THE PERFORMANCE OF SOUTH AFRICAN AND BRITISH CHILDREN ON
THE GRIFFITHS MENTAL DEVELOPMENT SCALES – EXTENDED
REVISED: A COMPARATIVE STUDY

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ABSTRACT

The South African context necessitates developmental assessment measures with particular characteristics. A critical examination of a variety of potential measures indicates that there are very few measures available to meet these specific needs. The GMDS-ER is judged to be one such measure.

This study explores the performance of South African children aged 4 to 7 years of age as it relates to that of British children (from the standardisation sample). The samples consisted of normal South African (n=129) and British (n=161) children, where normalcy refers to the absence of sensory, physical, or mental handicap.

The study was done in an attempt to explore the suitability of using the GMDS-ER in the South African context. More specifically, the following two aims were pursued:

1. To explore and describe the general development of each of four year groups of a sample of British and South African children by utilising the general developmental quotient of the GMDS-ER
2. To explore and describe the comparative developmental profiles of each of the four year groups of a sample of British and South African children across the six developmental areas represented by the subscales of the GMDS-ER.

Descriptive statistics and simple $t$-tests were used to accomplish Aim 1 and Hotellings $T^2$ tests were mainly used in order to accomplish Aim 2.

The major findings of the present study were as follows:

1. South African and British children’s overall performances (as measured by the GMDS-ER GQ) are similar.
2. A great deal of variability exists between the GMDS-ER profiles of normal South African and British children (i.e., when individual subscales and year groups are considered).

3. In general, South African children performed better on the Locomotor and Personal-Social Subscales, while British children performed better on the Language and Practical Reasoning Subscales. Performance on the Eye and Hand Coordination Subscale was similar for the two samples and on the Performance Subscale performance was too variable to come to any general conclusions.

In view of the findings, caution with regard to the use of the British-based norms in the South African context is recommended. Recommendations are made for the use of the GMDS-ER to help with the identification of specific classes of disorders in the South African context. Further investigation into the applicability of the GMDS-ER for South African use as well as the establishment of South African norms are final recommendations.

Key words: Developmental assessment, Griffiths Scales of Mental Development – Extended Revised (GMDS-ER), South African children, normal child development.
CHAPTER ONE: INTRODUCTION

1.1 General Introduction

The present study falls within the field of developmental assessment. More specifically, it focuses on investigating the applicability of the Griffiths Mental Development Scales – Extended Revised (GMDS-ER) for a South African population. This chapter will contextualise the study by looking at the need for a developmental measure that is usable in the South African context. To achieve this, the shortcomings of existing South African measures, as well as the characteristics of a measure that would meet the developmental assessment needs within the South African context, will be briefly explored. The aims of the study will be introduced subsequent to this exploration, since they are directly related to the South African developmental assessment context. The reader will also be introduced to concepts and definitions relevant to the discussion in the rest of the treatise. The chapter concludes with an outline of the chapters that follow.

1.2 Assessment Needs in the South African Context

1.2.1 Clinical Setting

Despite commendable efforts by a number of researchers, there still remain the following shortcomings with regard to currently available measures that could be used to assess development in individual clinical settings (Allan, 1992):

1. The existing measures are not comprehensive, with most focusing on specific aspects of development (mainly around the construct of intelligence).
2. Specific tests are standardised for specific ethnic groups to the exclusion of others, and there are none that can be used diagnostically with children who are not white.
3. Specific tests are standardised for specific age groups, and none are able to provide diagnostic information for the first 3 years of life.
4. Because tests regarding age ranges and groups are specific, related research is fragmentary, and this limits the generalisability of research findings.

The abovementioned scenario has serious practical implications. When psychologists need to assess the development of young children who come from a previously disadvantaged background, or children younger than 3 years, they are forced to use tests which are not standardised for these groups. The mean performance of a group on a test that has not been standardised for it may be different from that of the standardisation sample. Until research has been done on a group’s performance on a certain test, it cannot be assumed that the mean of that group is the same as or similar to that of the standardisation group. A low score (relative to the standardization group’s mean performance) may be cause for concern where in actual fact the development of the child is progressing at par (if compared to the mean performance of a relevant norm group). Similarly, a high score may be interpreted as satisfactory progress, when in actual fact there may be problematic issues that would have been detected if he or she had been compared to a relevant norm group. It would be a great disservice to a child if an incorrect diagnosis were to be made or a correct diagnosis not made (as this would lead to appropriate intervention not being taken). Considering the influence that test results may have on a child’s life, if there is any possibility that this influence may be detrimental, the test should be changed or abandoned. It is therefore very important to have information about the test performance of children from all ethnic and age groups.

1.2.2 Assessment Requirements of Intervention Programmes

As a substantial number of South Africa’s children are at risk, there is a great need for intervention programmes that focus on the improvement of the development of vulnerable children. Intervention projects to improve development are usually most effective if utilising a combined nutrition and psychosocial intervention strategy (Pelto, Dickin & Engle, 1999). The process of developing and implementing interventions would need to involve thorough
pilot testing and monitoring to evaluate appropriateness and ongoing efficacy. Pelto et al. (1999) indicate a nine-step process, in which four of the stages involve some kind of assessment or evaluation.

Pelto et al. (1999) indicate that assessment of outcomes for such programmes is problematic as they are complex and always affected by cultural context. Part of the problem is then that most standardised tests of development have been developed in industrialised societies, but the impact of this becomes less severe when groups within similar cultural contexts are compared (Pelto et al., 1999). Pelto et al. (1999) further indicate that tests of cognitive development for infants, which are indicative of later performance, are usually intensive and difficult to administer under field conditions. Furthermore assessments of longer-term outcomes need to be functional rather than focusing on inherent abilities, as functional outcomes are more reflective of the consequences of early experiences and interventions. This means that a functional outcome like talking should be measured rather than an abstract underlying process such as sequential processing. The basic tenet that development is a complex phenomenon is also important, and Pelto et al. (1999) view the following elements as critical: cognitive development, language development, fine and gross motor development, social-emotional development, and temperament. By implication, all of these constructs should also then be scrutinised by valid measurement when appropriate.

Measures that would fulfil the need of evaluating such programmes and their outcomes would therefore need the following kinds of characteristics:

1. Be able to be easily administered in field conditions
2. Be used in a culture-fair manner or be standardised for the population under study
3. Be able to yield results that are comparable over time (as efficacy would need to be proven by quasi-experimental designs)
4. Be able to assess a spectrum of domains of development, as interventions should aim to improve overall well-being and not selected aspects of development
5. Be able to provide information on the development of infants (below the age of 3 years)

1.2.3 Summary

When comparing the evaluation requirements of potential intervention programmes with groups of vulnerable children and current needs in clinical practice, with the characteristics of available South African measures, certain requirements come to the fore.

It is important that measures used are standardised for groups they are being used with, or be adapted in such a way that the results may be interpreted in a culturally fair manner. This translates into a test using a measuring strategy that is more or less culture-unbiased. To use a test in a culture-fair way, information would be needed on the performance of children of all relevant ethnic groups in South Africa for a specific test.

In both clinical practice and group programmatic intervention, it is important for the professional to be able to track progress (or lack thereof) over time. As early childhood development is a time of rapid change, measures would need to be of such a nature that they may be administered over time while yielding results that are comparable between administrations. Allan (1992) mentions in this regard that it is important to have a measure that covers all the years of early childhood and not just a specific age range. This translates to having a measure available that can be used for the age range birth to 7 years.

As far as the content is concerned, it is quite clear that we need a measure that covers all the important aspects of child development and not merely a narrow spectrum (Allan, 1992).
When contrasting the above needs for developmental assessment in South Africa with currently available instruments, it becomes apparent that there are important gaps as far as our ability to assess development goes.

The need for a measuring instrument that meets the abovementioned needs could, of course, be satisfied by the development of a new South African test for infants and young children. But this is a slow and expensive process. Another way is to adapt a foreign test for use in South Africa (Allan, 1992). The Griffiths Mental Development Scales – Extended Revised (GMDS-ER) (especially when used in conjunction with the Revised Infant Scales) is a measure that can potentially fill some of the abovementioned gaps if it was adapted for the South African context. This potential will be discussed more extensively in Chapters 2 and 3. There are various ways in which this can be done (such as changing of items, translating and back translating to ensure meaning equivalence, reordering of items, and factor analyses to see whether the construct structure holds up within a new cultural setting, etc.), but an important step in this process would be to obtain a general idea of whether the norms of the standardisation sample are comparable with those of the South African population. The aims of this study are moulded around this step.

1.3 Aims

The primary aim of the study is to explore and compare the performance of South African and British children aged 4 to 7 years in each of the four year groups on the GMDS-ER. This will be achieved by exploring the following more specific aims:

1. To explore and describe the general development of each of four year groups of a sample of British and South African children by utilising the general developmental quotient of the GMDS-ER
2. To explore and describe the comparative developmental profiles of each of the four year groups of a sample of British and South African
children across the six developmental areas represented by the subscales of the GMDS-ER.

The results of the present study will provide initial exploratory information on the applicability of the GMDS-ER for use in the South African context. Furthermore, information will be generated on the appropriateness of the general developmental quotients and profiles of normal South African children aged 4-7 years on the GMDS-ER (as compared with the norms from the standardisation group). The potential value of the GMDS-ER for use in South African clinical and programmatic intervention settings has been mentioned previously in this chapter. The present study will begin to address the fact that the GMDS-ER has not been standardized on the South African population, and pave some of the way in order that the mentioned potential may be realised.

1.4 Relevant Concepts and Definitions

This section introduces a number of concepts and definitions that are used to some degree in the treatise. Not all are central to the overall theme of the treatise and may only be relevant within the context of certain focused discussions. They are presented here for the sake of reference, and to minimise the encumbrance potentially caused by the intermission of definitions in said discussions.

1.4.1 Child Development

As child development will be explored more fully in the following chapter, only a brief definition is offered here.

According to current views, child development can be described as the phenomenon of the human child adapting to the demands of the context in which it finds itself. This process takes place within the boundaries of its biological maturation and is often timed according to critical periods of optimal development formed by these constraints.
1.4.2 Cross-cultural Psychology

As can be expected, a great deal of thinking in current cross-cultural psychology is contextualistic, and interestingly, the developmental approach is gaining more recognition as a mode of explaining differences across cultures (Kağıtçıbaşı, 1996). Kağıtçıbaşı (1996) states that her approach to studying cross-cultural phenomena is functional, in that it looks at the reasons why variability (or similarity) in certain areas exists between cultures. Although cross-cultural psychology is greatly interested in the mechanics of differences rather than the fact that they are there, this approach also has an (often unnamed) underlying presupposition that universal human developmental processes and potential may exist, and in its comparisons will look to highlight these universal processes.

1.4.3 Cultural Psychology

Cultural psychology is the study of psychological factors from a phenomenological or “emic” approach. Even more than cross-cultural psychology, the phenomenological approach brings in an all-important contextualistic view. This approach studies the psychology from within a culture, and constructs are naturally occurring rather than imposed. The focus is on the variability and uniqueness of the individual case (whether a person, a culture, or a group). At times this is seen as the antithesis of cross-cultural psychology (Kağıtçıbaşı, 1996), as comparisons are defied by definition.

1.4.4 Nativism

This approach to the study of child development postulates that development takes place due to factors that are innate and present in the newborn infant. This view is also known as “rationalism” and loosely builds on the ideas of those on the nature side of the historical nature vs. nurture debate. Today, however, the perspective heavily involves the idea that children are pre-programmed to develop and mature in certain ways (Woods, 1998).
1.4.5 Associationism

This position is also known as “empiricism” and has been referred to as the nurture side of the nature vs. nurture debate. It postulates that development is dependent upon the experiences and environment to which a child is exposed. The behaviourism of B.F. Skinner can be seen as the most extreme form of associationism. There is often a connotation of passivity on the side of the child in his or her own development when dealing with associationism (Woods, 1998).

1.4.6 Constructivism

Constructivism (or interactionism) treads a middle path between the extremes of associationism and nativism, and postulates that development is dependent upon the interplay between internal/biological factors and external/experiential influences.

1.5 Chapters of the Study

This chapter outlined the need for appropriate developmental assessment in the South African context and made mention of the GMDS-ER as a potential answer to this problem. The aims of the study as well as relevant concepts were introduced. Chapter 2 provides a theoretical context for child development by examining the history of its study as well as current views on its nature. Child development is further explored by looking at its constituent domains. The assessment of child development is also explored and reference made to the variety of instruments that are used in the South African and international contexts. These instruments are briefly examined with reference to their potential to function within the parameters set by the South African developmental assessment needs. Chapter 3 provides an overview of research done on the original Griffiths Scales and looks at the revision and restandardisation that resulted in the GMDS-ER. Chapter 4 describes the problem formulation and methodology employed in the current
study. Chapter 5 presents the descriptive statistics for each of the samples as well the results of the comparative analysis between the samples. It also provides an initial discussion of the results. Final conclusions on the applicability of the GMDS-ER and recommendations are offered in Chapter 6, as well as a discussion on the limitations of the current study.
CHAPTER TWO: CHILD DEVELOPMENT AND ITS ASSESSMENT

2.1 Introduction

In Chapter 1 the need for and the characteristics of a developmental measure in the South African context were explored. Cursory definitions of theoretical terms related to the assessment of child development were also introduced. This chapter will provide a theoretical context for child development and its assessment and will explore more fully the issues surrounding some definitions assumed or offered during the introductory chapter. It will commence with an exploration of the history and current state of developmental science. This will be followed by an exploration of the construct of child development and its assessment. The chapter will be concluded with a brief exploration of major measures in the field and their potential to meet South African developmental assessment needs.

2.2 Child Development

2.2.1 A Short History of the Study of Child Development

The formal study of child development is generally recognised as having been pioneered by G. Stanley Hall (influenced by Darwin’s theory of evolution) at the turn of the 19th century (Luiz, 1999). During the early part of the 20th century, the study of child development focused on the collection of descriptive information about normal development (Mussen, Conger, Kagan and Huston, 1990) and at this time it was a risky, speculative science (Cole, 1997). During these early stages, developmental changes were assumed to be influenced mainly by maturational changes.

Even during the 1930s, the science of child development was still a burgeoning one and many of the longitudinal studies of the decade were focused on description and providing normative data (Parke, 2004). Major influences
came from Freud, Gesell, Piaget, and Watson, but there was no agreed-on definition of problem, method, or design. Adding to this state of disjointedness was the fact that theory was fragmented (Parke, 2004).

The 1940s and ’50s saw the application of mainly learning theories, but the theories of Freud were still very influential (Parke, 2004). Major conceptual contributions during this period were made by Sears and Skinner (Parke, 2004), who sought for broad, universal principles with little concern for culture or other contextual influences. Application to better child development through applied research and policy influencing during this era took a backseat to basic research, as the field was still trying to establish itself as a science (Parke, 2004). The importance of dyadic analyses, a recognition of the biological basis of behaviour, and the application of experimental research were the major advances during this period (Parke, 2004).

The 1960s and 70s heralded the return of Piagetian theory and concern about cognition, the discovery of precocity and the “competent infant”, the redefining of social learning, and an inclusion of broader systems under study (moving away from mere individual and dyadic study), and a focus on the study of emotion (Parke, 2004). During this period, the science of developmental psychology started to show signs of maturity, and the theories of this period started to include internal as well as contextual elements (Parke, 2004). Under leaders such as Bronfenbrenner, a commitment to contextualism was evident. These theorists claimed that the study of child development should no longer be “the science of the strange behaviour of children in strange environments with strange adults for the briefest period of time” (Bronfenbrenner, 1979 in Kağıtçıbaşi, 1996, p.4). At her Hampstead Child Therapy Clinic Anna Freud “emphasized that it was essential for [developmental data] to be interpreted within context” (Luiz, 1999, p.5). Along with contextualism, the role of structure and function in development as a transactional dynamic entity (rather than a uni- or bi-directional one) came to the fore (Parke, 2004). Grander theories of earlier decades were replaced by more limited theories which explained smaller domains of behaviour (Parke, 2004). There was also a return to applied and social policy concerns and greater interdisciplinary collaboration (Parke, 2004).
Although context started to become important, it received little attention during the periods preceding the current one. However, developments in cultural and cross-cultural psychology (notably developmental research) have been substantial over the last two decades and have challenged the established traditions of psychological research (Kağıtçibaşı, 1996).

2.2.3 The Current State of Child Development Study

2.2.3.1 Major Themes

An interest in the genetic and neurological underpinning of behaviour, an interest in the interdependence of cognition and emotion, a recognition of the role of culture, and a move toward a mature multidisciplinary science are characteristic themes of the current period (Parke, 2004). The current era is also characterised by a retreat from grand theory which began in the 1980s and theories are used eclectically as appropriate. Parke (2004) states that the idea of general universal processes of development have been given up as it is increasingly evident that these processes are dependent on the context (In this regard, see Kindermann and Valsiner’s (1989) definition of human development presented below.) Social trends and shifts in policy and practice influencing child development are coming under closer scrutiny, and there has been a return of the idea of critical periods in child development rather than a view of unlimited plasticity (Parke 2004). There is also an appreciation of the fact that the boundary between basic and applied work is nebulous and this is illustrated by a wide array of applied and policy-oriented work (Parke, 2004).

Major advances include progress in understanding on multiple levels (from the genetic to cultural levels). The field has increased in sophistication in conceptual framing in order to explain the interrelatedness between the different levels. The recognition of contextual determinants and the ability to measure them also represents a major advance on the environmental side of developmental science (Parke, 2004). The use of neuroimaging and genetic
techniques has furthermore been instrumental in research that closely links the biological domain to behavioural antecedents.

Up to this point of the discussion of current major themes, this treatise has used Parke’s (2004) review of the field extensively, but another recent review seems to corroborate his assertions. Kagan (2003) focuses on two important concepts in summarising the field at this stage in its history. There is still a great emphasis on biological factors and their maturational influence on development, but Kagan’s (2003) review also states firmly that the context of any human behaviour is central to its definition and understanding. The role of culture *per se* is only given fleeting mention, as the article is written from an experimental psychology perspective (with numerous references of laboratory-type investigations and animal experiments), and context is viewed as another delimiter that needs to be included in laboratory-type experiments and not approached in the holistic manner that other experimental psychologists like Cole (1997) might envisage. Yet the role of context in development is seen (at least theoretically) as an integral part of human development. It would seem, then, that the field of developmental psychological research is loosely\(^1\) split into two parts: one focusing primarily on the biological and genetic antecedents of maturational development (relying heavily on experimental study), the other focusing on the role of the context of such development (relying heavily on phenomenological and quasi-experimental study). Great strides have been made towards an integration of the two spheres\(^2\) (Parke, 2004). When reading the work of different authors that acknowledge those on the other side of the field, one still gets a sense of disjointedness, suggesting that the field is working out the best ways in which to integrate without losing essential characteristics that make both sides uniquely valuable.

\(1\) I use “loosely” here as many other possible divisions would be possible.

\(2\) See Kagan (2003) on the interrelations between semantics (culture bound) and the forming of schemata (modulated heavily by biological maturation), and Cole’s (1997) work incorporating experimental principles in the research into the acquisition of cognitive skills in different cultures without losing the “within” characteristic of his brand of cultural psychology.
2.2.3.2 The Future

Areas for current as yet unanswered research questions includes mapping which behaviours are independent of socio-historical influences and which are more susceptible to them. Related to this is the question whether social trends and historical influences merely change the timing of onset of developmental phenomena, or whether the underlying processes are fundamentally changed. Another important question that needs answering is which aspects of behaviour are likely to be altered by environmental events at specific critical points in development and which are more fluid and open to influences over a wider span of development (Parke, 2004). Parke (2004) further argues that it is important to find out which processes and outcomes are universal, which are universal but modulated by culture, and which are determined by culture. He calls this finding the “boundaries of culture” or “finding universals among differences” (Parke, 2004, p.13).

Parke (2004) gives a central role to increasing the focus of context when he states that “we need a more culturally sensitive field” (p.10). He suggests that an awareness of diversity has far outpaced our understanding, and that “there is a serious gap in our descriptive base, which can be used to develop profiles of similarities and differences across children’s development in different ethnic, racial and class backgrounds” (p.10). Although he was speaking about the situation in the USA, a number of publications point to the fact that this may well have been said about South Africa (Allan, 1988; 1992; Bhamjee, 1991; Luiz, 1999). He further indicates that research should focus more on within-culture research to emphasise the underlying processes that may account for differences rather than on just documenting group differences. It is unclear how this would facilitate the serious lack of profiles of similarity and difference. Kağıtçibaşı (1996) suggests that there need not be an antithesis between intra-(phenomenological) and intercultural (comparative) research. She states that “the two approaches can be, and should be, complementary” (Kağıtçibaşı, 1996, p12). She says that the purported universalities of American European studies of course do not necessarily hold for other cultures, but that cross-cultural comparisons may highlight similarities between cultures that may (upon closer
within-cultural studies) prove to be due to universal psychological principles. In essence she acknowledges that certain universal truths may not be truths at all, but that there may be certain truths to be discovered through an application of cross-cultural and cultural research. If one considers the above information and arguments, it seems that cross-cultural comparisons are not only still feasible, but also in fact needed.

Parke (2004) further emphasises that culture-sensitive studies are necessary because culturally sensitive services and programmes need to be provided. Again, it is possible to ask how one will know what services are needed for minority or previously disadvantaged groups without comparing them to majority or previously advantaged groups. If within-cultural research only were to be conducted, one might end up with a situation where these imbalances that exist with regard to policy issues might never be addressed.

According to Parke (2004), there are some difficulties with culture-sensitive research. These include getting representative samples, the development of culturally meaningful scales and meaning equivalence across languages, the recognition of when comparability of measurement across cultures hinders our understanding and when it helps, and the need to ensure that interpretations of people’s behaviours are consistent with their own understanding of them.

Parke (2004) asserts that quantitative and qualitative approaches are not incompatible, and that they should be used in conjunction as they may be valuable at different stages of the research process. This is reminiscent of what Kağıtçıbaşı (1996) says about within-cultural and cross-cultural research (i.e. a focus on the emic and the etic, as both will make valuable contributions).

2.2.4 Summary and Definition of “Development”

Child development is usually defined by introductory developmental psychology textbooks as the “orderly and relatively enduring changes over time in physical and neurological structures, thought processes and behavior” in children (Mussen et al., 1990, p. 4). According to this conceptualisation, the
goals of studying childhood development are to get a better understanding of
universal changes, individual differences, and the influence of the environment or
context on said development. Kağıtçıbaşı (1996) has indicated that most
American introductory textbooks see culture as an extraneous variable, and the
individualistic (American) trajectory as the normal way of developing.

Kindermann and Valsiner (1989) offer the following definition of development
as part of an initiative to make developmental study more culture-inclusive (p. 18):

*Development cannot be conceived as a process of moving inside a
continuum but as a dialectical interchange between parts of the developing
organism on the one hand, and conditions of the environment on the other.
Instead of movement on a continuum, of concepts of increase or decrease,
developmental reality is characterized by transformations of the structural
relationships of organisms and their environment.*

Amongst other things, Kindermann and Valsiner (1989) with this definition
make the point that context is an integral part of the nature of development and
not merely one of a myriad of factors that influence development. According to
this definition, the study of child development is the study of the changes in the
structure of the relationship between the child and the environment over time.
The ultimate goal of the study of development according to this
conceptualisation, is an investigation of the underlying processes that contribute
to similar and/or dissimilar outcomes. Kindermann and Valsiner’s (1989)
definition rings true if evaluated from a phenomenological perspective, but this
particular way of looking at development has not found its way into mainstream
developmental thinking.

Based on Kagan (2003) and Parke’s (2004) reviews of the field it is safe to
say that the following are true of current thinking in the field of child development:

1. Child development is based on **biological factors** such as neurological
development, physical maturation, and genetic factors. The interaction
between these factors and context varies across different behaviours.
This means that certain developmental processes seem to be relatively independent of contextual factors (and are therefore presumably governed by biological influences that remain constant across contexts) and others change as the context does. The question remains whether contextual factors change the timing of onset of behaviours or whether the underlying process is altered.

2. **Contextual factors** (like culture) are also intrinsically important and influence the development of the child in a dynamic transactional manner rather than just being an external factor to be considered. Culture and its related factors influence and modulate the emergence of developmental phenomena by modulating biological maturation, but also by providing the demand context in which development takes place. In that sense, context can never be just another variable to consider in the study of child development – it forms a central part of the conceptualisation and definition of what development is.

3. Development is also subject to **critical or sensitive stages**, and although some variation is a given, current thinking leans towards the notion that development is not a process characterised by unlimited fluidity.

Recent views and directions in the field of child development still seem to centre on the concepts of nature (maturation) and nurture (contextual factors), as well as continuity (fluidity of timing and sequence) and discontinuity (critical stages in timing and sequence). The field is no longer engaging in questions about which of these concepts supersede their counterparts in influence on development, but rather how they interact and how these interactions differ across behaviours. A newer debate (albeit implicit and expressed mainly through the application of antithetical approaches) seems to centre on universalism and relativism, a topic approached by various authors (Kağıtçibaşı, 1996; Kindermann & Valsiner, 1989; Parke, 2004).

Definitions of the day are no more true than the assumptions of the day are accurate. In no way does the following purport to be more than a single
subjective observation based on a brief overview of the field of developmental science:

Child development is the phenomenon of the human child adapting to the demands of the context that it finds itself in. This process takes place within the boundaries of its biological maturation and is often timed according to critical periods of optimal development due to these constraints.

2.2.5 Development According to Behavioural Domains

Much of the above has been explored to come to a conceptualisation of child development. Definitions are important as they facilitate communication and knowledge generation. But another way to approach child development is to look at the facets of a child’s life that are usually under investigation when speaking about the child’s development.

Publications that deal with development of children refer to the following domains of development: physical, cognitive, psycho-social, moral, neurological, emotional, expressive language, receptive language, fine motor, gross motor, temperament and self-help (Brooks-Gunn, 1990; Coghlán, Kiing and Wake, 2003; Kohler and Rigby, 2003; Pelto et al., 1999). These are mentioned merely as examples since other domains and further refinement and subdivisions are of course possible. The purpose of dividing behaviour into several domains is to facilitate classification and understanding, but it must always be remembered that the growing child is a whole entity and should be understood as such. This means that the interdependence and interaction between domains should never be forgotten.

The following sections will utilise a broad division that is aimed at facilitating the classification of behavioural observations that are usually made of the development of children from 4 to 7 years of age. This kind of division not only facilitates an understanding of what child development encompasses, but is extremely useful from the perspective of the practice of psychology, as it expresses child development in terms of observable behaviour. These
behaviours are expressions of functionality and adaptivity and are ultimately more objectively measurable than abstract concepts.

### 2.2.5.1 Motor Development

“Motor development” refers to control over bodily movements through the coordinated activity of the nerve centres, the nerves, and the muscles (Hurlock, 1981). In contrast to the rapid growth of first half-year of a child’s life, between the ages of 4 and 7 he or she will experience a relatively stable period of growth (Hurlock, 1981). During this period (especially after the age of 5) the child usually experiences major developments in fine-motor movements of the smaller muscle groups (Bloom, 1985; Hurlock, 1981).

Motor development depends on neural and muscular maturation. By the age of 5, a child’s cerebellum (which controls balance amongst other things) and cerebrum (which is involved with skilled movements) are nearly fully developed (Hurlock, 1981). The striated muscles develop slowly through this period of development and sufficient maturation is a prerequisite for voluntary coordinated action (Hurlock, 1981).

Biological pathways therefore form the basis of motor development during the pre-school years, but contextual limitations like overprotectiveness may stifle developmentally ready motor abilities (Hurlock, 1981). Motor development follows a predictable sequence and, although there are normal variations in the timing of emergence of behaviours, it is possible to establish norms for motor development during this period (Hurlock, 1981).

The following Table gives an indication of the expected timing of the emergence of certain behaviours during this period (combined and adapted from Bloom, 1985; Lee, 1990; Sharman, Cross and Vennis, 1995).
Table 1
Gross motor and fine motor abilities acquired by children between the ages of 4 and 7 years of age

<table>
<thead>
<tr>
<th>Age</th>
<th>Gross motor skills</th>
<th>Fine motor skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>6th year (60 months to 71.9 months)</td>
<td>Runs lightly on toes and is able to walk on narrow line. Skilful in climbing, swinging and sliding. Kicks and throws ball with considerable ability. Able to move rhythmically to music.</td>
<td>Good control of pencil and crayons. Draws people and houses recognisably.</td>
</tr>
<tr>
<td>7th year (72 months to 83.9 months)</td>
<td>Can somersault, skip with rope, and use climbing ropes. Begins to use bat adequately. Very active stage of development and accidents happen frequently.</td>
<td>Draws more realistic and complicated pictures and begins to fill in colour. Starts writing, but may reverse some letters.</td>
</tr>
<tr>
<td>8th year (84 months to 95.9 months)</td>
<td>Good coordination – gets better at bat and ball games. Can walk along narrow planks and balance on poles.</td>
<td>Able to write well and may start to write stories for self.</td>
</tr>
</tbody>
</table>

The following factors influence the rate of motor development during this period: intelligence, body build, levels of stimulation, encouragement and protectiveness of parents, physical defects, gender, ethnicity, and socio-economic status (Hurlock, 1981).

2.2.5.2 Personal-social Development

Personal-social development is a broad category that has been used to describe the development of the inner workings of a child (emotions, identity development, self-esteem) and the outer aspects of interactions (relationships with peers, friendships, prosocial or antisocial behaviour (Mussen et al., 1990)). In the context of the GMDS-ER, the term also refers to adaptive self-care behaviours (Luiz et al., 2004).
Even though the pattern of emotional development is predictable, there are variations in the frequency, intensity and duration of the different emotions and even the ages at which they start appearing (Hurlock, 1981). Neurological development and the concomitant development in the ability to perceive meanings, the ability to attend to a stimulus for a longer time, and the ability to understand and anticipate an event affect emotional reactions and have a marked influence on which stimuli children will respond to and which not (Hurlock, 1981). The growth of the adrenal glands is also important as they play a dominant role in emotions (Hurlock, 1981). These glands have almost reached maturity when the child is 5 years old, and therefore we can expect to see a wide variety of emotions and emotional expression during the ages 4 to 7 years. Emotional experience and expression are, however, influenced to a greater degree by contextual factors. Learning seems to play an especially important role in this regard (Hurlock, 1981).

The work of Erik Erikson has for a long time guided relevant professionals in understanding the emotional and social development of children. Erikson’s concept of ego-identity allows for inner and outer elements of emotional development. A satisfactory level of acceptance towards self and the group culture in which a person finds himself or herself indicates healthy development (Thomas, 1985). Erikson (1965) believed that humans must develop through eight stages of emotional development, and that each stage is characterised by a struggle between two polar states. Two key stages are relevant between the ages of 4 and 7. The first is “initiative versus guilt” and usually takes place from 3 to 6 years of age. Children who have completed previous stages successfully will have a strong desire to take action and assert themselves. They will wish to create, invent, pretend, take risks, and engage in lively activities with peers (Schröder, 2004). Encouragement from adults who understand what the child is facing and encourage him or her in these activities, provides for the facilitation of initiative and a sense of enterprise and exploration (Thomas, 1985). If children are made to believe their efforts are wrong, they will develop a sense of guilt, and overbearing guilt may inhibit the child from proceeding in life in a self-confident way (Thomas, 1985). The “industry versus inferiority” stage takes place between the ages of 7 and 12 years of age and therefore children of age 7
will start dealing with this conflict. Children start to wish to complete tasks that are interesting and worthwhile, and if adults furnish the guidance needed for successful completion of these tasks, children will develop a sound sense of industry. If the necessary support is not given and the child fails at a task or if a completed task is considered to be insignificant, the child may experience overwhelming feelings of inferiority and may not develop all his or her potential abilities (Thomas, 1985).

“Social development” refers to the acquisition of skills that allow one to function within one’s socio-cultural environment (Hurlock, 1981). Hurlock (1981) explains that the successful adjustment to a social group depends on ample opportunity, the ability to communicate effectively with peers, motivation, and effective ways of learning under guidance. The family is the most important socialising agent for the greatest part of the time period between the ages 4 and 7, but since most children are at school at the age of 7, the role of teachers cannot be underestimated during the latter part of the period (Hurlock, 1981).

The following behavioural indicators and their expected times of emergence can be classified under this broad domain. In a sense, the self-help behaviours are expressions of children’s emotional and social development as they may be influenced both by feelings of self-efficacy and the overall socialisation process within the family. These behavioural indicators were combined and adapted from Bloom (1985), Lee (1990), Sharman, Cross and Vennis (1995), and Sheridan (1992).

Table 2
Behavioural Indicators of Personal-social Development Acquired by Children between the Ages of 4 and 7

<table>
<thead>
<tr>
<th>Age</th>
<th>Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th year (48 months to 59.9 months)</td>
<td>Less expression of imaginary fears than earlier ages.</td>
</tr>
<tr>
<td></td>
<td>Often shy in first contacts.</td>
</tr>
<tr>
<td></td>
<td>Can dress and undress, except for difficult fastenings like laces and</td>
</tr>
<tr>
<td></td>
<td>buttons.</td>
</tr>
<tr>
<td></td>
<td>Capable of washing own hands, but often does not complete the job well.</td>
</tr>
<tr>
<td></td>
<td>Capable of sharing and taking turns, but may still cheat to win.</td>
</tr>
<tr>
<td></td>
<td>Shows sympathy for friends that are hurt.</td>
</tr>
<tr>
<td></td>
<td>Shows purpose and persistence and some control over emotions.</td>
</tr>
<tr>
<td>Age</td>
<td>Behaviour</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6th year</td>
<td>Gives full name, home address and usually age. Shows good degree of control over emotions and is stable overall. Shows desire to excel and can be persistent in learning new skill. Prone to boast or show off. Washes and dries own hands and face without help. Can dress and undress, but may still need help with difficult fastenings. Enjoy games with rules, understands “fairness”, but may still cheat to win.</td>
</tr>
<tr>
<td>7th year</td>
<td>Friendships form and dissolve rapidly, but often plays with one friend. Eagerness for praise expressed frequently. Emotionally turbulent time due to increased cognitive capacity. Capable of care and consideration, but also of very strong expressions of verbal and physical temper. Emergence of membership in clubs. Conforms to avoid disapproval.</td>
</tr>
<tr>
<td>8th year</td>
<td>More emotionally stable than at 6 years of age. Independent behaviour starts emerging; may be solitary for short periods. Lacks control over own energy and may become irritable due to this. Starts moving away from dependence on family for reassurance and starts to want to please the teacher. Outbursts rarer; more likely to sulk when upset.</td>
</tr>
</tbody>
</table>

### 2.2.5.3 Cognitive Development

Current thinking in the development of cognition in children favours constructivist theories such as those of Vygotsky and Piaget, which take genetic pre-programming as well as environmental adaptation into account (Greig, 1998).

According to Piaget’s view the child between the ages of 4 and 7 years of age finds himself or herself in the preoperational stage of cognitive development. The hallmark of this stage is the acquisition of mental representation - the ability to think about objects and events that are not present in the immediate environment and to represent them in mental images, sounds, words or other forms (Mussen et al., 1990). The first period of this stage takes place between the ages of 2 and 4 and is characterised by egocentrism (the inability of the child to take another's perspective) and centration (the inability to consider more than one aspect of a stimulus) (Thomas, 1985). The next phase takes place between the ages of 5 and 6 and is characterised by intuitive thought. This stage of reasoning is transitional between the previous stages that rely solely on
perception and those of truly logical thought. There is greater movement toward
decentration and the child starts to consider more than one factor influencing an
event, but problem solving is intuitive and based largely on trial and error rather
than on true logic (Thomas, 1985).

Piaget was an epigenetic epistemologist with a background in the biological
sciences. He believed that the unfolding of cognition was primarily based on
biological determinants which reside within the child and which cause cognition
to develop in an invariant way across cultures. Vygotsky, on the other hand, was
greatly influenced by the fact that socialism was making claims towards being a
supreme ideology that contained the answers to all facets of existence (including
human development). He therefore placed a much higher emphasis on the
influence of interaction with knowledgeable others and cultural systems in the
development of cognition (Woods, 1998). Vygotskian thinking, therefore,
postulates that cognitive abilities and capacities are formed and built up in large
part by interaction with the social environment (Meadows, 1993). Vygotsky’s
stage II corresponds more or less to the ages between 2 and 7 years and can be
divided into five subphases that succeed one another (Thomas, 1985). During
subphase II-A the child thinks in associative complexes, and groups objects
based on any bond he or she notices, such as shape or colour. Subphase II-B
consists of thinking in collection complexes, where the child groups objects
based on contrast rather than similarity. During subphase II-C, thinking takes
place in chain complexes, where joining of groups takes place where a
meaningful bond is necessary only between one link and the next. Subphase II-
D is characterised by diffuse complexes, where a fluidity exists in the attribute
that unites the individual elements. Thinking in subphase II-E appears to be
based on true conceptual thought, but the child is only able to group elements on
characteristics that have been provided by adults and is not able to see a self-
formed conceptual link between the elements. This substage is referred to as
“thinking in pseudoconcept complexes” (Thomas, 1985).

The important groundwork that has been laid by theorists such as Piaget and
Vygotsky is still influential today, but the current focus in the field of cognitive
development is on information-processing models (Bjorklund, 1994; Meadows,
One set of theories treats the mind as a computer which (i) represents information as syntactic symbols, (ii) operates on these symbols according to logical rules, and (iii) stores the resultant symbols in specified localities in long term memory. These theories have some serious shortcomings, however. They fail to adequately explain automatic thought (the cognitive activity that takes place when one is engaged in a task that does not require concerted mental effort) and do not consider information on recent advances in brain development (Bjorklund, 1994; Meadows, 1993). Some of the research findings that proponents of these theories use as proof for their views could just as well be interpreted in terms of other theoretical models (Bjorklund, 1994). Newer theories of information processing have however taken the advances in neuroscience seriously, and there seems to be much promise for the success of these theories to adequately explain the role of maturation and environmental factors on the development of cognition, as well as filling the gaps that have been left by earlier models. These models do not regard the mind as a mechanism that processes information in a serial way, but on the mind as an organism that can engage in several activities in a parallel manner. The basic units of knowledge and processes are not symbols, but connections between different elements (much like the connections between neurons in the brain). Each set of connections can have its bonds strengthened or weakened in order to produce a certain pattern that constitutes information (Meadows, 1993). The biggest drawback of these newer approaches is that they are emerging theories that, in spite of their potential, cannot yet explain the spectrum of phenomena that can be classified under cognitive development (Bjorklund, 1994).

Some of the behaviours that emerge owing to cognitive development can be seen in the following Table (Bloom, 1985; Lee, 1990; Sharman, Cross & Vennis, 1995; Sheridan, 1992).

Table 3
Behavioural Indicators of Cognitive Development Acquired by Children between the Ages of 4 and 7

<table>
<thead>
<tr>
<th>Age</th>
<th>Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th year (48</td>
<td>Copies cross and square.</td>
</tr>
<tr>
<td></td>
<td>Draws recognisable house and person with head, trunk, legs and arms.</td>
</tr>
<tr>
<td>Age</td>
<td>Behaviour</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5th year</td>
<td>Counts up to 20 from rote memory or may understand the numbers 4 or 5.</td>
</tr>
<tr>
<td>(50 months to 59.9 months)</td>
<td>Sometimes confuses fact and fantasy but can relate long stories.</td>
</tr>
<tr>
<td></td>
<td>Beginning to name drawings and plan models before starting.</td>
</tr>
<tr>
<td>6th year</td>
<td>Decides what to draw before commencing, but may still copy from neighbour.</td>
</tr>
<tr>
<td>(60 months to 71.9 months)</td>
<td>Beginning to distinguish between truth and falsehood.</td>
</tr>
<tr>
<td></td>
<td>Can name and draw a circle, rectangle and triangle.</td>
</tr>
<tr>
<td></td>
<td>Counts fingers on one hand.</td>
</tr>
<tr>
<td></td>
<td>Realises clock time is related to daily routine.</td>
</tr>
<tr>
<td>7th year</td>
<td>Draws more realistic and complicated pictures.</td>
</tr>
<tr>
<td>(72 months to 83.9 months)</td>
<td>Interested in learning to read.</td>
</tr>
<tr>
<td></td>
<td>Has a better understanding of number symbols.</td>
</tr>
<tr>
<td></td>
<td>Intensely curious.</td>
</tr>
<tr>
<td>8th year</td>
<td>Often rubs out work in attempt to be right – has insight into conclusions.</td>
</tr>
<tr>
<td>(84 months to 95.9 months)</td>
<td>Tells the time well.</td>
</tr>
<tr>
<td></td>
<td>Growing sense of right and wrong.</td>
</tr>
<tr>
<td></td>
<td>Enjoys experimentation with new materials.</td>
</tr>
<tr>
<td></td>
<td>Able to store, revive and reorganise experiences to fit them to new challenges.</td>
</tr>
</tbody>
</table>

### 2.2.5.4 Language Development

Language development is often seen as being part and parcel of cognitive development or being very closely related to it and both Piaget and Vygotsky considered language and cognition as developing interdependently (Seifert & Hoffnung, 1991). However, language acquisition is a vital part of a child’s development and assists not only with communication, but also with an understanding of society and the furthering of social relationships. It also allows symbolic categorisation and aids reasoning (Mussen et al. 1990). Because of its importance, it is considered separately here.

For most children, language expands rapidly after infancy, and significant changes in semantics and general communicative competence can be observed. The preschool years are of particular importance to the development of syntactic rules (Seifert & Hoffnung, 1991). Children seem to have the innate ability to acquire syntactic rules and this may lead to overgeneralisations during this period as children try out their newly noticed rules. Because of the irregularities in all languages, not all possible forms of words can be inferred from rules and a
great deal of rote learning still takes place (although children rely predominantly on the syntactic rules) (Seifert & Hoffnung, 1991).

There are various mechanisms that assist with acquiring language, but it may be summarised as follows: language seems to grow by the interaction of an active, thinking child with certain key people and linguistic experiences (Seifert & Hoffnung, 1991). Common sense and behavioural theories postulate that a great deal of language acquisition takes place by means of the following mechanisms of learning: reinforcement, imitation and practice. However, children’s predisposition to acquire language as well as the predictable sequence that speech and language go through across languages and cultures, are not explained by these theories. From a nativist perspective, children also have an innate ability to acquire language which is at its most sensitive between the ages of 6 months and puberty, sometimes referred to as the “language acquisition device” (Mussen et al., 1990; Seifert & Hoffnung, 1991). Research on this sensitive period has been fruitful (Parke, 2004), but of course experience still plays a crucial role in the development of language, demonstrated in various studies of twins (Seifert & Hoffnung, 1991). The role of experience can be simply illustrated by the fact that a child growing up in a French-speaking home will acquire French rather than another language. Certain parent-child interactions have also been found to facilitate the differential acquisition of language. Parents who speak in shorter sentences, use more concrete nouns than pronouns and recast their children’s utterances, are providing a scaffolding for their children to build their own language structure around (Mussen et al., 1990; Seifert & Hoffnung, 1991). This conclusion supports arguments for the social construction of language and is sometimes included under social interaction theory (Mussen et al., 1990).

The following Table gives an indication of the progression of language in the preschool child (Bloom, 1985; Lee, 1990; Sharman, Cross & Vennis, 1995; Sheridan, 1992).
Table 4

Behavioural Indicators of Language Development Acquired by Children between the Ages of 4 and 7

<table>
<thead>
<tr>
<th>Age</th>
<th>Behaviour</th>
</tr>
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<tbody>
<tr>
<td>5th year</td>
<td>Speech intelligible and essentially grammatically correct.</td>
</tr>
<tr>
<td>(48 months to 59.9 months)</td>
<td>Loves new words and will invent them in order to tell a story or put an unknown into context.</td>
</tr>
<tr>
<td></td>
<td>May still have difficulty pronouncing w – f – th.</td>
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<tr>
<td></td>
<td>Vocabulary of 1500 to 2000 words.</td>
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<tr>
<td></td>
<td>May swear and use bad language.</td>
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<tr>
<td></td>
<td>Eternally asking “why?”, “when?” and “how?”</td>
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<tr>
<td></td>
<td>Knows several nursery rhymes which are repeated or sung correctly.</td>
</tr>
<tr>
<td>6th year</td>
<td>Vocabulary of approximately 3000 words.</td>
</tr>
<tr>
<td>(60 months to 71.9 months)</td>
<td>Defines concrete nouns by use.</td>
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<tr>
<td></td>
<td>Constantly asks meaning of abstract words and uses them frequently.</td>
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<tr>
<td></td>
<td>Speech fluent and grammatically correct.</td>
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<tr>
<td></td>
<td>Recognises some written words and may begin writing a few.</td>
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<tr>
<td>7th year</td>
<td>Talks freely and still very interested in new words.</td>
</tr>
<tr>
<td>(72 months to 83.9 months)</td>
<td>Usually beginning to read.</td>
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<tr>
<td>8th year</td>
<td>Reads a good deal and enjoys writing own stories.</td>
</tr>
<tr>
<td>(84 months to 95.9 months)</td>
<td>Watches television with comprehension and appreciation.</td>
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<tr>
<td></td>
<td>Starting to use language to reason.</td>
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<tr>
<td></td>
<td>Still enjoys being read to, but starts to read to self more.</td>
</tr>
</tbody>
</table>

2.3 The Developmental Assessment of Children

In general “assessment” refers to the process of evaluating behaviour, mental abilities, and other personal characteristics in order to assist in making judgments, predictions and decisions about people (Aiken, 1997). By gathering and integrating information from a variety of sources (observations, tests and records), decisions can be made about the most appropriate services and support for a child or a group of vulnerable children.

According to Squires, Nickel and Eisert (1998), the use of formal measures in the process of assessment compensates for the limitations of pure observation, provides a structure for observation and increases the identification of mild problems which would otherwise go unidentified. A structured approach to evaluation is a valuable aid in the early identification of problematic areas of
development and assists greatly with the process of intervening in a timely fashion.

Developmental assessment in clinical practice with children is important for a number of reasons. For example, Holt (1974) stressed that chronic disorders and disabilities such as mental retardation or cerebral palsy, usually first evident in infancy or early childhood, interfere with the future development of the child and may cause a lifetime of lowered potential. Referrals to community-based psychological resources for assessments related to these kinds of suspected difficulties abound in the South African context. For the optimum benefit of the child, interventions should be implemented as early as possible, as interventions in early childhood have been shown to have higher efficacy than those at later stages (Pelto et al., 1999). As unobtrusive developmental variations and delays may be the first indication of serious conditions, early and accurate assessment of the potentially delayed child is of paramount importance.

Holt (1974) emphasised the fact that developmental delays may also reflect the influence of adverse environmental circumstances which need to be remedied. Intellectual and cognitive deficits as well as delayed development may, for example, point to emotional abuse or child battering (Allan, 1992).

In the South African context in particular, there are also many other reasons why developmental assessment is important. Poverty and poor living conditions contribute significantly to the health status of children in South Africa and result in their being classified as “children at risk” (Luiz, 1999). The impact of AIDS on children is also devastating, as orphaned children are often left to the care of older siblings (who are often as young as 10 years old) (Barbarin & Richter, 2001). By 2001, South Africa had 662 000 AIDS orphans (UNICEF, 2003) and this significant number of youngsters can also be classified as being at risk for developmental delays owing to direct (some are suffering from advanced AIDS themselves) and indirect (sub-standard care and poor living conditions are exacerbated by HIV/AIDS) influences.
The under-5 mortality rate (U5MR) is used as a robust reflection of the general well-being of the children of a country. There is no direct relationship between increases in per capita Gross Domestic Product (GDP) and increases in U5MR, since U5MR reflects the influence of nutritional health, health knowledge of caretakers, the quality of health services, and the quality of sanitation services (The United Nations Children’s Fund (UNICEF), 2003). The alleviation of poverty therefore will not necessarily influence the overall well-being of a country’s children in a direct manner. South Africa’s own U5MR reflects the fact that many of the children in this country are at risk. South Africa has an U5MR of 65 per 1000 live births, which places us as the 70th worst country with regard to this statistic (UNICEF, 2003). This is a large number of deaths when compared to industrialised countries where this statistic averages 39 per 1000. Even more worrisome is the fact that this statistic has increased by 8% since 1990 (an average increase of 0.7% per annum) whereas most other countries have been steadily reducing this number. Additionally, 15% of South African children are born with a low birthweight and 25% of children suffer from stunted growth (UNICEF, 2003).

As a substantial number of South Africa’s children are at risk, there is a great need for intervention programmes that focus on the improvement of the development of vulnerable children. Intervention projects to improve development are usually most effective if utilising a combined nutrition and psychosocial intervention strategy (Pelto et al., 1999). A process that would develop and implement interventions will need to involve thorough pilot testing and monitoring to evaluate appropriateness and ongoing efficacy. Pelto et al. (1999) suggest a 9-step process, four stages of which involve some kind of assessment or evaluation. It is thus imperative that developmental assessment be accurate and informative in the South African context. The following section considers relevant available measures used in the South African context in order to ascertain whether there are any which can be used in an accurate and informative manner.
2.3.1 Developmental Tests Used in the South African Context

2.3.1.1 The South African Individual Scales

For many years the only South African test available to assess the development of young children in the clinical setting was the Individual Scale of General Intelligence for South Africa (Fick, 1939). Although it included items for children aged 2 to 16 years, items were standardised only for children aged 7 and older. The New South African Individual Scale, published in 1964 and later renamed the Senior South African Individual Scale (SSAIS) (Huysamen, 1983), was the first standardised measure that could be used for young children (including preschool children). The target population of the SSAIS was White children from the age of 5 years onwards. In respect of the 5-year-olds, the standardisation sample was not representative of the relevant population and therefore only provisional norms were provided for this age group (Madge, 1983). A comprehensive revision of the SSAIS led to the instrument being renamed the Senior South African Individual Scale – Revised (SSAIS-R) in 1991 (Van Eeden, 1991). The target population of this instrument is Afrikaans-speaking and English-speaking children aged 7 to 16 years (including children from deprived socio-economic backgrounds) (Van Eeden, 1991).

The Junior South African Individual Scales (JSAIS) were initially developed and standardised for the assessment of White children in the age group 3 to 7 years (Madge, 1981). The JSAIS is a comprehensive test that provides a profile of the child’s abilities, but it does not assess gross motor and personal-social development. It is standardised for children with home languages of Afrikaans or English who have had a number of years of preschool or school instruction in these languages. Children from a deprived socio-economic background are explicitly excluded (Van den Berg, 1987).

2.3.1.2 School-Readiness Assessment Tools

The School Readiness Evaluation by Trained Testers (SETT) is an instrument which could be used, especially by trained teachers, to evaluate
school-readiness (Joubert, 1984). Although the test can also be used for diagnostic purposes, it does not provide a comprehensive developmental assessment. The SETT was developed with White, Coloured and Asian children, but no Black children were included in the standardisation sample. The test is not intended for children under the age of 5 years.

Ras (1987) recognised the need for the school-readiness assessment of Black children and developed standardised procedures that teachers could use to screen Black pre-school children. She developed the Learning Readiness Assessment Procedure for Black Preschoolers (LAP-P) and the Learning Readiness Assessment Procedure for Black School Beginners (LAP-B). These assessment protocols have, however, not been published and have not found their way into mainstream testing practice.

Foxcroft, Shillington, Turk, Corby, and Collier’s (1997) School Group Screening Measure (SGSM) has been standardised as a screening measure to assess school readiness. It provides cut points for Asian, Black, Coloured, and White preschoolers, but unfortunately the SGSM has also not found its way into mainstream testing practice.

Although useful in their own right, the above school readiness assessment instruments are not applicable to test general development, as they focus on a very specific age group (children about to enter formal schooling), assess a very specific domain, and are mainly screening measures which cannot be used diagnostically or to differentially indicate in which area a developmental problem may primarily reside.

2.3.1.3 The Herbst Measure

In 1994, Herbst constructed the Herbst Assessment Measure, which was designed specifically to suit the developmental assessment of Black children in South Africa (Schröder, 2004). The measure consists of a battery of items to determine the progression of the various aspects of development, namely, Cognitive Aspects (including visual perceptual abilities), Fine Motor Development
and Gross Motor Development in 3- to 6-year-old Black children. It provides the practitioner with a quantitative depiction of the child's ability as well as possible neurological indicators. Limited information regarding the procedures to norm the measure is available. A normative sample of 249 Black children was used. Normative data, including percentiles, is provided for each subtest of the Herbst measure.

Similar to the school-readiness screening measures discussed above, the Herbst measure is useful in its own right, but does not suit the general developmental assessment needs of the South African context. It is only for Black children, has not found its way into mainstream testing and no additional studies are available on the psychometric properties of the measure.

2.3.2 Developmental Tests Used in an International Context

From the discussion above it becomes clear that there are no South African measures that will completely fulfil the developmental assessment needs of the country. It is, of course, always an option to develop a totally new measure to fulfil these needs, but another more cost-efficient way is to explore the applicability of a measure developed elsewhere to the South African context. There are several well-established developmental assessment measures used on the international landscape. This section will look at the most prominent of those.

2.3.2.1 The Stanford-Binet Intelligence Scale, Fifth Edition (SB5)

The Stanford-Binet Intelligence Scale has a long and rich tradition which began in 1916, when Lewis M. Terman completed his revision of the 1908 Binet-Simon Scale (Stanford-Binet Intelligence Scales, 2004). The SB5 provides norms from the age of 2 years to beyond 90, and has several improvements on previous editions. A variety of non-verbal items are included, which are aimed at the assessment of non-English individuals or individuals with communication difficulties. It includes IQ scores for verbal and non-verbal performance. The SB5 also includes composite scores for five dimensions related to intelligence as
well as subtest scores. It retains the wide age range which has been one of the major strengths of the Stanford-Binet Intelligence Scales as noted by Simeonsson (1986). Some of the weaknesses of earlier editions, such as its highly verbal nature and the impossibility of constructing a profile of strengths and weaknesses (Allan, 1992; Simeonsson, 1986), have been addressed in the SB5, but it still remains a test of mainly cognitive development rather than global development.

2.3.2.2 The Wechsler Scales

The Wechsler Intelligence Scale for Children (WISC) was developed in 1949, and it was replaced by a standardised version known as the Wechsler Intelligence Scale for Children – Revised (WISC-R) (Wechsler, 1974). The WISC-R measures the intelligence of children between the ages of 6 years and 16 years 11 months. Anastasi (1982) considers the construction procedures and reliability and validity studies as not comprehensive or conclusive.

The Wechsler Intelligence Scale for Children-III (WISC-III) is basically an updated version of the WISC-R and covers the same age range (Aylward, 1994). Edelman (1996) points out that the WISC-III has acceptable internal consistency reliability coefficients, but that there is a significant practice effect on the Performance scale if a retest is completed within a 12- to 63-day interval. This means that the WISC-III is not a suitable test for testing developmental changes if a retest is being done prior to 2 months after the initial testing.

The Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) was released in 2003, and is basically an update of the WISC-III (Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV), 2004). There is very little (if any) independent research available on the WISC-IV.

The Wechsler Pre-School and Primary Scale of Intelligence – Revised (WPPSI-R) was developed in 1989 as an extension of the WISC. It was designed specifically for children between the ages of 3 years to 7 years and 3 months. The WWPSI-R is easy to administer, but (Aylward, 1994) points out that
the major shortcoming of the test is its inability to estimate the IQs for severely retarded children. Aylward (1994) concludes that overall the WPPSI-R is a good measure (perhaps even the test of choice) for preschool evaluation.

The Wechsler Pre-School and Primary Scale of Intelligence – III (WPPSI-III) was released in 2002, and while keeping the central characteristics of the WPPSI-R, is basically an update which extends the age range of the test to 2 years 6 months at the lower end (Author Unknown 3, 2004).

2.3.2.3 Gesell Developmental Schedules (Gesell Schedules)

The original Gesell Schedules were standardised in the 1920s and 1930s on a sample of 107 children, and the test was popularised in 1941 (Aylward, 1994). The most recent revision was published in 1980, the age range for this examination being from 1 week to 36 months (Aylward, 1994). Measurement takes place over five domains: adaptive, gross motor, fine motor, language, and personal-social. Drawbacks include instructions that are brief and subjective, and small normative samples (Aylward, 1994) which may be the reason why the test is typically used by physicians rather than psychologists.

2.3.2.4 McCarthy Scales of Children’s Abilities (McCarthy Scales)

The McCarthy Scales were published in 1972. Results are divided into five categories: verbal, perceptual-performance, quantitative, motor, and memory. Although the age range is 2 years 6 months to 8 years 6 months, the test is most useful in the age range 3 to 5 years owing to inadequate floor and low ceiling levels (Aylward, 1994). The test is well constructed and psychometrically sound (Anastasi, 1982; Aylward, 1994) and provides a General Cognitive Index (GCI) that is statistically comparable to IQ scores (mean = 100, SD = 16), but not interchangeable. Aylward (1994) comments that the normative data is old and possibly outmoded.
2.3.2.5 The Bayley Scales of Infant Development-II (BSID-II)

The Bayley Scales of Infant Development (BSID) were published in 1969 and restandardised as the BSID-II in 1993 (Bayley, 1969; 1993). The BSID-II measures mental and physical development, as well as emotional and social development. The revised scales are applicable for children between the ages of 1 and 42 months. Anastasi (1982) considers the test construction procedures to be of a very high technical standard, with an average reliability coefficient of 0.88 being reported. Although concurrent validity studies with the original BSID and McCarthy Scales have been undertaken, Schröder (2004) suggests that more concurrent and construct validity studies should be conducted on the BSID-II. Barnard (2000) has also recommended that further studies be undertaken to investigate the BSID-II’s suitability with special populations.

2.3.2.6 Kaufman Assessment Battery for Children (K-ABC)

The Kaufman Assessment Battery for Children (K-ABC) was developed in 1983 and is applicable from the ages of 2 years 6 months to 12 years 6 months. Aylward (1994) considers the test useful for the assessment of minority groups, bilingual children, and children with communication difficulties and other learning difficulties, because tasks are primarily non-verbal. He notes, however, that the test produces only two meaningful factors before the age of 4 (sequential and simultaneous processing). Its limited floor makes the assessment of very young or retarded children difficult, and the ceiling is insufficient to challenge children above the age of 10. He considers the lack of assessment of expressive language to be a major drawback in the assessment of preschoolers.

The Kaufman Assessment Battery for Children, Second Edition (KABC-II) was released in 2004, and apart from updates to the norms, the test now employs a dual theoretical approach. Apart from the process-oriented approach (based mainly on Luria’s model), the test also allows for testing in the more achievement-oriented approach that traditional intelligence tests use (AGS Publishing, 2004). The test constructors claim that the test is culturally unbiased and one prepublication validity study indicates that there is substance to this
claim as it pertains to scores that rely on processing abilities rather than those based on crystallised knowledge (Fletcher-Janzen, 2004).

2.3.2.7 The Cattell Infant Intelligence Scales (The Cattell Scales)

The Cattell Scales were developed by adapting the already existing Gesell Schedules. The Cattell Scales measure mental development from 3 to 30 months, evaluating motor control and verbalisations. Motor control is assessed by a series of tasks that involve manipulating various objects, such as cubes, pencils and pegboards. During the motor control subtests, the examiner takes notes on the infant’s attempts to communicate. Literature reveals conflicting findings regarding the reliability and validity of the Cattell Scales (Schröder, 2004). Aylward (1994) argues that the test is not the most appropriate developmental test as there are no personal-social or gross motor items included.

2.3.2.8 The Griffiths Mental Development Scales – Extended Revised (GMDS-ER)

As the Griffiths Scales will be discussed in detail in the following chapter, they will only be briefly introduced here.

In the early 1950s, the late Dr Ruth Griffiths developed the Griffiths Scales of Mental Development (Griffiths Scales) (Griffiths, 1954; 1970; 1984). These Scales were developed to assess the developmental level of children from birth to 2 years of age on five subscales, namely, the Locomotor (A), Personal-Social (B), Hearing & Speech (C), Eye & Hand Co-ordination (D) and Performance (E) Subscales. During the 1960s the Scales were expanded to cover ages from birth to 8 years 4 months (Griffiths, 1970). A sixth subscale named Practical Reasoning (F) was added to the Extended Griffiths Scales for children aged 2 years and older. The Practical Reasoning Subscale was aimed at providing a more comprehensive coverage of the young child’s emerging problem-solving and logical reasoning skills.
A revision began of the Baby Scales (0-2 years), and in March 1994 the Association for Research in Infant and Child Development (ARICD) introduced a draft version of the Revised Baby Scales from Birth to 2 Years, which were published in 1996 (Huntley, 1996). The Extended Scales have since been revised as well, and this process will receive more attention in the following chapter.

2.3.3 Summary of Applicability of Discussed Measures to the South African Situation

If we consider all that has been said about the developmental assessment needs in the South African context, it becomes clear that none of the above tests have all the needed criteria. This situation is presented below in tabular form. The Griffiths is included here for expediency, but some of what is asserted will only be fully motivated in the following chapter. If a test meets a criterion, the relevant cell is blacked out. If a particular criterion is partially met, the relevant cell is greyed out. Not all criteria related to good psychometric instruments (e.g., reliability, validity, objective scoring rules and updated norms) are included below. The Table focuses instead on the specific needs of the South African situation that have been highlighted thus far in this treatise.
Table 5
Comparison of Developmental Measures on Certain Key Criteria

<table>
<thead>
<tr>
<th>TESTS</th>
<th>Comprehensive</th>
<th>Functional assessment rather than abstract concepts</th>
<th>Standardised for all South African groups</th>
<th>Culture-fair potential</th>
<th>Covers age range birth to 7 years</th>
<th>Sufficient knowledge base within South African context</th>
<th>Easy administration in field conditions</th>
<th>Yields results that are comparable over time</th>
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<tbody>
<tr>
<td>SSAIS-R</td>
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<td>JSAIS</td>
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<td>LAP-P/B</td>
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<td>Herbst</td>
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<td>SB5</td>
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<td>WISC-IV</td>
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<td>WWPSI-III</td>
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<td>Gesell</td>
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<tr>
<td>McCarthy</td>
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<td>BSID-II</td>
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<td>KABC-II</td>
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<td>Cattell</td>
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<tr>
<td>GMDS-ER</td>
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From the above table it is readily clear that the GMDS-ER has the potential to answer the greatest number of needs of the South African developmental assessment landscape. The standardisation criterion above is greyed out because relevant research has been done on the original Extended Griffiths Scales in this area. There are thus some indications of the performance of normal South African children on the Scales as compared to their British counterparts (Allan, 1988; 1992; Bhamjee, 1991; Mothuloe, 1990). The present study addresses the fact that the GMDS-ER has not been standardised for a South African population by exploring the performance of children aged 4 to 7 years in comparison to the British standardisation sample.
2.4 Chapter Summary

This chapter provided an overview of the nature of child development and the behavioural antecedents of the construct. It was concluded by looking at measures that are generally used to assess these behavioural manifestations. The conclusion was reached that the GMDS-ER has the potential to meet the greatest number of special requirements of the South African developmental assessment context.
CHAPTER THREE: THE GRIFFITHS MENTAL DEVELOPMENT SCALES – EXTENDED REVISED (GMDS-ER)

3.1 Introduction

This chapter will provide an overview of the development and content of the original Griffiths Scales of Mental Development (Griffiths Scales), research completed on the Scales, and the reasoning behind the need to revise the Scales. Towards the end of the chapter, emphasis will be placed on the revision process and the resulting Griffiths Mental Development Scales – Extended Revised (GMDS-ER) as well as initial findings on its psychometric properties. Finally, some comments will be offered on the potential of the GMDS-ER to answer South African developmental assessment needs.

The extensive overview presented in this chapter is not only due to the fact that the GMDS-ER forms the subject matter of the present study, but also because Van Ede (1996) suggests that an appropriate measure should be selected for cross-cultural adaptation\(^3\). The information presented in this chapter will clarify whether the GMDS-ER is such a measure (as well as whether it meets the demands of the South African developmental assessment context). Van Ede (1996) suggests that one factor to be considered is whether the constructs tapped by the test are transportable to the culture of interest. An exploration of the development of and research on the original Griffiths Scales informs this (as the constructs and central characteristics of the GMDS-ER are based on the original Griffiths Scales), and is therefore the departure point for this chapter.

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\(^3\) The present study is not an adaptation study per se. However, the early revision process for the GMDS-ER took place in South Africa where the revised items were piloted, and this means that the revised items are in a sense already adapted for the South African context. An investigation of how South African children compare with the standardisation sample therefore essentially forms part of an adaptation process, albeit theoretically, at a later stage of the process.
3.2 Development and Content of the Original Griffiths Scales

The name Ruth Griffiths is synonymous with the concept of “developmental assessment” in much of the developed world (Allan, 1992), and Griffiths is one of the pioneers of the psychology of early childhood development in the United Kingdom. By constructing the Griffiths Scales, she linked the traditional normative and clinical approaches to child assessment, by combining them into a set of comprehensive scales.

The Griffiths Scales were originally developed by Ruth Griffiths in the United Kingdom in 1954 to assess the development of children from birth to 2 years of age (Griffiths, 1954; 1970; 1986). The Griffiths Infant Scales were and still are regarded as one of the most meticulously constructed infant scales and one of the best-known tests developed in England (Thomas, 1970). The main impetus for the development of the Scales was a need for the early detection of developmental delays in children. Initially, the Scales were devised by drawing substantially on existing measures, in particular the Gesell Developmental Schedules. Since previously published infant instruments such as the Stanford Binet Intelligence Test and the Wechsler Intelligence Scale for Children lacked speech items, Griffiths included twice as many speech items in the Scales. She believed that speech is a “unique human intellectual task” (Brooks & Weinraub, 1976, p.46) and should therefore be included in any infant assessment scale. Griffiths also added items of a social nature, especially for the first year of development.

The Griffiths Infant Scales consisted of five subscales, namely, the Locomotor (Subscale A), Personal-Social (Subscale B), Hearing and Speech (Subscale C), Eye and Hand Co-ordination (Subscale D), and Performance (Subscale E) subscales. Griffiths received many requests for the extension of the Infant Scales for use in clinical practice with older children. To meet this need, the Scales were revised and extended in 1970 to cover the ages from birth to 8 years and 4 months (Griffiths, 1970). Griffiths realised that certain skills and items of learning could not logically be fitted into any of the five existing scales. As a result, a sixth subscale, the Practical Reasoning Subscale (Subscale F) was
developed and included in the test for children aged 2 years and older. This subscale was to provide a more comprehensive coverage of young children’s emerging problem-solving and logical reasoning skills (Griffiths, 1970). The construction of the Practical Reasoning Subscale resulted in the development of the Griffiths Extended Scales.

Griffiths (1970, 1984) adhered stringently to the following five criteria in developing the Griffiths Scales:

1. The development of the Scales was based on the detailed and systematic observation of children in the United Kingdom. Children were observed in their natural settings – 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 test items emerged.

2. Previous and existing test methods and tests such as the Gesell Developmental Schedules were taken into account, and items from relevant tests were included in the Griffiths Scales.

3. The Scales had to fulfil stringent statistical requirements in terms of their reliability and validity.

4. The Scales took the specific needs of both normal and disabled children into account.

5. The Scales were based on a study of: (i) trends that appeared significant for mental growth, and (ii) the origins and interrelations among the “basic avenues of learning”, namely, physiological or locomotor, eye and hand co-ordination, voice and hearing, which development takes place with rhythm, in time and space, and is influenced by environmental and social factors (Griffiths, 1984, p.5).

As was seen in the previous chapter, the majority of developmental tests for children focus mainly on the cognitive development of the child. The Griffiths Scales provide a comprehensive developmental profile which highlights areas of development such as motor and personal-social development in addition to the child’s cognitive and perceptual skills. The items on the Scales are diverse and tap the main aspects of a child’s development which were explored in the
previous chapter. Motor, personal-social, perceptual, and language development is assessed, directly and an astute clinician can glean from the test items information concerning emotion, in an indirect manner. Most of the items are based on natural activities such as walking, talking and playing.

Play is considered to be a universal activity, and research findings indicate that different types of play emerge at about the same age in children from different cultures (Kagan, 1981). Constructing the Griffiths Scales according to such a universal activity implies that the Scales can be considered as being potentially culture-fair. In addition, research on the Griffiths Scales has shown that they have practical and diverse applications in the evaluation and treatment of infants and young children from a variety of cultural backgrounds (e.g., Brandt, 1983; 1984; Cobos, Rodrigues & De Venegas, 1971; Collins, Jupp, Maberly, Morris & Eastman, 1987; Laroche, Brabant & Brabant, 1976; Laroche, Gutz & Desbiolles, 1974; Luiz, Foxcroft & Knoesen, 2003; Luiz, Foxcroft & Stewart, 1999; Luiz, Foxcroft, Worsfold, Kotras & Kotras, 2001; Ramsay & Fitzharding, 1977; Sletten, 1970; 1977). For these reasons, the Griffiths Scales have been adapted for use in several countries, further suggesting that they are relatively culture-fair. This is relevant to the present study as several cultural groups are included in the total sample, and any measure that would answer the South African developmental assessment needs, would have to be potentially culture-fair.

Griffiths (1970) stated that each of the six subscales was devised to be a separate and complete subscale in itself. This allows any one process of development to be measured independently and as completely as possible. The six subscales are equally difficult at each age level and contribute equally to the General Quotient (GQ). A child’s performance on the different subscales is plotted on a histogram, allowing his/her performance to be compared to the norm of each developmental area. The developmental profile therefore demonstrates the individual child’s range of abilities and relative strengths and weaknesses. The developmental profile is of particular use in clinical practice and programmatic intervention as it allows for the planning of interventions based on strengths. A comparison of profiles at different times can easily be effected in
order to track progress or deterioration. Each subscale as well as the total scales yields a mental age that can be compared against the child’s chronological age to express strengths and weaknesses to professionals and laymen in a meaningful way (i.e., in discrepancies in months between chronological and mental ages). Brief descriptions of the subscales are presented below.

3.2.1 Locomotor Subscale (A)

This subscale provides the opportunity to observe certain physical weaknesses, physical disabilities, neurological deficits, and more definite inadequacies of movement. Items include activities such as walking up and down stairs, hopping, throwing and kicking a ball, and jumping over a rope. The items challenge the child’s regular physical strength, skill and speed in movement, and rhythm and poise, at a level compatible with his/her age. The child’s ability to focus and concentrate on the task at hand and the emotional determination to succeed further influence performance.

3.2.2 Personal-Social Subscale (B)

This subscale assesses personal and social development. At a level which corresponds with the child’s age, a degree of self-help is required from the child in terms of his/her independence. Activities include personal cleanliness, efficiency at the table, the ability to wash his/her hands and face, to dress and undress, to fasten buttons, and the like. Information such as the child’s name, home address, family name, and so on, can be gleaned through a casual conversation with the child, but is scored according to objective rules. Some degree of social interaction is necessary from the child, as is co-operation in play with other children. Although emotional factors affect performance on all subscales, they usually have a more explicit influence on this subscale. Griffiths (1984) stated that the over-protected child and the neglected child usually do rather poorly on this subscale.
3.2.3 Hearing and Speech Subscale (C)

This subscale has been considered to be the most intellectual of all the subscales (Luiz, 1999; Schröder, 2004) and assesses the growth and development of both receptive and expressive language. The subscale not only necessitates the comprehension of language, but also 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 of various lengths, and the identification of stimulus picture cards. Regarding older children, the gradual enhancement of expressive vocabulary, the use of different parts of speech, learning to use sentences and to develop paragraphs of description in relation to pictures are assessed. Children who perform poorly on this subscale, relative to their own performance on the other subscales, may have speech and/or language deficits or may possibly suffer from hearing loss.

3.2.4 Hand and Eye Co-ordination Subscale (D)

This subscale is comprised of items relating to handwork and visual ability. The child is required to demonstrate manual dexterity, hand-eye co-ordination, manipulation and control of a pencil and persistence with a task. Items *inter alia* include the threading of beads, drawing, cutting paper, and writing. From the child’s drawings, it is possible to obtain information on his/her personality, as well as his/her conception of special relationships. The test does not provide a structured method for interpreting the emotional significance of drawings, and accuracy depends on whether the clinician has been trained in interpreting the projections of children from their drawings.

3.2.5 Performance Subscale (E)

This subscale assesses skill in fine motor manipulation, including the speed and precision of activities related to this skill. Spatial perception and visual acuity are required for the completion of the tasks on this subscale. Items correspond
with those on the Hand and Eye 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. This subscale supplements Subscale D in that manual dexterity and eye-hand co-ordination are assumed, and the child is required to apply these skills in novel situations.

### 3.2.6 Practical Reasoning Subscale (F)

This subscale is only introduced to children over the age of 2 years and focuses mainly on assessing the most primitive indications of arithmetical comprehension and the solving of the most basic practical problems. It has value in demonstrating a child’s ability to benefit from formal schooling. Attention and concentration span influence performance on all subscales, but even more so with Subscale F. Items include the repetition of digits (which gives an indication of short-term sequential auditory memory) as well as differentiation of objects in terms of size, weight, length and height.

A cursory comparison of the Griffiths Subscales with the most important domains of child development reveals that the Griffiths Scales do indeed provide a comprehensive assessment of child development. It has been argued previously in this treatise that this comprehensiveness is an important consideration in the South African context, and therefore the Griffiths seems to be an appropriate test to investigate for use in South Africa.

### 3.3 The Administration and Scoring of the Griffiths Scales

The Griffiths Extended Scales consist of 468 items. There are two items per month in each of the five relevant subscales from 0 to 24 months, thus allowing a half-month credit for each item. From the 3\(^{rd}\) to the 8\(^{th}\) year, there are six items for each year in each of the six subscales, plus two extra items in the 9\(^{th}\) year in each subscale, thus allowing for two months’ credit for each item in each subscale. The tester begins to administer the items approximately four months
below the child’s chronological age. A basal of six consecutive passes is required on each subscale. If a child fails any of the initial six items in a subscale, earlier items are administered until a basal of six consecutive passes is achieved. The items on each subscale should be administered until the child fails six consecutive items on the subscale. This then represents the ceiling level as well as the maximum level of development of the child as measured by that subscale. The sum of the credits for all the items below the basal of six consecutive passes and for all the items passed over the basal, provides a mental age (MA) for every subscale. Developmental quotients are calculated for each subscale by means of the following formula:

**Formula 1 Calculating subscale quotients**

\[
Q_X = \frac{\text{MA} \times 100}{\text{CA}}
\]

CA above refers to the child’s chronological age in months, and X represents the subscale letter for which the developmental quotient is being evaluated (Griffiths, 1984).

For a quick calculation of overall development, the total number of items passed is divided by 3 for items in Year III to Year VIII. This is done because the test consists of 36 items for every year of life from Year III. The total credit for the whole range is calculated by adding the MA credit for the first two years of life to the total MA credit the child achieved for each year of life between Years III and VIII. The formula presented above, which is used to calculate the developmental quotients for the individual subscales, can then also be used to calculate the GQ. As each subscale has been standardised independently, each can also be used and scored individually. Using quotients instead of mental ages makes it feasible to compare children of differing chronological ages, and also to compare a child’s performance over time at different points in his/her life.
3.4 The Interpretation of Performance on the Griffiths Scales

By studying the profiles of a large number of children, Griffiths (1984) identified certain patterns of performance on the subscales which aided in the interpretation of an individual child’s performance. Diagnostic interpretations are also possible, since the Griffiths Scales is a diagnostic instrument.

Overly protected or socio-environmentally deprived children usually do not perform at an age-appropriate level on the Personal-Social Subscale. This may be as a result of their lack of exposure to learning self-help and self-care activities (Griffiths, 1984). Children with a poor performance on the Locomotor and Eye Hand Co-ordination Subscales have been shown to possibly suffer from a physical defect, some degree of muscular weakness, or visual perceptual problems. A low score on the Hearing and Speech Subscale can be attributed to a language or hearing impairment, or a lack of environmental stimulation. This low score is often accompanied by a low score on the Practical Reasoning Subscale and Personal-Social Subscale. This pattern of development was confirmed by Luiz (1988a). As has been mentioned previously, the drawings required by the Hand and Eye Co-ordination Subscale can provide valuable information on the child’s personality and emotional functioning if the clinician has been trained accordingly.

Consistently low performances on each subscale is usually indicative of a general delay in development, with the level of performance indicating the degree of delay. The resulting developmental profile of the child on the Griffiths Scales provides information that can be useful for:

1. the identification of strengths and weaknesses;
2. decisions about further investigations such as speech therapy, occupational therapy or specialised education;
3. the construction of treatment programmes to address skill deficits;
4. evaluating the effect of intervention; and
5. decisions about appropriate placement that will allow the child to develop to his/her fullest potential (Griffiths, 1970, 1984; Hall, 1971; Hanson, 1982; Lister, 1981).
The format of scoring and interpreting the Griffiths Scales makes it appropriate to the South African situation, where tracking progress over time and a profile of strengths and weaknesses are of particular importance.

### 3.5 Research Studies on the Original Griffiths Scales

Research on the Scales has been generated as far afield as Canada (Ramsay & Fitzharding, 1977), Columbia (Cobos, Rodrigues & De Venegas, 1971), France (Laroche, Brabant & Brabant, 1976; Laroche, Gutz & Desbiolles, 1974), Germany (Brandt, 1983, 1984), China (Collins et al., 1987), Norway (Sletten, 1970, 1977), Australia, Greece, Lebanon and the United States of America. The scales have also been used in South Africa on a wide range of the population (Schröder, 2004).

Research related to the psychometric properties of the Griffiths Scales indicates that they comprise a reliable and valid psychological instrument (e.g. Alridge-Smith, Bidder, Gardner and Gray, 1980; Beail, 1985; Caldwell & Drachman, 1964; Conn, 1993; Griffiths, 1970, 1984; Heimes, 1983; Honzik, McFarlane and Allen, 1996; Luiz, 1988c; Luiz, Foxcroft & Stewart, 1999; Luiz & Heimes, 1994; Mothuloe, 1990; Povey, 2002; Ramsay & Fitzharding, 1977; Ramsay & Piper, 1980; Stewart, 1997; Worsfold, 1993).

Case study and profile research on the original Griffiths Scales (Griffiths, 1984; Krige, 1988; Lister, 1981; Luiz, 1988b; Luiz, 1988d; Magongoa & Venter, 2003; Sweeney, 1994) have indicated that the Griffiths is a clinical tool which is useful for diagnosis, and treatment planning and monitoring, in a variety of cultures.

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 been administered

Initially research on the Griffiths Scales in South Africa 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). Continued research on the Griffiths Scales in South Africa has focused mainly on clinical studies involving special populations and studies into the psychometric properties of the Scales. Research relating to the clinical use of the Scales has provided evidence that the Griffiths 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 hearing-impaired children (e.g., Luiz, 1988a), battered children (e.g., Luiz, 1988b), borderline mentally handicapped preschoolers (e.g., Houston-McMillan, 1988), Black South African HIV+ infants (e.g., Kotras, 2002), and physically disabled children (e.g., Krige, 1988).

In an attempt to establish whether the original Griffiths Scales were applicable to South African children, research has also been carried out on the performance on the Griffiths Scales of normal children of different ages and different population groups (Allan, 1988, 1992; Bhamjee, 1991; Mothuloe, 1990). These pilot normative studies established that the original Griffiths Scales were applicable to South African children and provided guidelines for accountable interpretation in the South African context. As these studies are similar in nature and intent to the current study, they will be discussed in more detail.

3.5.1 Pilot Normative Studies

The Extended Scales (Griffiths, 1970) were standardised on a fairly representative sample of 2260 children from England, Scotland and Wales. The mean quotients and standard deviations for each subscale are presented in the Table below. The closeness to 100 for the means, and relative closeness of the
standard deviation to 15 suggest that for each of the subscales a normal
distribution was attained for the standardisation sample.

Table 6
Quotient Means and Standard Deviations of the Original Griffiths Scales

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Locomotor</td>
<td>100.41</td>
<td>16.32</td>
</tr>
<tr>
<td>B. Personal-Social</td>
<td>100.26</td>
<td>16.20</td>
</tr>
<tr>
<td>C. Hearing and Speech</td>
<td>99.78</td>
<td>17.75</td>
</tr>
<tr>
<td>D. Hand and Eye Co-ordination</td>
<td>100.46</td>
<td>15.58</td>
</tr>
<tr>
<td>E. Performance</td>
<td>99.87</td>
<td>17.21</td>
</tr>
<tr>
<td>F. Practical Reasoning</td>
<td>99.97</td>
<td>17.43</td>
</tr>
<tr>
<td>GQ</td>
<td>100.18</td>
<td>12.76</td>
</tr>
</tbody>
</table>

(from Griffiths, 1970)

However, recent studies have suggested that the population on which the
Infant and Extended Scales were standardised may not necessarily represent a
contemporary population (Allan, 1988, 1992; Hanson & Alridge-Smith, 1987;
Hanson, Alridge-Smith & Hume, 1985; Huntley, 1996). Hanson and Alridge-
Smith (1987) compared the Griffiths performance of N = 217 normal British
children in the age group 3 to 8 years, tested between 1978 and 1982, with the
1960 standardisation sample. The results revealed large increases in the
quotients for each of the subscales, except the Hand and Eye Co-ordination
Subscale. The researchers attributed the low score on the Hand and Eye Co-
ordination Subscale to the changes in educational policies and child-rearing
practices. Physical activities tend to be encouraged more than skills requiring
quietness and concentration (Barnard, 2000).

The means for Allan’s (1988) sample investigating the suitability of the 1960
norms for White South African children is presented in Table 7.
Table 7
Comparison of the 1960 norms and the performance of 5-year-old White South African children (N=60)

<table>
<thead>
<tr>
<th>Subscale</th>
<th>SA 1988</th>
<th>British 1960</th>
<th>British 1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Locomotor</td>
<td>121.30</td>
<td>100.70</td>
<td>116.10</td>
</tr>
<tr>
<td>B. Personal Social</td>
<td>109.20</td>
<td>100.40</td>
<td>112.60</td>
</tr>
<tr>
<td>C. Hearing and Speech</td>
<td>108.20</td>
<td>100.90</td>
<td>111.80</td>
</tr>
<tr>
<td>D. Hand and Eye Co-ordination</td>
<td>104.90</td>
<td>102.30</td>
<td>112.90</td>
</tr>
<tr>
<td>E. Performance</td>
<td>112.30</td>
<td>101.40</td>
<td>113.30</td>
</tr>
<tr>
<td>F. Practical Reasoning</td>
<td>102.80</td>
<td>100.60</td>
<td>109.90</td>
</tr>
<tr>
<td>GQ</td>
<td>109.70</td>
<td>101.40</td>
<td>112.80</td>
</tr>
</tbody>
</table>

(adapted from Allan, 1988)

Findings revealed significant differences between the South African sample and the British standardisation sample, on the GQ as well as on four of the six subscales, namely, the Locomotor, Personal-Social, Hearing and Speech, and Performance Subscales. No significant difference was found when Allan (1988) compared the South African sample to a more contemporary British sample (Hanson & Alridge-Smith, 1987) (the “British 1980” sample indicated in the Table above). Allan (1988) reported that socio-economic status was a factor in performance, with children from a higher socio-economic bracket performing better on the Griffiths Scales.

Mothuloe (1990) compared the Griffiths GQ of 45 Setswana-speaking children, between the ages of 5 years 9 months and 7 years, with those of the British standardisation sample of 1960. Mothuloe (1990) found that the mean scores for the South African Black children were similar to the means established in the 1960 normative sample. However, while the children in Mothuloe’s (1990) sample may have performed on a par with the 1960 sample, the performance of other cultural groups have surpassed the 1960 sample. Despite Mothuloe’s (1990) findings which suggest that cultural group has an influence on the performance on the Griffiths Scales, later research by Allan (1992) and Bhamjee (1991) has revealed socio-economic status, not cultural group, as being the significant factor impacting on performance.
Bhamjee (1991) conducted a similar study to that of Allan (1988), comparing the performance of (N=360) Indian South African children between the ages of 3 and 8 years to the 1960 British norms. Bhamjee (1991) reported that age and socio-economic status significantly influenced the sample’s overall performance on the GQ and four of the six subscales, namely, the Personal-Social, Hearing and Speech, Hand and Eye Co-ordination, and Practical Reasoning Subscales. Gender differences were also observed for the GQ and for two of the six subscales, namely, the Locomotor and Performance Subscales. Once again, Indian South African children performed better than British children based on the 1960 norms, especially at the preschool level.

Allan followed up her 1988 study with a similar one that included Black, Coloured, Indian and White (N = 200) South African children between the ages of 5 and 6 years old (Allan, 1992). She did not do a total sample comparison, but each cultural group was compared with the 1960 standardisation norms (Griffiths, 1970) and 1980 norms of Hanson and Alridge-Smith (1987). In general, White and Indian South African children’s performances were dissimilar from those of their 1960 British counterparts, but similar to the 1980 norms. On the other hand, Black and Coloured children’s performances were similar to the 1960 norms, but dissimilar from the 1980 norms. Allan (1992) also compared the South African groups with one another and found that there were no significant differences between them with respect to the GQ, Personal-Social and Practical Reasoning scores. With respect to the other four subscales, Coloured and Black children performed similarly, as did White and Indian children. The only subscale on which White children performed significantly better was the Hearing and Speech Subscale. Allan (1992) confirmed the results of her prior study (Allan, 1988), finding that socio-economic status was an important covariant influencing performance on the Griffiths Scales. In this regard, a comment may be warranted about the manner in which socio-economic status (SES) was approached. Allan (1992) used a classification system in which differing criteria are applied to different cultural groups in South Africa when classifying them as upper, middle, or lower SES (Riordan’s (1978) system). In effect, this means that Coloured and Black children are likely to be classified as “middle” when a White or Asian child may have been classified as “lower”. It is therefore possible
that SES factors played a role in the differences found between the groups’ comparisons to the British norms.

South African studies have produced contradictory findings when considering the influence of gender on the performance on the Griffiths Scales. Allan (1988) found no significant difference between the performance of 5-year-old White boys and girls. Mothuloe (1990), however, found that Black girls performed significantly better than Black boys on the Locomotor Subscale, which is an interesting finding, since it is generally accepted that boys are superior in this area of development. Bhamjee (1991) found that South African Indian girls obtained significantly higher scores than Indian boys in respect of the Personal-Social Subscale. However, the contradictory results of the above-mentioned studies may have been due to cultural differences found in the samples, which were drawn from different cultural groups. Schröder (2004) noted that more research would be needed before sound conclusions could be made, but with the release of the GMDS-ER, it is unlikely that the original Griffiths Scales will receive much more attention in this regard.

Based on the results of Allan’s (1988, 1992), Bhamjee’s (1991) and Mothuloe’s (1990) studies, the usefulness and appropriateness of using the 1960 norms for South African children seems to be questionable. However, there seems to be some consensus that South African children perform similarly to their contemporary British counterparts. There seems to be a general consensus that SES has an influence on performance, but it is not clear whether culture/ethnicity influences performance, as there have been contradictory findings that may have been due to sampling and classification difficulties. It is generally accepted that SES was a confounding variable on findings of the influence of culture/ethnicity, since a classification system (Riordan, 1978) was used in most of the above research that made it more likely that previously disadvantaged children would be classified in a higher SES category than a child from a previously advantaged group (e.g., a White child may have been classified as “lower” SES, while a Black child whose parents had identical educational levels and occupations, may have been classified as “middle”). Allan (1992) considered parental income as a classification system for SES, but comments that owing to outdated data, “it [was] possible that [B]lack children
were classified as upper or middle class, while they were in fact from the lower socio-economic group” (p.172). This would mean that Black children (as well as Coloured and Indian children in other studies mentioned above) from a lower SES group were possibly being compared with counterparts from a middle or higher SES group. This may account for some of the differences noted between ethnic groups rather, than ethnicity itself. As Riordan’s (1978) system was based on data that was even more outdated than that which Allan (1992) considered inappropriate, this possibility remains likely in Allan’s (1988, 1992) and Bhamjee’s (1991) studies. There have also been differential findings about the influence of gender on performance on the Griffiths Scales. Although not centrally the aim of the current study, the present study will generate information that will inform the above questions.

The studies mentioned above were invaluable in providing information that facilitated the accountable interpretation of the original Griffiths Scales in the South African context. As the Scales have been revised recently, these kinds of studies will once again need to be undertaken to inform users on the performance of normal South African children on the GMDS-ER. The current study is an initial South African exploration into the applicability of the GMDS-ER, and this revised version of the Griffiths Scales will be discussed in the following section.

### 3.6 The Revision of the Griffiths Scales of Mental Development

From the above it is clear that there is an extensive amount of support for the Griffiths Scales. However, research over the last two decades has indicated a clear and urgent need for the revision of the Scales. Studies by Hanson (1982; 1983), Hanson and Alridge-Smith (1982; 1987), Allan (1988; 1992), Bhamjee (1991) and Povey (2002) have suggested that the 1960 norms are no longer valid. The items of the scale are outdated and several of the items are culturally biased and ambiguous (Kotras, 2003).
In March 1994, the Association for Research in Infant and Child Development (ARICD) held a conference for Griffiths Scales tutors in Manchester, England, as an introduction of the Revised Infant Scales (Huntley, 1996). At the conference, the need to expand and co-ordinate efforts to revise the Extended Griffiths Scales of Mental Development was highlighted. Professor D.M. 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 of the Extended Scales:

1. The basic qualities of the Griffiths Scales should be preserved. Throughout the revision process, the “child friendly” nature of the Scales should be preserved.

2. 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.

3. 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.

4. 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.

5. The normative data on the Scales should be updated. They should be standardised on a contemporary sample that reflects the UK population in terms of ethnicity, gender, and socio-economic status of the parents.

6. The psychometric quality of the Scales should be updated. Reliability and validity studies should be conducted, employing statistical procedures such as cluster and factor analysis.

7. Finally, the clinical utility of the Scales should be enhanced by collecting data on children with a clinical diagnosis.
Since the introduction of this large-scale project to revise the Griffiths Extended Scales, all but the 7th objective have been achieved, but research currently underway promises to add a great deal of knowledge on the performance on the GMDS-ER of clinical populations, such as children suffering from ADHD, children suffering from hearing impairment, and children suffering from Autism, on the GMDS-ER (Baker, in press; Gowar, 2004; Makowem, in press; Schröder, 2004).

One of the first studies intended to fulfil the objectives set out by Luiz (1994) was an international survey relating to the strengths and weaknesses of the Griffiths Scales. A survey was conducted among a large sample of registered Griffiths users who frequently use the test (approximately 30 times a year) with an average of 5 years’ experience with the Griffiths Scales. Questionnaires were sent to 700 registered Griffiths users, and of those, 111 completed questionnaires were analysed. Respondents were asked to evaluate items, where appropriate, as “good” or “poor” on nine categories, namely: cultural bias, contemporaneity, order of difficulty, scale appropriateness, age appropriateness, instructions, administration, scoring, and kit. A number of problematic items were identified. Subscales A, B and C were indicated as those in need of a more extensive revision. The Table below presents the ten most problematic items identified by the registered Griffiths users.

Table 8
Ten most Problematic Items according to Griffiths Users

<table>
<thead>
<tr>
<th>Rank</th>
<th>Item</th>
<th>Description</th>
<th>Total number of negative responses across 9 categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BVI.3</td>
<td>Can go alone on errand to nearby shop</td>
<td>172</td>
</tr>
<tr>
<td>2</td>
<td>AV.5</td>
<td>Can climb on and off a bus unaided</td>
<td>171</td>
</tr>
<tr>
<td>3</td>
<td>CIV.1</td>
<td>Names 6+ objects in big picture</td>
<td>135</td>
</tr>
<tr>
<td>4</td>
<td>CIII.2</td>
<td>Picture vocabulary (12)</td>
<td>124</td>
</tr>
<tr>
<td>5</td>
<td>BIII.2</td>
<td>At table uses spoon and fork</td>
<td>108</td>
</tr>
<tr>
<td>6</td>
<td>BV.5</td>
<td>Can fasten shoe buckle</td>
<td>103</td>
</tr>
<tr>
<td>7</td>
<td>BIV.5</td>
<td>Helps lay table: places few items</td>
<td>102</td>
</tr>
</tbody>
</table>
It is evident that users of the Scales found certain items culturally biased and outdated. The social world of children in the new millennium looks very different from that of children during the 1960s when the Scales were standardised. Because of recent increases in urban terrorism, child abduction and abuse, many parents consider it too dangerous to let their young children take a bus unaccompanied or go alone on errands, even to neighbourhood shops. Clinicians have also been sensitised to items that measure culture-bound social practices such as letting children lay the table or eat with cutlery (Luiz et al., 1995). As the test is used in diverse settings in both the developed and developing world contexts (Allan, 1992; Allan, Luiz & Foxcroft, 1988; Hanson & Alridge-Smith, 1982; M.D. Victora, C.G. Victora & Barros, 1990), it was imperative that elements of the test required separate, context-specific revision of certain items. If accurate developmental assessments of children from diverse backgrounds are desired, the adaptation of certain items for different contexts in which the test is used is vital (Luiz et al., 1995).

In order to establish which items were problematic, a 10-point weighted scoring system was developed. While the majority of the items were found to be acceptable, some were identified as being problematic. Some of the problematic items were in need of complete replacement, while other items required modification in order to make them more acceptable and contemporaneous. The modification of an item entailed modification of its content, wording, administration, or scoring procedures.

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 followed:

1. 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.

2. Revision of new items: Once a sufficient number of items had been suggested, they were submitted to a panel to check for culture and gender fairness.

3. Piloting the new items – phase one: New items that were established as culture- and gender-fair were administered to a sample of children in South Africa and analysed. Only White children were represented in the sample, as research had suggested that they matched the performance of UK children on the Griffiths Scales (Allan, 1988; 1992), thereby allowing tentative international comparisons to be made.

4. 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.

5. Piloting the new items – phase three: Finally, the most superior items derived from the two pilot tests, along with old items from 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, the socio-economic status according to parental education and occupation, and the children’s personal and social development. In addition, a neurological checklist was also completed, to aid in the screening of children whose development was classified as being not within the normal range. The process of collecting this sample will be described in more detail below, since it was the sample utilised in the current study.

6. Lastly, the new experimental version of the Extended Scales was submitted to the ARICD for their comments and approval.

The procedure mentioned in number 5 above will be described in more detail here, as the data that was used in the current study was obtained from this sample. Subjects were recruited via accessible newspapers in the Nelson
Mandela Municipal Metropolitan area (at that stage still the Port Elizabeth area). Consent was assumed owing to the voluntary nature of participation, but written consent was also obtained. The Biographical Questionnaire was completed by all parents. Between July and October of 1999, the children included in the sample were tested by Master’s students, interns, and psychologists, who had completed a registered Griffiths course. All testers were comfortable in English and Afrikaans, and these children were tested in their first language as far as possible.

Unfortunately not all Xhosa-speaking children could be tested by a mother-tongue speaker, and interpreters were employed when testing Xhosa-speaking children. Griffiths (1984) provides guidelines only for administration instructions, and therefore interpreters did not have to comply rigidly with the wording of the translation. Interpreters were familiar with the test material and had either some experience in psychometric testing (e.g. psychology Honours students) or had been used for interpreting with the Griffiths before. Testers were also more proficient in the target language than in the source language (as suggested by Barnard, 2000). Both testers and interpreters reported that these children enjoyed testing and that the test was administered in a relatively free conversation and play session. It was therefore not anticipated that the performance of Xhosa-speaking children would be differentially affected by the way in which the test was administered.

The original Griffiths Scales were completed in their entirety, and then the experimental items thought to be appropriate to the child’s age were also administered. The Neurological Checklist was also completed with the children. Feedback was given to parents in the form of a standardised report based on the results of the original Extended Griffiths Scales.

Finally, two clinical psychologists evaluated each data set (results from the testing procedure as well as the detailed information from the Biographical Questionnaire and Neurological Checklist), before deciding on normality. Children who were considered “normal” were included in the subsequent analysis. Riordan’s (1978) system was used to classify children as lower, middle
or upper SES. This system uses the highest levels of occupation and education of the breadwinner as criteria, and children are differentially classified depending on their ethnic group (Barnard, 2000).

The procedure for the revision of items and the pilot testing of the items (pp. 59-60 above) is important in many respects, but especially for the current study, as it indicates that the inherent culture-fairness of the original Griffiths Scales has been enhanced by the consideration of above factors. That is, the experimental items were subjected to a panel to check for culture fairness, and the items were presented to a large multicultural South African sample before the experimental version was finalised. This means that there was ample opportunity to eliminate culture bias from items. Although this was not made explicit in the objectives, culture-fairness (from items being based on the universal activity of play) has always been an inherent part of the Griffiths Scales, and this characteristic was important during the revision. The above is important because the current study looks at the applicability of the Griffiths in the South African context (a setting with diverse cultures). Even more relevant to the current study is the fact that the initial revision process was based on South African samples – something which enhances the potential for the GMDS-ER to be applicable to the South African context.

Many items on the Hearing and Speech Subscale (Scale C) had been identified as being problematic (Hanson, 1982; Luiz et al., 1995). Taking the findings of Hanson (1982) and Luiz et al. (1995) into consideration, Kotras (1998) revised the small pictures and large picture of the Hearing and Speech Subscale in South Africa. The study resulted in the development of 20 new small pictures and two new large pictures (one having a contemporary British/European/Australian focus, and one having a contemporary South African focus). The new versions were developed by a South African artist who was familiar with both the study and the Griffiths Extended Scales.

In 2003 Kotras extended her study and explored the construct validity of the Language Subscale of the Revised Extended Griffiths Scales. The sample consisted of (N=325) English-speaking children throughout the British Isles and
Eire, between the ages of 2 and 8 years. The results of the study confirmed that the subscale measures comparable constructs in individuals from different socio-economic and gender groups.

Barnard (2000) revised the Practical Reasoning Subscale of the Griffiths Extended Scales. The total sample represented six age groups (Years III, IV, V, VI, VII and VIII) 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 experimental and 11 adapted original items were included in the revised subscale, which improved the content covered and the contemporaneous nature of the items of the subscale.

Finally, Knoesen (2003) assessed 93 urban preschool children between the ages of 5 years and 6 years 11 months on the Revised Griffiths Scales to determine whether the Scales can be used to predict scholastic performance of Grade 1 learners. The children were tested towards the end of their final preschool year and were then followed up one year later at the end of their Grade 1 year. Results suggested that the revised Griffiths can be used to identify strengths and weaknesses in Grade 1 learners in the outcomes-based education system of South Africa. Like previous research on the original Griffiths Scales, Knoesen’s (2003) results also revealed differences between gender, cultural group, and socio-economic status. Girls performed better than boys, White and Asian children performed similarly and Coloured and Black children performed similarly. Children from higher socio-economic status performed better than children from lower socio-economic status (Knoesen, 2003). The study added support to the value of using the Revised Griffiths Scales to predict the scholastic performance of Grade 1 learners.

3.7 The Standardisation of the Griffiths Mental Development Scales – Extended Revised (GMDS-ER)

In this section, the standardisation of the Griffiths Mental Development Scales - Extended Revised (GMDS-ER) on a large representative sample of
children between the ages of 2 and 8 years in the United Kingdom and Eire are outlined by discussing the sampling and data collection procedures. This section is important as it details the recruitment of participants and gathering of data against which the performance of South African children was compared. This section is included as the British sample that is used in this study is a subsample of the standardisation group. The description of the process of standardisation (if read in conjunction with the relevant sections that follow the description of the sampling and data collection procedures) therefore facilitates an understanding of how the current study’s sample was collected, as well as indicating the degree of rigour that was present in the construction of the measure that is employed in the present study. Examples of this rigour include the careful placement of items based on item difficulty values to ensure subscales that were increasingly difficult, the calculation of norms to facilitate interpretation on subscales and the calculation of significant difference scores to facilitate intersubscale interpretation. The bulk of the information presented in the sections that follow comes from Luiz et al. (2004).

3.7.1 Sampling and Data Collection Procedures for Standardisation

The normative information for the GMDS-ER is based on a national standardisation sample representative of children from the ages of 2 to 8 years of age in the United Kingdom (i.e. England, Wales, Scotland and Northern Ireland) and Eire (i.e. Republic of Ireland) (Luiz et al., 2004). The recruitment of children to participate in the standardisation occurred in two phases. The first phase involved the random selection of children across the United Kingdom and Eire. Prior to this random selection of children, however, approval had to be granted by each of the five regions’ and sub regions’ Local Ethics Committees (LECs). Upon obtaining this consent, the examiners then selected a random sample from their region by means of data obtained from the Child Health System or equivalent system. Four times the required number of children in each region were selected in an attempt to account for attrition rates (i.e., unavailability of children at time of testing, children with developmental delays, etc.). All children selected from the database were screened for normality, as only children with a normal developmental profile had been included in the
standardisation sample. Those children with developmental delays were excluded from the sample and replaced with children whose development was normal. However, unavailability of children towards the end of the deadline for data collection resulted in the remainder of the standardisation sample being obtained by testing children in kindergartens and preschools willing to participate around the United Kingdom and Eire to ensure that equal numbers of children in each year group were included in the final sample. These children were sampled using a convenience sampling technique, thus making it impossible to adhere strictly to proportions that had initially been planned. This was the second phase in the recruitment of participants. Prior to the children being tested in the kindergartens and preschools, local permission had to be obtained from the relevant authorities as well as the parents of those children involved. The necessary ethical procedures were adhered to at all stages of recruiting the children (Luiz et al., 2004). The second phase also included only children whose general development was normal (i.e. the absence of any sensory, physical or mental handicap).

The final standardisation sample for the Revised Griffiths Scales of Mental Development included 1026 children between the ages of 2 and 8 years of age, representing children from Wales (n = 107), Scotland (n = 61), Northern Ireland (n = 102), Southern Ireland (n = 103) and England (n = 653). Figure 1 shows the proportion of children assessed in each region in the United Kingdom and Eire as well as their respective population ratios (obtained from the Office for National Statistics (ONS) and the Central Statistics Office (CSO)).
Although the final standardisation sample was not exactly proportionate to the population ratios in Wales, Scotland, Northern Ireland, Southern Ireland and England, it still revealed trends similar to the majority of the sample representing the England region.

In an attempt to achieve an evenly spread sample in terms of age, gender, urban/rural, and SES (calculated from parental occupation and highest level of education), a quota-sampling technique was employed to select the children (from the random and convenience samples described earlier) to participate. Although equal proportions of children were selected for each of these sampling variables, the final cell sizes were not exactly equal owing to attrition rates and availability of the children at time of testing.
Relatively even proportions of children were sampled from each year group with slightly more children falling into Year VII and comparatively fewer children into Year III. Figure 2 presents the number of children in each year group.

The numbers of boys and girls were similar, with slightly more girls (53%; n = 542) than boys (47%; n = 484) in the standardisation sample. The children’s SES was inferred from their parents’ level of education and occupation (Helms, in Flanagan, Genshof & Harrison, 1997; Luiz et al., 2004). Just less than half of the sample belonged to the middle socio-economic status group (44%, n = 457) with the remainder of the sample being relatively equally distributed between the lower (24%, n = 245) and upper (32%, n = 327) socio-economic status groups. The majority of the sample (86%; n = 862) consisted of children residing in the urban areas of the United Kingdom and Eire, while 14% (n = 139) lived in the rural areas.
3.8 Final Item Placements on the GMDS-ER

Upon completion of the standardisation testing and after eliminating outliers, item analysis was conducted to ensure that items were placed appropriately on the six subscales in increasing order of difficulty. Item difficulty values ($p$) were calculated for all items on the GMSD-ER, using the following formula:

Formula 2 Item difficulty calculation

$$p = \frac{\text{no. of children passing the item}}{\text{total no. of children who were administered the item}}$$

Paediatricians, clinical psychologists, research psychologists, and statisticians were involved in the process of examining the age appropriateness and placement of the items on the six subscales. In order to evaluate items in terms of their difficulty appropriate to the intended age range, the following process was used:

1. A difficulty value of 0.80 was regarded as an acceptable pass rate for each item, while pass rates as low as 0.50 were also accepted with further investigation. A minimum of 0.50 was regarded as acceptable by Griffiths (1970) in the original standardisation of the Scales.

2. In order to establish whether the items were placed in order of increasing difficulty, item difficulty values were calculated for items in each year group for children in that year group (e.g., children in Year III passing items in Year III) as well as for children in one year group above (except for Year III) and below (except for Year VIII) the intended age range for those items (e.g., for the Year IV sample, difficulty values were calculated for items in Year IV, Year III, and Year V). In extreme cases, difficulty values were also explored for up to two years above or below the intended age range.

3. Items were then rearranged in increasing order of difficulty per year group.

4. Item difficulty values in the year above the intended age range were compared with the highest difficulty value for the items in the intended
year. If children performed worse on items in a younger year group than the items in their intended year, the earlier item was found to be too difficult and was therefore moved to a later age stage.

5. Item difficulty values in the year below the intended age range were compared with the lowest difficulty value for the items in the intended year. If children performed better on items in an older year group than the items in their intended year, the later item was found to be too easy and was therefore moved to a younger age stage.

6. Items where $p < 0.80$ or $p > 0.80$ were further investigated for differences in performance across gender and SES groups, urban/rural residence and region using the Chi-square statistic. Where significant differences were found, the lower or higher difficulty value was ascribed to differences in the relevant variable, rather than being too difficult or too easy for that year group. 21 items were affected in this way and are presented in the technical manual (Luiz et al., 2004). In cases where no significant differences were found between the various subgroups, it was concluded that the item was either too difficult or easy for that year group and thus inappropriately placed. Items that were found to be inappropriately placed were then reshuffled to their age-appropriate positions in the Scales according to Steps 4 and 5 described above, in order to obtain Griffiths’ original goal of equality of difficulty of the subscales as far as possible. Table 9 below provides the average pass rates per subscale. Ruth Griffiths’ original goal of equality of difficulty of the Scales was still maintained, as can be seen by the similar difficulty values obtained for each subscale.

Table 9
Average Pass Rates per Subscale

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Difficulty Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – Locomotor</td>
<td>0.74</td>
</tr>
<tr>
<td>B – Personal-Social</td>
<td>0.76</td>
</tr>
<tr>
<td>C – Language</td>
<td>0.78</td>
</tr>
<tr>
<td>D – Hand and Eye Co-Ordination</td>
<td>0.72</td>
</tr>
<tr>
<td>E – Performance</td>
<td>0.79</td>
</tr>
<tr>
<td>F – Practical Reasoning</td>
<td>0.76</td>
</tr>
</tbody>
</table>

(from Luiz et al., 2004)
In light of the reshuffling of items to their new age-appropriate positions on the subscales (based on the difficulty values of the items discussed above), and the fact that not all items were administered to the entire standardisation sample, certain assumptions had to be made to account for missing data (i.e., items that were not administered to children because of their original placements on the subscales, and were therefore left blank on the database). Each missing value was evaluated in terms of the individual child’s performance on the six items surrounding the missing cell. If the child had passed 68% of the items immediately surrounding the missing value (i.e., 4 out of 6 items were passed), it was assumed that the child would then also have passed the item that was not administered to him. If the child had not passed 4 out of the 6 items surrounding the missing value, it was then assumed that the child would have failed the item.

3.9 The Establishment of Norms

Raw scores (the Sub-Quotients) were converted to comparable units (standard scores) with a mean of 100 and a standard deviation of 15 for each subscale. This conversion was accomplished by preparing a cumulative frequency distribution of raw scores for each subscale, smoothing and normalising these distributions, and then calculating the appropriate standard score and percentile for each raw score per 4-month interval in each year group. Further smoothing eliminated minor irregularities in progression from age to age. Norm tables provided in the technical manual accompanying the GMDS-ER allow for the conversion of raw scores to standard scores per 4-month interval (Luiz et al., 2004).

The means and standard deviations of the standard scores for each of the six subscales are presented in Table 10. The means and standard deviations are provided for the sample as a whole (N = 1026) here, but the technical manual provides the data for the six year groups, as well as for each 4-month interval per year group (Luiz et al., 2004).
Table 10

Means and Standard Deviations per Subscale for the Total Sample

<table>
<thead>
<tr>
<th>SUBSCALES</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ</td>
<td>101.05</td>
<td>15.11</td>
</tr>
<tr>
<td>BQ</td>
<td>101.10</td>
<td>15.02</td>
</tr>
<tr>
<td>CQ</td>
<td>101.49</td>
<td>15.02</td>
</tr>
<tr>
<td>DQ</td>
<td>100.73</td>
<td>15.03</td>
</tr>
<tr>
<td>EQ</td>
<td>100.91</td>
<td>14.96</td>
</tr>
<tr>
<td>FQ</td>
<td>101.02</td>
<td>15.03</td>
</tr>
<tr>
<td>GQ</td>
<td>101.35</td>
<td>14.95</td>
</tr>
</tbody>
</table>

(from Luiz et al., 2004)

The means and standard deviations of each subscale closely approximate a mean of 100 and a standard deviation of 15, which makes these normalised standard scores comparable with other diagnostic measures with a mean of 100 and a standard deviation of 15 (Luiz et al., 2004). The results in Table 10 are similar to those found in the original Extended Scales, where mean Sub-Quotients ranging between 99.78 and 100.46 were found Griffiths (1970).

According to the results presented in the technical manual (Luiz et al., 2004), optimal performance does not occur consistently at any specific age group or across any specific subscale. Furthermore, age appears to have had a greater or lesser impact on the sample’s performance on some of the subscales. On the Performance Subscale, for example, the standardisation sample’s performance steadily declines with age, ranging from a raw mean of 116.80 in Year III to a raw mean of 84.57 in Year VIII.

Similarly to the performance of children in the original standardisation (Griffiths, 1970), children in Year VII and VIII do not reach the ceiling in their performance on the subscales, thus these two year groups have lower means and standard deviations than earlier year groups.

Table 11 compares the actual percentages of children scoring 1, 2 and 3 standard deviations above and below the mean, with the theoretical proportions expected under the normal distribution curve. The actual distribution of standard scores corresponds closely to the theoretical values shown in the Table, thus
confirming its normality. However, a slightly greater percentage of the standardisation sample fell within 1 standard deviation above and below the mean compared to the expected probability.

Table 11
Normality of the Subscale Distributions

<table>
<thead>
<tr>
<th>% Frequencies Expected</th>
<th>Actual % - SUBSCALES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>-1 SD and + 1 SD</td>
<td>(68.3)</td>
<td>70.40</td>
</tr>
<tr>
<td>-2 SD and + 2 SD</td>
<td>(95.4)</td>
<td>95.50</td>
</tr>
<tr>
<td>-3 SD and + 3 SD</td>
<td>(99.7)</td>
<td>99.50</td>
</tr>
</tbody>
</table>

(from Luiz et al., 2004)

This information indicates that the Griffiths sample represents the total population reasonably well (as a normal curve would be expected to be found had the total population been sampled). The test also seems to be an appropriate diagnostic measure that would be appropriate for use with special populations as items are relatively sensitive. The original Griffiths Scales had a general item difficulty value around the 0.5 range, whereas the GMDS-ER has a general item difficulty value that ranges from 0.5 to 0.75. This means that a child failing an age-appropriate item on the original Griffiths Scales was performing similarly (on that item) to 50% of normal children, whereas this figure on the GMDS-ER on most items would be closer to 25%. In a sense, this means that failure on an age-appropriate item becomes more clinically significant, as 75% of normal children would be expected to pass the item. This is important for the context of the current study, as the GMDS-ER seems to be a measure that is not only a good behavioural sample of child development, but also one that has a good deal of potential in identifying the children that are most at risk – something that is very relevant to the South African context. The above sensitivity in identifying the most delayed children is controlled for by the use of norm tables (i.e. the GMDS-ER is able to detect performance that may border on being considered abnormal). As mental ages higher than chronological ages may still
be considered “normal” owing to the use of standardised scores, mental ages on the GMDS-ER that are lower than choronological ages are even more indicative of problems than on the original Griffiths Scales.

3.10 Reliability

The “reliability” of a test refers to the accuracy, consistency, and stability of test scores across situations (Aiken, 1997; Anastasi, 1982). Internal consistency coefficients are the most suitable test of reliability in cases where an individual’s score on some attribute, such as development, may inevitably change significantly in a short period of time (Kline, 1993). For this reason, Cronbach’s Alphas were calculated for each subscale separately, as well as for the GQ per age group, as well as across the six age groups, as an indication of the reliability of the subscales as a measure of mental development. Table 12 provides the Cronbach’s Alphas for each subscale and the GQ per age group as well as across the six age groups.

Table 12
Reliability Coefficients for Each Subscale and the GQ

<table>
<thead>
<tr>
<th>SUBSCALES</th>
<th>Year III</th>
<th>Year IV</th>
<th>Year V</th>
<th>Year VI</th>
<th>Year VII</th>
<th>Year VIII</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.67</td>
<td>0.81</td>
<td>0.85</td>
<td>0.82</td>
<td>0.79</td>
<td>0.67</td>
<td>0.97</td>
</tr>
<tr>
<td>B</td>
<td>0.70</td>
<td>0.78</td>
<td>0.82</td>
<td>0.82</td>
<td>0.72</td>
<td>0.52</td>
<td>0.96</td>
</tr>
<tr>
<td>C</td>
<td>0.80</td>
<td>0.86</td>
<td>0.86</td>
<td>0.82</td>
<td>0.71</td>
<td>0.59</td>
<td>0.97</td>
</tr>
<tr>
<td>D</td>
<td>0.63</td>
<td>0.72</td>
<td>0.87</td>
<td>0.85</td>
<td>0.68</td>
<td>0.64</td>
<td>0.97</td>
</tr>
<tr>
<td>E</td>
<td>0.75</td>
<td>0.64</td>
<td>0.77</td>
<td>0.71</td>
<td>0.72</td>
<td>0.79</td>
<td>0.90</td>
</tr>
<tr>
<td>F</td>
<td>0.95</td>
<td>0.93</td>
<td>0.91</td>
<td>0.92</td>
<td>0.97</td>
<td>0.98</td>
<td>0.97</td>
</tr>
<tr>
<td>GQ</td>
<td>0.80</td>
<td>0.79</td>
<td>0.83</td>
<td>0.75</td>
<td>0.70</td>
<td>0.69</td>
<td>0.96</td>
</tr>
</tbody>
</table>

(from Luiz et al., 2004)

The overall reliability of the GMDS-ER is a highly satisfactory 0.96. The overall reliability of the individual subscales range between 0.90 and 0.97, also indicating a high level of internal consistency. Although very high Cronbach Alphas may be indicative of excessive inter-correlations, suggesting that some of
the items may be redundant (Luiz et al., 2004), it is important to consider the
developmental nature of the items on the Griffiths Scales. Many of the items on
the six subscales are tested repeatedly at various developmental levels (i.e. at
increasing levels of difficulty). For example, on Subscale A, the item “Jumps off
steps” occurs four times, ranging from “Can jump off 1 step” to “Can jump off 4
steps”. Therefore, although there are 38 items in each subscale, these do not all
reflect unique items. Thus, it is expected that the Total Cronbach Alphas
(presented in Table 12) will be higher than what is usually found on other
measures (Luiz et al., 2004).

The reliability coefficients for the individual subscales per year group are
lower than the reliability coefficients for the total Subscales (across all year
groups). This is expected because of the relatively small number of items (i.e., 6
items) composing each subscale per year group, compared with the total number
of items across the year groups in each subscale (i.e., 38 items).

In addition to reliability, the standard error of measurement ($SE_M$) should be
taken into consideration in the interpretation of a test score (AERA, 1999; Aiken,
1997). Unlike most physical measurements (e.g. height or weight), psychological
test scores are never precise or exact. Any score on a test for an individual on
any occasion differs from his true score on account of random error. If an
individual were to be tested on an infinite number of occasions, a normal
distribution of scores would be obtained around his true score (Aiken, 1997).
Therefore, a test score is correct or “true” only over a certain range. A statistical
estimate of this range (i.e., $SE_M$) is a function of the variability of test scores for a
particular age group, represented by the reliability coefficient. The $SE_M$ is thus a
practical statistic that is indicative of the band of error associated with a test
score. The $SE_M$ is inversely related to the reliability coefficient: the greater the
reliability, the lower the $SE_M$, and the more confidence one may have in the
accuracy or precision of the observed test score. Measurement error is
commonly expressed in terms of standard deviation units; that is, the $SE_M$ is the
standard deviation of the measurement error distribution. The $SE_M$ is calculated
with the formula given below.
Formula 3 Calculation of the Standard Error of Measurement

$$\text{SE}_M = SD \sqrt{1 - r_{xx}}$$

where $SD$ = standard deviation unit of the Subscale  
$r_{xx}$ = the reliability coefficient of the Subscale

The $SE_M$ is provided for various degrees of probability, with the 95% and 99% probabilities being the most frequently used ones. Table 13 provides the average $SE_M$ per subscale across the six year groups. The technical manual (Luiz et al., 2004) provides $SE_M$ at 68%, 95% and 99% confidence levels for each subscale at each year group which can be used in conjunction with the norm tables in order to express a score in confidence intervals. Confidence intervals are another means of expressing the precision of a test score (Aiken, 1997; Luiz et al., 2004) and report a child’s score as an interval that has the likelihood (expressed as one of the percentages mentioned above in the case of the GMDS-ER) of containing a child’s true score. Confidence intervals based on the standard error of measurement are calculated and expressed in the following way:

Formula 4 Calculation and Expression of Confidence Intervals

The score $x$ has a likelihood of $p$ of lying between $x - zp(SE_M)$ and $x + zp(SE_M)$

where $x$ = the obtained score on the GMDS-ER  
$p$ = the appropriate/chosen confidence level (e.g. 95% or 99%)  
$zp$ = the $z$-value associated with the confidence level (which can be located in the normal probability tables)

Table 13

Average $SE_M$ /Subscale and GQ at 68%, 95% and 99% Confidence Levels

<table>
<thead>
<tr>
<th>SUBSCALES</th>
<th>$SE_M$ (68% chance)</th>
<th>$SE_M$ (95% chance)</th>
<th>$SE_M$ (99% chance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6.49</td>
<td>12.72</td>
<td>16.74</td>
</tr>
<tr>
<td>B</td>
<td>6.72</td>
<td>13.18</td>
<td>17.35</td>
</tr>
<tr>
<td>C</td>
<td>5.92</td>
<td>11.61</td>
<td>15.28</td>
</tr>
<tr>
<td>D</td>
<td>5.22</td>
<td>10.23</td>
<td>13.46</td>
</tr>
<tr>
<td>E</td>
<td>5.68</td>
<td>11.13</td>
<td>14.65</td>
</tr>
<tr>
<td>F</td>
<td>3.34</td>
<td>6.55</td>
<td>8.63</td>
</tr>
<tr>
<td>GQ</td>
<td>6.18</td>
<td>12.12</td>
<td>15.96</td>
</tr>
</tbody>
</table>

(from Luiz et al., 2004)
These considerations are important in the light of the context of the current study. Van Ede (1996) indicates that an appropriate measure for consideration for cross-cultural use is one that has a good reliability with regard to the initial target group (as the Griffiths has). The relative consistency of test scores (as represented by the reported $SE_m$ figures) is also important in the South African context, where assessment over time would be critical (as explored in Chapter 1).

### 3.11 Intercorrelations between GMDS-ER Subscales and Overall Performance

As stated by Griffiths (1970), “each subscale was devised to be a separate and complete scale in itself, each measuring only one avenue of learning or process of development, but measuring this one aspect as completely as possible” (p.34). Thus low intercorrelations between some, seemingly unrelated, subscales are to be expected as the GMDS-ER is comprised of six separate subscales all “vastly different in content” (p.34) rather than one global Scale. Therefore, as an indication of the common factor of “general intelligence” the quotients obtained on each subscale were correlated with the GQ instead. The purpose of correlating the GQ with the six subscales is not to ascertain whether a correlation exists between the subscales and the GQ (as it is assumed that they will be correlated as each subscale contributes towards the GQ), but rather to identify which subscales are comparatively more highly correlated with the GQ. Thus, although the correlations presented in Table 14 may be slightly inflated (as the Sub-Quotients contribute to the GQ), they still provide meaningful information regarding the intercorrelations between the GQ and the subscales.
Table 14

Correlation of Subscales with General Quotient

<table>
<thead>
<tr>
<th>SUBSCALES</th>
<th>GQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ</td>
<td>0.63</td>
</tr>
<tr>
<td>BQ</td>
<td>0.74</td>
</tr>
<tr>
<td>CQ</td>
<td>0.76</td>
</tr>
<tr>
<td>DQ</td>
<td>0.55</td>
</tr>
<tr>
<td>EQ</td>
<td>0.53</td>
</tr>
<tr>
<td>FQ</td>
<td>0.78</td>
</tr>
</tbody>
</table>

According to Guilford’s (1965) guidelines for interpreting correlation coefficients, the results indicate moderate to high correlations between the subscales and the GQ, thus confirming the presence of a general underlying factor of general intelligence as was supposed by Griffiths (1970). Furthermore, Subscales F, C and B are comparatively more highly correlated with the GQ than the other subscales.

Upon closer inspection of the results, Subscales C and F have similar correlations to the GQ, namely, 0.76 and 0.78 respectively. This can be attributed to the fact that these are the two most intellectual of the subscales. Similarly, the two more manual subscales (i.e., involving the manipulation of small objects), namely Hand and Eye Co-ordination and Performance, have correlations of 0.55 and 0.53.

3.12 Validity

The “validity” of measuring instruments is defined as “the degree to which evidence and theory support the interpretations of test scores entailed by proposed uses of tests” (American Educational Research Association (AERA), 1999, p.9). Because the Griffiths Scales are used for diagnostic purposes, content-based evidence was explored, including an empirical analysis of the adequacy with which the test content represents the content domain, by means of a literature review and the consultation of experts. An analysis of this kind is important for a test that will be used in the South African context since a broad range of domains need to be adequately assessed (as has been argued in
Chapter 1). As the six subscales of the Griffiths were developed to be used independently as measures on their own, construct-related evidence was also explored in the form of a construct-model for each subscale.

3.12.1 Content-Based Evidence

Content-related evidence is provided as “a logical structure that maps the items on the test to the content domain illustrating the relevance of each item and the adequacy with which the set of items represents the content domain” (AREA, 1999, p.19). A facet analysis was conducted on each subscale separately in order to provide proof of the validity of its contents. The results of the facet analysis indicated that the items in each of the six subscales are representative of their respective content domains and that each item has a satisfactory degree of relevance to the construct being measured (Luiz et al., 2004).

3.12.2 Construct-Related Evidence

According to Kaufman and Kaufman (1983), “factor structure is probably the most important evidence of a theory-based, multiscale test’s construct validity” (p.90). The application of factor analytic techniques to the GMDS-ER yielded important information regarding the underlying constructs assessed by the six subscales. Exploratory factor analyses were conducted, seeking one-factor solutions for the items underlying the constructs identified by the experts and confirmed by relevant literature and theory. Exploratory factor analysis was regarded as the most appropriate technique, rather than confirmatory factor analysis, as an exploration into the underlying structure of the individual Griffiths Scales had as yet not been conducted, thus revealing no predetermined pattern within each subscale. Common factor analyses with oblique rotations were performed, seeking the best possible fit for each item based on empirical criteria, including the factor loadings and percentage variance explained, as well as the psychological meaningfulness of the factor structure (Luiz et al., 2004). Factor loadings of the items on their particular construct(s), as well as the amount of variance explained by each factor and its Cronbach’s Alpha, are provided in the
technical manual of the GMDS-ER (Luiz et al., 2004). Variance explained by the different factors ranges between 64.5% and 99.9%.

3.13 Interpretation of Scores on the GMDS-ER

The test constructors warn that “results on the GMDS-ER provide important information, but should never be interpreted in isolation” (Luiz et al., 2004, p.44), and that test results should be interpreted within the context of the full clinical picture. Guidelines for quantitative and qualitative interpretation (using the standard score mean of 100 and standard deviation of 15) are provided in the technical manual.

3.13.1 Differences between Standard Scores

As the GMDS-ER has 6 subscales and a total score (GQ), the question arises as to how different the scores must be, to be meaningfully and significantly different from one another. The fact that a child does well in certain kinds of tasks does not necessarily mean that he or she will maintain the identical level of performance in other kinds of problems or tasks. A “difference score” refers to the numerical difference in scores on two quantitatively comparable scales. A statistically significant difference between scores, for example, between the Language and Practical Reasoning Subscales, refers to the likelihood that obtaining such a difference by chance is very low (e.g., $p < 0.05$) if the “true” difference between the scores is zero (Matarazzo & Herman, 1985). The level of significance reflects the level of confidence the examiner can have that the difference between scores (i.e., the difference score), is a true difference. The difference score is a function of the standard error of measurement of the two subscales being compared. The higher the $SE_M$ of the two subscales (and hence the lower the reliability of these subscales), the greater the likelihood that the difference between scores is due to chance rather than to any real difference in the child’s abilities (Luiz et al., 2004). The difference score provides an estimate of the standard deviation of the sampling distribution of the difference between the two obtained standard scores. Multiplying the standard error of
measurements of the difference, which is a function of the $SE_M$ of each subscale in the pair, by an appropriate $z$-value, yields the amount of difference required for statistical significance at any given level of confidence. The formula used to calculate these significant differences is as follows:

Formula 5 Calculation of Significant Difference Scores

\[
\text{Difference Score} = z \sqrt{SE_{ma}^2 + SE_{mb}^2}
\]

where: $z$ = the normal curve value associated with the desired level of significance
$SE_{Ma/b}^2$ = the standard errors of measurement of the two Subscales

The significant difference scores between the subscales themselves and between individual subscales and the GQ are presented in Table format for the 5% and 1% levels of confidence for each year group respectively, in the technical manual of the GMDS-ER (Luiz et al., 2004).

3.14 Chapter Summary

This chapter explored the development of the original Griffiths Scales and explored relevant research on its psychometric properties and application. The revision and restandardisation of the GMDS-ER was explored and the chapter concluded with initial psychometric property findings presented by the South African Griffiths Research Team as part of the manuals accompanying the test.

Although the Griffiths has undergone a revision and restandardisation, it has kept its central characteristics as an instrument that assesses the most important domains of child development. Furthermore, it has kept its child-friendly nature and is still based on activities that occur naturally in most cultures. Items are still ordered according to increased difficulty and the individual subscales are still comparable (even though this comparison should be done according to standard scores rather than raw scores). The GMDS-ER has also remained true to Griffiths’ original motivation of linking the clinical and normative approaches to developmental assessment. As these central characteristics have not been
changed, there is no reason to believe that the Scales’ utility as a diagnostic measure which is applicable to normal (or presumed normal) as well as special populations, has been adversely affected.

One of the drawbacks of the GMDS-ER for use in the South African context is that it requires a suitcase (two would be necessary when testing children around the age of 2) and an additional bag of items. It is therefore not the easiest test to administer under field conditions (e.g. if walking a long way with the kit). However, the GMDS-ER was constructed in such a manner as to allow the usage of the subscales in an independent manner. Although the accountable usage of subscales in an independent manner would have to build on research that is not yet available, the potential exists to use only necessary subscales in programme evaluations. This means that the administration of the Griffiths under field conditions may be improved.

The above, in conjunction with what has been explored in preceding chapters, leads naturally to the conclusion that the GMDS-ER is the most applicable existing test for the South African developmental assessment context. This study aims to address one of the GMDS-ER’s few shortcomings by exploring the performance of a sample of normal South African children on the measure. The process by which this has been achieved will be discussed in the next chapter.
CHAPTER FOUR: PROBLEM STATEMENT AND RESEARCH METHODOLOGY

4.1 Introduction

Chapter 4 presents the problem statement and primary objective of the present study. It further discusses the methodology employed in conducting the study, including the research design, the participants, the sampling method, the assessment measures, and the procedure. This is followed by a description of the statistical analysis and ethical considerations relevant to the study.

4.2 Problem Statement

Although some studies have been done previously on the performance of normal South African children on the original Griffiths Scales (Allan, 1988; 1992; Bhamjee, 1991), none have been conducted using the GMDS-ER. The developmental assessment needs in the South African context and the potential for the GMDS-ER to answer these needs have been explored in the preceding chapters. Before information obtained from the GMDS-ER can be used accountably, knowledge needs to be accumulated on the performance of normal South African children on the Revised Scales as the GMDS-ER was standardised on a British norm group. Although previous studies have been done and ongoing research is being conducted on the performance of South African children on the GMDS-ER (Baker, in press; Gowar, 2003; Makowem, in press; Sandison, in press; Schröder, 2004), all of these studies have involved clinical populations. Until sufficient knowledge has been accumulated about the performance of normal South African children, the clinical utility of the GMDS-ER as a diagnostic or programmatic intervention tool is limited.
4.3 Primary Objective

The primary aim of the study is to explore and compare the performance of South African and British children aged 4 to 7 years in each of four year groups on the GMDS-ER. The overall performance of the two groups is compared, as well as that on each subscale where appropriate. The overall aim of the study is achieved by consideration of the following two more specific aims:

1. To explore and describe the comparative general development of each of four year groups of a sample of British and South African children by utilising the general developmental quotient of the GMDS-ER.

2. To explore and describe the comparative developmental profiles of each of the four year groups of a sample of British and South African children across the six developmental areas represented by the subscales of the GSMD-ER.

4.4 Research Design

An exploratory descriptive philosophy guided the design of the study and although comparisons were made, only tentative causal conclusions were offered. Therefore the design can be said to be exploratory descriptive in nature. Exploratory-descriptive research aims at 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 a specific phenomenon or construct (Cozby, 1993). According to Leary (1991), descriptive research can be defined as the description of thoughts, feelings or behaviours of a particular group of participants. This describes the present study well, as behavioural indicators of development were described and compared, but assigning causal attributions was not an objective. In the current study, numerical data was statistically summarised in order to make interpretation easier, and in this way the phenomenon was explored and described. This was done for each year group in terms of overall performance (aim 1), as well as in terms of each subscale (aim 2). Exploratory-descriptive research establishes the foundations for future research, and is therefore
considered to be a necessary initial step in the overall research process (Rosnow & Rosenthal, 1996). The present study is an initial exploration into the applicability of the GMDS-ER to a South African context, but will need to be followed up by future, more in-depth studies in order to reach any conclusive findings. When employing an exploratory-descriptive methodology, the researcher often does not have any formal hypothesis, which is also the case in the present study. The design can also be described as quantitative as data is represented and analysed in a numerical format.

To meet the above aims, two groups of children between the ages of 4 and 7 years were compared. A modified matched group design was employed in order to control for extraneous variables. The groups were comparable on age, gender, and SES, but were not matched on a case-to-case basis. Rather, a matched frequency distribution was utilised in order to make sure that the groups were similar on the above-mentioned variables. This was thought to be more appropriate than case-to-case matching, as one of the variables under study (namely, SES) may mean something completely different in the two contexts from which the groups come. That is, to have a lower SES status in South Africa may mean that a family has limited access to amenities such as running water, electricity, and sanitation, whereas this would not be the case in the UK and Eire. It was thought that a matched frequency distribution design would minimise the effect of such influences more so than a case-to-case matching design (Foxcroft, 2004).

4.4.1 Sampling Procedure and Description of the Samples

4.4.1.1 South African Sample

The South African sample was collected as part of the early process of the revision and restandardisation of the GMDS-ER. A convenience and quota sampling technique was used to obtain this sample (Barnard, 2000). The method for obtaining the South African sample can therefore be described as non-probability sampling, since the researcher does not know the probability of a member of the population being included in the study (Cozby, 1993). Since this
probability is not known, the researcher cannot generally claim that the sample is representative of the larger population. However, a non-probability sample is considered to be entirely adequate if the study is a trial run for an anticipated larger study (Bailey, 1987), as is the case with the present investigation.

At the stage of sample selection, an attempt was made to obtain 10 children per year from every major cultural group in South Africa. Articles outlining the purpose of the research were published in local and accessible newspapers, and volunteers responded directly to the Department of Psychology at the University of Port Elizabeth. All the children were screened for normality before being included in the sample. To facilitate this process, the South African sample was subjected to a Biographical Questionnaire and the Neurological Checklist that had been developed by Foxcroft in 1985 (Barnard, 2000). The Neurological Checklist evaluates the child’s physical development in the areas of sitting, standing, involuntary movements, coordination and association movements, walking, and vision. The Biographical Questionnaire includes questions pertaining to the child’s general health and developmental status. “Normality”, according to the combined use of the Biographical Questionnaire and Neurological Checklist, thus refers to the absence of central nervous system pathology (i.e., sensory, physical or mental handicap and/or severe developmental delay) and not to a deviation in development. This combination had been used previously with satisfactory results (Allan, 1988; 1992; Barnard, 2000; Bhamjee, 1991; Leonard, 1986; Nortje, 1986; Scholodder, 1986; Tennant, 1986). The South African sample came from urban areas. Table 15 presents the breakdown of the resulting South African sample by age category and ethnic group.
Table 15

South African Sample by Age and Ethnic Group

<table>
<thead>
<tr>
<th>Year</th>
<th>Age Range</th>
<th>White</th>
<th>Black(^4)</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year V</td>
<td>4 yrs 0 mnths to 4 yrs 11.99 mnths</td>
<td>10</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Year VI</td>
<td>5 yrs 0 mnths to 5 yrs 11.99 mnths</td>
<td>13</td>
<td>17</td>
<td>30</td>
</tr>
<tr>
<td>Year VII</td>
<td>6 yrs 0 mnths to 6 yrs 11.99 mnths</td>
<td>12</td>
<td>21</td>
<td>33</td>
</tr>
<tr>
<td>Year VIII</td>
<td>7 yrs 0 mnths to 7 yrs 11.99 mnths</td>
<td>10</td>
<td>19</td>
<td>31</td>
</tr>
<tr>
<td>All Groups</td>
<td></td>
<td>45</td>
<td>82</td>
<td>129</td>
</tr>
</tbody>
</table>

* The total number here includes 2 subjects for whom data on ethnic group was not available. As ethnicity is not one of the criteria that will be used to ensure equivalence of the two samples, these subjects were included in the total South African sample.

Although it cannot be seen in Table 15, each ethnic group (Asian, Black, Coloured and White) is not exactly equally represented. However, the representation reflects the South African demographic situation, as there are fewer White children than children from previously disadvantaged backgrounds. Previous studies (e.g., Allan 1992; Barnard, 2000) have found that ethnic group is not a predictor of performance on the original Griffiths, and therefore the influence of ethnic group on overall outcome should be negligible. As ethnic group is also not a matching variable; Table 15 should be considered as a mere depiction of the degree of representativeness of the South African sample according to ethnic group.

The combined frequency distribution of gender and socio-economic status of the South African sample is presented in Table 16.

\(^4\) This group includes children who would previously have been differentially classified as Coloured, Asian, and Black.
Table 16
SES and Gender Distribution of South African Sample

<table>
<thead>
<tr>
<th>Year</th>
<th>SES</th>
<th>Male</th>
<th>Female</th>
<th>SUBTOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High (17.1%)</td>
<td>9 (25.7%)</td>
<td>6 (17.1%)</td>
</tr>
<tr>
<td>Year V</td>
<td></td>
<td>7 (20%)</td>
<td>3 (8.6%)</td>
<td>4 (11.1%)</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>13 (37.1%)</td>
<td>12 (34.3%)</td>
<td>25 (74.2%)</td>
</tr>
<tr>
<td>Year VI</td>
<td>Male</td>
<td>1 (3.3%)</td>
<td>3 (10%)</td>
<td>1 (3.3%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>9 (30%)</td>
<td>7 (23.3%)</td>
<td>16 (48%)</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>10 (33.3%)</td>
<td>10 (33.3%)</td>
<td>20 (60%)</td>
</tr>
<tr>
<td>Year VII</td>
<td>Male</td>
<td>3 (9.1%)</td>
<td>6 (18.2%)</td>
<td>9 (27%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5 (15.2%)</td>
<td>7 (21.2%)</td>
<td>12 (36%)</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>8 (24.2%)</td>
<td>13 (39.4%)</td>
<td>21 (63%)</td>
</tr>
<tr>
<td>Year VIII</td>
<td>Male</td>
<td>4 (12.9%)</td>
<td>11 (35.5%)</td>
<td>15 (45.5%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>6 (19.4%)</td>
<td>2 (6.5%)</td>
<td>8 (24.2%)</td>
</tr>
<tr>
<td></td>
<td>TOTALS</td>
<td>10 (32.3%)</td>
<td>13 (41.9%)</td>
<td>23 (69%)</td>
</tr>
</tbody>
</table>

As can be seen above, each year of the sample does not equally represent all the socio-economic groups or gender groups (i.e., each cell does not have equal percentages). The overall sample has slightly more subjects in the middle SES group, which is preferable, as this is usually the stratum with the most subjects in the population. There are slightly more boys (n = 67, 52%) than girls (n = 62, 48%) in the total South African sample.

4.4.1.2 The British Sample

The British sample was selected from the GMDS-ER standardisation sample to match the frequency distribution of the South African sample. The sampling procedure of the restandardisation sample has already been described in Chapter 3. This technique can be described as purposive sampling, as certain types of elements were criteria for the selection of cases. Apart from the matching variables (i.e., age, SES and gender), only children from urban areas were selected. The resulting SES and gender distribution can be seen in Table 17.
Table 17
SES and Gender Distribution of British Sample

<table>
<thead>
<tr>
<th>Year</th>
<th>SES</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Middle</td>
<td>Low</td>
<td>TOTAL</td>
</tr>
<tr>
<td>Year V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7 (16.3%)</td>
<td>11 (25.6%)</td>
<td>8 (18.6%)</td>
<td>26 (60.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>9 (20.9%)</td>
<td>4 (9.3%)</td>
<td>4 (9.3%)</td>
<td>17 (39.5%)</td>
</tr>
<tr>
<td><strong>SUBTOTALS</strong></td>
<td></td>
<td>16 (37.2%)</td>
<td>15 (34.9%)</td>
<td>12 (27.9%)</td>
</tr>
<tr>
<td>Year VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2 (5.2%)</td>
<td>4 (10.5%)</td>
<td>9 (23.7%)</td>
<td>15 (39.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>11 (28.9%)</td>
<td>8 (21.1%)</td>
<td>4 (10.5%)</td>
<td>23 (60.5%)</td>
</tr>
<tr>
<td><strong>SUBTOTALS</strong></td>
<td></td>
<td>13 (34.2%)</td>
<td>12 (31.6%)</td>
<td>13 (34.2%)</td>
</tr>
<tr>
<td>Year VII</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4 (9.7%)</td>
<td>8 (19.5%)</td>
<td>7 (17.1%)</td>
<td>19 (46.3%)</td>
</tr>
<tr>
<td>Female</td>
<td>6 (14.6%)</td>
<td>8 (19.5%)</td>
<td>8 (19.5%)</td>
<td>22 (53.7%)</td>
</tr>
<tr>
<td><strong>SUBTOTALS</strong></td>
<td></td>
<td>10 (24.4%)</td>
<td>16 (39%)</td>
<td>15 (36.6%)</td>
</tr>
<tr>
<td>Year VIII</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5 (12.8%)</td>
<td>13 (33.3%)</td>
<td>5 (12.8%)</td>
<td>23 (59%)</td>
</tr>
<tr>
<td>Female</td>
<td>8 (20.5%)</td>
<td>3 (7.8%)</td>
<td>5 (12.8%)</td>
<td>16 (41%)</td>
</tr>
<tr>
<td><strong>SUBTOTALS</strong></td>
<td></td>
<td>13 (33.3%)</td>
<td>16 (41%)</td>
<td>10 (25.6%)</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td>52 (32.3%)</td>
<td>59 (36.6%)</td>
<td>50 (31.1%)</td>
</tr>
</tbody>
</table>

As with the South African sample, the middle SES stratum has slightly more subjects than the lower and upper strata, and there are slightly more boys (n = 83, 52%) than girls (n = 78, 48%) in the total sample.

4.4.1.3 Comparison between Samples on Matching Variables

Table 18 compares the frequency distributions according to SES and gender per year group. The British frequencies are indicated in parenthesis.
Table 18
Frequency Distribution Comparison according to SES and Gender (expressed as percentages)

<table>
<thead>
<tr>
<th></th>
<th>SES</th>
<th></th>
<th></th>
<th></th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Middle</td>
<td>Low</td>
<td></td>
<td>TOTAL</td>
</tr>
<tr>
<td>Year V</td>
<td>Male</td>
<td>17.1 (16.3)</td>
<td>25.7 (25.6)</td>
<td>20 (18.6)</td>
<td>62.9 (60.5)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>20 (20.9)</td>
<td>8.6 (9.3)</td>
<td>8.6 (9.3)</td>
<td>37.1 (39.5)</td>
</tr>
<tr>
<td></td>
<td>SUBTOTALS</td>
<td>37.1 (37.2)</td>
<td>34.3 (34.9)</td>
<td>28.6 (27.9)</td>
<td>100 (100)</td>
</tr>
<tr>
<td>Year VI</td>
<td>Male</td>
<td>3.3 (5.2)</td>
<td>10 (10.5)</td>
<td>23.3 (23.7)</td>
<td>36.7 (39.5)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>30 (28.9)</td>
<td>23.3 (21.1)</td>
<td>10 (10.5)</td>
<td>63.3 (60.5)</td>
</tr>
<tr>
<td></td>
<td>SUBTOTALS</td>
<td>33.3 (34.2)</td>
<td>33.3 (31.6)</td>
<td>33.3 (34.2)</td>
<td>100 (100)</td>
</tr>
<tr>
<td>Year VII</td>
<td>Male</td>
<td>9.1 (9.7)</td>
<td>18.2 (19.5)</td>
<td>18.2 (17.1)</td>
<td>45.5 (46.3)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>15.2 (14.6)</td>
<td>21.2 (19.5)</td>
<td>18.2 (19.5)</td>
<td>54.5 (53.7)</td>
</tr>
<tr>
<td></td>
<td>SUBTOTALS</td>
<td>24.2 (24.4)</td>
<td>39.4 (39)</td>
<td>36.4 (36.6)</td>
<td>100 (100)</td>
</tr>
<tr>
<td>Year VIII</td>
<td>Male</td>
<td>12.9 (12.8)</td>
<td>35.5 (33.3)</td>
<td>12.9 (12.8)</td>
<td>61.3 (59)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>19.4 (20.5)</td>
<td>6.5 (7.8)</td>
<td>12.9 (12.8)</td>
<td>38.7 (41)</td>
</tr>
<tr>
<td></td>
<td>SUBTOTALS</td>
<td>32.3 (33.3)</td>
<td>41.9 (41)</td>
<td>25.8 (25.6)</td>
<td>100 (100)</td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td>31.8 (32.3)</td>
<td>37.2 (36.6)</td>
<td>31 (31.1)</td>
<td>100 (100)</td>
</tr>
</tbody>
</table>

As can be seen above, the frequency distributions of the two samples are very similar on the SES and gender (per year group) variables. Each year group does not represent the gender and SES variables equally. For example, there are more boys than girls in Years V and VIII, while the converse is true for Years VI and VII. Although each year group has roughly equal frequencies from each SES group, the internal composition of those numbers is not necessarily equal (e.g., Years V and VI have about a third of their subjects from the middle SES group, but in Year V the middle SES group is made up of more boys than girls, while the opposite is the case in Year VI).

Table 19 provides a comparison of the mean ages per year group.

Table 19
Comparison of Samples by Mean Age per Year Group (expressed in months)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Age</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA sample</td>
<td>UK sample</td>
<td></td>
</tr>
<tr>
<td>Year V (48 – 59.9 months)</td>
<td>54.8</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Year VI (60 – 71.9 months)</td>
<td>66.3</td>
<td>65.6</td>
<td></td>
</tr>
</tbody>
</table>
Table 19 indicates that the mean ages (per year group) are very similar for the South African and British samples. There is less than a month’s difference between the two samples’ mean ages per year group. In Years V, VI and VII, the mean ages also correspond closely to the chronological age that would be approximately halfway between the upper and lower cut-offs of the year groups (e.g., in Year V (48-59.9 months) the mean ages for the South African and British samples (54.8 months and 54 months respectively) are very close to the theoretical halfway mark for this year group, namely 54 months). This is, however, not the case in Year VIII, where the mean ages are 2 months below the halfway mark between the upper and lower limits (i.e., 90 months).

### 4.5 Assessment Measures

Three measures were used in collecting the data that was utilised in the present study: The Biographical Questionnaire (Appendices B and C), Neurological Checklist (Appendix A), and the Griffiths Mental Development Scales – Extended Revised. As the GMDS-ER has been discussed extensively in the previous chapter, it will not be dealt with again in this section.

#### 4.5.1 The South African Sample

Since the collection of the South African sample was part of the revision of the Griffiths Scales, the actual testing presents a slightly different procedure to that of the British sample. The original Griffiths Scales were completed in their entirety and then the experimental items thought to be appropriate at the child’s age were also administered. The further addition of the Neurological Questionnaire to the South African sample means that the testing procedure for the South African sample took longer than that of the British sample.
4.5.1.1 The Biographical Questionnaire

The South African version of the Biographical Questionnaire (Appendix C) was used to obtain relevant biographical and developmental information about the participants. This information was used to demographically describe the South African sample and contained the information that was eventually used in ensuring the general equivalence of the two sample groups. The questionnaire includes information on language, gender, age, educational levels of parents, parental occupations, and history relevant to the question of normality. The questionnaire elicited responses on the child’s birth history (e.g. complications and duration of pregnancy), developmental milestones (e.g. walking, talking and toilet training), medical history (e.g. previous and current medical conditions and medication use), emotional functioning (e.g. frequency of nightmares, bed wetting and tantrums), neurological indications (e.g. muscle twitching and hyperactivity), and school history.

4.5.1.2 The Neurological Checklist

The Neurological Checklist was developed by Foxcroft in 1985 (Barnard, 2000) and was used to obtain screening information on possible genetic and congenital abnormalities in the South African sample. Two clinical psychologists evaluated each data set (results from the testing procedure as well as the detailed information from the Biographical Questionnaire and Neurological Checklist), before deciding on normality. Only children who were considered “normal” were included in the dataset that was analysed. As mentioned previously, this particular combination had been used in various studies as a method of screening for normality.

4.5.2 The British Sample

4.5.1.2 The Biographical Questionnaire

The Biographical Questionnaire used with the British sample (Appendix B) was very similar to the one used with the South African sample, and was used
for the same purposes as described above. It covered the same areas as the South African version, but some questions on treatments for medical conditions or educational problems were expanded to include information on practitioners who had been consulted.

4.6 Procedure

The procedures for obtaining the data for both samples were described in the previous chapter, as both were utilised in the overall revision and restandardisation process of the Griffiths Scales.

The following steps were relevant in the completion of the current study:
1. Permission was obtained from the South African Griffiths Restandardisation Team (SAGRT) to use both the South African and British datasets.
2. A proposal for the current research was presented and permission was obtained from the Advanced Degree Committee of the Faculty of Health Sciences of the University of Port Elizabeth to continue with the present study.
3. The relevant year groups from the South African sample were selected based on the fact that there were enough participants in these years to compute the statistics necessary to meet the aims of the current study. The result of this selection can be seen in Table 17 (p. 85).
4. Items of the South African sample were moved around to reflect the final placement of items on the GMDS-ER.
5. The South African children’s SES was inferred from the breadwinner’s highest level of occupation and education using Riordan’s (1978) criteria. However, all children (irrespective of ethnic group) were classified according to Riordan’s (1978) cut-points for White children. This was thought to be appropriate as many changes have been brought about in South Africa over the last decade to correct the inequalities that existed between ethnic groups in the past.
6. Owing to number 4 above, some assumptions had to be made to account for missing data. The same process followed for the British standardisation sample was adhered to. Each missing value was evaluated in terms of the individual child’s performance on the six items surrounding the missing cell. If the child passed 68% of the items immediately surrounding the missing value (i.e., if 4 out of 6 items were passed), it was assumed that the child would then also have passed the item that was not administered to him/her. If the child had not passed 4 out of the 6 items surrounding the missing value, it was then assumed that the child would have failed the item. There were cases where missing data was too extensive to employ the above procedure only. In these cases, a clinical judgment on an item-by-item basis was made by the researcher, based on the available information contained in the original research protocol, until there was enough information to continue with the above procedure. The number of items accounted for by using clinical judgment was small in relation to the total number of items on the GMDS-ER.

7. British participants were selected from the standardisation sample in an arbitrary manner, to ensure that the frequency distributions of the two samples on the variables of gender, age, and SES, were similar. This was done by the researcher using only the relevant biographical details (i.e., before the data containing scores on the GMDS-ER subscales were received from the SAGRT). The results of this matching procedure can be seen in Tables 18 and 19 (p. 88).

8. Data was analysed in terms of the aims of the current study (this is described in more detail below).

9. Results are described and discussed in Chapters 5 and 6.

4.7 Data Analysis

Raw quotients were used in the data analysis process.
Data was analysed in terms of the aims and objectives of the study. An independent *t*-test was used to determine if any statistically significant differences exist between the total samples’ overall performances as well as the overall performances of each year group (Aim 1). That is, the GQs of the two groups were compared, using an independent *t*-test. An independent *t*-test can be used when two samples are not paired in any way (Harris, 1995), as was the case in the present study. The samples remain independent, as no individual case in the one sample was matched with an individual case in the other sample.

For Aim 2, the following procedure was followed. A Hotelling’s $T^2$-test was conducted comparing the profiles of the total samples and each of the four year groups. This analysis technique is appropriate for differing sample sizes if the bigger sample to smaller sample ratio does not exceed 3:2 (as was the case with the present study) (Hair, Anderson, Tatham, and Black, 1998). An independent sample Hotelling $T^2$ compares the profiles of two different groups when no particular score in one group is paired with a particular score in the other (Hair et al., 1998).

Descriptive statistics were also computed where appropriate, and included mainly measures of central tendency and variance. For example, the means and standard deviations for each subscale in each year were reported as cursory descriptions of the two samples (pp. 98-99). Histograms were used to represent and evaluate the normality of the two samples in a qualitative manner. According to Hair et al. (1998) a statistical analysis can be employed to determine normality, but that often a histogram gives an adequate representation of a variable’s normality. As a Hotelling $T^2$ test is robust to violations of normality (Hair et al., 1998) histograms and qualitative comparisons were judged to be adequate representations and evaluations of normality in the case of the present study.

ANOVARs and MANOVARs were used where appropriate. The ANOVA is a technique that allows the comparison of a number of groups at once on a single variable (e.g., the GQ of the GMDS-ER). ANOVARs were, for example, employed to compare different year groups’ GQ performances for both the British and
South African samples. The MANOVA is similar to the ANOVA, but allows the comparison of groups in respect of a number of variables at once (Hair et al., 1998). MANOVAs were employed to investigate the influence of SES (i.e., upper, middle and lower) on the individual subscales for both samples. Where significant differences were found, post hoc analyses (e.g. Sheffe’s test) were conducted to establish where exactly the differences existed. This is appropriate when using ANOVAs and MANOVAs (Hair et al., 1998).

The data was analysed using the Statistica for Windows '98 software package (Stasoft Inc., 1998).

4.8 Ethical Considerations

The primary purpose of ethical principles 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). Many of the principles generally used as ethical yardsticks in research practice are directly related to interaction with research participants. These include such factors as respect and dignity, informed consent, privacy and confidentiality, and beneficence. The studies during which the data for the present study was collected were subjected to review by various ethical bodies and permission was granted by these bodies in order for the research to continue. As this study does not entail any contact with research participants, these issues will not be dealt with in this section.

The following principles were upheld throughout this research study.

4.8.1 Relevance

South African researchers have an ethical and moral obligation to ensure that their research is relevant to the country’s broad health and development needs, as well as to the real needs of those suffering from the concerns and diseases being studied. The research must be translatable into procedures for
improving the health status of South Africans (Ethics in Health Research in South Africa, 2000). The present study’s relevance have been explored in Chapter 1 and the conclusions and recommendations offered in Chapter 6 attest to its utility with regard to potentially improving the overall development of individual children and groups of vulnerable children.

4.8.2 Scientific Integrity

Besides demonstrating a value and need for the research, the researcher must also demonstrate a thorough methodology and a strong prospect for providing answers to the specific research questions which have been posed. A sound knowledge of the relevant literature must be evident in the research protocol (Ethics in Health Research, 2000). The present study reflects a thorough methodology for its intended purpose, a strong prospect for generating the intended information, and a sound knowledge of the relevant literature (as presented in Chapters 1 and 2).

4.8.3 Investigator Competence

A suitably qualified individual should carry out the research study. Two major parameters are used to assess the researcher’s competence, namely technical and humanistic. Education, knowledge, certification and experience, which includes research competence, are the parameters used to evaluate technical competence. Humanistic parameters demand compassion and empathy (Ethics in Health Research in South Africa, 2000). In the present study, the researcher is completing the research as part of degree requirements for a Master’s degree in clinical psychology. As such, competence is ensured through a process of guidance and supervision by a supervisor and co-supervisor who have extensive knowledge and experience with the subject matter under investigation.
4.8.4 Inclusion/Exclusion Criteria

It is essential that the criteria guiding recruitment, selection, inclusion and exclusion of research participants in a research study are fair and just, based on ethical and scientific principles. Individuals must not be excluded unjustly or inappropriately based on their age, gender, race, religious beliefs, or disability (Ethics in Health Research in South Africa, 2000). In the present study, these factors were considered and built into the research design. Criteria were guided by sound scientific principles and no participants were included or excluded unfairly or unjustly.

4.8.5 Transparency

Research investigators are required to distribute research results in a competent and timely manner. In addition, it is essential that the release of research findings be conducted in an ethical manner, so as to guarantee that false anticipations are not raised in a susceptible public (Ethics in Health Research in South Africa, 2000). Transparency and accountability for the current research were ensured by the submission of the proposal for the study to the Advanced Degrees Committee of the Faculty of Health Sciences of the University of Port Elizabeth. No false anticipations were raised during the process, and the results are published in this treatise.

4.8.6 Conflict of Interest

Researchers are obliged to disclose the source of funding for the research to the research participants, as well as to relevant ethics committees, and where appropriate, to the regulatory authority. In addition, the researcher must declare any affiliation or financial interest when proposing and reporting the results of the research (Ethics in Health Research in South Africa, 2000). The initial studies were funded by the Association for Research in Infant and Child Development (ARICD) as part of the revision of the Extended Griffiths Scales. The researcher is an ordinary member of this organization. No further funding was provided for the present study and therefore there could not be any conflict of interest.
4.8.7 Ethical Review

An ethical review of any health research which is carried out in South Africa must be conducted before commencement, and must not be conducted before approval has been granted by an appropriate body (Ethics in Health Research in South Africa, 2000). The Advanced Degrees Committee (ADC) of the Faculty of Health Sciences of the University of Port Elizabeth approved the proposal for the current research unconditionally.

4.9 Conclusion

This chapter included the problem statement and primary objectives of the present study. The research design, sampling, and assessment measures were outlined. Subsequently the process of implementation of the research and the methods for analysing the data were expanded upon. Finally, a variety of ethical considerations and the way in which they were managed in the current study were highlighted.
CHAPTER FIVE: RESULTS AND DISCUSSION

5.1 Introduction

The primary aim of the study is to explore and describe the comparative performances on the GMDS-ER of a sample of South African and British children aged 4 to 7 years. This was done for each of the six subscale, as well as for the overall performance of the two samples (i.e., comparisons of Sub-Quotients, as well as the GQs were done). The above comparisons were done for the total samples as well as for each year group.

The empirical findings of the study are presented and discussed below. Descriptive statistics are presented to summarise the performance of both the South African and British samples.

As many of the results discussed below will make use of the designations per age group which are standard to the GMDS-ER, the table below is presented as a reference for converting the year groups into month-equivalents.

Table 20
Ages per Year Group Designation

<table>
<thead>
<tr>
<th>Age range per year group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Year V (48 – 59.9 months)</td>
<td></td>
</tr>
<tr>
<td>Year VI (60 – 71.9 months)</td>
<td></td>
</tr>
<tr>
<td>Year VII (72 – 83.9 months)</td>
<td></td>
</tr>
<tr>
<td>Year VIII (84 – 95.9 months)</td>
<td></td>
</tr>
</tbody>
</table>

5.2 Descriptive Statistics Results

5.2.1 Overall Mean Performances per Year Group

It should be noted again at this stage that raw scores were used (i.e., the South African sample’s scores were not converted to standard scores and the
raw scores for the British children were also used). Thus, means will not reflect standard score means of around 100 and standard deviations of around 15.

The mean performance of the South African sample per year group is presented in Table 21.

Table 21

<table>
<thead>
<tr>
<th>Performance of South African Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year Group</strong></td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>AQ</td>
</tr>
<tr>
<td>BQ</td>
</tr>
<tr>
<td>CQ</td>
</tr>
<tr>
<td>DQ</td>
</tr>
<tr>
<td>EQ</td>
</tr>
<tr>
<td>FQ</td>
</tr>
<tr>
<td>GQ</td>
</tr>
</tbody>
</table>

Similar studies on the original Griffiths scales (Allan, 1988; 1992; Bhamjee, 1991; Mothuloe, 1990) have not presented total sample results that encompassed the age range of the present study. Allan’s (1992) study had a similar composition of ethnic groups to that of the present study. Her (1992) study revealed that the Locomotor scores for South African children in year VI were consistently elevated above most of the other subscales, which is similar to the results of the present study. Her results for each ethnic group, however, contradicts the findings of the present study, as far as Subscale B is concerned in that the consistent elevation of this scale in the present study was not found in her study. Furthermore, whereas the present study found that the more intellectual scores (Subscales C and F) are higher than the ones relating to fine-motor movement (Subscales D and E) Allan (1992) found more similarity than difference between Subscales C, D, E, and F.

An ANOVA indicated a significant difference between the year groups on the GQ performance of South African children, $F(3,125)=16.526, p<0.001$. More specifically, according to the post hoc Scheffe test significant differences were found between Years V and VII ($p<0.05$), Years V and VIII ($p<0.001$), Years VI
and VII ($p<0.05$), and Years VI and VIII ($p<0.001$) on the GQ. The differences here may be attributed to the flattening of scores in the later year groups due to children not reaching ceilings (i.e., had items been included for later ages, these differences may have been minimised). It is also a favourable reflection on the use of the GMDS-ER on the South African sample as one would expect a developmental test to consist of age appropriate tasks that would discriminate, for example, between children in Year V and VIII, i.e., one would not expect a child in Year V to pass items intended for a child in Year VIII.

The mean performance of the British sample per year group is presented in Table 22.

Table 22
Performance of British Sample

<table>
<thead>
<tr>
<th>Year Group</th>
<th>V (n = 43)</th>
<th>VI (n = 38)</th>
<th>VII (n = 41)</th>
<th>VIII (n = 31)</th>
<th>Total (n = 161)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>119.20</td>
<td>16.69</td>
<td>117.84</td>
<td>16.29</td>
<td>114.35</td>
</tr>
<tr>
<td></td>
<td>105.10</td>
<td>7.56</td>
<td>114.23</td>
<td>14.40</td>
<td></td>
</tr>
<tr>
<td>BQ</td>
<td>120.45</td>
<td>17.11</td>
<td>117.43</td>
<td>13.98</td>
<td>114.54</td>
</tr>
<tr>
<td></td>
<td>105.38</td>
<td>6.55</td>
<td>114.58</td>
<td>13.48</td>
<td></td>
</tr>
<tr>
<td>CQ</td>
<td>128.68</td>
<td>17.16</td>
<td>128.86</td>
<td>14.66</td>
<td>119.99</td>
</tr>
<tr>
<td></td>
<td>107.74</td>
<td>7.84</td>
<td>121.44</td>
<td>15.25</td>
<td></td>
</tr>
<tr>
<td>DQ</td>
<td>113.18</td>
<td>16.61</td>
<td>122.96</td>
<td>13.89</td>
<td>115.24</td>
</tr>
<tr>
<td></td>
<td>102.82</td>
<td>7.34</td>
<td>113.50</td>
<td>14.14</td>
<td></td>
</tr>
<tr>
<td>EQ</td>
<td>114.60</td>
<td>16.62</td>
<td>106.83</td>
<td>13.41</td>
<td>98.53</td>
</tr>
<tr>
<td></td>
<td>89.61</td>
<td>12.99</td>
<td>102.62</td>
<td>16.43</td>
<td></td>
</tr>
<tr>
<td>FQ</td>
<td>123.74</td>
<td>18.39</td>
<td>126.60</td>
<td>15.58</td>
<td>119.78</td>
</tr>
<tr>
<td></td>
<td>108.92</td>
<td>7.45</td>
<td>119.82</td>
<td>15.51</td>
<td></td>
</tr>
<tr>
<td>GQ</td>
<td>119.98</td>
<td>11.31</td>
<td>120.09</td>
<td>9.65</td>
<td>113.74</td>
</tr>
<tr>
<td></td>
<td>103.26</td>
<td>6.20</td>
<td>114.37</td>
<td>10.83</td>
<td></td>
</tr>
</tbody>
</table>

The British samples’ more intellectual scales (Subscales C and F) are higher at face value than the other scales. The British sample performed similarly on Subscales A and B, and Subscales C and D.

Similar to the South African sample, an ANOVA comparing the performance per year group indicated significant differences $F(3,157)=34.235, p<0.001$. The post hoc analysis indicated differences between Years V and VII ($p<0.05$), Years V and VIII ($p<0.001$), Years VI and VII ($p<0.05$), and Years VI and VIII ($p<0.001$). These differences were also evident for the South African sample.

Figures 3 and 4 compare the performance ranges of the South African and British samples with those of a theoretical normal distribution.
It can be seen in Figure 3 that the distributions of the various subscales (of the South African sample) vary as far as their similarity to a theoretical normal distribution is concerned. Subscales C and D are the most similar to a theoretical normal distribution over all of the standard deviation categories.
The British samples’ distributions of scores are very similar to that of a theoretical normal sample. Subscale C seems to have a distribution that is the least similar to that of a theoretical normal distribution.

The respective ANOVAs indicated that the differences detected between year groups are similar for the two samples. The distributions of scores are similar, but the British samples’ distribution seems to be closer to that of a normal distribution. One of the assumptions of the main analysis techniques (independent $t$-tests and Hotellings $T^2$ tests) of the present study, is that the samples are normally distributed (Hair et al., 1998). However, violations of this assumption have little impact on larger sample sizes (as is the case with the present study) (Hair et al., 1998), and the two samples are therefore judged to be comparable for the purposes of the present study.
5.2.2 Mean Performances per Gender Group

A \( t \)-test indicated a significant difference between the GQ performance of South African boys (\( M_{GQ} = 110.47 \)) and girls (\( M_{GQ} = 116.48 \)), \( t(127) = -2.97, p < 0.01 \). Furthermore a Hotellings \( T^2 \) indicated specific significant differences on Subscales C, D, E and F. In all instances girls performed better than boys. The results are indicated below in tabular form.

Table 23

Hotellings \( T^2 \) Comparing Developmental Profiles (A-F) of Boys and Girls from the South African Sample

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Boys (n=67)</th>
<th>Girls (n=62)</th>
<th>( t )</th>
<th>( df )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ</td>
<td>120.74</td>
<td>119.25</td>
<td>0.49</td>
<td>127.00</td>
<td>0.62</td>
</tr>
<tr>
<td>BQ</td>
<td>118.59</td>
<td>123.08</td>
<td>-1.48</td>
<td>127.00</td>
<td>0.14</td>
</tr>
<tr>
<td>CQ</td>
<td>109.21</td>
<td>115.47</td>
<td>-2.25</td>
<td>127.00</td>
<td>0.03</td>
</tr>
<tr>
<td>DQ</td>
<td>103.91</td>
<td>116.33</td>
<td>-4.38</td>
<td>127.00</td>
<td>0.00</td>
</tr>
<tr>
<td>EQ</td>
<td>102.04</td>
<td>107.54</td>
<td>-1.99</td>
<td>127.00</td>
<td>0.05</td>
</tr>
<tr>
<td>FQ</td>
<td>108.35</td>
<td>117.18</td>
<td>-3.36</td>
<td>127.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

No previous research exists with regard to the comparative performances of normal South African boys and girls on the GMDS-ER. Research on the original Griffiths Scales conflict with the above findings. In general, no differences were found between South African boys and girls on the original Griffiths Scales (Allan, 1988; 1992). Where differences were found, they seemed to have been confined to Subscales A (Mothuloe, 1990) and B (Bhamjee, 1991), which were the only subscales in the present study that did not indicate any differences. The only similarity between the present and previous research, is that girls performed better where significant differences were found.

A \( t \)-test indicated a significant difference between the GQ performance of British boys (\( M_{GQ} = 110.61 \)) and girls (\( M_{GQ} = 118.36 \)), \( t(159) = -4.84, p < 0.001 \). Furthermore a Hotellings \( T^2 \) indicated significant differences between the two genders on all subscales with girls consistently performing better. Results are presented below.
Table 24
Hotellings $T^2$ Comparing Developmental Profiles (A-F) of Boys and Girls from the British Sample

<table>
<thead>
<tr>
<th>Sub-Quotient</th>
<th>Boys (n=83)</th>
<th>Girls (n=78)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>AQ</td>
<td>111.42</td>
<td>13.70</td>
<td>117.23</td>
<td>14.61</td>
<td>-2.60</td>
</tr>
<tr>
<td>BQ</td>
<td>110.48</td>
<td>13.93</td>
<td>118.95</td>
<td>11.55</td>
<td>-4.19</td>
</tr>
<tr>
<td>CQ</td>
<td>117.09</td>
<td>14.87</td>
<td>126.07</td>
<td>14.33</td>
<td>-3.90</td>
</tr>
<tr>
<td>DQ</td>
<td>108.88</td>
<td>14.15</td>
<td>118.42</td>
<td>12.44</td>
<td>-4.53</td>
</tr>
<tr>
<td>EQ</td>
<td>99.87</td>
<td>16.45</td>
<td>105.55</td>
<td>16.00</td>
<td>-2.22</td>
</tr>
<tr>
<td>FQ</td>
<td>115.94</td>
<td>14.06</td>
<td>123.94</td>
<td>15.99</td>
<td>-3.37</td>
</tr>
</tbody>
</table>

The above results, indicating that British girls perform better on the GMDS-ER, conflict with the findings presented in the GMDS-ER technical manual, where differences with regard to gender were only found on an item level of the test and not on any of the Sub-Quotients (Luiz et al., 2004). In the light of this, it is probable that sampling characteristics had an influence on the observed differences between boys and girls. Although sample sizes are sufficient to run the relevant statistical analysis, the performance of the relevant gender groups is not the focus of the present study and have therefore not been explored further. The results are merely presented here to indicate the similar trends in performance of the South African and British samples, if gender as a variable is considered.

Similarly the influence of SES as a variable is presented below, but only in order to explore whether the performance of the two samples are similar with regard to SES.

5.2.3 Mean Performances per SES Group

An ANOVA, comparing the GQ performance of the total South African sample’s performance per SES group, yielded no significant results ($F(2,126)=1.951, p>0.05$). However, a MANOVA indicated significant differences on Subscales C ($F(2,126)=7.154, p<0.01$), D ($F(2,126)=4.235, p<0.05$) and E ($F(2,126)=.398, p<0.05$). More specifically, post hoc Sheffe tests indicated that
these differences were between the upper and lower SES groups on all three subscales, with children from the upper SES group consistently performing better.

The above results are similar to that of Allan (1992). Although done on the original Griffiths Scales, Allan’s (1992) study is the only other study that focused on the influence of SES across all cultural groups. She found that SES was related to performance on Subscales C, D and E – which was also the case with the present study. However, unlike the present study, Allan found that SES did influence overall performance (GQ on the original Griffiths Scales).

In contrast, an ANOVA comparing the performance of the SES groups for the total British sample’s GQ indicated significant differences \( F(2,158)=3.879, p<0.05 \). The \textit{post hoc} Sheffe test indicated a significant difference between the upper and lower SES groups on the GQ, with children from the upper SES group performing better. A MANOVA indicated differences on Subscales D \( F(2,158)=4.75, p<0.01 \) and F \( F(2,158)=4.507, p<0.05 \). More specifically, \textit{post hoc} Sheffe tests indicated significant differences between the upper and lower SES groups, with the upper SES group performing better on both subscales.

It is generally expected to find that SES will have an influence on performance on tests like the GMDS-ER (Allan, 1992; Yeung, Linver & Brooks-Gunn, 2002), but as with the gender comparisons, it is beyond the focus of this study to further investigate these differences. Speculation on reasons for differences is not possible, since the present samples are not representative and thus results can not be generalised back to the bigger population. As was the case with the gender group comparisons, similar differences are noted when comparing the performance of SES groups for both samples in that differences seem to exist only on some of the subscales. In the case of the British sample, these differences were large enough to cause a statistically significant difference on the GQ.
5.3 Comparison between the South African and British Samples

5.3.1 Aim 1: Comparison of Overall Performance

The results of the independent samples $t$-tests, comparing the GQ’s of the South African and British samples per year groups, can be seen in Tables 25 to 29.

Table 25
Independent Samples $t$-test Comparing the Overall Performances of the Total South African and British Samples

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>$t$-value</th>
<th>df</th>
<th>$p$</th>
<th>NS/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA (N=129)</td>
<td>113.36</td>
<td>11.82</td>
<td>-0.76</td>
<td>288</td>
<td>0.45</td>
<td>NS</td>
</tr>
<tr>
<td>British (N=161)</td>
<td>114.37</td>
<td>10.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 26
Independent Samples $t$-test Comparing the Overall Performances of Year V

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>$t$-value</th>
<th>df</th>
<th>$p$</th>
<th>NS/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA (N=35)</td>
<td>118.87</td>
<td>13.32</td>
<td>-0.40</td>
<td>76</td>
<td>0.69</td>
<td>NS</td>
</tr>
<tr>
<td>British (N=43)</td>
<td>119.98</td>
<td>11.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 27
Independent Samples $t$-test Comparing the Overall Performances of Year VI

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>$t$-value</th>
<th>df</th>
<th>$p$</th>
<th>NS/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA (N=30)</td>
<td>119.31</td>
<td>11.38</td>
<td>-0.31</td>
<td>66</td>
<td>0.76</td>
<td>NS</td>
</tr>
<tr>
<td>British (N=38)</td>
<td>120.09</td>
<td>9.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 28
Independent Samples $t$-test Comparing the Overall Performances of Year VII

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>$t$-value</th>
<th>df</th>
<th>$p$</th>
<th>NS/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA (N=33)</td>
<td>110.99</td>
<td>7.05</td>
<td>-1.94</td>
<td>72</td>
<td>0.06</td>
<td>NS</td>
</tr>
<tr>
<td>British (N=41)</td>
<td>113.74</td>
<td>5.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 29
Independent Samples $t$-test Comparing the Overall Performances of Year VIII

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>$t$-value</th>
<th>df</th>
<th>$p$</th>
<th>NS/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA (N=31)</td>
<td>103.91</td>
<td>6.90</td>
<td>0.41</td>
<td>68</td>
<td>0.69</td>
<td>NS</td>
</tr>
<tr>
<td>British (N=39)</td>
<td>103.26</td>
<td>6.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As can be seen from Tables 25 to 29, none of the GQ comparisons indicated significant differences between the South African and British samples. Although no other comparative research is available on the GMDS-ER, there has been similar comparative studies using the original Griffiths Scales (as has been discussed in Chapter 3). Similar to the results reported in Tables 25 to 29, Allan (1988, 1992) did not find any significant differences on GQ performance when comparing 5 (Year VI) and 6 (Year VII) year old White, Coloured and Asian South African children to British contemporaries\(^5\). Both Allan (1992) and Mothuloe (1990) found that Black children aged 5, 6 and 7 (Years VI, VII, and VIII) performed more similarly to the 1960 standardisation sample than to the more contemporaneous British sample of Hanson and Alridge-Smith (1987). In the current study, the South African sample is inclusive of Asian, Black, Coloured, and White children, but no specific ethnic group comparisons were made.

From above, it seems as if South African children perform similarly to British children from the standardisation sample (at least as far as overall performance (GQ) is concerned). Although more testing on a contemporary South African sample that is truly representative of our multi-cultural setting is required, the above results indicate that it may be feasible to use the norm tables in a clinical setting to come to conclusions about the level of general development of a South African child. However, care should be taken in practice when converting the raw scores to standard scores using the British norm tables in cases where a child is borderline between two performance categories (i.e., if a few more items had been passed or failed the child may fall within a different category and no diagnosis should be based on these results until sufficient testing has been done on a representative South African sample).

In educational placement processes, decision-makers often require information on the general intelligence of a child. In the case of a child being too young for using the JSAIS, the original Griffiths Scales’ GQ often sufficed as an adequate estimate of this general intelligence. This was appropriate as the

\(^5\)“Contemporaries”, in this and following sections, refers to the British sample of Hanson and Alridge-Smith (1987).
original Griffiths Scales were thought to be a measure of Spearman’s (1927) “g” factor of intelligence. It is, however, not advisable to use the GMDS-ER GQ on its own for decision-making concerning educational placement as far as South African children are concerned. This is owing to the fact that the similarity of GQs between the South African and British samples hides the variability that exists between subscales (especially if one considers that these differences are not stable over the different year groups). Differences between the individual subscales “averaged out” to result in similar GQs between the two samples. The subscales that correlated the most highly with the GQ for the British standardisation sample, were Subscales C and F, which are generally considered to be the most intellectual of the subscales (Luiz et al., 2004). It was therefore reasonable to assume that the GQ does indeed represent Spearman’s (1927) “g” factor of intelligence (as far as the British standardisation sample is concerned). The same cannot be said for the South African children in the present sample. Although no correlation statistics were calculated for the present study, the averaging out effect of other less intellectual subscales (notably Subscales A and B) for the South African sample, leads to the tentative conclusion that similar GQs may represent dissimilar levels of general intelligence for the two samples. The above discussion is presented here as it concerns the use of the GQ, but may become clearer when the information presented in the sections about the subscale comparisons are considered.

5.3.2 Aim 2: Comparison of Subscale Performance

In contrast to the similarities on the total samples’ GQs and those witnessed for each of the year groups, many differences were observed when comparing the subscales. These differences seem to vary from year to year, creating a situation where a great deal of variability exists between the South African and British samples.

5.3.2.1 Locomotor (A)

A Hotellings $T^2$ comparing the developmental profiles of the total samples revealed that the South African sample ($M_{AQ}=120.022$) performed significantly
better than the British sample ($M_{AQ}=114.231$) on the Locomotor Subscale, $t(288)=3.1, p<0.01$. This difference was due mainly to noticeably better performance by the South African sample on this subscale in years V and VI. Year V yielded significant results ($t(76)=3.5, p<0.001$) and although the results for Year VI were not significant, the difference between the performances were noticeably greater than for Years VII and VIII, for example. The performances of the two samples on Subscale A per year group are presented graphically in Figure 5. South African means are presented above the blue line, while the British means are presented below the pink line.

Figure 5

Performance on the Locomotor Subscale (AQ) for the British and South African Samples per Year Group

No comparative research is available on South African and British performance on Subscale A of the GMDS-ER. Comparable studies on the original Griffiths Scales provide results that are somewhat contradictory with regard to the Locomotor Subscale. Allan’s (1992) study reports that Locomotor scores for 3 South African ethnic groups (all except the Asian group) in Year VI were higher than that of contemporary British counterparts, but not significantly
so. Bhamjee’s (1991) study provides scores over a similar age range than the present study. Her (1991) results reveal a pattern that is almost the complete reverse of the findings of the present study. In this case the South African Asian children consistently scored lower than their contemporary British counterparts, with this difference seemingly being smallest in Year V and becoming bigger to yield significant results in Years VII and VIII. In the present study, South African children consistently scored better than their British counterparts, with differences seemingly becoming smaller for the later year groups.

A possible explanation for the above results lies partly in differences in the schooling systems of the two countries. British children usually start their formal schooling, Reception or Grade 0, during the year in which they turn 5 (i.e., Year V) (Waterhouse, 1993). Although South Africa has a similar educational year for children turning 6, compulsory schooling only starts in Grade 1 during the year in which children are already turning 7 (i.e., Year VIII) (Department of Education (DoE), 1998). This may mean that the average British child has two more years of formal schooling than the average South African child. Although early schooling experiences (i.e., Reception and Pre-school classes) focus on all aspects of development, activities that are classroom based usually means that children are exposed to more sedentary activities when they enter formal schooling. Considering the above graph, it means that the average South African child has more opportunity to engage in physical activities in Years V and VI than the average British child – which may account partly for the higher South African scores on the Locomotor Subscale in these years. This seems to be further corroborated by the fact that once South African children enter compulsory formal schooling, these differences between the two groups are no longer statistically significant.

Another possible explanation for the significant difference in Year V and trend in Year VI lies in the climates of the two countries. South Africa for the greatest part of the year has weather that is conducive to playing outside and engaging in the gross-motor activities that are quantified by the GMDS-ER Locomotor Subscale. This is not the case in the UK. This would of course culminate in a difference in the levels of stimulation that South African and British
children receive with regard to their gross-motor development and according to Hurlock (1981), greater exposure would influence development in this domain.

An examination of the items, which make up the different years in the Locomotor Subscale (A), reveals further potential reasons for differences in Years VII and VIII. Years V and VI are almost exclusively made up of items that represent basic movement activities, which do not require any equipment (e.g., running, jumping and walking up and down stairs), Years VII and VIII on the other hand, sample more coordinated activities (often witnessed in the context of social games) and more activities that require equipment (e.g., hopskipping, hopscotch, skipping with a rope, and riding a bicycle). The kinds of activities that are sampled in Years VII and VIII are more likely to occur in formal schooling than outside of it (as equipment becomes more readily available to all children and children are placed within a context necessitating social interaction). It seems that when the two samples are exposed to similar activities, they perform similarly and British children catch up when more coordinated activities are sampled.

It may also be that characteristics of the GMDS-ER had an influence on the findings on Subscale A. That is, children in Years VII and VIII may not have reached their full Sub-Quotient scores, because there were not enough items to do so. It must also be remembered that different cohorts of children are represented in each year group and dissimilar results may have been found if a larger sample or a single cohort’s progression had been followed.

5.3.2.2 Personal-Social (B)

A Hotellings $T^2$ test, comparing the developmental profiles of the total samples revealed that the South African sample ($M_{BQ}=120.749$) performed significantly better than the British sample ($M_{BQ}=114.581$) on the Personal-Social Subscale, $t(288)=-3.4, p<0.001$. Hotellings $T^2$ tests indicated that this difference was probably due mainly to significantly better performance by the South African sample on this subscale in years V and VI. Year V yielded significant results ($t(76)=-3.5, p<0.001$), as did Year VI ($t(66)=2.7, p<0.01$). The performances of the
two samples on Subscale B per year group are presented graphically below. South African means are presented above the blue line, while the British means are presented below the pink line.

Figure 6
Performance on the Personal-Social Subscale (BQ) for the British and South African Samples per Year Group

A review of the items in the different year groups indicates that Years V and VI contain more items related to the personal aspects of child development (dressing, eating and personal hygiene), while Years VII and VIII have more items related to social aspects (self-concept, interpersonal skills and domestic skills). A possible explanation for the above could be found in differing parenting styles. It is possible that South African children are encouraged to a greater extent to become independent earlier in their self-care activities than their British counterparts. This encouragement to earlier independence may be the product of the economic situation in South Africa. It is often necessary for both parents to be working and the cost and availability of daycare may mean that many South African children have to take responsibility at an early age (possibly with the assistance of older siblings) for their personal hygiene, eating and dressing.
Another plausible explanation for the differences witnessed on the Personal-Social Subscale concerns the differences in weather patterns. British children have to put on several layers of clothing during winter, whereas South African children very rarely need to do this. This makes dressing slightly more difficult for British children. Furthermore, in many of the cultures found in South Africa it is acceptable to use one’s hands at the table. The lack of utensils means that children become proficient at the table at an earlier age.

5.3.2.3 Language (C)

A Hotellings $T^2$ comparing the developmental profiles of the total samples revealed that the British sample ($M_{CQ}=121.44$) performed significantly better than the South African sample ($M_{CQ}=112.221$) on the Language Subscale (Subscale C), $t(288)=-5.0,p<0.001$. Hotellings $T^2$ tests, comparing the two samples on different year groups, indicated that this difference was consistent across the year groups with significantly better performance by the British sample on this subscale in Years V ($t(76)=-3.1,p<0.01$), VI ($t(66)=-2.5,p<0.05$) and VII ($t(72)=-4.2,p<0.001$). Although the difference in Year VIII was not significant ($t(68)=-2.0,p>0.05$), this can again be attributed to the fact that raw scores became lower due to the ceiling effect; thus differences between the raw scores also became smaller. The performances of the two samples on Subscale C per year group are presented below. In this instance, South African means are presented below the blue line, while the British means are presented above the pink line.
It is readily apparent that the British sample consistently performed better than their South African counterparts on the Language Subscale. No comparative research is available on South African and British performance on Subscale C of the GMDS-ER. Comparable research on the original Griffiths Scales is in contradiction with the above findings. Allan’s (1988, 1992) studies only found significant differences between Black South African and British children in Year VI of the Language Subscale. There was a trend for British children to perform better than their South African counterparts, but none, other than the above, were significant. Luiz and Bhamjee (1991) found significant differences in the performance of British and South African children on Subscale C of the original Griffiths Scales in Years IV and V when comparing Asian South African children with contemporary British counterparts. Again the British means tended to be higher for the later years (VI, VII and VIII), but none were significantly so.

One explanation may again be found in the different levels of exposure to formal schooling. English language training is one of the core subjects that
British children are introduced to in their Reception year (i.e., at the age of 4 years – Year V) (Riley, 1992). Instruction in this early stage involves emphasis in many areas, but particularly in speaking and listening (Connell, 1992). It is also clear that the formal policies that guide English instruction, require the attainment of educational objectives that are related to the use of standard English (Connell, 1992). South African children would only be exposed to similar kind of instruction in their Grade 1 year (i.e., at the age of 6 years – Year VII). Children in the British schooling system therefore are exposed to formal language instruction approximately two years before their South African counterparts, and this may possibly influence performance on the Language Subscale of the GMDS-ER.

It is also possible that the influence of being exposed to a multitude of languages have a detrimental effect on first language development. According to Ray (2002), the majority of research indicates that children that develop more than one language at a time use different phonological and syntactic systems to develop each language. It is possible that being cognisant of understanding and speaking more than one language (as many South African children learn to do), divides the resources available to spend on first language acquisition. This may of course have a detrimental impact on the development of the first language. However, this explanation would need further investigation before any decisive conclusions can be made.

However, despite these possible explanations for the finding, the fact that British children perform better on Subscale C is surprising in the sense that language acquisition is seen as a robust process with a great deal of resilience even in the face of wide environmental and biological variation (Bishop & Leonard, 2000). If we consider that children at the age range of 3 to 3 and a half years of age begin to rely more on syntactic rules than on imitation (Tomasello, 2000), we expect children of the compared ages to perform similarly on this subscale. Tomasello (2000) speculates that children would need to have imitated a certain “critical mass” (p.11) of examples of particular expressions for the human cognitive apparatus to construct the analogies, categories and schemas necessary to function on this syntactic-rule-level. It could be that South
African children are exposed to less of these necessary examples in earlier ages and that they do not reach this assumed “critical mass” as well as their British counterparts do. Unfortunately there is not enough data available (from this or other studies) to make any kind of conclusion with regard to the findings presented above. What is clear, however, is that the British children in this study performed consistently better than their South African counterparts on Subscale C.

5.3.2.4 Hand and Eye Co-ordination (D)

A Hotellings $T^2$ comparing the developmental profiles of the total samples revealed that the British sample ($M_{DQ}=113.505$) performed significantly better than the South African sample ($M_{DQ}=109.88$) on the Hand and Eye Co-ordination Subscale (Subscale D), $t(288)=-2.0, p<0.05$. None of the individual year group comparisons yielded significant results for Subscale D. This indicates an overall pattern of better performance by the British children in the sample, but that this difference is not significant during any of the specific year groups under study. The performances of the two samples on Subscale D per year group are presented graphically below. In this instance South African means are presented below the blue line, while the British means are presented above the pink line.
There have been no previous comparisons of normal British and South African children on Subscale D of the GMDS-ER, but Allan (1988, 1992) found no differences between White and Asian South African 5 year olds (i.e., Year VI), when comparing them to British contemporaries on the original Griffiths Scales. She did, however, find that British children from Hanson and Alridge-Smith’s (1987) sample performed significantly better than South African Black 5 and 6 year olds and Coloured 5 year olds. Similarly, Bhamjee (1991) found no significant differences between South African Asian 5, 6, and 7 year olds (i.e. Years VI, VII and VIII) when compared to their contemporary British counterparts. She did however find that British children performed better than South African Asian children in Year V. In all of the above research, year groups that yielded non-significant differences, indicated a trend towards better performance by the British children. Previous research in this regard thus tends to indicate better performance by British children that does not reach significant proportions. This trend seems to be confirmed by the findings of the current research, i.e., British children performed better than South African children, but this trend does not reach statistical significance in any one year group.
A possible explanation for the consistent better performance of the British children is that they are exposed to writing letters and numbers at an earlier age. A fair number of items in Subscale D involve the writing of numbers and letters. This exposure starts when they enter their Reception year (Year V in the present study). The fact that they receive earlier writing training may also lead to improved pencil-grip, which on its part, may lead to more accurate drawings. Since a fair number of items on Subscale D involve drawing, it is plausible that this may have been a factor that influenced the observed differences.

5.3.2.5 Performance (E)

A Hotellings $T^2$ comparing the profiles of the total samples indicated no significant difference between the South African ($M_{EQ}=104.681$) and British ($M_{EO}=102.621$) samples, $t(288)=-1.1, p>0.05$. However, Hotellings $T^2$ tests on each year group revealed significant differences in Year V ($t(76)=-2.3, p<0.05$), Year VII ($t(72)=2.8, p<0.01$) and Year VIII ($t(68)=2.9, p<0.01$). In Year V British children performed better than South African children and in Years VII and VIII South African children performed better than their British counterparts. The performances of the two samples on Subscale E per year group are presented graphically below. In this instance, South African means are presented below the blue line, while the British means are presented above the pink line.
The above findings seem to be similar to previous research done on the
original Griffiths Scales as far as Year V is concerned, but the results for the later
year groups seems to be in contradiction with previous comparable research.
Allan (1988, 1992) found that British children performed better than Black South
African children in Years VI and VII and better than Coloured South African
children in Year VI. No differences were found between White and Asian South
found significant differences between Indian South African children in Year IV
and V if compared to British contemporaries, with British children performing
better. She did not find any differences between Asian South African children in
Year VI, VII and VIII when compared to British counterparts.

Only Bhamjee (1991) compared children in Year V and her findings were
similar to the findings of the present study. Findings in Year VI of the present
study were similar to previous findings in the sense that no significant differences
were found. However, in all of the research on the original Griffiths Scales cited
above, there was always a tendency for British children to perform better in Year
VI. The results in Years VII and VIII contradict the findings of Bhamjee (1991) where no significant differences were found, but where there was a tendency for British children to perform better than their Asian South African counterparts.

Results in Year V may have been influenced by the fact that this is the year in which British children start their formal schooling career. They may be exposed to apparatus similar to that which is used in the Performance Subscale at the age of four while South African children may not. The finding in Year VI is interesting in that it is somewhat in contradiction to previous research. On the other hand, the two samples can be expected to perform similarly as some South African children start (non-compulsory) Grade 0 during this year. A more gradual closing of the gap would have been expected however. The findings in Year VII and VIII are surprising in that it would have been expected that British children (with assumed more exposure to fine-motor activities) would have performed better (even if not significantly so) during these years. The differences noted on Subscale E are further a bit anomalous if it is considered that British children performed better in general on the other fine-motor subscale (Subscale D).

5.3.2.6 Practical Reasoning (F)

A Hotellings $T^2$ comparing the developmental profiles of the total samples revealed that the British sample ($M_{FQ}=119.816$) performed significantly better than the South African sample ($M_{FQ}=112.596$) on the Practical Reasoning Subscale (Subscale F), $t(288)=-3.9, p<0.001$. Hotellings $T^2$ tests on each year group revealed significant differences in Year VII ($t(72)=-3.4, p<0.001$) and Year VIII ($t(68)=-2.4, p<0.05$). Although differences in Years V and VI were not significant, British children tended to perform better. The performances of the two samples on Subscale F per year group are presented graphically below. South African means are presented below the blue line, while the British means are presented above the pink line.
Results from studies done with the original Griffiths Scales have yielded similar results to that presented above. Allan’s (1988, 1992) comparisons indicated that British children in Year VII performed significantly better than their Black South African counterparts, whereas this was not the case with Black South African children in Year VI. British children also performed significantly better than Coloured South African children in Year VI, but this was not the case with White or Asian South African children. Bhamjee (1991) only found significantly better British performance in Year VI in her comparison of British children with Asian South African children. The trend in all of the above research was towards better performance by British children in the year groups that did not yield statistically significant results.

The above results can possibly be attributed to British children’s earlier exposure to formal schooling (especially if looked at in conjunction with results on Subscale C – which is the other more intellectual subscale on the GMDS-ER). The kinds of items that are found on Subscale F (e.g., counting and stating the names of the days of the week) are often some of the first things that children are
taught in formal schooling. This would mean that British children’s greater learned knowledge gives rise to the differences observed above.

5.4 Discussion of Results per Year Group

To come to tentative conclusions about the use of the GMDS-ER with a South African population, each year group needs to be scrutinised. Table 30 facilitates the discussion of the results per year group. Non-significant trends are also considered (along with significant differences) as these may be important in practice. The performances of the total samples as well as performance in individual years on a subscale were considered to include a non-significant difference as a trend (e.g., each year Subscale D is considered a trend because of all other years in that subscale being higher for British children and the fact that the total British sample performed significantly better than the South African sample on this subscale). A blue cell indicates that the South African sample performed better than the British sample. A light blue cell indicates that there was no significant difference, but a trend of better performance by the South African sample was noticed. A red cell indicates that the British sample performed significantly better than the South African sample. A pink cell indicates that the British samples’ scores tended to be higher, but that no statistically significant difference was noted. Cells that represent cases where there were no significant differences and where no trend was noticed, are white.

Table 30

Visual Representation of Performance Comparison

<table>
<thead>
<tr>
<th>Subscale</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Year VI</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Year VII</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year VIII</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In Year V, the South African’s children’s scores on Subscales A and B were significantly higher, whereas scores on Subscales C and E were significantly
lower than those of the British sample. Although no differences were found on Subscales D and F, there was a trend towards better performance by the British sample.

In Year VI, the South African sample performed significantly better on Subscale B and tended to perform slightly better on Subscale A. The British sample performed better on Subscale C and tended to perform better on Subscales D and F. No difference was noted on Subscale E.

In Year VII, the British sample performed significantly better on Subscales C and F, and tended to perform better on Subscale D. The South African sample performed significantly better on Subscale E. No differences were noted on Subscales A and B.

In Year VIII, the South African sample performed significantly better on Subscale E. The British sample performed significantly better on Subscale F and tended to perform better on Subscales C and D. No differences were noticed on Subscales A and B.

5.5 Chapter Summary

This chapter presented the results of the current study. Initially the South African and British samples were described and although there were some differences, the samples were judged to be comparable. The comparison between the South African and British samples was then presented and discussed for each subscale.

A summary statement about results on a test like the GMDS-ER is important for our understanding of general areas of difference between British and South African children. In the present study, British children generally performed better than South African children on the more intellectual subscales (Language and Practical Reasoning), whereas South African children performed better on the Locomotor and Personal-Social Subscales in the earlier year groups (Year V and
VI). British children also performed better on the Hand and Eye Co-ordination Subscale and mixed results were obtained from the comparison between the two groups’ performances on the Performance Subscale.

The results presented in this chapter informs the conclusions about the GMDS-ER’s applicability to the South African context. These conclusions are presented in the following chapter.
CHAPTER SIX: LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The limitations, conclusions and recommendations of the study is presented in this chapter. The present study’s overall aim is an initial investigation into the applicability of the GMDS-ER for use in the South African context. This aim was achieved by comparing the performance of a sample of South African children (that took part in the early revision process of the GMDS-ER) to that of a subsample of the British standardisation sample.

6.2 Limitations

The limitations of the present study need to be acknowledged. Limitations mainly involved issues concerning sampling and differences in testing procedures.

6.2.1 Limitations regarding the sampling procedure

The South African sample was collected by using a non-probability sampling methodology. The one main weakness with non-probability sampling is that the researcher is not aware of the statistical probability that an individual will be included in the study, and therefore cannot claim that the sample is generally representative of the larger population. The sampling technique is therefore detrimental to the external validity of the results and means that generalisability to the larger population is limited. However, as an exploratory descriptive study, it was never the intention of the study to provide any absolute values that approximate norms for the South African context.

The present study uses a comparison between South African and British children as its main technique of exploration and therefore it is important to control for extraneous variables that may influence child development. Age,
gender and SES were identified as such variables and controlled for as far as possible. Since these variables were controlled for, it is reasonable to expect that the differences and similarities that exist between the samples of the present study, are real differences and not due to the influence of uncontrolled extraneous variables. This means that the internal validity of the study has not been compromised.

6.2.2 Limitations regarding differences in testing procedures

As has been mentioned previously in this treatise, there were differences between the testing procedures for the South African and British samples. This was owing to the fact that the respective samples were gathered during different stages of the revision and restandardisation process of the GMDS-ER. The differences in testing procedures mean mainly that the South African children had longer testing periods as they completed the original Griffiths Scales as well as the experimental items and Neurological Checklist whereas the British children completed the revised version of the original Griffiths Scales. This could have had a negative influence on the South African children’s performance on the GMDS-ER, but there are factors which seem to indicate that the influence of longer testing periods was negligible. One would expect with longer testing periods that children’s performance would decline, due to fatigue, especially towards the end of the testing procedure. An indication that the influence of factors related to longer testing periods did not affect the performance of the South African sample greatly, can be found in the similarity between GQs over all four year groups. If fatigue had any systematic influence on the overall performance of South African children, this did not result in any systematic differences as would have been represented by differences in the GQs of the two sample groups.

A mitigating factor on the influence of longer testing periods for South African children is the fact that testing locales for the British sample were not held entirely constant. Some children were tested in centralised locations (e.g., paediatric clinics), but others were tested at their homes or schools. There were thus some variability in the British testing procedures and they were therefore not
exposed to procedures that were entirely systematically different from that of the South African children.

Notwithstanding this mitigating factor and the indication that longer testing periods did not have an adverse influence on the performance of the South African sample, differences in testing procedures remain a factor that was not scientifically controlled for in the present study and could still mean that scores for the South African children may have been higher.

6.2.3 Limitations regarding period of collection of South African sample

The South African sample was collected in 1999 and as such does not constitute a completely contemporary sample. The changing context in South Africa may mean that the results obtained from a more contemporary sample may be slightly different. The time period between the testing of the South African sample and that of the British one is approximately 5 years. Studies similar to the present one done with the original Griffiths Scales (Allan 1988, 1992; Bhamjee, 1991) used data from samples that were chronologically removed by approximately a decade. During the time-spans of these studies, South Africa was undergoing major political and societal changes. In the light of practices with comparable previous studies, the present study’s 5 year time-span is not extreme and it is judged that the current comparison is not affected greatly by the differences between the collection periods of the two samples.

Despite the limitations mentioned above, several important conclusions can be reached accountably from the results of the present study.

6.3 Conclusions and Recommendations for Practice

6.3.1 General

South African children aged 4 to 7 years of age seem to perform similarly to British children on the GMDS-ER (as represented by the GQ).
However, as far as subscale performance is concerned, a great deal of variability (as far as the similarity between South African and British children) exists between the different year groups. The details for each subscale per year group can be found in Chapter 6. It is recommended that the clinician consult Table 30 (p.120) when interpreting a child’s profile as a normal South African profile may differ extensively from a normal British profile. The following general guidelines may also be kept in mind. South African children generally score higher than British norms would indicate on Subscales A and B and during Years VII and VIII of Subscale E. South African scores are generally lower than the British norms would indicate on Subscales C, D, and F, and Years V and VI of Subscale E. Although a norm reference (using the British norms) may be informative, it is not recommended that the British norms be used in isolation to determine developmental categories (e.g., below average, above average, etc.) or that normalised scores or categories inferred from them be reported.

6.3.2 Use in Scholastic Placement Evaluations

Results from the GDMS-ER should never be the sole basis for the identification of scholastic problems, but the clinician may find the following guidelines useful in using the results qualitatively in this regard.

Care should be taken when using the GQ in scholastic placement contexts as it does not necessarily represent Spearman’s (1928) “g” factor of intelligence as is presumed to be the case with the British sample. It is recommended that Subscales C and F be scrutinised as far as intellectual development is concerned, but that care should be taken if the norm tables are consulted. In general, scores on these two scales were lower for the South African sample and therefore normal South African development may be indicated as subnormal if the norm tables are consulted. This is especially true in Years V, VI and VII for the Language Subscale as there were significant differences in performance between the South African and British samples in the present study.
6.3.3 Use in the Identification of Movement Disorders

Results from the GDMS-ER should never be the sole basis for the identification of movement disorders, but the clinician may find the following guidelines useful in using the results qualitatively in this regard.

For the identification of fine-motor disorders it is recommended that Subscales D and E be consulted. Scores on Subscale D are expected to be slightly lower than the British norms, but as no significant differences were found in the present study, it becomes feasible to consult the norm tables for performance categorisation. Care should however be taken when a few items could have made a difference in performance category. In these cases, it is relatively safe to conclude that the South African child's performance falls in the higher category, as there was a stable (but non-significant) trend of slightly lower performance by South African children on Subscale D. The use of quantitative information on Subscale E is not recommended to assist in the diagnosis of fine-motor disorders as too much variability was found on this subscale. Qualitative information from this subscale remains valuable.

As far as gross-motor disorders are concerned, the use of Subscale A may be useful. It must however be remembered that South African children tend to perform better than British children from the normative sample. If the norm tables accompanying the test are consulted, scores may be inflated (i.e., indicate better performance than is actually the case). This is especially true in Year V (where a significant difference was found in the present study) and also in year VI (where a trend to better performance was judged to exist in Chapter 6. Again, the norm tables may be a useful informative tool, but performance categories should not be solely based on the norm tables. It is not recommended that norm scores be reported.
6.3.4 Use in the Identification of Language Disorders

Results from the GDMS-ER should never be the sole basis for the identification of language problems, but the clinician may find the following guidelines useful in using the results qualitatively in this regard.

Results on Subscale C can be useful in assisting the clinician in identifying language disorders (including those related to hearing rather than language production). It must however be remembered that South African children scored significantly lower than children from the British sample in three of the four years under investigation. Therefore, South African children that perform below average on Subscale C may not necessarily have communication problems, as their “normal” performance on the GMDS-ER seems to be lower than that of their British counterparts. If normalised scores are used to assist in interpretation, the above should be kept in mind. It is not recommended that the diagnosis of language disorders are made solely based on scores from the GMDS-ER Language Subscale, but it is relatively safe to consider South African children with scores in the average range and above as problem-free in this regard.

6.4 Contributions and Recommendations for further Research

Despite the limitations noted in 6.2 above, the study has made valuable contributions in:

1. Establishing that the overall performance on the GMDS-ER of South African and British children are similar for the ages 4 to 7 years.
2. Establishing that the profiles of South African and British children are dissimilar if scores on the individual subscales are considered.
3. Establishing that differences and similarities on a subscale level vary across year groups.
4. Providing initial research findings and recommendations that facilitate the accountable use of the GMDS-ER in the South African context.
The above contributions can be further enhanced by the following research:

1. The development of South African norms for the GMDS-ER, i.e., a larger more representative sample should be used.
2. An item level analysis of each subscale to investigate whether items are placed appropriately for the South African context (i.e., in order of gradually increasing difficulty.

These options are presented as they would further increase the accountable use of the GMDS-ER in the South African context in general, but it is imperative to consider the potential usefulness of the GMDS-ER in clinical settings and programmatic intervention. It is therefore finally recommended that the valuable work that relates GMDS-ER scores to clinical diagnoses be continued and that the inherent potential of the GMDS-ER in programmatic evaluation be subjected to scientific scrutiny.
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APPENDIX A

University of Port Elizabeth
NEUROLOGICAL CHECKLIST FOR PRE-SCHOOL CHILDREN

NAME:…………………………   DATE:…………………………
DATE OF BIRTH:……………..  TESTER:………………………

BEHAVIOURAL STATE:
0 = awake, not crying, relaxed
1 = awake, not crying, tense & rigid
2 = awake, fussing
3 = awake, crying
4 = yelling
5 = other (describe)  Score: ___

SOCIAL RESPONSIVENESS:
0 = interested, agrees with proposal, no stimulation needed, facial expression alert.
1 = disinterested, but agrees with proposals, no particular encouragement needed, but not facially alert.
2 = reluctant, needs encouragement, appears anxious, tense facial expression.
3 = reluctant, needs encouragement, appears sullen, withdrawn.
4 = shrinks back on approach, refuses to fulfill demands, appears frightened.
5 = refuses to fulfill demands, appears impassive.
6 = resists by pushing examiner away, tries to get away, struggles.
7 = other (describe)  Score: ___

A. SITTING:
Posture is judged while the child sits upright on a chair (without arms), feet not touching the ground for about 3 minutes.
0 = posture is normal, head is kept in the middle and the posture of the body & limbs is symmetrical, sits reasonably still.
1= posture is abnormal, child moves & fidgets a great deal.  Score: ___
While the child is sitting upright, with his hands on his knees & his head centred, the examiner gives a gentle sideward push against the child’s shoulder. The ability of the child to remain in a sitting position is recorded.

0 = the child keeps his balance without arms or hands.
1 = the child lifts his hands from his knees.
2 = the child lifts his arms & uses his opposite hand for support.
3 = the child falls sideward and must be caught.  

Score: ___

Next the child’s response in rotating his trunk while following a moving object with his eyes. Child sits with his hands on his knees & the examiner holds a small toy to the side & slightly behind the child’s head. He asks the child to look at the object & then to grasp it. The optimal response occurs when the child turns his head & rotates his shoulders to the side where the object is presented, while his hips remain more or less centred. Some compensatory balancing movements of the legs (spreading the knees, deviation of the legs to the contralateral side) may be observed especially in children below 7 years old.

0 = good rotation of the trunk while maintaining a stable sitting position.
1 = some rotation visible from the shoulders to the hips, often associated with compensatory movement of the legs.
2 = the child rotates his whole trunk without differentiation between shoulders & hips. Compensatory movements of the legs are present.
3 = the child cannot turn to the object without supporting himself on his hand.  

Score: ___

B. STANDING:

The examiner inspects the posture of the head, body & limbs while the child stands up, relaxed & with his arms hanging loosely by his side.

0 = posture is normal with no marked deviations.
1 = posture is abnormal.  

Score: ___

Next check the child’s posture with his arms extended. Get the child to stand with his feet together & his head centred, & then to stretch out his arms, palms downward for 20 sec. The test should be performed with eyes closed. The hands must be kept slightly apart from each other. Check for lateral & vertical deviations from the median line as well as spooning (hyperextending & forking of the fingers).
Scoring for lateral & vertical deviations:
0 = no deviations.
1 = arms drop.
2 = arms rise.

Score: ___

Scoring for spooning:
0 = no spooning.
1 = minimal spooning.
2 = obvious spooning.

Score: ___

C. INVOLUNTARY MOVEMENTS:
The child is asked to stand with his feet together, his head centred, & then to stretch out his arms with his fingers spread as wide apart as possible, keeping them still for 30 sec.
0 = no choreiform (jerky) movements, no ethetotic (writhing) movements, and no tremors present.
1 = if any of the above movements occur.

Score: ___

D. CO-ORDINATION & ASSOCIATED MOVEMENTS:
Diadochokinesis: The child is required to stand with one arm relaxed at his side & the other flexed at an angle of over 90 degrees at the elbow, the hand pointing forwards. The child’s head must be centred & his arms & shoulder relaxed. He must then quickly pronate (turn downwards) & supinate (turn palm upwards) the hand & forearm. The examiner must demonstrate the movements at a speed of 4 complete pronations & supinations per sec. Then asks the child to imitate his movement at the same speed while trying to keep his elbow still & away from his body. (Continue for 15 sec.). The pronation and supination movements should be smooth & continuous, with no conspicuous pauses. Associated movements should be looked for in the opposite arm. These consist mainly of mirror movements, sometimes accompanied by flexion of the elbow.

Score: (for diadochokinesis)
0 = smooth & correctly performed pronation & supination, the elbow moving over a distance of less than 5cm.
1 = awkward pronation & supination, the elbow moving over a distance of 5 – 15m.
2 = awkward pronation & supination, the elbow moving over a distance of more than 15cm.
3 = no pronation or supination of the forearm, but other movements present.

| Right Arm | Score: ___ |
| Left Arm  | Score: ___ |

Score: (for associated movements)
0 = no visible mirror movements or flexion of the elbow.
1 = barely discernable mirror movements or slight flexion of the elbow without mirror movements.
2 = marked mirror movements without flexion of the elbow.
3 = marked mirror movements with flexion of the elbow.

| Right Arm | Score: ___ |
| Left Arm  | Score: ___ |

N.B. the score for each arm is recorded separately.

**Finger-nose:** Get the child to stand upright and say:

- “Touch your finger to your nose.” Right: ___
- “Touch your other finger to your nose.” Left: ___
- “Close your eyes & touch your finger to your nose.” Right: ___
- “Close your eyes & touch your other finger to your nose.” Left: ___

0 = performed well
1 = performed poorly

**Standing with eyes closed:** Standing upright, the child must keep his eyes closed for 10 – 15 sec. Say:

“Let’s see how long you can stand still with your eyes closed. Close your eyes & I shall count how long you can do it.”

0 = perfect balance & no movements.
1 = balance is possible with the aid of only a few movements of the ankle & toes.
2 = balance is only possible with the aid of movements of the whole body, often resulting in the shifting of the feet.
3 = no balance with eyes closed. The child has to move his foot to one side to prevent himself from falling. Score: ___

N.B. A consistency to fall to one side should be recorded.
Reaction to push against shoulder: The child is asked to stand upright with his head centred, his arms hanging freely and his feet about 5cm apart. The examiner gives a gentle sideways push against the child’s shoulder. The child’s ability to remain standing without a sideward placing of his contralateral leg is recorded.

Score: Indicate with X
0 = the child does not move except for some rapidly checked swaying movements.
1 = the child shows an abduction of the arms at the shoulder.
2 = the child steps sideways.
3 = the child falls sideways and has to be caught.  

Score: ___

E. WALKING:
A piece of rope or string (about 10m long) is placed on the floor.
For each of the following tasks, the scoring system is as follows:
0 = performed correctly
1 = performed but not well
2 = performed poorly & only after repeated demonstration.
3 = unsuccessful even after repeated demonstration.

Say:
“Walk to the end of the line and back.” (Demonstrate)  
Score: ___

“Walk to the end of the line on your toes.” (Demonstrate)  
Score: ___

“Walk back to me on your heels.” (Demonstrate)  
Score: ___

“Hop on one foot to the end of the line.” (Demonstrate)  
Score: ___

“Now hop back to me on your other foot.” (Demonstrate)  
Score: ___

“Stand on one foot until I tell you to stop.” (Demonstrate & allow 10 – 15 sec.)  
Score: ___

“Now stand on your other foot until I tell you to stop.” (Demonstrate & continue for 10 – 15 sec.)  
Score: ___

F. VISION:
Fixation: Ask the child to fixate his gaze on a pencil which is held in front of his eyes for 15 sec. at a distance of 40cm.
0 = no deviation, jerking movements of the eye, or squint present.
1 = any of the above present.  
Score: ___
Convergence: Hold your finger about 50cm from the child’s face & move it towards him. Normally, the eyes should converge & the pupils contract.

0 = maintains convergence of both eyes on an object to about 10cm in front of the eyes.
1 = unable to maintain convergence with the object closer than 15cm to the eyes.
2 = no convergence visible at all.  

Score: ___

GRAND TOTAL: ____
Dear Parent / Guardian,

Please take time to complete this questionnaire. The following questions are applicable to children of a broad age range, therefore, we do not necessarily expect your child to be capable of all of the tasks listed below. We would appreciate a completely honest evaluation of your child's ability, and please do not worry if your child is not yet able to complete each of the activities.

1. Date: ........................................................................................................
2. Name of child: ...........................................................................................
3. Address: ...................................................................................................
4. Phone number: ..........................................................................................
5. Home language: .........................................................................................
6. Creche/pre-school/school/other attending: ..............................................
7. Child's date of birth: ..................................................................................
8. Child's age: ................................................................................................
9. Child's gender (please tick the correct block)

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
</table>

10. Class/Form at school (if applicable): .................................................
11. **Mother’s/Guardian’s**
   - **Age:** .............................................. .....................................
   - **Occupation:** present and past (if applicable): ............... .................................................. .......................
   - **Educational qualifications (Please tick all relevant blocks below):**
     | None                      | GCSE/0 levels | A-levels | GCSE | Higher education (e.g., university or college) | Other (e.g., NVQ) |
     |----------------------------|----------------|----------|------|-----------------------------------------------|------------------|

12. **Father’s/Guardian’s**
   - **Age:** ............................................... .....................................
   - **Occupation:** present and past (if applicable): ............... ................................................. ..........................
   - **Educational qualifications (Please tick all relevant blocks below):**
     | None                      | GCSE/0 levels | A-levels | GCSE | Higher education (e.g., university or college) | Other (e.g., NVQ) |
     |----------------------------|----------------|----------|------|-----------------------------------------------|------------------|

13. **Child’s birth history. Please describe anything unusual about your pregnancy or delivery:**
   - ..........................................................................................................................
   - ..........................................................................................................................
   - ..........................................................................................................................

14. **Was the birth (please tick all relevant blocks below):**
   - **Natural**
   - **Induced**
   - **Caesarean section**
   - **Forceps delivery**
15. Did your child have to go to a special care baby unit (SCBA) after birth? (please tick the block below).
   If yes please specify how long.
   Yes ➔ For how long? ………………………………
   No

16. Was your child born either prematurely or after more than 41 weeks of pregnancy? (please tick the block below)
   Yes ➔ After how many weeks? ………………………………
   No

17. Was your child one of a multiple birth (e.g., twin or triplet)? (please tick the block below)
   Yes
   No

18. Were walking, talking, toilet training achieved at normal times? (please tick the block(s) below)

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Ages (in months)</th>
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<tbody>
<tr>
<td>Walking</td>
<td></td>
<td></td>
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<tr>
<td>Talking</td>
<td></td>
<td></td>
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<tr>
<td>Toilet training</td>
<td></td>
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</tbody>
</table>

19. Did you have any problems with feeding your child? (please tick the block below). If so please specify.
   Yes ➔ Specify………………………………………………
   No

20. Has your child ever had any of the following (please tick the block(s) below if applicable):
   Meningitis
   Encephalitis
   Convulsions (fits)
   Concussion
   Anaemia
   A very high fever requiring hospital admission
   A head injury where s/he lost consciousness
   An allergy

21. Does your child complaint of regular headaches? (please tick the block below)
   Yes
   No

22. Do you think your child to be clumsier than children of the same age? (please tick the block below)
   Yes
   No

23. Does anyone in your immediate family suffer from epilepsy? (please tick the
### 24. Is your child on any kind of medication? (please tick the block below)

<table>
<thead>
<tr>
<th>Yes</th>
<th>Specify:</th>
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<tbody>
<tr>
<td>No</td>
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If Yes what medication?

<table>
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<th>Specify:</th>
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What for?

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<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### 25. Has the teacher ever complained that your child is very restless and struggles to concentrate in class? (please tick the block below)

<table>
<thead>
<tr>
<th>Yes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

### 26. Please list all childhood diseases and ages:

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

### 27. Does your child attend a hospital or pediatric clinic regularly? (please tick the block below). If yes please specify with a reason.

<table>
<thead>
<tr>
<th>Yes</th>
<th>Reason:</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

### 28. Does your child attend a General practitioner (GP) regularly? (please tick the block below). If yes please specify with a reason.

<table>
<thead>
<tr>
<th>Yes</th>
<th>Reason:</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

### 29. Does your child attend any of the following? (please tick all relevant blocks below).

<table>
<thead>
<tr>
<th>Speech therapist</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physiotherapist</td>
<td></td>
</tr>
<tr>
<td>Occupational therapist</td>
<td></td>
</tr>
<tr>
<td>Clinical psychologist</td>
<td></td>
</tr>
<tr>
<td>Educational psychologist</td>
<td></td>
</tr>
<tr>
<td>Child development centre</td>
<td></td>
</tr>
<tr>
<td>Special needs playgroup</td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>
30. Does your child receive any additional help at school? (please tick the block below). If yes please specify with a reason.

<table>
<thead>
<tr>
<th>Yes</th>
<th>Reason ………………………………………………</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>..................................................................</td>
</tr>
<tr>
<td></td>
<td>..................................................................</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
</tr>
</thead>
</table>

31. Is your child being assessed because of special educational needs (statement)? (please tick the block below). If yes please specify with a reason.

<table>
<thead>
<tr>
<th>Yes</th>
<th>Reason ………………………………………………</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>..................................................................</td>
</tr>
<tr>
<td></td>
<td>..................................................................</td>
</tr>
</tbody>
</table>

| No |

Please tick the appropriate answer (Y = yes; N = no):

<table>
<thead>
<tr>
<th>32</th>
<th>My child puts away toys when encouraged to do so.</th>
<th>Y / N</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>My child can put on his or her own socks and shoes.</td>
<td>Y / N</td>
</tr>
<tr>
<td>34</td>
<td>My child plays well with other children.</td>
<td>Y / N</td>
</tr>
<tr>
<td>35</td>
<td>My child helps with small household tasks or chores when requested to do so.</td>
<td>Y / N</td>
</tr>
<tr>
<td>36</td>
<td>My child washes his or her own hands and face, requiring only a little assistance or help.</td>
<td>Y / N</td>
</tr>
<tr>
<td>37</td>
<td>My child can clean his or her own teeth fairly well.</td>
<td>Y / N</td>
</tr>
<tr>
<td>38</td>
<td>My child can put on his or her top coat, cardigan or raincoat, without any assistance</td>
<td>Y / N</td>
</tr>
<tr>
<td>39</td>
<td>My child has one special playmate.</td>
<td>Y / N</td>
</tr>
<tr>
<td>40</td>
<td>My child can fetch a specified item for me while we are out shopping</td>
<td>Y / N</td>
</tr>
<tr>
<td>41</td>
<td>My child chooses his or her own clothes, and these are appropriate for the weather conditions and the occasion.</td>
<td>Y / N</td>
</tr>
<tr>
<td>42</td>
<td>My child can brush or comb his or her own hair, requiring only a little assistance.</td>
<td>Y / N</td>
</tr>
<tr>
<td>43</td>
<td>My child is able to get a drink of water from the tap without any assistance or help.</td>
<td>Y / N</td>
</tr>
<tr>
<td>44</td>
<td>My child can eat at the table without assistance.</td>
<td>Y / N</td>
</tr>
<tr>
<td>45</td>
<td>My child can wash and dry his or her own hands and face without any assistance.</td>
<td>Y / N</td>
</tr>
<tr>
<td>46</td>
<td>My child can dress and undress completely without any assistance.</td>
<td>Y / N</td>
</tr>
<tr>
<td>47</td>
<td>My child has one special school friend.</td>
<td>Y / N</td>
</tr>
<tr>
<td>48</td>
<td>My child takes full responsibility for keeping his or her hair tidy.</td>
<td>Y / N</td>
</tr>
<tr>
<td>49</td>
<td>My child is able to bath or shower and dry without any assistance.</td>
<td>Y / N</td>
</tr>
<tr>
<td>50</td>
<td>My child is able to lay the table with some supervision.</td>
<td>Y / N</td>
</tr>
<tr>
<td>51</td>
<td>My child can lay a table completely without any help or supervision, for ordinary occasions.</td>
<td>Y / N</td>
</tr>
</tbody>
</table>

Thank you for your co-operation in filling in this Questionnaire. All the information that you have supplied us with will be treated as strictly confidential.

Please return this Consent form and the Questionnaire in the stamped envelope provided.
APPENDIX C

Dear parent/guardian,

Please take time and complete this comprehensive questionnaire. Note that all the questions are not necessarily applicable to children of all age groups. Your honesty will be greatly appreciated.

SECTION A
Questionnaire for parents

Child’s Name: ____________________________________________________________
Address: _________________________________________________________________
Suburb: _________________________________________________________________
Telephone number: __________________________________________________________
Home Language: ___________________________________________________________
Date of Birth: 19___/___/___
Date of Testing: 19___/___/___
Gender:  

M  F

School: _________________________________________________________________
School Telephone No: ______________________________________________________
Father’s / Guardian’s Occupation: __________________________________________
Father’s / Guardian’s Educational Level: (Please tick the highest level achieved)

<table>
<thead>
<tr>
<th>None</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary School</td>
<td></td>
</tr>
<tr>
<td>Junior Certificate</td>
<td></td>
</tr>
<tr>
<td>Apprenticeship</td>
<td></td>
</tr>
<tr>
<td>Matric</td>
<td></td>
</tr>
<tr>
<td>Further training (not at university)</td>
<td></td>
</tr>
<tr>
<td>University degree or diploma</td>
<td></td>
</tr>
</tbody>
</table>
SECTION B

1. Birth History: Please describe anything unusual about the pregnancy or delivery: ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

Please tick the appropriate answer:

2. Did you give birth to your child naturally?    YES / NO
3. Was your child anoxic (i.e., did he/she lack oxygen at birth?)    YES / NO
4. Was your child born either prematurely or after more than 41 weeks of pregnancy?    YES / NO
   If yes, after how many weeks: ________ weeks
5. Is your child one of a twin?      YES / NO
6. Walking, talking, toilet training were normal?    YES / NO
   If no, please indicate the ages:
   Walking: ____ months
   Talking: ____ months
   Toilet training: ____ months
7. Was feeding development normal?     YES / NO
8. Has your child ever had: (Please tick the appropriate block \s and as many as applicable)

   Meningitis
   Encephalitis
   Convulsions (fits)
   Concussion
   Anemia
   A very high fever/temperature
   A head injury where he/she lost consciousness
   An allergy

9. Does your child complain of headaches?    YES / NO
10. Is your child clumsy?       YES / NO
11. Does your child have dizzy spells sometimes?    YES / NO
12. Does your child have nightmares often?    YES / NO
13. Sometimes, does your child fall deeply asleep even though it is not his/her bedtime?  
   YES / NO

14. Does your child have temper tantrums regularly?  
   YES / NO

15. Does your child wet the bed regularly?  
   YES / NO

16. Does your child sometimes stare blankly into space?  
   YES / NO

17. Does your child sometimes start to say something, blank out and forget what he/she was saying?  
   YES / NO

18. Does anyone in your immediate family suffer from epilepsy?  
   YES / NO

19. Do you sometimes notice a muscle or group of muscles twitching in your child?  
   YES / NO

20. Does your child sleep-walk?  
   YES / NO

21. Is your child on any kind of medication?  
   YES / NO
   If yes, for what?  ________________________________

22. Does your child lie or steal?  
   YES / NO

23. Does your child get on well with other children?  
   YES / NO

24. If applicable, has your child’s school history been normal?  
   YES / NO

25. Is your child currently attending:

<table>
<thead>
<tr>
<th>No school</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-school</td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td></td>
</tr>
</tbody>
</table>

If your child is attending primary school, please list your child’s school subjects and give the mark or symbol that he/she received for each one in the last examination:

<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>MARKS/SYMBOLS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

26. Which subjects are your child very poor at in school?  ________________________________
   _____________________________________________
27. Has the teacher complained that your child is very restless and struggles to concentrate in class?  YES / NO
28. Does your child sometimes start crying for no apparent reason? YES / NO
29. Does your child:

- Stutter
- Faint frequently
- Bite his/her nails excessively

30. Have your child had any childhood diseases? YES / NO
   If yes, please list all childhood diseases and the ages at which they occurred:

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION C

Please tick the appropriate answer True or False:

<table>
<thead>
<tr>
<th>Your child helps with household instructions such as:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) helps to lay the table</td>
</tr>
<tr>
<td>(b) helps tidy room</td>
</tr>
<tr>
<td>(c) helps clear the table</td>
</tr>
<tr>
<td>(d) other tasks:</td>
</tr>
</tbody>
</table>

- Your child can bath or shower with minimal assistance T/F
- Your child can clean own teeth T/F
- Your child can wash own face and hands T/F
- Your child can put on shoes and socks (easy fastening) T/F
- Your child can choose own clothes T/F
- Your child is able to pass on a message (e.g. from teacher to parent) T/F
- Your child is able to go on instruction to get a specific item in a public area, e.g. go and get bread from the counter and bring it to mother T/F
- Your child can go alone on errands to nearby shops, etc. T/F
- Your child can neaten and tidy own hair adequately (not fancy arrangements) T/F
- Your child has complete bowel control T/F
- Your child has complete bladder control, including during the night T/F
- Your child is able to eat without assistance T/F

Thank you for your co-operation in filling in this questionnaire. All the information that you have supplied us with will be treated as strictly confidential.