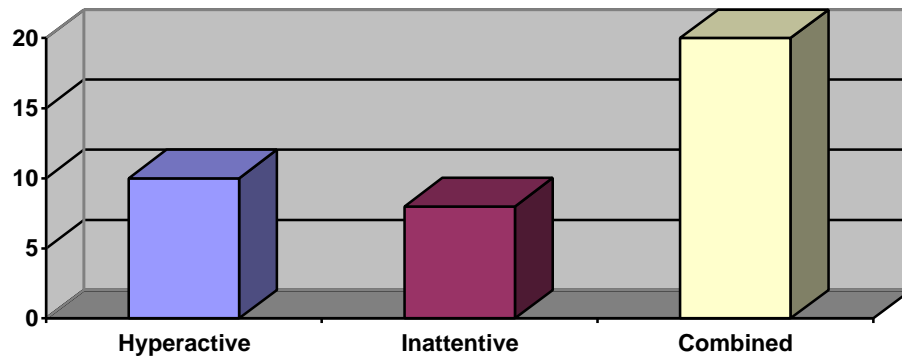
The SES of the sample comprised 32% of children from a lower socioeconomic class, 26% of children from a middle socioeconomic class, and 42% of children from an upper socioeconomic class. Figure 5 below provides a graphic representation of this distribution.

Figure 5: Sample breakdown in terms of socioeconomic status

e) Type of ADHD

As previously mentioned, children with any subtype of ADHD were included in the sample, but their subtypes needed to be specified. The sample comprised 26% of children with the Hyperactive-Impulsive Type of ADHD, (the restless and fidgety type), 21% with the Inattentive Type of ADHD (the daydreaming type), and 53% with the Combined Type of ADHD (where criteria for both aforementioned types are met). Figure 6 provides a graphic illustration of this breakdown.

Figure 6: Sample breakdown in terms of type of ADHD



5.5.3 Normal Sample

A matched sample of 38 normal children (aged 5-to-7 years old) was included in the study in order that the ADHD sample's developmental profiles could be meaningfully compared. Normalcy has been broadly defined as: "...an absence of any sensory, physical or mental handicap" (Luiz et al., 2000, p. 14). The sample was obtained from an existing database in the Psychology Department at the University of Port Elizabeth,

which was established during the revision process of the Extended Griffiths Scales. The database consists of children at crèches, pre-schools and schools who have been screened for normalcy by means of a comprehensive biographical questionnaire which had been developed for the revision study, as well as by a neurological checklist, which assesses if birth and development are in the normal range (Luiz et al., 2002). Table 10 below provides a summary of the two matched samples.

Table 10: Matched sample breakdown of the ADHD and normal sample in terms of age, gender, cultural group and socioeconomic status (N = Number)

	Normal Sample	N	ADHD Sample	N
Age:	Year 6	3 (7.9%)	Year 6	3 (7.9%)
	Year 7	15 (39.5%)	Year 7	15 (39.5%)
	Year 8	20 (52.6%)	Year 8	20 (52.6%)
Gender:	Male	22 (57.9%)	Male	22 (57.9%)
	Female	16 (42.1%)	Female	16 (42.1%)
Cultural Group:	White	33 (86.8%)	White	33 (86.8%)
	Black	2 (5.3%)	Black	2 (5.3%)
	Coloured	3 (7.9%)	Coloured	3 (7.9%)
SES:	Lower	12 (31.6%)	Lower	12 (31.6%)
	Middle	10 (26.3%)	Middle	10 (26.3%)
	Upper	16 (42.1%)	Upper	16 (42.1%)

5.6 Assessment Measures

5.6.1 Biographical Questionnaire

In order to gain additional information regarding birth history, living conditions, physical, mental, behavioural and social development as well as medical history, the child's parents or guardians completed a biographical questionnaire (See Appendix D). This information assisted the researcher in obtaining a more holistic picture of the child. Such information enriched the interpretation of results.

5.6.2 Conners 39 Item Teacher Rating Scale

Each participant was initially screened using the Conners 39 Item Teacher Rating Scale. The Conners form comprises a 39 item checklist of behaviours and difficulties commonly experienced by children with ADHD. Behaviours measured on this scale include daydreaming, hyperactivity, aggression and conduct problems. Each child's teacher completed the form by indicating the number of symptoms the child was presenting. A score above a certain cut off point on the Conners 39 Item Teacher Rating Scale, combined with a diagnosis of ADHD from a medical professional, based on the criteria for ADHD in the Diagnostic and Statistical Manual of Mental Disorders, confirmed the presence of the disorder in the clinical sample.

5.6.3 GMDS-ER

The GMDS-ER was administered to all of the participants, namely the ADHD and the normal sample. As was discussed in Chapter 4, individual mental ages and subquotients for each of the six subscales as well as the total mental age (MA) and general quotient (GQ) was obtained. Based on the subquotient score, the performance of the child was interpreted according to the rating system depicted in the following table.

Table 11: Subquotient categories for the general quotient and the six subscales

	Level of Development						
	Very superior	Superior	Above average	Average	Below average	Far below average	Borderline
GQ	138.9+	126-138.8	113.1-125.9	87.4-113	64.1-81.9	46.2-64	<46.1
AQ	149.5+	133.2-149.5	116.8-133.1	84.1-116.7	67.7-84.0	51.3-67.6	<51.2
BQ	149.2+	132.9-149.1	116.6-132.8	84.1-116.5	67.8-84.0	51.5-67.7	<51.4
CQ	153.5+	135.6-153.4	117.7-135.5	82-117.6	64.1-81.9	46.2-64.0	<46.1
DQ	147.6+	131.9-147.5	116.2-131.8	84.9-116.1	69.2-84.8	53.5-69.1	<53.4
EQ	151.8+	134.5-151.7	117.2-134.4	82.7-117.1	65.4-82.6	48.1-65.3	<48.0
FQ	152.3+	134.8-152.2	117.3-134.7	82.4-117.2	64.9-82.3	47.4-64.8	<47.3

5.6.4 Measures Used in Collecting the Normal Sample

As previously mentioned, to facilitate the collection of information from the normal sample which was established during the revision of the Scales, a biographical questionnaire and a neurological checklist were used. The biographical questionnaire, directed at the child's parents, gleaned information on the child's developmental history and socioeconomic status. The neurological checklist was included in order to obtain specific information regarding the child's birth and developmental history. Only children who were considered to have a normal birth and developmental history were included in the normal sample.

5.7 Procedure

In 1994, the ARICD appointed Prof Luiz as project director to revise and restandardise the Griffiths Scales. Permission was granted by the Ethics Committee of the University of Port Elizabeth to assess children on the Scales. At first, children from various cultural groups who were classified as being normal, were assessed. A further objective of the restandardisation process was to determine the effectiveness of the Griffiths Scales on clinical populations. Assessing a sample of ADHD children thus fell under the larger project of revising and restandardising the Scales. Permission was granted by the Department of Education in the Eastern Cape, as well as the principals of selected local pre-schools and primary schools to assess children with ADHD using the GMDS-ER.

Once the principals of the schools had identified children in their schools who met the inclusion criteria of the study, the parent(s) of the children with ADHD were contacted and their written consent was gained to assess their children. The parents were asked to complete the biographical questionnaire in which specific questions relating to the course of their child's development and diagnosis were explored. All data was treated as strictly confidential, and no costs were incurred by the parents for the developmental assessment. The children were also assessed on the Conners 39 Item Teacher Rating Scale, whilst on their medication, by their respective class teachers.

Psychologists in training and intern psychologists studying at the University of Port Elizabeth who had completed a Users Training Course as prescribed by the Association for Research in Infant and Child Development (ARICD) were trained on the

GMDS-ER. The testers then assessed the children with ADHD on the GMDS-ER at the various schools. The assessments took place in designated rooms at the schools in order to minimise the disruption to the child's school day as much far as possible.

The testers scored the protocols and then returned them to a registered psychologist at the University of Port Elizabeth for checking. Once the protocols were checked, the data was captured and statistically analysed. The capturing and statistical analysis of the data was conducted by the South African Griffiths Research Team appointed by the International ARICD based in Britain.

Individual reports on each child assessed on the GMDS-ER were then written by the testers and checked by a registered psychologist before being sent to the principals of the schools, the Special Needs Section of the Department of Education in the Eastern Cape in Port Elizabeth, as well as to the parents' of the participants. It is envisaged that upon completion of the study each of the identified schools will receive a summary of the research results and findings, and the Department of Education will receive a copy of the treatise.

5.8 Data Analysis

The data was analysed according to the specific aims of the study. Descriptive statistics were employed to describe the ADHD sample's performances on each of the six subscales of the GMDS-ER as well as the General Quotient (GQ). The mean was used to describe the average of the sample's performance on the assessment measure and to indicate the centre of the scores, whilst standard deviations were used to

describe the dispersion of the scores around the centre. The range (indicating the highest and lowest scores) served to enrich the description of the profile.

The biographical details of the sample (for example, age, socioeconomic class and gender), as well as the classification of the sample's performances were summarised using descriptive statistics. After which a profile depicting the children's performance on each of the subscales was constructed using average subquotients.

A matched t-test was used to compare the ADHD sample to the normal sample on the GQ. This enabled the researcher to assess whether the ADHD sample differed significantly from the sample of 'normal' children of the same age, gender and socioeconomic status. This t-test is easily applied, commonly used and useful when wanting to test the difference between two groups (Graziano & Raulin, 2000). However, a t-test can only be used to compare two groups on one variable, which, in this case, was the GQ. As the GQ is a summary of the six subscales, any large discrepancy in one of the subscales could cause the overall GQ to differ significantly for the two groups. A post hoc analysis was then conducted to identify on which of the six subscales the discrepancy may have been.

A Hotellings T^2 was then used to compare the subscales of the two groups and to provide a p value for each. A Hotellings T^2 was employed as it mitigates against making a Type I error that usually results from the performance of a number of sequential t-tests on the same data. Once a p value had been obtained for each Scale, a conclusion could be drawn as to whether or not a significant difference existed between the ADHD sample and the normal sample on each of the subscales, or whether there were only one or two subscales that differed significantly. With a Hotellings T^2 , the six subscales could be

compared in one analysis, thereby enabling one to draw conclusions as to whether or not a difference existed between the ADHD and the normal sample.

5.9 Ethical Considerations

The primary purpose of ethical principals and values is to protect the welfare and rights of research participants and to reflect the basic ethical values of respect for individuals, beneficence and justice (Ethics in Health Research in South Africa, 2000). The following ethical principals were considered and upheld throughout this study.

The ethical principle of respect and dignity was observed throughout the study, for example, children were assessed in their home language. The ethical principle of conducting relevant research was also upheld in this study, as the present study contributed to the definition of a developmental profile of children with ADHD on the GMDS – ER, and in identifying the developmental strengths and weaknesses of these children which may be of use in developing intervention strategies or remedial programmes. This information is especially relevant in the face of inclusive education where the burden to address problems falls mainly on the educator. Other contributions of the study will be highlighted in the conclusions cited in Chapter 7.

The present study also observed the principle of scientific integrity by reflecting a sound methodology, and has the prospect of answering pertinent questions regarding the development of children with ADHD. Another important ethical principle is that of informed consent. In the present study, informed consent was obtained in writing from the parents of the participants before the research commenced (See Appendices). Additionally, the parents or children had the right to withdraw from the research. Consent

to conduct the study was also obtained from the Department of Education and the principals of the schools.

Research participants have a right to both privacy and confidentiality. This ethical principle was also upheld throughout the study. Out of respect for the privacy of the participants, confidentiality was stressed in the consent forms. All the data was treated with confidentiality by ensuring that no identifying material was disclosed to anyone who was not authorised by the ethics committee to have access to it.

It is essential that the recruitment, selection, inclusion and exclusion of research participants in a research study are fair and just, and based on ethical and scientific principals. In the present study, all children who met the inclusion criteria were included in the clinical sample, while all children who were defined as having a normal development were included in the normal sample of the study. Thus the principle of just inclusion criteria was observed in this study.

The ethical principle of transparency was observed by sharing the research findings as well as individualised recommendations with the participants' parents after the data had been analysed, so that they could benefit from the research. The principals of the selected schools and the Special Needs Section of the Department of Education in the Eastern Cape will also receive a report of each of the children assessed, summarising the child's performance on the Revised Griffiths Scales and making appropriate recommendations. The results of the study have been written up in the form of a treatise and will be available in the Nelson Mandela Metropolitan University library, as well as at the Special Needs Section of the Department of Education in the Nelson Mandela Metropole.

5.10 Chapter Overview

This chapter provided an overview of the problem formulation and primary aims of the study, and outlined the research methodology most appropriate to meet the aims of the study. An exploratory descriptive method, accompanied by a between groups comparison, using a variation of a matched groups design, was regarded as the most suitable to explore and describe the sample's performance on the subscales of the GMDS-ER, and then to compare the performance of the ADHD sample to that of the normal sample. Descriptive statistics were chosen as the data analysis method of choice. The results obtained from the data analysis are presented and discussed in the following chapter.

CHAPTER SIX: RESULTS AND DISCUSSION

6.1 Introduction

This chapter will present the empirical findings of the study in terms of:

- a) the ADHD sample's overall performance on the GMDS-ER;
- b) the ADHD sample's performance on each Subscale of the GMDS-ER; and
- c) a comparison of the performance of the ADHD children and their counterparts in the normal sample.

6.2 Overall Performance of the ADHD Sample on the GMDS-ER

The mean General Quotient (GQ) obtained by the ADHD sample on the GMDS-ER is above average (\bar{X} GQ = 129.8). Recent studies have revealed that a 'normal' GQ falls in the range of 105 – 115 (Knoesen, 2003). The ADHD sample's mean of 129.8 is thus higher than the normal range. It also falls in the upper limit of the above average cut-point. On general performance (GQ), the minimum score recorded was 88.0 whilst the maximum score was 162.0, thus indicating a range of 77.0. This high range with very high and very low scores would smooth the mean performance of the sample out to reflect a more average performance, although individual children appeared to show differential performance. It should be noted that large ranges in performance were observed across the Subscales. Table 12 provides a summary of the ADHD sample's GQ in terms of descriptive category breakdown.

Table 12: The General Quotient of the ADHD sample in terms of descriptive categories

Category	Number of Total Sample	Percentage of Total Sample
Very Superior	7	18.4
Superior	14	36.8
Above Average	9	23.7
Average	8	21.1

Overall, the majority of the sample ($n = 14$) achieved a superior GQ on the GMDS-ER, whilst 7 children attained a very superior GQ and 17 children fell in the average to above average range.

Table 13 indicates the mean developmental sub-quotients for the sample on the GMDS-ER.

Table 13: Mean developmental sub-quotients for the ADHD sample

Griffiths Subscales	Mean	Performance Categorisation	Minimum	Maximum	Range	SD
GQ	129.8	Above Average	88.0	162.0	74.0	17.9
AQ	129.7	Above Average	95.0	153.0	58.0	11.5
BQ	128.2	Above Average	78.0	158.0	80.0	18.6
CQ	125.0	Above Average	77.0	163.0	86.0	16.5
DQ	89.6	Average	52.0	122.0	70.0	19.0
EQ	126.4	Above Average	79.0	168.0	89.0	17.7
FQ	135.8	Superior	81.0	178.0	97.0	26.7

As the table illustrates, results on the Locomotor ($\bar{X} A = 129.7$), Personal-Social ($\bar{X} B = 128.2$), Hearing and Speech ($\bar{X} C = 125.0$) and Performance ($\bar{X} E = 126.4$) Subscales reveal above average performance. Results on the Practical Reasoning Subscale ($\bar{X} F = 135.8$) reveal superior performance, whilst results on the Eye and

Hand Co-ordination Subscale ($\bar{X} D = 89.6$) reveal average performance. The largest range was found for the Practical Reasoning Subscale (97.0), which is probably due to the heterogeneous nature of the ADHD sample.

The mean sub-quotients attained by the ADHD sample for the Locomotor ($\bar{X} A = 129.7$), Personal-Social ($\bar{X} B = 128.2$), Hearing and Speech ($\bar{X} C = 125.0$) and Performance ($\bar{X} E = 126.4$) Subscales were all relatively even in profile, with a range of 4.7 between the sub-quotient means for these Subscales. This suggests that having a diagnosis of ADHD may not differentiate a child's performance on these Subscales.

The highest sub-quotient attained by the ADHD sample was for the Practical Reasoning Subscale ($\bar{X} F = 135.8$). This good performance may be attributed to the structured nature of the items on this particular Subscale, which defer the child from becoming distracted. It should be noted that many of the children in the sample were in their eighth year and had already started school. This is relevant as it means that many of the children had had practice working in a structured school environment and within time constraints. This practice may have had a positive influence in their test performance under similar structured conditions.

It is also possible that this was one of the Subscales on which the children ran out of test items, due to their age, as the GMDS-ER only contains items up until and including year eight. This results in many of the older children not failing six consecutive items and therefore not reaching a ceiling, resulting in artificially inflated scores.

The ADHD sample performed poorest on the Eye and Hand Co-ordination Subscale ($\bar{X} D = 89.6$). This was anticipated due to the fact that this Subscale comprises differing visual perceptual, visual spatial and visual motor tasks, and visual perceptual difficulties are often a co-morbid condition with ADHD.

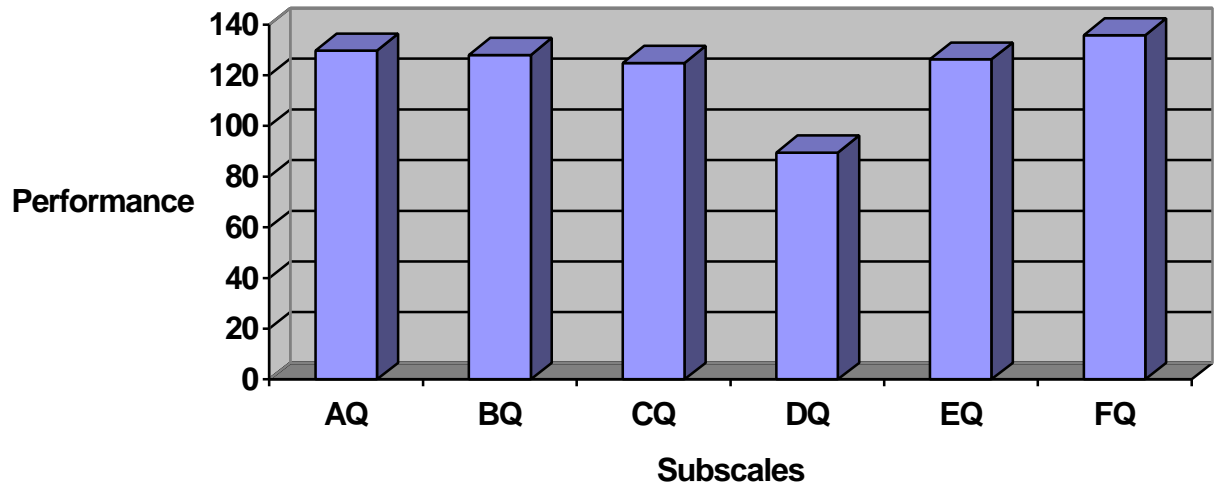
In the present study a difference between the highest ($F = 135.8$) and lowest ($D = 89.6$) developmental sub-quotients was approximately 46 points. However, as discussed in Chapter 4 Lister (1981) found that a substantial number of developmental profiles have been characterised by marked irregularity, and that studies on clinical populations had found that differences between the highest and lowest developmental quotients were approximately 16 points or more. Luiz (1988d) found that 32% of the South African children tested tended to have a difference of 31 – 45 points between their lowest and highest scores. The large difference found on the ADHD sample therefore need not be of concern. Table 14 illustrates the difference between the highest and lowest scores for British and South African samples.

Table: 14: Differences between the highest and lowest scores for the British and South African samples studied by Lister (1981) and Luiz (1988d) respectively, expressed as percentage

Sample	Differences between the highest and lowest scores, expressed as a percentage						
	1-15	16-30	31-45	46-60	61-75	76-90	91-105
British %			14	16	10	0	9
South African %			32	17	5	1	0

Figure 7 is a graphically presented profile, depicting the mean performance of the ADHD sample on each of the six Subscales using average subquotients.

Figure 7: Griffiths developmental profile of the ADHD sample on the GMDS-ER.



6.3 Performance of the ADHD Sample on each of the Six Subscales of the GMDS-ER

6.3.1 Performance of the ADHD Sample on the Locomotor Subscale (Subscale A)

Descriptive data indicated that the mean performance for the sample on this Subscale was 129.7, reflecting above average performance. The minimum score recorded was 95.0, whilst the maximum score recorded was 153.0, resulting in a range of 58.0. A standard deviation of 11.5 was identified. Table 15 provides a summary of the sample's performance on the Locomotor Subscale in terms of category breakdown.

Table 15: Performance of the ADHD sample on the Locomotor Subscale in terms of category breakdown

Category	Number of Total Sample	Percentage of Total Sample
Average	8	21.1%
Above Average	17	44.7%
Superior	13	34.2 %

The results indicate that the children in the sample appear to be rather well developed in terms of completing locomotor activities. None of the children tested seemed to have significant limitations or difficulties in this area. Whilst children with ADHD tend to be somewhat clumsy with the more refined gross motor skills such as skipping, the majority were quite competent on this Subscale. The majority of the sample (78.9%) obtained scores in the above average and superior categories for this Subscale, with the remaining 21.1% of children in the sample falling in the average range.

6.3.2 Performance of the ADHD Sample on the Personal-Social Subscale (Subscale B)

On the Personal-Social Subscale, the mean performance was 128.2, indicating above average performance. The minimum score was 78.0 whilst the maximum score was 158.0, signifying a range of 80.0. The results point to a standard deviation of 18.6. Table 16 provides a summary of the sample's performance on the Personal-Social Subscale in terms of category breakdown.

Table 16: Performance of the ADHD sample on the Personal-Social Subscale in terms of category breakdown

Category	Number of the Total Sample	Percentage of the Total Sample
Below Average	1	2.6%
Average	9	23.7%
Above Average	9	23.7%
Superior	14	36.8%
Very Superior	5	13.2%

The majority of the sample (84.2%) fell within the average to superior range, indicating that most children were independent in personal-social tasks. Only one child (2.6%) scored below average in this area, whilst five children scored in the very superior

range (13.2%). Initially, the researcher suspected that the sample may have difficulties on this Subscale, due to the socially inept behaviour that children with ADHD often manifest (Hallowell & Ratey, 1995). Such behaviour includes being impulsive, bossy, blurting out things without thinking and being excessively active in situations in which it is inappropriate. Children with ADHD are often shunned by their peers due to such problems with their social judgement and interactions. However, many of the items on the Personal-Social Subscale do not tap peer interaction, and instead, assess a child's level of self-care and independence, as well as his/her knowledge and skills regarding the environment. As these are not inherent areas of difficulty for children with ADHD, the majority of the children in the sample performed in the average to superior range on this Subscale.

6.3.3 Performance of the ADHD Sample on the Hearing and Speech Subscale (Subscale C)

Descriptive data reflects that the mean performance for the Hearing and Speech Subscale was 125.0 which falls in the above average category. The minimum score recorded was 77.0 whilst the maximum score was 163.0, thus presenting a range of 86.0. The results signify a standard deviation of 16.5. The following table reflects the sample's performance on the Hearing and Speech Subscale in terms of category breakdown.

Table 17: Performance of the ADHD sample on the Hearing and Speech Subscale in terms of category breakdown

Category	Number of Total Sample	Percentage of Total Sample
Below Average	1	2.6%
Average	7	18.4%
Above Average	18	47.4%
Superior	9	23.7%
Very Superior	3	7.9%

The majority of the sample (89.5%) fell in the average to superior range, indicating that most of the children in the sample were competent with the tasks on this Subscale. Only one child (2.6%) performed below average on this Subscale, whilst three children (7.9%) performed in the very superior range. The results indicate that the majority of the sample (97.4%) appear to be on par with their chronological development with regards to hearing and speech ability.

6.3.4 Performance of the ADHD Sample on the Eye and Hand Co-ordination Subscale (Subscale D)

The mean quotient on the Eye and Hand Co-ordination Subscale was 89.6 indicating average performance. The minimum score recorded was 52.0 and the maximum score was 122.0, signifying a range of 70. The standard deviation for this Subscale was 19.0. The following table presents the sample's performance on the Hand and Eye Co-ordination Subscale in terms of category breakdown.

Table 18: Performance of the ADHD sample on the Eye and Hand Co-ordinationSubscale in terms of category breakdown

Category	Number of Total Sample	Percentage of Total Sample
Developmentally Delayed	2	5.3%
Borderline	6	15.8%
Below Average	5	13.2%
Average	22	57.8%
Above Average	3	7.9%

Whilst 57.8% of the sample performed in the average range on this Subscale, which indicates that the majority of the sample appear to be on a par with their chronological development with regard to their visual-motor ability, a significant portion of the sample (34.3%) attained scores in the below average to developmentally delayed categories. Research has revealed that attention deficit disorder, hyperactivity, neurological immaturity, brain damage as well as eye problems may be related to specific neurodevelopmental delays in perceptual motor functioning (Ittyerah & Renu, 1997). Research has also shown that perceptual problems are a common co-morbid condition with ADHD (Benn et al., 2003). It is therefore plausible that having ADHD negatively impacted on the children's performance on this Subscale, as only 7.9% of the sample performed in the above average category.

6.3.5 Performance of the ADHD Sample on the Performance Subscale (Subscale E)

Descriptive statistics revealed that the mean performance for the Performance Subscale was 126.4 which reflect above average performance. The minimum score was 79.0 whilst the maximum score was 168.0 indicating a range of 89. The standard deviation was 17.7. The following table reflects the sample's performance on the Performance Subscale in terms of category breakdown.

Table 19: Performance of the ADHD sample on the Performance Subscale in terms of category breakdown

Category	Number of Total Sample	Percentage of Total Sample
Below Average	1	2.6%
Average	7	18.4%
Above Average	12	31.6%
Superior	17	44.8%
Very Superior	1	2.6%

The majority of the sample (79%) performed in the above average to very superior categories, which indicates that the vast majority of the sample appear to be advanced in their visual-spatial ability. Only one child (2.6%) fell in the below average category, whilst seven children (18.4%) performed average. It is possible that the ADHD sample performed well on this Subscale due to the fact that many items are timed and highly structured, which appeals to these children (Barkley, 1997). The challenge of doing items quickly and trying to improve their time on consecutive trials may be seen as exciting to a child with ADHD, which may then foster good performance on this Subscale. Additionally, many of the older children in the sample have had practice with time related activities, as these skills are taught at the beginning of the Grade 1 year in preparation for formal learning. This practice may have contributed to the overall good performance exhibited by the ADHD sample on this Subscale.

6.3.6 Performance of the ADHD Sample on the Practical Reasoning Subscale (Subscale F)

The mean performance for the Practical Reasoning Subscale was 135.8 indicating superior performance. The minimum score was 81.0 whilst the maximum score was 178.0, indicating a range of 97. The standard deviation was 26.7. The table below presents the sample's performance on the Practical Reasoning Subscale in terms of the category breakdown.

Table 20: Performance of the ADHD sample on the Practical Reasoning Subscale in terms of category breakdown

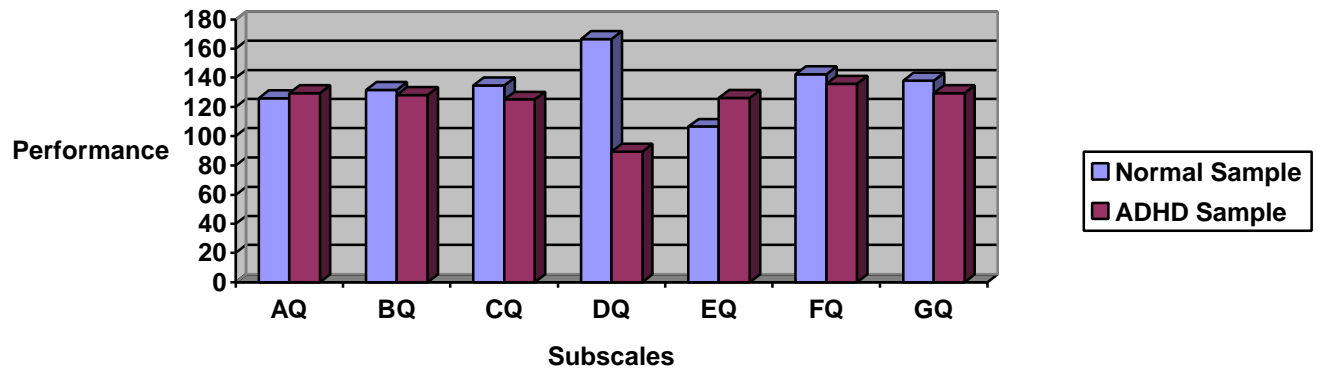
Category	Number of Total Sample	Percentage of Total Sample
Below Average	3	7.9%
Average	5	13.2%
Above Average	7	18.4%
Superior	9	23.7%
Very Superior	14	36.8%

The majority of the sample (78.9%) performed above average to very superior on the Practical Reasoning Subscale. This indicates that that the children in the sample tend to be advanced with regard to their higher order cognitive functioning. Only three children (7.9%) performed below average on this Subscale, whilst five children (13.2%) performed average. The items on this Subscale consist to a large extent of questions and answers. As children with ADHD are usually of average intellectual ability and are able to learn higher order concepts despite having ADHD (Tannock, 1998), the intellectual nature of this Subscale did not pose problems for these children. Again, this Subscale is quite structured, which allows children with ADHD to demonstrate their true ability without becoming distracted. This may account for the higher scores attained on this Subscale.

Another factor, which may account for the high scores attained on this Subscale, is that many of the children being tested were in their 7th and 8th years. As the GMDS-ER only includes test items up to the end of year eight, many of the older children tested on these measures are able to complete all the items on the Subscales and do not reach ceilings on their performance. This leads to inflated scores. As many of the children in the sample were in their 7th or 8th years, many of them did not reach ceilings to their performance and consequently their scores look inflated. This criticism of the GMDS-ER will be further discussed in the following chapter.

6.4 Comparison of the Performance of the ADHD Sample to the Normal Sample

According to the matched samples *t*-test, a significant difference exists between the performance of children with ADHD (\bar{X} GQ = 129.8) and children from the normal sample (\bar{X} GQ = 138.1), $t(37) = 3.263$, $p < 0.01$. The children with ADHD obtained a significantly lower GQ score on the GMDS-ER compared to children from the normal sample. The normal sample had a mean GQ of 138.1 (standard deviation of 16.51), whilst the ADHD sample had a mean GQ of 129.8 (standard deviation of 17.96). Figure 8 provides an illustration of the developmental profiles of the two samples.

Figure 8: The developmental profiles of the ADHD sample and the normal sample

Results of the Hotellings T^2 test, indicated that a significant difference exists between the performance of the ADHD and normal sample on three of the six Subscales, namely, the Hearing and Speech (Subscale C), Eye and Hand Co-ordination (Subscale D) and Performance (Subscale E) Subscales. Table 21 below shows the comparison between the two samples in terms of their mean performance on the GQ and subquotients.

Table 21: A comparison of the ADHD and normal sample's mean performance in terms of GQ and subquotients

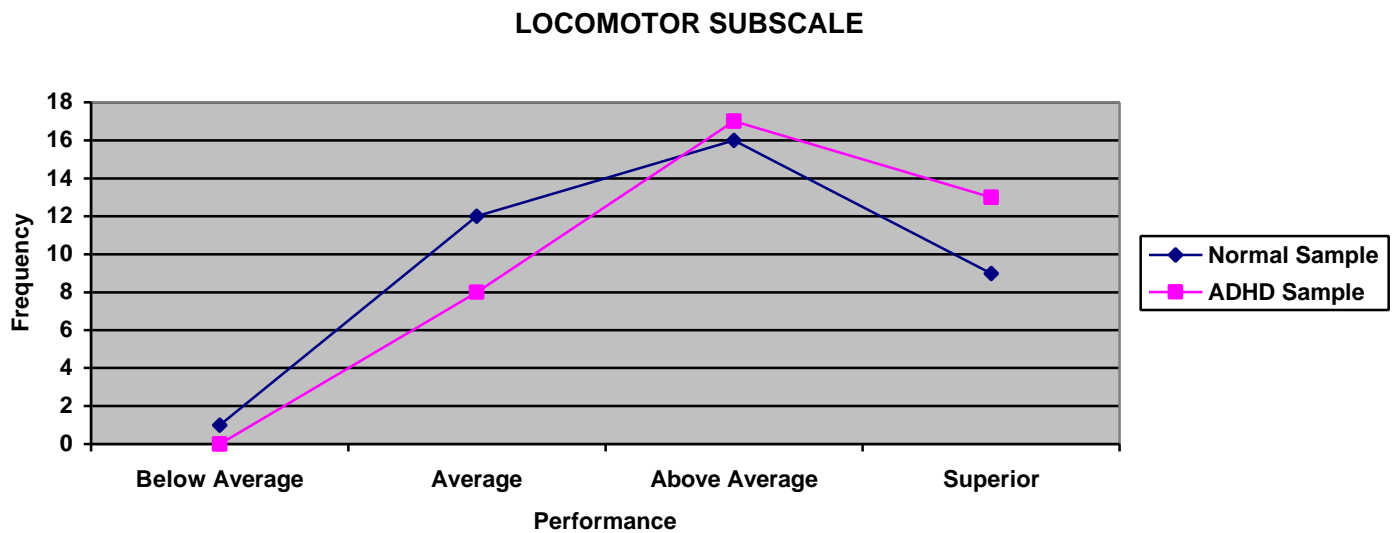
	Normal Sample's Mean	ADHD Sample's Mean
Subscale A	125.8	129.7
Subscale B	131.9	128.2
Subscale C	134.9	125.0
Subscale D	166.6	89.6
Subscale E	106.4	126.4
Subscale F	142.2	135.8
GQ	138.1	129.8

A discussion will now follow on the comparison of the two samples on each of the six Subscales.

6.4.1 Locomotor Subscale

Although descriptive statistics indicate that the ADHD sample ($\bar{X} A = 129.7$) performed better than the normal sample ($\bar{X} A = 125.8$) on the Locomotor Subscale, according to the Hotellings T² test it was not a statistically significant difference [$t(74) = -1.250, p < 0.05$]. The graph below illustrates the performance of the two samples on this Subscale.

Figure 9: A comparison of the ADHD sample and the normal sample on the Locomotor



Key: ADHD Sample: Mean: 129.66 Standard Deviation: 11.5
 Normal Sample: Mean: 125.82 Standard Deviation: 15.1

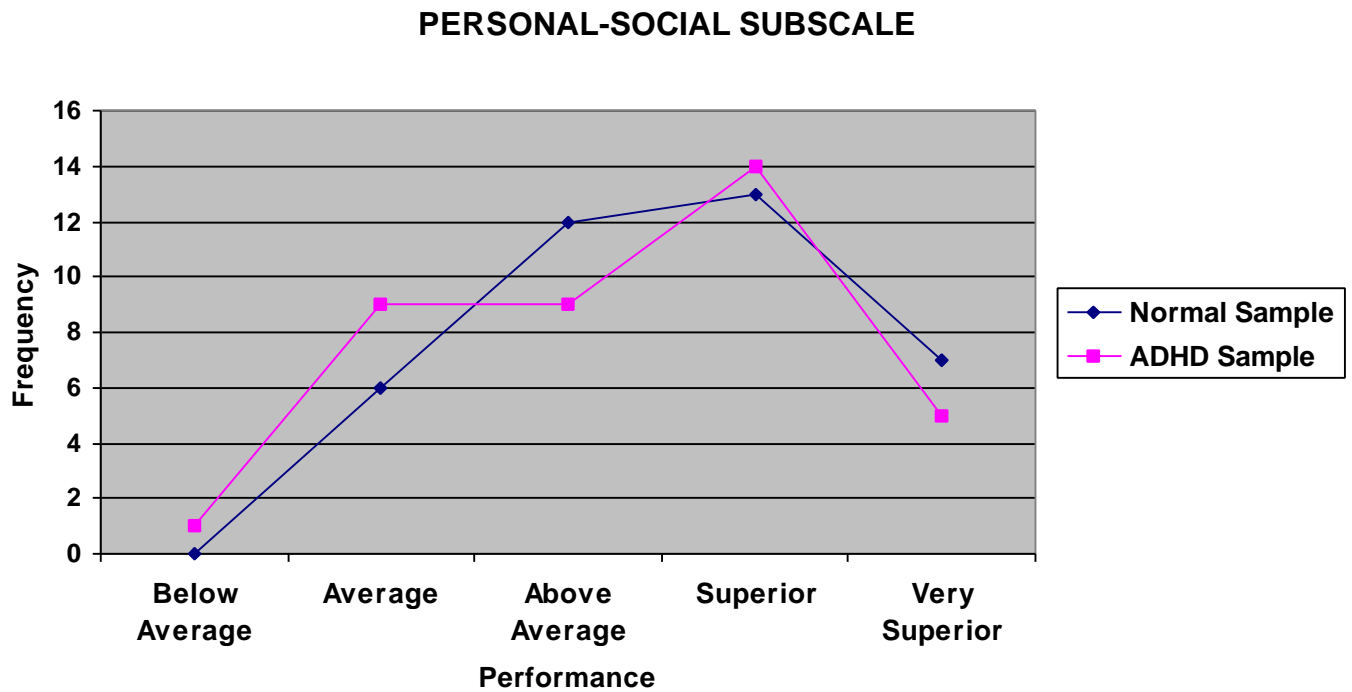
Subscale (N = 38)

Results indicate that 30 of the ADHD children fell in the above average to superior range, compared to the 25 normal children in the same ranges. The ADHD

sample's general good performance on this Subscale may be attributed to the fact that these children tend to avoid pencil and paper tasks preferring opportunities to be physically active.

6.4.2 Personal-Social Subscale

On the Personal-Social Subscale, descriptive statistics indicate that the normal sample ($\bar{X} B = 131.9$) performed better than the ADHD sample ($\bar{X} B = 128.2$), although the Hotellings T^2 test indicated that this difference was not statistically significant [$t(74) = 0.973, p < 0.05$]. The following graph illustrates the performance of the two samples on this Subscale.

Figure 10: A comparison of the ADHD and the normal sample on the Personal-SocialSubscale (N = 38)

Key: ADHD Sample: Mean: 128.16 Standard Deviation: 18.6
 Normal Sample: Mean: 131.90 Standard Deviation: 14.7

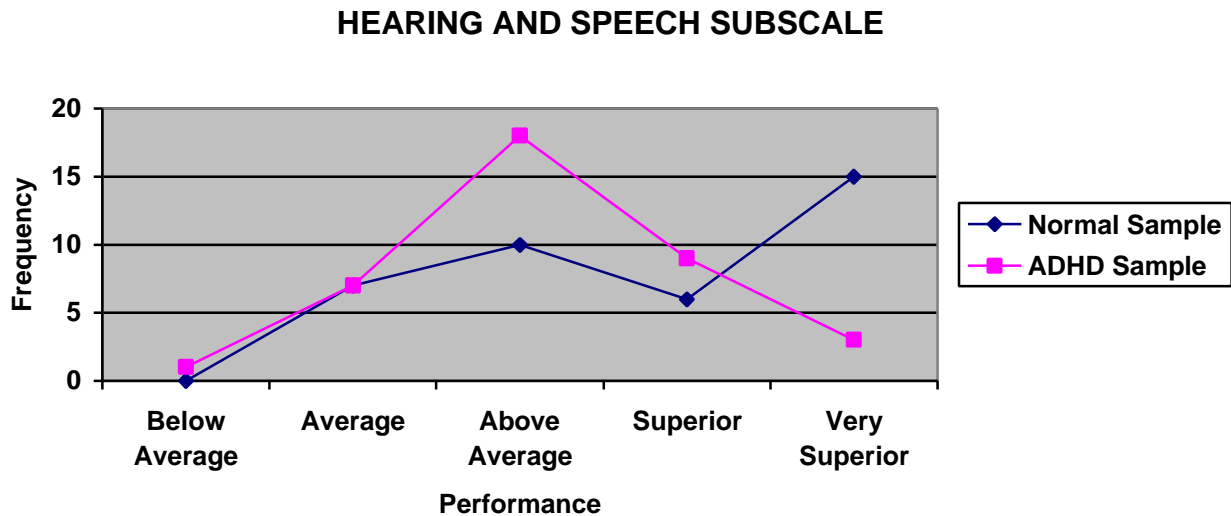
Whilst 32 children in the ADHD sample fell in the average to superior range, compared with 31 in the normal sample in the same ranges, the normal sample had more children performing in the very superior range and the ADHD sample had one child who fell in the below average range. These outlying values caused the overall performance of the normal sample to be better than that of the ADHD sample. As previously mentioned, this Subscale assesses inter alia the child's general knowledge and skills with regards to personal information and self care, as well as his/her functionality within his/her environment. It is plausible that the ADHD sample performed

poorer than the normal sample on this Subscale, due to associated difficulties of ADHD such as clumsiness (which may have prevented the child from being able to perform self care tasks unaided, such as tying shoe laces, or which may make the child an unreliable helper with household tasks). Alternatively, the fact that many of the children in the sample were from a middle to upper socioeconomic class, may mean that they may not need to do household chores themselves, and therefore perform badly because they never practise such skills.

6.4.3 Hearing and Speech Subscale

According to the Hotellings T^2 test, the normal sample ($\bar{X} C = 134.9$) performed significantly better than the ADHD sample ($\bar{X} C = 125.0$) on the Hearing and Speech Subscale, [$t(74) = 2.399, p < 0.05$]. The following graph illustrates the performance of the two samples on this Subscale.

Figure 11: A comparison of the ADHD and the normal sample on the Hearing and Speech Subscale (N = 38)



Key: ADHD Sample: Mean: 125.03 Standard Deviation: 16.5
 Normal Sample: Mean: 134.87 Standard Deviation: 19.2

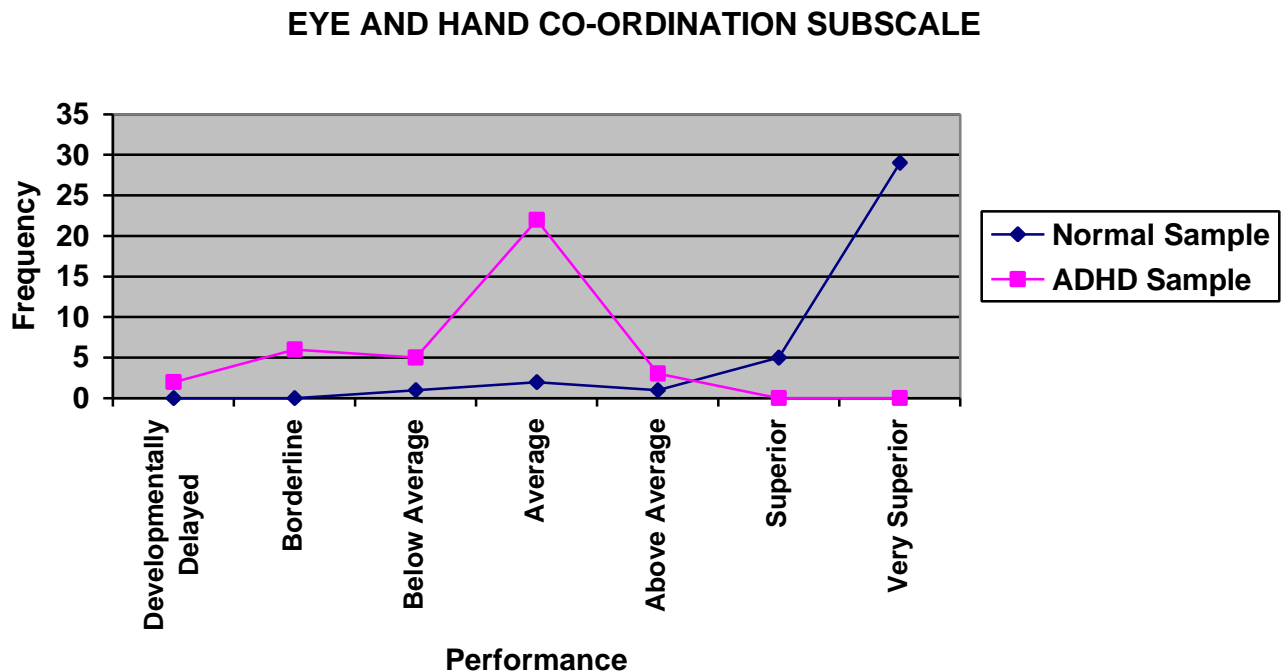
Whilst the ADHD sample had 12 children performing in the superior and very superior ranges, the normal sample had 21 children falling in these categories. The ADHD sample also had 1 child falling in the below average category whereas the normal sample had no children in this category. As discussed in chapter four, the Hearing and Speech Subscale is the most intellectual of all the Subscales. The fact that the ADHD sample performed significantly worse on this Subscale than did the normal sample, may be associated with problems with the arousal and attention unit in these children, and if a problem exists at this level of information processing, the coding of incoming information and the subsequent planning of what to do with that information are negatively affected (Luria, 1966; 1973; 1980). It is therefore possible, that ADHD may negatively affect a

child's information processing abilities, making their performance on the Hearing and Speech Subscale significantly worse than that of normal children. Additionally, many of the items on this Subscale are verbally presented. Children with ADHD are often inattentive, and more so if verbal information is presented without stimulating visual aids. As information in the classroom is usually presented verbally too, this Subscale may give a realistic picture of the level of functioning a child will display in the classroom.

6.4.4 Eye and Hand Co-ordination Subscale

The Hotellings T^2 test revealed that the normal sample ($\bar{X} D = 166.6$) performed significantly better than the ADHD sample ($\bar{X} D = 89.6$) on the Eye and Hand Co-ordination Subscale, [$t(74) = 12.349, p < 0.001$]. The following graph illustrates the performance of the two samples on this Subscale.

Figure 12: A comparison of the ADHD and the normal sample on the Eye and Hand Co-ordination Subscale (N = 38)



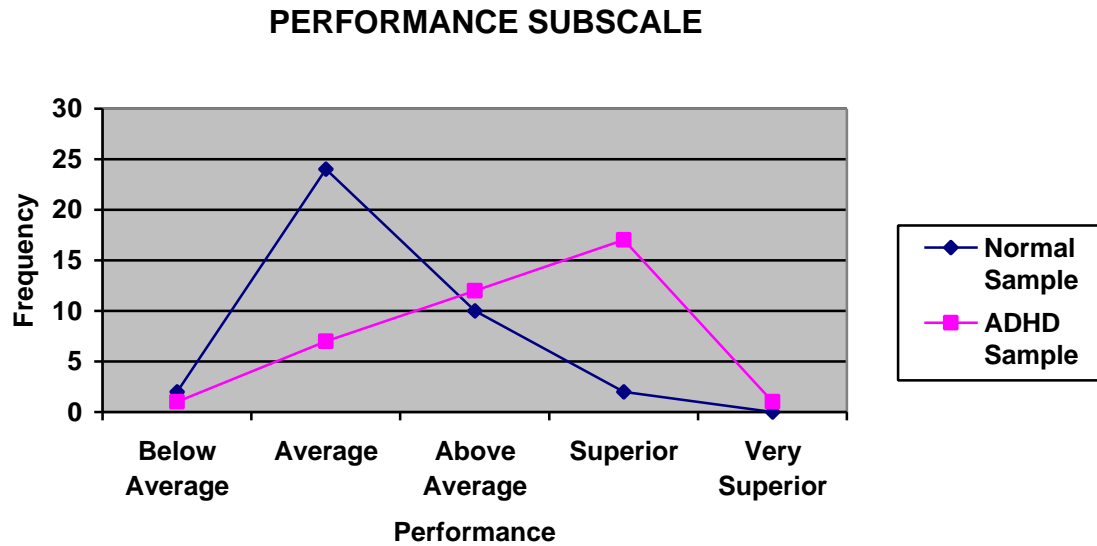
Key: ADHD Sample: Mean: 89.55 Standard Deviation: 19.0
 Normal Sample: Mean: 166.55 Standard Deviation: 33.4

The normal sample had 34 children in the superior and very superior categories on the Eye and Hand Co-ordination Subscale, whilst the ADHD sample had no children in these categories. The ADHD sample had 8 children falling in the borderline to developmentally delayed categories whilst the normal sample had no children in these categories. The largest difference between the two samples in the present study was found on this Subscale. The low scores of the ADHD sample may signify that these children have perceptual processing, visual spatial and visual motor difficulties, as these constructs are tapped by the Subscale. Benn et al. (2003) state that visual-perceptual problems are a common co-morbid condition with ADHD. Having a co-morbid visual-

perceptual problem with ADHD may be one reason the children in the ADHD sample performed poorly on this Subscale. Alternatively ADHD and its associated features may be solely responsible for the children's poor performance. Low muscle tone, poor pencil grip and a reluctance to partake in pencil and paper type tasks are fairly characteristic of children with ADHD (Benn, et. al., 2003). As a result they do not practice these activities often and experience such tasks as difficult. Their pencil and paper work is often messy and these children do not experience success with these types of tasks, which perpetuates their avoidance of them.

6.4.5 Performance Subscale

According to the Hotellings T^2 test, the ADHD sample ($\bar{X} E = 126.4$) performed significantly better than the normal sample ($\bar{X} E = 106.4$) on the Performance Subscale, [$t (74) = -5.226, p < 0.001$]. The following graph illustrates the performance of the two samples on this Subscale.

Figure 13: A comparison of the ADHD and the normal sample on the PerformanceSubscale (N = 38)

Key: ADHD Sample: Mean: 126.40 Standard Deviation: 17.7
 Normal Sample: Mean: 106.42 Standard Deviation: 15.6

A total of 18 children in the ADHD sample performed in the superior and very superior categories, whilst only one child in the normal sample attained a score in the superior category, and no children attained scores in the very superior category. Additionally, 26 children in the normal sample performed in the below average to average categories, whilst only 8 children from the ADHD sample fell into these categories. A possible reason for the better performance of the ADHD sample is that the children's performance was enhanced by the nature of the items on this Subscale. Many of the items on this Subscale are timed and very structured in nature. The child is given clear instructions as to what to do and then timed as he or she performs the task. It is possible that the highly structured nature of the items as well as the excitement

associated with doing items “as fast as you can” appeals to children with ADHD. These children tend to perform better on structured tasks than on unstructured tasks (Barkley, 1997). They also tend to enjoy stimulating activities which include variation. The items on the Performance Subscale include these variables in their administration, with the result being that the children with ADHD performed well on this Subscale.

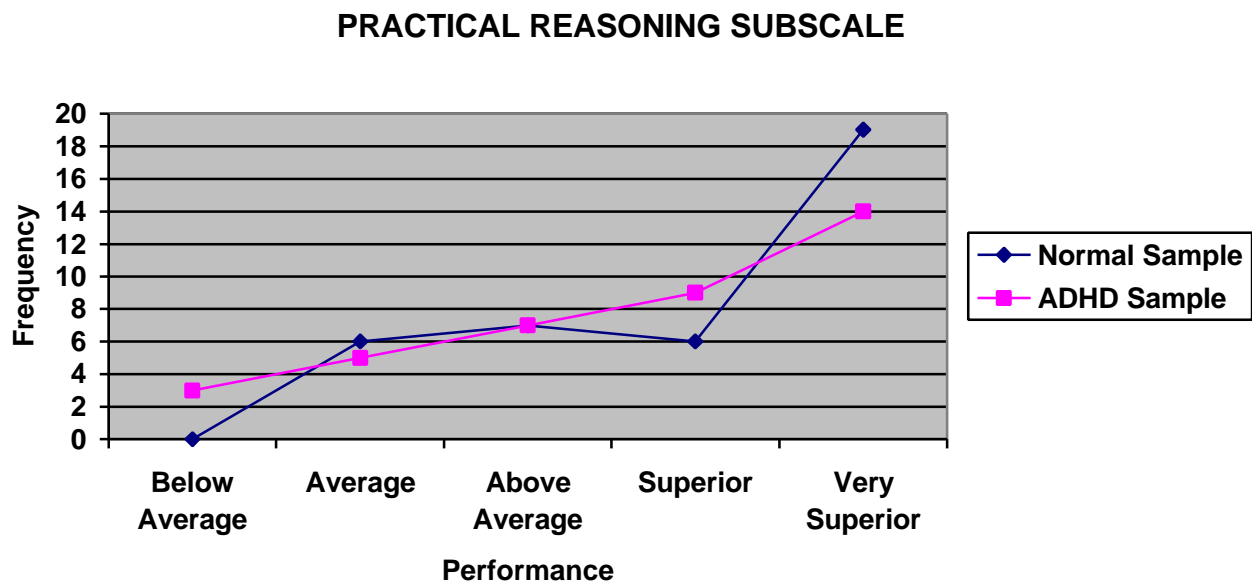
These findings have implications for educators as well as for other professionals involved in treating children with ADHD. If these children learn, and in turn are examined best, by the implementation of certain conditions which minimalise the negative impact of ADHD, both their experience of being in school as well as their general handling will be more positive. By introducing more structure in their learning and in their assessment, educators and other professionals may be able to use the characteristics of their disorder in order to help them, instead of restricting them.

Another reason for the ADHD sample’s good performance on this Subscale may be as a result of the one to one interaction between the child and the examiner in the assessment situation. If the child’s attention drifted during the assessment, the examiner could easily bring the child’s attention back to the task at hand with a verbal prompt or some encouragement. This type of interaction allowed the child to remain focussed and do the tasks to the best of his/her ability. However, in the classroom situation, there are many disruptive influences, and it is not always possible for a teacher to be constantly re-orientating and encouraging one child.

6.4.6 Practical Reasoning Subscale

Although descriptive statistics indicate a difference between the ADHD sample ($\bar{X} F = 135.8$) and the normal sample ($\bar{X} F = 142.2$), the Hotellings T^2 test revealed that the difference was not statistically significant [$t(74) = 1.155, p < 0.05$]. The graph below illustrates the performance of the two samples on this Subscale.

Figure 14: A comparison of the ADHD and the normal sample on the Practical Reasoning Subscale (N = 38)



Key: ADHD Sample: Mean: 135.82 Standard Deviation: 26.7
 Normal Sample: Mean: 142.24 Standard Deviation: 21.5

Results indicate that the normal sample had 19 children who performed in the very superior range, compared to 14 in the ADHD sample. The ADHD sample also had 3 children performing below average whereas the normal sample had no children in this category. These outlying values may have caused the overall performance of the normal

sample to be better than that of the ADHD sample. Had the sample been larger, it is possible that the difference between the two samples may have become statistically significant, but with the relatively small sample size, a statistically significant difference was not achieved. The difference in the ADHD sample's performance may also be attributed to the fact that the Practical Reasoning Subscale assesses higher order cognitive functioning, such as the ability to formulate goal directed plans. This higher order cognitive functioning may be affected by ADHD. This is because, as discussed in Chapter 3, ADHD affects a child's arousal and attention unit, which in turn affects the coding of incoming information and the subsequent planning of what to do with that information (Luria, 1966; 1973; 1980). In this way, ADHD may negatively affect a child's global/overall level of cognitive functioning, as it affects the first in a hierarchical series of information processing units in the brain (Luria, 1966; 1973; 1980).

6.5 Chapter Overview

This chapter provided the reader with the findings of the study, according to the primary and secondary aims of the study, and a discussion of the aforementioned findings. The reader was also provided with a developmental profile for children with ADHD as established on the GMDS-ER. Comparisons were made between the performance of the ADHD and normal sample and significant differences were highlighted. Conclusions, limitations of the study as well as recommendations will follow in the next chapter.

CHAPTER SEVEN: LIMITATIONS, RECOMMENDATIONS AND CONCLUSIONS

7.1 Introduction

One of the objectives associated with the revision and restandardisation of the Griffiths Scales was to identify the usefulness of the GMDS – ER on different clinical populations. The present study contributed towards this objective by focussing on the performance of a sample of children with ADHD residing in the Nelson Mandela Metropole, South Africa. This chapter will focus on the limitations of the present study, as well as recommendations for future research. Finally, the conclusions and contributions of the study will be summarised.

7.2 Limitations

Methodological issues such as the experimental design, the sampling procedure, and uncontrolled variables limit generalisations from this study. The following limitations need to be acknowledged.

7.2.1 Limitations of the Research Approach

As the research design was exploratory in nature, a descriptive research approach was employed in the present study. As previously mentioned, when using this design, the researcher lacks full control over the extraneous variables in the study. Consequently, cause-and-effect conclusions cannot be drawn. Hence the findings of the study cannot be confidently generalised beyond the sample of children assessed.

7.2.2 Limitations Regarding the Sampling Procedure

A non-probability, purposive and convenient sampling method was applied to identify suitable children to be assessed. With such a sampling method, the researcher uses his/her own judgment in selecting participants to best suit the aims of the study. Hence the researcher cannot claim that the sample is representative of the larger population. As previously mentioned, this limits the researcher's ability to generalise the research findings beyond the sample being studied. However, a non-probability sample is adequate if the study is a trial run for a larger study, or if the researcher does not intend to generalise the findings beyond the study's sample (Gregory, 2000), as is the case in the present study.

Children with ADHD comprise a heterogeneous group and variables such as the type and severity of ADHD, the presence of co-morbid disorders, and the type of intervention received, may impact on the child's development. Since all these factors could not be controlled for in the present study, they must be acknowledged as limitations to the study. Additionally, only children aged between 5 and 7 years old were included in the present study. Therefore the ability to generalise the findings to children of older and younger age ranges must be done with caution, and with a developmental perspective in mind.

Another limitation is that the majority of the sample comprised White children, with only a small number of children from the Black and Coloured cultural groups. Although this factor could limit the generalisability of the findings, Allan (1992) found in her study that no significant differences existed between the cultural groups with respect to the General Quotient, Personal-Social and Practical Reasoning Subscales on the Griffiths Scales. With regards to the other four Subscales, Black and Coloured children

performed similarly, as did White and Asian children. The only Subscale on which White children performed significantly better was on the Hearing and Speech Subscale. Research has also found that variables other than culture, in particular the variable of socioeconomic status, have a more profound impact on children's performance on the Griffiths Scales. These findings, combined with the fact that the aim of the study was exploratory-descriptive in nature, negate this particular limitation to some extent. However, the results of the study should nevertheless be interpreted with caution for children from Black and Coloured cultural groups.

7.2.3 Limitations Regarding the Sample being on Medication for the Disorder

The fact that only children receiving medication for ADHD were included in the sample, is a possible limitation to the study, as the effects of the medication may have dulled the symptoms of ADHD and have allowed the child to attain a better profile than if he or she were tested without medication. However, as most of these children receive medication on a daily basis, the results that were obtained are a more accurate reflection of how they function in their everyday scholastic and personal environments.

7.2.4 Limitations Regarding the Availability of Items for Older Children on the GMDS – ER

As discussed in Chapter 6, utilising the GMDS – ER with older children may prove to be problematic, as there are only items available up until year eight. This often leads to older children being able to complete all the items on the Scales, not reaching a ceiling to their performance, and achieving inflated scores which may not represent an accurate picture of their ability. In the present study, many of the children were in year 7 or 8, and did in fact manage to complete all the items before reaching ceilings to their performance. This is an inherent limitation of the assessment measure being used.

7.2.5 Limitations Regarding the Lack of South African Norms for the GMDS – ER

As outlined in Chapter 4, South African norms are not currently available for the GMDS – ER and hence the results should be interpreted with caution. However, as a result of the many research projects that have used this measure on both normal and clinical populations (Kotras, 2001; Knoesen, 2003; Schröder, 2004), the results can be confidently used to aid in diagnostic situations.

7.2.6 Limitations Regarding the Lack of South African Research Conducted on Children with ADHD Profiling their General Development

As discussed in Chapter 5, to date limited South African research has been conducted on a selected group of children with ADHD to profile their general development. It is therefore difficult to link the findings of the present study with related research. However, as outlined in Chapter 2, ADHD is often associated with co-morbid disorders and difficulties such as visual-perceptual problems (Benn et. al., 2003). The ADHD sample in the present study showed similar trends, with their poorest performance being on the Eye and Hand Co-ordination Subscale.

In spite of the limitations identified, the findings of the present study make a valuable contribution to research on children with ADHD. However, further research needs to be conducted to identify the extent to which findings of the present study may be generalised. Preliminary findings indicate that certain patterns of development have been identified which seem to be relatively characteristic of children with ADHD.

7.3 Recommendations for Future Research

Although the researcher acknowledges the aforementioned limitations of this research, it is suggested, that the findings of this study have important implications for future research. These include the following:

- a) The need to conduct not only a static, cross-sectional study, but an additional longitudinal investigation to assess whether a hastening in the rate of maturation of children with ADHD exists, or whether their development continues to lag behind that of their peers in certain respects.
- b) The necessity to employ, together with the assessment measure, qualitative information in the form of case studies to complement the quantitative data, in order to provide a more integrated picture of children with ADHD.
- c) More systematic research is needed in order to establish the effect of variables such as type of ADHD, presence of co-morbid conditions, and types of intervention received, on the development of children with ADHD.
- d) To investigate what specific intervention and assistance is necessary in order for children with ADHD to cope more successfully in the inclusive education system as outlined by the RNCS.

The findings of the present study should be disseminated as broadly as possible to assist in the development of therapeutic programmes and to allow for early intervention and appropriate stimulation in all areas of concern. This is especially important in light of the fact that the inclusive educational policy of the RNCS seeks to mainstream all children regardless of their special educational needs. Information regarding the developmental strengths and weaknesses of children with ADHD may

assist teachers, parents and other professionals involved in the management of these children.

7.4 Conclusions and Contributions

This study has contributed to the process of revising and restandardising the Griffiths Scales, by focusing on a clinical population, namely, children with ADHD. It has highlighted that the GMDS – ER can be successfully used in evaluating the developmental profiles of these children. Additionally, this study contributes to South African research regarding children with ADHD and National Education Policy, namely, the RNCS. The study emphasised the impact that ADHD can have on the development of a child. The goal for children with ADHD should be early detection followed by appropriate intervention.

The study therefore provides people involved in the diagnosis, treatment, education and management of children with ADHD, with a developmental profile of these children. In addition to the general developmental profile which has been provided, other difficulties and characteristics of ADHD have been highlighted which may have implications for educators working with these children within the RNCS. Such difficulties include the fact that these children struggle with group work, both academically as it is fraught with distractions, and socially/psychologically, as they may be rejected by their peers, who do not want to work with children who find it difficult to focus on a task. Other skills these children experience difficulties with include visual perceptual, visual spatial, and visual motor skills. They tend to avoid these tasks as they experience little success with them, with the result that they do not practice these skills and find them increasingly difficult.

Another fact this study highlighted is that children with ADHD are generally of average intellectual functioning, but that their higher order cognitive functioning is negatively influenced by a problem with their arousal and attention units. This has important implications for educators involved with teaching these children, as if a way to maintain these children's attention is found, concepts can be satisfactorily taught and subsequently learned. This study emphasised how structured tasks which included varied stimuli (especially if visual components are used), are more likely to hold the attention of these children. All this information can be used by educators and other people who work with children with ADHD, and it is hoped that through the findings of this study, children with ADHD may receive appropriate intervention to assist them in achieving their optimum personal development.

References

- Achenbach, T. M. & Edelbrock, C. S. (1983). *Manual for the Child Behaviour Checklist and Revised Child Behaviour Profile*. Burlington: University of Vermont, Dept of Psychiatry.
- Aiken, L. R. (1997). *Psychological testing and assessment* (9th ed.). Boston: Allyn and Bacon.
- Aldridge-Smith, J., Bidder, R. T., Gardner, S. M., & Gray, O. P. (1980). Griffiths Scales of Mental Development and different users. *Child: Care, Health and Development*, 6, 11-16.
- Allan, M. M. (1988). *A comparison of the performance of normal preschool South African and British children on the Griffiths Scales of Mental Development*. Unpublished master's treatise, University of Port Elizabeth.
- Allan, M. M. (1992). *The performance of South African normal preschool children on the Griffiths Scales of Mental Development: A Comparative Study*. Unpublished doctoral thesis, University of Port Elizabeth.
- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.) [DSM III]. Washington, DC: Author.
- American Psychiatric Association (2000). *Diagnostic and Statistical. Manual of Mental Disorders – Text Revision (DSM-IV-TR)* Washington: APA.
- Anastasi, A. (1982). *Psychological testing* (5th ed.). New York: Macmillian.
- Barkley, R. A. & Edelbrock, C. S. (1987). Assessing situational variation in children's behaviour problems: The home and school situations questionnaires. In R. Prinz (Ed.), *Advancement in behavioural assessment of children and families* (Vol. 3, pp. 157-176). Greenwich, CT:Jai Press.

- Barkley, R. A. (1990). *Attention Deficit Hyperactivity Disorder: A handbook for diagnosis and treatment*. New York: Guilford Press.
- Barkley, R. A. (1991). *Attention-deficit hyperactivity disorder: A clinical workbook*. New York: The Guilford Press.
- Barkley, R. A. (1997). *ADHD and the nature of self control*. New York / London: Guilford Press.
- Barkley, R. A. (1998). *Attention deficit hyperactivity disorder: A handbook for diagnosis and treatment (2nd ed)*. New York: Guilford Press.
- Barnard, A. (2000). *The Griffiths Practical Reasoning Scale: A revision*. Unpublished master's treatise, University of Port Elizabeth.
- Beail, N. (1985). *A comparative study of profoundly multiply handicapped children's scores on the Bayley and Griffiths Developmental scales*. *Child: Care, health and development*, 11, 31-36.
- Benn, Venter, A., Aucamp, A. & Benn, J. (2003). *Attention Deficit Hyperactivity Disorder: Can I have your attention please*. Booklet. Sponsored by Novartis.
- Bhamjee, R. A. (1991). *A comparison of the performance of normal British and South African Indian children on the Griffiths Scales of Mental Development*. Unpublished doctoral dissertation, University of Port Elizabeth.
- Bondurant-Utz, J. A., & Luciano, L. B. (1994). *A practical guide to infant and preschool assessment in special education*. Boston: Allyn & Bacon
- Braswell, L., Bloomquist, M., & Pederson, S. (1991). *ADHD: A guide to understanding and helping children with Attention Deficit Hyperactivity Disorder in school settings*. Minneapolis: University of Minnesota Professional Development.
- Braswell, L. & Bloomquist, M. (1994). *Cognitive behaviour therapy of ADHD*. New York: Guilford Press.

- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology, 1* (3), 185-216.
- Brooks-Gunn, J. (1990). Identifying the vulnerable in young children. In D. E. Rogers & E. Ginsberg (Eds), *Improving the life chances of children at risk*. (104-124). Boulder: Westview Press.
- Brown, N. B. & Cantwell, D. P. (1976). Siblings as therapist: A behavioural approach. *American Journal of Psychiatry, 133*, 447-450.
- Calderon, R. (1999). Further support for the benefits of early identification and intervention for children with hearing loss. *Volta review, 100* (5), 53-85.
- Cantwell, D. P. (1996). Attention Deficit Disorder: A Review of the Past 10 Years. *Journal for the American Academy of Child and Adolescent Psychiatry, 35* (8) 978-987.
- Christensen, L.B. (1997). *Experimental methodology* (7th ed.). Needham Heights: Allyn and Bacon.
- Cobos, F., Rodrigues, C., & De Venegas, A. V. (1971). Practical use of the Griffiths Scales in older children. *Interamerican Journal of Psychology, 5* (3-4), 163-166.
- Collins, J. K., Jupp, J. J., Maberly, G. F., Morris, J. G., & Eastman, C. J. (1987). An exploratory study of the intellectual functioning of neurological and myxoedematous cretins in China. *Australian and New Zealand Journal of Development Disabilities, 13*, 13-20.
- Conn, P. (1993). The relations between Griffiths Scales assessments in pre-school period and educational outcomes at 7+ years. *Child: Care, Health and Development, 19*, 275-289.
- Conners, K. (1994). *Conners abbreviated symptom questionnaire*. North Tonawanda, NY: Multi Health Systems.

- Cozby, P.C. (1989). *Methods in behavioural research* (4th ed.). Mountain View, CA: Mayfield.
- Cozby, P. C. (1993). *Methods in behavioural research* (5th ed.). Mountain View, CA: Mayfield.
- Craig, G. J. (1996). *Human Development*. Upper Saddle River, NJ: Prentice Hall.
- Department of Education. (2003). Province of the Eastern Cape. *Teacher's orientation course: Exploring the RNCS in the Foundation Phase (Grades R – 3). General Overview*. Harry's Printers.
- Dane, F.C. (1990). *Research Methods*. California: Brooks/Cole.
- Desgranges, K., Desgranges, L. & Karsky, K. (1995). Attention Deficit Disorder: Problems with Preconceived Diagnosis. *Child and Adolescent Social Work Journal*, 12, (1), 3-17.
- Douglas, V. I. (1972). Stop, look and listen: The problem of sustained attention and impulse control in hyperactive and normal children. *Canadian Journal of Behavioural Science*, 4, 259 – 282.
- Douglas, V. I. (1983). *Attention and cognitive problems*. In M. Rutter (Ed.), *Developmental neuropsychiatry* (pp. 280 – 329). New York: Guildford Press.
- DuPaul, G. J., & Barkley, R. A. (1992). Situational variability of attention problems: Psychometric properties of the revised home and school situations questionnaires. *Journal of Clinical Child Psychology*, 21, 178-188.
- DuPaul, G. J. & Barkley, R. A. (1994). Response of children with ADHD to methylphenidate. *Journal of American Child and Adolescent Psychiatry*, 33, 894-903.
- Education White Paper 5 on Early Childhood Education*. Pretoria, May, 2001.
- Erikson, E. H. (1965). *Childhood and society*. Harmondworth: Penguin.

- Ethics in Health Research in South Africa. (2000). *Statement on ethical principals for health research*. Draft document.
- Evans, S. W. & Pelham, W. E. (1991). Psychostimulant effects on academic and behavioural measures for ADHD junior high school students in a lecture format classroom. *Journal of Abnormal Child Psychology*, 19, 537-552.
- Foxcroft, C. D. & Roodt, G. (2001). *An introduction to psychological assessment in the South African context*. Cape Town: Oxford University Press.
- Gadow, K. D. (1981). *Prevalence of drug treatment for hyperactivity and other childhood behaviour disorders*. In K. D. Gadow and J. Loney (Eds.), *Psychosocial aspects of drug treatment for hyperactivity* (pp. 13-70). Boulder, Co: Westview Press.
- Gingerich, K., Turnock, P. , Litfin, J. K. & Rosen, L. A. (1998). Diversity and attention deficit hyperactivity disorder. *Journal of Clinical Psychology*, 54, 425-426.
- Graziano, A. M., & Raulin, M. L. (2000). *Research methods: A process of inquiry* , (4th ed). USA: Allyn & Bacon.
- Gregory, R. J. (2000). *Psychological testing. History, principles and applications*. (3rd ed.). Boston: Allyn & Bacon.
- Griffiths, R. (1954). *The abilities of babies*. London: Child Development Research Centre.
- Griffiths, R. (1960). *The abilities of babies*. London: University Press.
- Griffiths, R. (1970). *The abilities of young children*. London: Child Development Research Centre.
- Griffiths, R. (1984). *The abilities of young children*. Amersham: ARICD.
- Griffiths, R. (1986). *The abilities of babies*. Amersham: ARICD.

- Groth-Marant, G. (1984). *Handbook of psychological assessment*. U.S.A.: Van Nostand Reinhold Co.
- Hall, L. C. (1971a). Balvicar Centre after five years (Survey of a child development centre for preschool handicapped children). *Community Medicine*, 126 (3288), 93-98.
- Hall, C. W., Katira, S., Keys, G. F. & Wong, M. M. (1992). Learning styles of LD and NLD ADHD children. *Journal of Clinical Psychology*, 48, 3, 371-378.
- Hallowell, E. & Ratey, J. (Eds.) (1994). *Driven to distraction*. New York: Pantheon Books.
- Hallowell, E. D. & Ratey, J. J. (1995). *Driven to distraction: Recognising and coping with attention deficit disorder from childhood through adulthood*. London: Simon & Schuster.
- Hanson, R. (1982). Item reliability for the Griffiths Scales of Mental Development. *Child Care, Health and Development*, 8, 151-161.
- Hanson, R. (1983). *Proposals for the revision of the Griffiths Scales based on studies carried out at the University of Leeds during the years 1980 to 1982*. Unpublished manuscript.
- Hanson, R., & Aldridge Smith, J. (1982). Current applications of the Griffiths Mental Development Scales. *Association of Educational Psychologists' Journal*, 5, 57- 59.
- Hanson, R., Aldridge-Smith, J., & Humes, W. (1985). Achievements of infants on items of the Griffiths Scales: 1980 compared with 1950. *Child: Care, Health and Development*, 13, 181-195.
- Hanson, R., & Aldridge Smith, J. (1987). Achievements of young children on items of the Griffiths Scales: 1980 compared with 1960. *Child: Care, Health and Development*, 13, 181-195.

- Hechtman, L. (1993). Aims and methodological problems in multimodal treatment studies. *Canadian Journal of Psychiatry* (38), 458-464.
- Hechtman, L. (1996). Families of children with Attention Deficit Hyperactivity Disorder: A review. *Canadian Journal of Psychiatry*, 41, 350-360.
- Heimes, L. (1983). *The comparison of the JSAIS and the Griffiths Developmental Scale scores of 3-5 year old boys and girls*. Unpublished master's treatise, University of Port Elizabeth.
- Hill, J. & Schoener, E. (1996). Age dependent decline in ADHD, *American Journal of Psychiatry*, 15, 1143 – 1146.
- Hindley, C. B. (1960). The Griffiths Scales of Infant Development: Scores and predictions from 3 to 18 months. *Journal of Child Psychology and Psychiatry*, 1, 99-112.
- Honzik, M. P., McFarlane, J. W., & Allan, L. (1966). The stability of mental test performance between two and eighteen years. In C. I. Chase & H. G. Ludlow (Eds.), *Readings in educational and psychological measurement*. Boston: Houghton Mifflin.
- Hook, D. (2002). Psychoanalytic, cognitive and psychosocial developmental psychology: The 'hows' and 'whys'. In D. Hook, J. Watts & K. Cockcroft (Eds), *Developmental Psychology*, 3-13.
- Holt, K. S. (1979). Assessment of handicap in childhood. *Child: Care, Health and Development*, 5, 151 – 162.
- Hotz, T. L. (1998). *An assessment battery for the diagnosis and evaluation of attention deficit hyperactivity disorder*. Unpublished Masters Treatise, University of South Africa.

- Houston-McMillan, J. E. (1988). Borderline mental handicapped preschoolers: Identification and treatment evaluation using the Griffiths Scale of Mental Development. In D. M. Luiz (Ed.), *Griffiths Scales of Mental Development: South African studies* (Research Papers No. C25) (pp.52-58). Port Elizabeth: University of Port Elizabeth.
- Hunt, R. D. (1995). *Neurobiological subtypes of ADD. Implications for research and treatment*. Centre for Attention and Hyperactivity Disorders. Nashville.
- Huntley, M. (1996). *The Griffiths Mental Development Scales. From birth to 2 years. Manual*. (Revision). United Kingdom: Association for Research in Infant and Child Development.
- Hurlock, E. B. (1981). *Child development* (6th ed.). Auckland: McGraw-Hill International Book Company.
- Ittyerah, M., & Renu, S. (1997). The performance of hearing impaired children on handedness and perceptual motor tasks. *Genetic, Social & General Psychology Monographs*, 123 (3), 285-302.
- Jansen, J. M. (1991). *Stress and coping in families with physically handicapped children*. Unpublished master's treatise, University of Port Elizabeth.
- Johnston, C. (1996). Parent characteristics and parent-child interactions in families of nonproblem children and ADHD children with higher and lower levels of oppositional-defiant behaviour. *Journal of Abnormal Child Psychology*, 24, 85-104.
- Kagan, J. (1981). *The second year*. Cambridge, Massachusetts: Harvard University Press.
- Kaplan, R. M. & Saccuzzo, D. P. (2001). *Psychological testing: Principles, applications and issues* (5th Ed). USA: Wadsworth/ Thomas Learning.

- Kaplan, S. I. , Sadock, B. J. & Grebb, J. A. (1994). *Kaplan and Sadock's synopsis of psychiatry* (7th ed). London: Williams & Wilkins.
- Keenan, T. (2002). *An introduction to child development*. London: SAGE Publications Ltd.
- Kessler, J. W. (1980). History of minimal brain dysfunction. In H. Rie & E. Rie (Eds.), *Handbook of minimal brain dysfunctions: A critical view* (pp. 18 – 52). New York: Wiley.
- Kirby, J. R., & Das, J. P. (1989). *A cognitive approach to intelligence: Attention, coding and planning*. Manuscript submitted for publication.
- Knoesen, N. (2003). *An exploration of the relationship between the Revised Griffiths Scales and grade one scholastic development*. Unpublished master's treatise, University of Port Elizabeth.
- Kotras, N. (1998). *A revision of a section of the Hearing and Speech scales of the Griffiths Scales of Mental Development*. Unpublished master's treatise, University of Port Elizabeth.
- Kotras, H. (2002). *Exploring the developmental profiles of black South African HIV+ infants using the Revised Griffiths Scales of Mental Development*. Unpublished master's treatise, University of Port Elizabeth.
- Kotras, N. (2003). *Exploring the construct validity of the Revised Extended Griffiths' Language Subscale in the British Isles*. Unpublished doctoral dissertation, University of Port Elizabeth.
- Krige, P. (1988). A physically handicapped child: A longitudinal study. In D. M. Luiz (Ed.), *Griffiths Scales of Mental Development: South African studies*

(Research Papers No. C25) (pp. 38-43). Port Elizabeth: University of Port Elizabeth.

- Laufer, M., Denhoff, E. S., & Solomons, G. (1957). Hyperkinetic impulse disorder in children's behaviour problems. *Psychosomatic Medicine*, 19, 38 – 49.
- Lister, C. (1981). *Patterns of development in very young children*. Acta Paedopsychiatry, 45, 207 - 213.
- Levy, F. & Hay, D. A. (2001). *Attention, Genes, and ADHD*. USA / Canada: Taylor & Francis Inc.
- Lombard, M. (1989). *The SETT and the Griffiths Scales of Mental Development: A correlative study*. Unpublished master's treatise, University of Port Elizabeth.
- Louw, D. A., van Ede, D. M., & Louw, A. E. (1998). *Human development*. (2nd ed.). Pretoria: Kagiso Publishers.
- Luiz, D. M. (1988a). A child with a hearing loss: A longitudinal study. In D. M. Luiz (Ed.), *Griffiths Scales of Mental Development: South African studies* (Research Paper NO.C25) (pp.44-51). Port Elizabeth: University of Port Elizabeth.
- Luiz, D. M. (1988b). A battered child: A follow-up study. In D. M. Luiz (Ed.), *Griffiths Scales of Mental Development: South African studies* (Research papers No. C25) (pp. 52-58). Port Elizabeth: University of Port Elizabeth.
- Luiz, D. M. (1988c). A comparative study of two scales of language development: The Reynell and the Griffiths. In D. M. Luiz (Ed.), *Griffiths Scales of Mental Development: South African studies* (Research Paper No. C25) (pp. 16- 20). Port Elizabeth: University of Port Elizabeth.
- Luiz, D. M. (1988d). Developmental profiles of young children. In D. M. Luiz (Ed.), *Griffiths Scales of Mental Development: South African studies* (Research Paper No. C25) (pp. 33-38). Port Elizabeth: University of Port Elizabeth.

- Luiz, D. M. (1994a). *Children of South Africa. In search of a developmental profile.*
Inaugural and Emeritus Address. Port Elizabeth: University of Port Elizabeth.
- Luiz, D. M. (1994b). *The revision of the Griffiths Scales: Proposal for future research.*
Unpublished manuscript.
- Luiz, D., Barnard, A., Knoesen, N., Kotras, N., McAlinden, P., & O'Connell, R. (2004).
Griffiths Mental Development Scales – Extended Revised (GMDS-ER).
Administration Manual. Association for Research in Infant and Child
Development (ARICD).
- Luiz, D. M., Collier, P. T., Stewart, R., Barnard, A., & Kotras, N. (2000). *Revised*
Extended Griffiths Scales of Mental Development Technical Document (3rd
ed.). Working document.
- Luiz, D. M., Folsher, A. C., & Lombard, M. (1989). *The SETT and the Griffiths Scales of*
Mental Development: A correlative study. Durban: Paper delivered at PASA
conference.
- Luiz, D. M., Foxcroft, C. D., & Stewart, R. (1999). The construct validity of the Griffiths
Scales of Mental Development. *Child: Care, Health and Development, 27* 73-
83.
- Luiz, D. M. & Heimes, L. (1994). The Junior South African Intelligence Scales and the
Griffiths Scales of Mental Development: A correlative study. In R. van Eeden,
M. Robinso, & A. B. Posthuma (Eds.). *Studies on South African Intelligence*
Scales. (p. 2-13). Pretoria: Human Sciences Research Council.
- Luiz, D. M., Oelofsen, N., Stewart, R. & Mitchell, S. (1995). *An international survey of the*
extended Griffiths Scales of Mental Development. Unpublished manuscript.
- Luria, A. R. (1966). *Human brain and psychological processes.* New York: Harper &
Row.

- Luria, A. R. (1973). *The working brain: An introduction to neuropsychology*. New York: Basic Books.
- Luria, A. R. (1980). *Higher cortical functions in man* (Second Edition, Revised and Expanded). New York: Basic Books.
- Madge, E. M. (1981). *Manual for the Junior South African Individual Scales (JSAIS) – Part 1: Development and standardisation*. Pretoria: Human Science Research Council.
- Mash, E. J., & Johnston, C. (1990). Determinants of parenting stress: Illustrations from families of hyperactive children and families of physically abused children. *Journal of Clinical Child Psychology*, 19, 313-328.
- Mc Guigan, F.J. (1990). *Experimental psychology: Methods of research* (5th ed.). California: Prentice Hall International.
- Mc Reynolds, P. (1968). *Advances in psychological assessment, 1*. California: Science and Behaviour Books.
- Meisels, S. (1996). Charting the continuum of assessment and intervention. In S. Meisels, & E. Fenichel (Eds.), *New visions for the developmental assessment of infants and young children*. Washington, D. C: Zero to Three.
- Meisels, S. J., & Wiske, M. S. (1993). *The early screening inventory*. New York: Teachers College Press.
- Minde, K., & Kantor, S. (1976). Instructing Ugandan primary-school children in the execution of an “intelligence” test: a controlled evaluation. *Journal of cross-cultural psychology*, 7 (2), 209-222.
- Mothuloe, V. B. (1990). *The Aptitude Tests for School Beginners and the Griffiths Scales of Mental Development: An investigation into the assessment to the cognitive*

abilities of grade 1 children. Unpublished master's treatise, Medical University of South Africa, Pretoria.

Mussen, P. H., Conger, J. J., Kagan, J., & Huston, A. C. (1984). *Child development and personality* (6th ed.). New York: Harper and Row.

Naglieri, J. A., & Das, J. P. (1987). Construct and criterion related validity of Planning, Simultaneous and Successive cognitive processing tasks. *Journal of Psychoeducational Assessment*, 4, 363-368.

Naglieri, J. A., & Das, J. P. (1988). Planning-Arousal-Simultaneous-Successive (PASS): A model for assessment. *Journal of School Psychology*, 26, 36-48.

Nutall, E. V., Romero, I., & Kalesnik, J. (1992). *Assessing and screening preschoolers*. London: Allyn & Bacon.

Pelham, W. E. & Bender, M. E. (1982). Peer relationships in hyperactive children: Description and treatment. In J. Bailer & K. Gadow (Eds.), *Advances in learning and behavioural disabilities* (pp. 365-436). Greenwich, CT: Jai Press.

Peterson, N. L. (1997). *Early intervention for handicapped and at-risk children: An introduction to early childhood special education*. Denver: Love Publishing.

Piaget, J. (1977). *The origin of intelligence in the child*. London: Penguin.

Povey, J. L. (2002). *The Griffiths Extended Scales of Mental Development: A South African factorial validity study*. Unpublished master's treatise, University of Port Elizabeth.

Ramsay, M., & Fitzhardinge, P. M. (1977). A comparative study of two developmental scales: The Bayley and the Griffiths. *Early Human Development*, 1, 151-157.

Ramsay, M., & Piper, M. C. (1980). A comparison of two developmental scales: The Bayley and the Griffiths. *Early Human Development*, 1, 151-157.

- Reardon, S., & Naglieri, J. A. (1989). *Cognitive Processing Characteristics of Normal and ADD Males*. Manuscript submitted for publication.
- Reid, R., & Maag, J. W. (1994). How many fidgets in a pretty much: A critique of behavioural rating scales for identifying students with ADHD. *Journal of School Psychology, Vol. 32, No. 4*, pp. 339-354.
- Resnick, R. J. (2000). *The hidden disorder: A clinicians guide to attention deficit hyperactivity disorder in adults*. Washington, DC: American Psychological Association.
- Robinson, M. (1989). *Bylae tot die handleiding vir die Junor Suid-Afrikaanse Individuele Skale (JSAIS): Tegniese besonderhede en normtabelle vir 6-tot-8-jarige leerlinge*. Pretoria:HSRC.
- Root, R. W. & Resnick, R. J. (2003). An update on the diagnosis and treatment of attention-deficit / hyperactivity disorder in children. *Professional Psychology: Research and Practice, 34, (1)*, 34-41.
- Rudel, R. G. (1988). *Assessment of developmental learning disorders: A neuropsychological approach*. New York: Basic Books Inc.
- Santrock, J. W. (2001). *Child Development*. (9th ed.). New York: McGraw-Hill Companies.
- Schröder, I. A. (2004). *The performance of hearing impaired children on the Revised Extended Griffiths Scales*. Unpublished master's treatise, University of Port Elizabeth.
- Siraj-Blatchford, I., & Siraj- Blatchford, J. (2002). Surveys and questionnaires: an evaluative case study. In G. M. Naughton, S. A. Rolfe & I. Siraj- Blatchford (Eds), *Doing early childhood research*, 149-161.

- Sletten, T. (1977). *Intensive treatment of babies and infants based on the Griffiths Mental Developmental Scales*. Unpublished, address to A.R.I.C.D.
- Solomons, G. (1973). Drug therapy: Initiation and follow-up. *Annals of the New York Academy of Sciences*, 205, 335-344.
- Smit, G. R. (1996). *Psychometrics, aspects of measurement*. Pretoria: Kagiso.
- Smith, C. & Strick, L. (1997). *Learning disabilities: A to Z*. London: Free Press.
- Snow, C. W. (1998). *Infant development (2nd Ed)*. New Jersey: Prentice Hall.
- Stewart, R. (1997). *The Griffiths Scales of Mental development: A South African pilot validity study*. Unpublished Master treatise, University of Port Elizabeth, Port Elizabeth.
- Swanson, J. M. (1992). *School based assessment and interventions for ADD students*. Irvine, CA: KC Publications.
- Swanson, J. M., Cantwell, D. P., Lerner, M., Hanna, G. L. (1991). Effects of stimulant medication on learning in children with ADHD. *Journal of Learning Disabilities*, 4, 219-230.
- Swart, D. J. (1987). *Standaardisering van 'n Junior Individuele Skaal vir Indier- Suid-Afrikaners*. Unpublished doctoral dissertation, University of Potchefstroom.
- Sweeney, K. (1994). *Cluster analysis of the Griffiths profiles of a white South African Clinical population*. Unpublished masters treatise, University of Port Elizabeth.
- Szatmari, P., Offord, D. R., & Boyle, M. H. (1998). Ontario Child Health Study: Prevalence of attention deficit hyperactivity disorder with hyperactivity. *Journal of Child Psychology and Psychiatry*, 40, 168-179.

- Tannock, R. (1998). Attention deficit hyperactivity disorder: Advances in cognitive, neurobiological, and genetic research. *Journal of Child Psychology and Psychiatry*, 39, 65-99.
- Thomas, H. (1970). Psychological assessment instruments for use with human infants. *Merrill-Palmer Quarterly*, 16, 179-223.
- Trawick-Smith, J. W. (2000). *Early child development: A multicultural perspective*. Merrill: Upper Saddle River.
- Tukulu, A. N. (1996). *The Denver II Scale and the Griffiths Scales of Mental Development: A correlational study*. Unpublished Master treatise, University of Port Elizabeth, Port Elizabeth.
- Unisa: Faculty of Education, Tutorial Letter EDTPRS-B/307/2004 (2004). *Revised National Curriculum Statement*. For B.ed – Early Childhood Development: Foundation Phase.
- Van der Berg, A. R. (1987). *Using the Junior South African Scales (JSAIS) (1981) for testees from South African population groups which were not included in the norm population*. Pretoria: Human Scientific Research Council.
- Victoria, M., Victoria, C., & Barros, F. (1990). Cross-cultural differences in developmental rates: A comparison between British and Brazilian Children. *Child Care, Health and Development*, 16, 151-164.
- Vygotsky, L. S. (1962). *Thought and language*. Cambridge, MA: MIT Press.
- Weschler, D. (1974). *Manual for the Weschler Scale for Children-Revised (WISC-R)*. New York: The Psychological Corporation.
- Wilderstrom, A., Mowder, B., & Sandall, S. (1997). *Intervention strategies for handicapped newborns and infants: Development, assessment and intervention*. Engelwood Cliffs, Prentice Hall.

Worsfold, L. B. (1993). *The Griffiths Scales of Mental Development: An Evaluation of their Prediction of Scholastic Achievement*. Unpublished master's treatise, University of Port Elizabeth.

APPENDIX A

Inattention

(6 or more criteria persisting for at least 6 months to diagnose ADHD - Predominantly Inattentive Type)

- 1) Often fails to give close attention to details or makes careless mistakes in schoolwork, work or other activities.
- 2) Often has difficulty sustaining attention in tasks or play activities.
- 3) Often does not seem to listen when spoken to directly.
- 4) Often does not follow through on instructions and fails to finish schoolwork, chores or duties in the workplace (not due to oppositional behaviour or failure to understand instructions).
- 5) Often has difficulty organising tasks and activities.
- 6) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework).
- 7) Often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools).
- 8) Is often easily distracted by extraneous stimuli.
- 9) Is often forgetful in daily activities.

Hyperactive - Impulsivity

(6 or more criteria persisting for at least 6 months to diagnose ADHD - Predominantly Hyperactive - Impulsive Type)

Hyperactivity

- 1) Often fidgets with hands or feet or squirms in seat.
- 2) Often leaves seat in classroom or in other situations in which remaining seated is expected.
- 3) 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).
- 4) Often has difficulty playing or engaging in leisure activities quietly.
- 5) Is often “on the go” or often acts as if “driven by a motor”.
- 6) Often talks excessively.

Impulsivity

- 7) Often blurts out answers before questions have been completed.
- 8) Often has difficulty awaiting turn.
- 9) Often interrupts or intrudes on others (e.g., butts into conversations or games).

To diagnose ADHD - Combined Type, 6 or more criteria from each list must have been present for the past 6 months (American Psychiatric Association, 2000).

APPENDIX B



DEPARTMENT OF PSYCHOLOGY
 DEPARTEMENT PSIGOLOGIE
 ISEBE LA SAYIRHOLOJI

To The Principal,

RE: Exploring the Developmental Profiles of Children with Attention Deficit Hyperactivity Disorder (ADHD) Using the Revised Griffiths Scales.

The University of Port Elizabeth (UPE) plans to conduct a research project exploring the developmental profile of children with Attention Deficit Hyperactivity Disorder (ADHD), using the Revised Extended Griffiths Scales of Mental Development (GSMD). This study was evaluated and approved by the ethics committee of UPE.

The Griffiths Scales were developed in Britain in the 1960's and are used internationally for the developmental assessment of young children. A research team under the leadership of Prof. D.M. Luiz, Department of Psychology, UPE, is currently revising these Scales at the request of the Association for Research in Infant and Child Development in London, England.

Despite South Africa being a country where a significant number of children have ADHD, to date, limited research has been conducted on profiling their general development. For this reason it is necessary to accumulate knowledge about their cognitive, psychological and personal-social growth. Furthermore, from the findings of the study, information pertaining to the sample's development will be made available. From this, individual therapeutic programmes can be developed so as to allow for appropriate stimulation in any areas of concern.

We are writing to ask for your permission to allow the assessment of certain children who attend your school, using the Revised Griffiths Scales.

During the assessment, which takes approximately one hour, children are asked to complete a number of age appropriate tasks, such as building bricks, throwing a ball, drawing and naming pictures. With your consent, the assessment will take place at the school during March and April, at a time which the teachers have allocated to us, and will not interfere with the child's education. Furthermore, there will be

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no cost involved for the parents and following the assessment, the research team will provide you with a written report regarding each child's performance. The assessment results will be used for research purposes and all information will be treated as strictly confidential.

If you wish to obtain any further information about this project please contact us at the telephone numbers provided below.

We would like to stress that the success of this project depends on your consent and we sincerely thank you in anticipation.

Yours Sincerely

Prof. D.M.Luiz
Tel. 041 - 504 2354
Department of Psychology (UPE)

Dr J.M. Jansen
Tel. 041 - 373 122
Education Support Centre

Ms. L. Stroud
Tel. 041 - 504 2330
Department of Psychology (UPE)

Ms. S. Baker
Tel. 041 - 504 2330
Intern Psychologist



**DEPARTMENT OF PSYCHOLOGY
DEPARTEMENT PSIGOLOGIE
ISEBE LASAYIKHOLOJI**

APPENDIX C

Exploring the Developmental Profiles of Children with Attention Deficit Hyperactivity Disorder (ADHD)
Using the Revised Griffiths Scales.

Dear Parent / Caregiver

RE:.....(Child's name)(Date of birth)

The University of Port Elizabeth (UPE) plans to conduct a research project exploring the developmental profile of children with Attention Deficit Hyperactivity Disorder (ADHD), using the Revised Extended Griffiths Scales of Mental Development (GSMD). This study was evaluated and approved by the ethics committee of UPE.

The Griffiths Scales were developed in Britain in the 1960's and are used internationally for the developmental assessment of young children. A research team under the leadership of Prof. D.M. Luiz, Department of Psychology, UPE, is currently revising these Scales at the request of the Association for Research in Infant and Child Development in London, England.

Despite South Africa being a country where a significant number of children have ADHD, to date, limited research has been conducted on profiling their general development. For this reason it is necessary to accumulate knowledge about their cognitive, psychological and personal-social growth. Furthermore, from the findings of the study, information pertaining to your child's development will be made available. From this, individual therapeutic programmes can be developed so as to allow for appropriate stimulation in any areas of concern.

We are writing to ask for your permission to allow your child (named above) to take part in this research project, which involves an assessment on the Revised Griffiths Scales.

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YASEBHAYI, PO BOX 1600, PORT ELIZABETH, 6000, SOUTH AFRICA.
TEL: 041 5042354/5042776 FAX: 041 58331 52. [E-mail: yvonne.smith@upe.ac.za](mailto:yvonne.smith@upe.ac.za)

During the assessment, which takes approximately one hour, children are asked to complete a number of age appropriate tasks, such as building bricks, throwing a ball, drawing and naming pictures. With your consent, the assessment will take place at the school during May and June, at a time which the teachers have allocated to us, and will not interfere with the child's education. Furthermore, there will be no costs involved for the parents and following the assessment, the research team will provide you with a written report regarding each child's performance. The assessment results will be used for research purposes and all information will be treated as strictly confidential.

If you wish to obtain any further information about this project please contact us at the telephone numbers provided below.

We would like to stress that the success of this project depends on your consent and we sincerely thank you in anticipation.

Yours Sincerely

Prof. D.M.Luiz
Tel. 041 - 504 2354 Department of Psychology (UPE)

Ms. L. Stroud
Tel. 041 - 504 2330 Department of Psychology (UPE)

Dr J.M. Jansen
Tel. 041 - 373 1227
Education Support Centre

Ms. S. Baker
Tel. 041 - 504 2330 Intern Psychologist

APPENDIX D



DEPARTMENT OF PSYCHOLOGY
DEPARTEMENT PSIGOLOGIE,
ISEBE LASAYIKHOLOJI

Information and Consent Form

The Performance of Children with Attention Deficit Hyperactivity Disorder (ADHD) on the Revised Extended Griffiths Scales of Mental Development (GSMD).

Reference Number:

Principal Investigator: Ms. S. Baker
Department of Psychology
University of Port Elizabeth
Port Elizabeth 6000

Contact Telephone Number: 041 - 504 2330

Declaration by or on behalf of participant

I, the undersigned,ID number
the parent / guardian of
participantID number
.....of

The participant was invited to participate in the above mentioned research project which is being undertaken by Ms. S. Baker of the Department of Psychology in the Faculty of Health Sciences of the University of Port Elizabeth.

UNIVERSITY OF PORT ELIZABETH/UNIVERSITEIT VAN PORT ELIZABETH/IYUNIVES
YASEBHAYI, PO Box 1600, PORT ELIZABETH, 6000, SOUTH AFRICA. TEL: 041
5042354/5042776 FAX: 041 5833152. E-mail: yvonne.smith@upe.ac.za

<p>The following aspects have been explained to me the parent / guardian:</p> <p>Aim: The investigator is studying the typical developmental profile of a child with ADHD on the Revised Extended GSMD. The information will be used to compile normative data on ADHD children's performance on the Revised Scales.</p>	
<p>I understand that my child will be assessed at no cost, at his / her school at a time the teachers have allocated to the researcher.</p>	
<p>I understand that the assessment process could reveal information regarding concerns in my child's development.</p>	
<p>I understand that a possible benefit of this assessment is that any developmental concerns could be detected timeously which would allow me to intervene in areas of concern sooner.</p>	
<p>Confidentiality: neither my, nor my child's identity will be revealed in any discussion or scientific publication by the investigator.</p>	
<p>Access to findings: any new information or benefits that develop during the course of the study will be shared with me.</p>	
<p>Voluntary participation / refusal / discontinuation: My participation is voluntary. My decision whether or not to participate will in no way effect my present or future medical care / employment / lifestyle.</p>	
<p>The information above was explained to me, the parent / guardian of the participant byin Afrikaans / English / Xhosa / Other and I am in command of this language / it was satisfactorily translated to me by I was given the opportunity to ask questions and all these questions were answered satisfactorily.</p>	
<p>No pressure was exerted on me to consent to participation and I understand that I may withdraw at any stage without penalisation.</p>	
<p>Participation in this study will not result in any additional cost to myself.</p>	
<p>I HEREBY CONSENT VOLUNTARILY FOR MY CHILD TO PARTICIPATE IN THE ABOVE MENTIONED PROJECT> Signed / confirmed atOn2004.</p>	
<p>Signature of parent / guardian.</p>	<p>Signature of witness.</p>

APPENDIX E

Biographical questionnaire to be completed by the subject's parent's)

Today's date:

Child's name:

Home address:.....

Phone number (if applicable): (h) (w)

Child's date of birth: (Day) (Month)(Year)

Child's age:..... :

Child's gender: Male Female:.....

Home language:.....

Does your child attend a creche/pre-school?

How many children are in your family?

Where is your child positioned in the family ?
(i.e., eldest, youngest, etc)

Religion:.....

Mother's age:

Occupation:.....

Educational qualification: (please tick the appropriate space)

None

Primary School

Junior certificate (eg. Std 8)

Apprenticeship

Further training (not at university)

Occupation:.....

Educational qualification: (please tick the appropriate space) None

Primary School

Junior certificate (eg..Std 8)

Matric

Apprenticeship

Further training (not at university)

Birth History:

1. Describe anything unusual about your pregnancy or delivery: (Please indicate Yes or No)
2. Did you give birth to your child naturally?
3. Was your child anoxic (i.e., did s/he lack oxygen) at birth?
4. Was your child born either prematurely or after more than 40 weeks of pregnancy ? If YES, please indicate after how man weeks:
5. Is your child one of a twin?
6. Was walking, talking and toilet training normal?
7. Was feeding development normal?
8. Has your child ever had Meningitis?
9. Has your child ever had Encephalitis?
10. Has your child ever had Convulsions (fits)?
11. Has your child ever had Concussion?
12. Has your child ever had Anemia?
13. Has your child ever had a very high fever/temperature?
14. Has your child ever had a head injury where s/he lost consciousness?
15. Has your child ever had an allergy?
16. Does your child complain of headaches?
17. Is your child clumsy?
18. Does your child have dizzy spells sometimes?
19. Does your child often have nightmares?
20. Does your child sometimes fall deeply asleep even though it is not his/her bedtime?
21. Does your child have temper tantrums regularly ?
22. Does your child wet the bed regularly?
23. Does your child sometimes stare blankly into space?
24. Does anyone in your immediate family suffer from epilepsy?
25. Do you notice a muscle or group of muscles twitching in your child?
26. Is your child on any kind of medication? If YES, what kind?
27. Does your child get on well with other children?
28. Is your child restless and does s/he struggle to concentrate?
29. Does your child start crying for no apparent reason?
30. List all childhood diseases:

.....

Thank you for your co-operation.

All information supplied will be treated as strictly confidential.