

**THE DEVELOPMENT OF A SCHOOL READINESS SCREENING
INSTRUMENT FOR GRADE 00 (PRE-GRADE R) LEARNERS**

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DECLARATION

I Shireen Ahmed Mohamed declare that the thesis, *The development of a school readiness screening instrument for grade 00(pre-grade R) learners*, submitted by me for the Philosophiae Doctor (child psychology) degree is my own independent work, and has not previously been submitted by myself to any other university or faculty. I furthermore cede copyright of the thesis in favour of the university of the Free State.

Shireen Ahmed Mohamed

24 January 2013

Date

DEDICATION

I dedicate this work to the memory of my father, Ahmed Moosa Sabat. He taught me by example the value of hard work.

ABSTRACT

School readiness is increasingly being recognised as major need in education as it has far reaching consequences in a child's educational and later life. Inadequate preparation and lack of timeous identification of at risk factors in this phase of life has many negative sequaleae. The literature has highlighted the role of prediction variables for scholastic achievement to facilitate appropriate intervention. School readiness assessments have been criticised for a lack of multidimensional assessment approach.

In contrast to previous studies, which are generally univariate in their approach, this research aimed at a multidimensional approach to assessing at risk factors in grade 00 learners in the age cohort (4-5 ½ years). A further aim was to investigate the predictor variables/isolate the dimensions of development that would be linked to academic achievement in reading, spelling and maths in grade 1. The behaviours underpinning eight developmental domains and 19 dimensions (indicated in brackets) namely, 1) Cognitive (Ability, Approaches to learning); 2) Perceptual (Body awareness, Auditory, Spatial ability); 3) Speech (Speech, Language); 4) Neurological (Fine motor, Gross motor, Low tone), 5) Emotional (Empathy, Emotional Regulation, Self-confidence); 6) Social (Interpersonal competencies, Social regulation behaviour, Social graces, Play); 7) Developmental (Concentration, Sensory) and 8) Independence were identified in the form of a screening instrument (comprehensive version) for assessment of grade 00 learners. Factor analyses reduced the total pool of 214 items to 100 on the Comprehensive version of the test. A shortened version of the screening instrument was also compiled, using 42 items. Cronbach α coefficient's yielded high values (>0.7) indicating sound reliabilities for the 19 dimensions and 8 domains.

A convenience sample of 579 grade 00 learners in Durban schools were evaluated on the questionnaire by their teachers and parents in the first phase of the study. The same cohort were followed up in grade 1 and assessed on South African standardised tests, the ESSI and VASSI in spelling, reading and maths.

The results indicated that the domains of Cognitive, Perceptual, Speech and Language displayed acceptable validity to predict academic achievement of grade 1 learners. The

remaining domains, viewed as indirect variables, play an integral part in the child's future scholastic achievement. Results of a stepwise regression analyses showed that the combined value of four predictor variables (Cognitive Ability, Social Regulation, Sensory, and Speech) roughly contribute to 17% of the variance in academic achievement of Grade 1 learners.

As MANOVA analyses showed small effect sizes between the mean domain and dimension scores for the two gender groups, norms were calculated for the entire sample in the form of percentiles and stanines. The present research supports previous studies that show that early cognitive, perceptual and speech and language are strong predictors of grade 1 academic achievement.

The findings of the study have implications at policy and practice level for early identification and intervention. It is suggested that the screening instrument be used to facilitate curriculum goals at preschool level, that the predictor variables be targeted for intensive intervention at preschool level and later schooling to ensure positive academic trajectories.

Key words: school readiness, grade 00, pre K, multidimensional developmental assessment, predictor variables, Grade 1, holistic development.

ABSTRAK

Skoolgereedheid word al hoe meer erken as 'n belangrike faktor in die opvoedkunde aangesien dit verrykende gevolge in 'n kind se opvoedkundige en latere lewe het. Onvoldoende voorbereiding en 'n gebrek aan vroeë identifisering van risiko faktore in hierdie lewensfase het negatiewe skolastiese gevolge. Die literatuur beklemtoon die rol van veranderlikes wat skolastiese prestasie kan voorspel sodat toepaslike intervensies gefasiliteer kan word. Die assessering van skoolgereedheid is in die verlede weens 'n gebrek aan 'n multi-dimensionele benadering, gekritiseer.

In teenstelling met vorige studies, wat gewoonlik 'n enkelvoudige benadering gevolg het, is met hierdie navorsing 'n multi-dimensionele benadering gevolg, ten einde die risiko faktore vir graad 00-leerders, in die 4-5 ½ ouderdomsgroep, vas te stel. 'n Verdere doel was om die veranderlikes/dimensies van ontwikkeling wat graad 1-leerders se akademiese prestasie in lees, spelling en wiskunde kan voorspel, te identifiseer. Gedragskomponente op agt ontwikkelingsdomeine en 19 dimensies (aangedui in hakies), naamlik 1) Kognitief (vermoë, benadering tot leer), 2) Perseptueel (liggaamsbewustheid, ouditief, ruimtelike vermoë); 3) Spraak (spraak, taal); 4) Neurologies (fyn motories, groot motories, lae tonus); 5) Emosioneel (empatie, emosionele regulasie, selfvertroue); 6) Sosiaal (interpersoonlike bevoegdhede, sosiale regulerende gedrag, sosiale vaardighede, spel); 7) Ontwikkeling (konsentrasie, sensories) en 8) Onafhanklikheid is geïdentifiseer en in 'n siftingsvraelys (omvattende weergawe) saamgevoeg vir die evaluering van graad 00-leerders. Faktorontledings is benut ten einde die aanvanklike aantal items van 214 na 100 te verminder vir die omvattende weergawe van die siftingsinstrument. 'n Verkorte weergawe van die siftingsinstrument is ook opgestel wat slegs uit 42 items bestaan. Cronbrach α -koëffisiënte vir die 19 dimensies en agt domeine toon aan dat aanvaarbare interne konsekwente metings (>0.7) voorkom.

Tydens die aanvanklike fase van die studie is met behulp van 'n beskikbaarheidsteekproef 579 graad 00-leerders, verbonde aan skole in die Durban omgewing, betrek. Hierdie leerders is deur hul onderwysers en ouers op die vraelyste geëvalueer. Dieselfde groep leerders is in graad 1 opgevolg en met behulp van Suid-Afrikaans gestandaardiseerde toetse, naamlik die ESSI-Lees en speltoets en die VASSI wiskundetoets, geëvalueer.

Die resultate het aangetoon dat die kognitiewe, perseptuele, spraak en taal domeine aanvaarbare geldigheid toon deurdat dit daarin slaag om die graad 1-leerders se akademiese prestasie te voorspel. Die ander domeine speel 'n belangrike rol in die leerder se toekomstige skoolastiese prestasie. Die resultate van 'n stapsgewyse regressie-ontleding toon aan dat vier veranderlikes (kognitiewe vermoë, sosiale regulering, sensories en spraak) ongeveer 17% van die variansie in graad 1-leerders se akademiese prestasie verklaar.

Aangesien die MANOVA-resultate klein effekgroottes vir die twee geslagte rakende die gemiddelde domein- en dimensietellings aangedui het, is norms vir die groep as geheel in terme van persentiele en staneges, bereken. Die navorsingbevindinge van hierdie studie ondersteun die bevindinge van vorige studies, naamlik dat kognitiewe, perseptuele, spraak en taal veranderlikes belangrike voorspellers van van graad 1 akademiese prestasie is.

Die bevindings van die studie het op beleids- en praktiese vlak belangrike implikasies vir die identifisering van skoolgereedheid en vir moontlike intervensies. Daar word aanbeveel dat die siftingsinstrument gebruik word om kurrikulumdoelwitte op voorskoolse vlak te fasiliteer en dat die voorspellingsveranderlikes gebruik word vir ingryping op voorskoolse vlak om akademiese prestasie te verbeter.

Sleutelwoorde: skoolgereedheid, graad 00, pre K, multi-dimensionele ontwikkelingsevaluering, voorspeller veranderlikes, graad 1, holistiese ontwikkeling.

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CHAPTER I

INTRODUCTION AND NEED FOR STUDY

1.1 Introduction

This research was motivated by a need to address a gap evident in testing of children in the early preschool period who would be at risk during later learning. Under-resourced schools, in this regard, have made many pleas for guidance on screening for potential areas of risk, without the need for undergoing costly assessments to identify them.

As a private practitioner who has assessed children in the preschool phase and at later stages of their schooling development for the past 15 years, and who has worked in a remedial school with children with learning disabilities, I have highlighted the need for a suitable scientific screening tool to identify risk factors that are linked to later learning difficulties in order to facilitate decision-making effectively and promptly.

1.2 Background

Constitutional developments in South Africa in 1994 changed the political landscape of this country and highlighted a trail of inequities in education. This was apparent in early childhood education (ECD), as 75% of it was fee-based, unlike the smaller premium required in primary schooling (DoE, 2001; *Education White Paper 5*), and left it inaccessible to the majority of children. Section 29(1) of the Constitution guarantees a right to a basic education, making it compulsory for

children from Grades 1 to 9, or from ages 7 to 15 years to attend school (Hall & De Lannoy, 2010, 2011).

The government committed itself through the ECD policy to make Grade R would compulsory, and have Grade R classrooms attached to all primary schools by 2010. This however precluded childhood education below Grade R (Beirsteker & Dawes, 2008). While it did not meet the 2010 deadline, a steady increase in Grade R enrolment has been observed over the decade, with a 40% increase reported by 2010 (Department of Basic Education [DBE] 2010), and 80% by 2012 (Richter et al., 2012). The target to reach 100% for Grade R enrolment was extended to 2014, but although considerable strides have been taken to meet goals, the challenges faced by the quality and inequitable provision of services and subsidies still preclude the large majority of preschoolers from an adequate preschool education (DBE, 2010; Richter et al., 2012). The *Education White Paper 5* (DoE, 2001) acknowledges the wide gaps in the type, quality, curriculum and assessment standards in operation in the provision of early childhood education.

With more educational opportunities available to previously disadvantaged communities, children from all sectors of the social and economic hierarchy are admitted to so-called 'advantaged' (formerly White) schools. Learners begin on different levels in terms of access and quality owing to past inequities. In South Africa, as in developed countries such as the United States of America (USA), types and qualities of preschool experiences that are available to children before kindergarten and formal schooling are generally varied, and levels of preparedness

indicate widely discrepant skills (Ackerman & Barnett, 2005; Beirsteker & Dawes, 2008; Hojnoski & Missal, 2006).

Research shows that an advantaged social structural environment is conducive to early development and social and economic disparities pose significant barriers to learning (Bradley, Corwyn, McAdoo, & Coll, 2001; Dawes & Donald, 2000; Myers & Morris, 2009; Sheridan, Knoche, Edwards, Bovaird, & Kupzyk, 2010). Poverty and poor schooling outcomes indicate that deficits accrued in the early years (especially in children of 4 to 5 years old) are not easily overcome by later schooling (Smart, Sanson, Baxter, Edwards & Hayes, 2008). A lack of cultural (human and material resources) and social (networks and institutional supports) capital contributes significantly to unequal beginnings (Trumbull & Pacheco, 2005), and early differences in performance tend to persist as children progress through school (Sheridan et al., 2010), with achievement gaps widening over time in between children from different ethnic backgrounds, and between the advantaged and disadvantaged (Chatterji, 2006). With more opportunities available to previously disadvantaged South African children, physical access to school is now possible, but access to knowledge and resources remains highly unequal (Jansen, 2009).

Although not regarded as formal, Grade R or 0 (hereafter referred to as Grade R) has become a compulsory school year and is now included in the Foundation Phase of education (DoE, *Education White Paper 5*, 2001). The right to a basic education has guaranteed children in the age group 6 to 9 an education (South African Constitution, 1996; DoE, *Education White Paper 5*, 2001). Statistics, however, show that fewer than 10% of South African children enjoy any kind of adequate, formal

early childhood education, due to the many barriers that prevent access to this basic right (“Helping Diepsloot children out of life’s rut”, 2009). These include high levels of poverty, impoverished township and rural communities, poor transport, HIV/AIDS and a lack of trained educators (De Lannoy & Lake, 2009; DoE, *Education White Paper 5*, 2001).

With the advent of Grade R as a compulsory year, and now part of the Foundation Phase of education (Grade R to Grade 3), it has become necessary to be more discerning and base entry to this grade on more valid, reliable and concise criteria. The ECD policy articulated in the *Curriculum and Assessment Policy Statement* (DoE, 2011) has recommended that compulsory intake for admission to Grade 1 be instituted by 2012.

A further justification for this instrument is that once a child repeats Grade R it reduces his or her chance of repeating another year in the Foundation Phase (National Education Policy Act 27 of 1996), due to the statutory requirement that a child may not repeat more than once in any given phase (National Education Policy Act 27 of 1996). Careful consideration is therefore needed at the Grade 00 or pre-Grade R (an age range of 4-5½ years) level before a transition to Grade R is made. As the world is “shaped by global competition” international initiatives are geared towards promoting the attainment of skills in children prior to Grade R entry (Barnett & Yarosz, 2007; Bordignon & Lam, 2004), and consequently the criteria for Grades R and 1 are become more demanding.

Research suggests that school readiness at Grade R entry has effects on Grade 1 schooling outcomes (Hojnoski & Missall, 2006). Skills at school entry correlate greatly with later skills in literacy and mathematics (Snow, 2006), and pre-kindergarten (Grade 00) performance has been related to academic achievement through to Grade 10 (Stevenson & Newman, 1986). Children with difficulties in the earlier years across the developmental domains are at higher risk of problems throughout their school careers (Flanagan et al., 2003). Graue and DiPerna (2000) found that early retained students were more advanced than those retained at later grades, and that delayed entry into kindergarten led to academic skills consistent with peers. In South Africa, statistics show that more children are retained in Grade 1 and in the Foundation Phase than in other grades (Department of Basic Education [DBE], 2010; Taylor, 1989). The rate of repetition in primary schools was higher than that for both developing and developed countries (DBE, 2010). Liddell and Rae (2001), in a sample of rural South African children, found evidence that Grade 1 achievement strongly predicts survival through the primary school years, a situation that provides justification for identifying difficulties in the early years so as to promote competent, adaptive functioning at the start of formal schooling.

A final motivation was that a gap was observed in readiness measurements that did not include early birth and toddler development issues. According to Snow (2006), very few studies of school readiness include data on birth or toddlerhood, yet these constitute a key school readiness component. Compelling research evidence shows the negative impact of low birth weight and prematurity on school readiness and later academic performance (Pitchford, Johnson, Scerif, & Marlow, 2011).

1.3 Aim of the study

Against this background, the purpose of the study is to develop a school readiness instrument for the needs of South African school children, at the Grade 00 level, generally the 4 to 5 age group, to identify developmental risk factors for later learning difficulties.

1.4 Significance of the study

Psychological assessments and interventions are generally inaccessible to the disadvantaged communities due to the cost and lack of economic and human resources. In a country where a sound education is still a privilege it is important to assist in making testing and interventions more accessible to disadvantaged communities and under-resourced schools. The need for cost-effective and relevant testing is called for (Foxcroft, Paterson, Le Roux, & Herbst, 2004), and screening is a quick and effective method, in terms of cost, time and effort, for identifying children for further evaluation (Neisworth & Bagnato, 2004). However, practical experience shows that comprehensive assessments are not always necessary and there is no formal measuring tool available that encapsulates the various developmental domains: physical-medical (sensory); birth developmental milestones (cognitive); approaches to learning (with the specific inclusion of motivation); social-motional (with the specific inclusion of play and self-regulation); and motor (gross, fine and perceptual), in one measuring instrument to assess at-risk factors in the pre-Grade R group, and by implication school readiness. A diagnostic model presented by Berninger (as cited in Gredler, 2000) states that “what is needed is a multi-domain developmental approach to differential diagnosis of school age disorders” (p.97).

An overall suitable screening test for school readiness for Grade 00 does not exist in South Africa, the only one to assess social-emotional school readiness available at Grade R level having been developed by Bustin (2007). In South Africa and in developed countries such as the USA, pre-Grade R attendance rates are widely unequal and many children who would benefit most from participation do not attend schools (Barnett & Yarosz, 2007). Although there is consensus that ECD programmes in this country should meet developmentally appropriate, diverse needs, in respect of the different aspects of development, its implementation differs greatly (Meier & Marais, 2012). In view of these factors the construction of an instrument to screen for those being promoted to Grade R is necessary. Further, when identifying children at risk, we “shift the odds towards more optimal developmental trajectories” (Roberts, Bellinger, & McCormick, 2007, p.162). The risk of academic difficulties at age 8 can be accurately predicted in the preschool period by looking at cumulative risk factors (Roberts et al., 2007).

Another significant element of this study was the grassroots approach, in that the items for inclusion in the instrument were substantiated and based on actual assessment criteria that are used to evaluate children by local teachers in both private and public schools. Readiness criteria adopted by speech, language and occupational therapists, and by educational psychologists in Durban, KwaZulu-Natal, were also referenced. This makes it highly relevant to local needs.

1.5 Chapter breakdown

Chapter One has focused on the aims of and background to the study

Chapter Two focuses on the conceptualisation of risk factors and the need to track at-risk children. Positions for screening and assessment tools are presented. The link

between risk and school adjustment and the concept of learning difficulties is discussed.

Chapter Three is dedicated to the concept of school readiness, views and theories on which are explored. The association between school readiness and later school adjustment are explored, with the link of risk factors to later learning difficulties (LDs) drawn.

Chapter Four explores the three domains (perceptual, speech and language and cognitive) of development that are *directly* related to school readiness and the behaviours that underpin the competencies in each domain. Their relationship to academic risks is illustrated.

Chapter Five explores the three domains (social-emotional, neurological and developmental) of development that are *indirectly* related to school readiness and the behaviours that underpin the competencies in each domain. Their relationship to academic risks is illustrated.

Chapter Six entails a discussion of the construction of the screening instrument. Issues involved in test construction are discussed.

Chapter Seven describes the research design and methodology, also with reference to ethical issues.

Chapter Eight is a presentation of the results.

Chapter Nine presents a detailed discussion of the results and conclusions regarding whether the study has achieved its aims. Recommendations are made.

CHAPTER 2

SCREENING, ASSESSMENT AND SCHOOL READINESS MEASURES

The aim of this chapter is to give an overview of the distinction between the concepts of screening and assessments, school readiness measures and the need to track children at risk of developmental delay. There follows a brief overview and discussion of the developmental constructs used in the questionnaire and the link to later school adjustment.

2.1. The need to track at-risk children

The need for early identification is well documented (Blair, 2001; Briggs-Gowan & Carter, 2008; Brinkman, Wigent, Tomac, Pham, & Carlson, 2007; Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006; Smart et al., 2008). The most important goal of identifying children at risk of developmental difficulties is to provide consistent and reliable identification and subsequent intervention. In the South African context access to early diagnostic and intervention services is a priority.

The reality is that children are not born equal but rather start life with genetic blueprints of personal characteristics and inner predispositions. They are born into families, environments, social and political situations that will earmark whether they will go on to develop normally or face substantial problems that will place them at risk of developmental problems. It is now well established that early and proper identification of children, followed by appropriate interventions, will minimise the consequences of events that add to vulnerability and later difficulty (Jens & Gordon, 1991; Margetts, 2005). It is important to identify risk early to maximise learning

opportunities. Children who lack opportunities to build strong language and literacy foundations between birth and age six struggle to come up to the level of peers when formal literacy training begins at school entry in Grade 1 (Hickman & O'Carrol, 2012). Identification and raising awareness among educators at schools should be made a priority as risk factors influence children's educational outcomes (Pritchard, Clark, Liberty, Champion, Wilson & Woodward, 2009). Roberts et al. (2007) indicate that risks are apparent early in a child's life but academic difficulties only manifest themselves in formal schooling when increased demands are placed on children for complex learning. Early identification methods are needed so that remediation can be implemented at preschool level to prevent later school problems and reduce the need for special education services in the long term. Identifying children at greatest risk of school failure in the early years will avert adverse long-term outcomes by instituting prevention programmes prior to the commencement of formal schooling. Early identification of mental health problems in ethnic minority children, together with effective referral, can prevent academic failure in the long term (Barbarin, 2002).

It is important to identify risk because early remediation of difficulties in the various domains of development such as cognitive, speech, hearing and learning reduce later risk of emotional and behavioural problems (Shonkoff & Phillips, 2000). Even before school entry, poor academic skills have been significantly associated with marked emotional and behavioural difficulties (Sheridan et al., 2010).

Studies have shown that identification and intervention in the child's early years is considered a national priority, as the consequences of neglect have far-

reaching consequences long into adult life, both in terms of economic returns and wellbeing (Heckman, 2006; Shonkoff & Phillips, 2000), and that fostering school readiness in younger children builds a foundation for later learning and lifelong development (Rimm-Kaufmann, Pianta, & Cox, 2000a). Janus and Offord (2007), argue that “school readiness should be seen as a health-based measurable outcome that has long term consequences for population health” (p.2).

2.2 The preschool years and identification of risk

The preschool period is an important developmental phase because it is at this stage that difficulties experienced from the mother’s pregnancy through to birth, infancy, and the toddler years begin to merge in specific ways. It is in this phase of development that children “grow into their disorder” (Lidz, 2003, p.202) When assessing children in this age group, careful history taking would frequently reveal many risk factors such as accidents, hospitalisations, seizures and traumatic birth experiences that medical evaluations such as cat scans and x-rays would not identify, because these, apart from evident medical conditions, are not manifested in physical ways (Lidz, 2003). Unfortunately, such tests are unable to tell the sequelae of an injury as these present as soft signs. The consequences of such incidents are not obvious and their effects only show up later in life, when the child has to engage in formal learning tasks that require the use of the affected part of the nervous system (Lidz, 2003). While clear definitions exist for traditional disability categories there is generally no clear definition of “developmental delay” or “at risk”. There is no guideline or agreement about the “best index for risk” (Meisels & Wasik, 1990), yet biological risk factors such as apgar scores, birth weight, gestational age and

environmental risks, such as economic status, social support, and parental level of education, are vital indices in determining the level of risk.

Brooks-Gunn and Lewis (as cited in Lidz, 2003) argue that the value of screening is to identify risk rather than relying on the accomplishment of a milestone in a child's development. It is not in children's best interest to adopt a "wait and see" approach or at best wait for them to grow out of the problem (National Joint Committee on Learning Disabilities [NJCLD], 2007). Screening for at-risk factors allows one to identify potential difficulties early enough. They further state that it is better practice to identify early signs of risk that herald the development of dysfunction later on. A screening instrument gives one the opportunity to explore the major domains of development at a given time. As variations exist at age milestones, and they have to compete and function effectively with children in their age group, the wait and see approach does not serve them well. Also, while initial milestones may be reached, impairment and the quality of the skills may be compromised (Horovitz & Matson, 2011). Children's developmental timetables are limited in space and time, so the sooner intervention and identification take place the better the opportunity for positive growth. The Learning Disabilities Roundtable recommends that just as preschoolers are screened for hearing and vision so they should be screened to assess reading skills and language development (NJCLD, 2007).

2.3 Screening as opposed to assessment

There is consensus among many writers that screening should precede a comprehensive assessment battery (Lidz, 2003; Neisworth & Bagnato, 2004), the goal being to determine whether the child needs a diagnostic assessment. It should be a

precursor for further exploration and identify children who appear to have delays in development so that appropriate referrals can be facilitated (Tieman, Palisano, & Sutlive, 2005). Screening tools should be implemented to bring attention to learning problems at a young age (Gredler, 2000). The purpose of screening, according to Lidz (2003), is to categorise children into *risk*, *caution* and *no risk* groups, and: “Screening measures need to predict diagnostic procedures and diagnostic procedures need to predict future functioning” (Lidz, 2003, p.23). Further, screening should provide an opportunity for interventions that are designed to meet individual needs either within the classroom or with outside support services, with the aim of rescreening to determine if risk areas are addressed. As development is “episodic”, repeated measures are called for rather than a single assessment or screening to formulate a comprehensive picture of a child’s developmental progress (Coombes, as cited in Beirsteker & Dawes, 2008). Planning and interventions as a result of early screening can improve the child’s first-time experience of formal schooling (Meisels, 1986). Screening tools are not intended for diagnosis, educational planning or to make placement decisions (NJCLD, 2007), but while they are not as comprehensive as diagnostic assessments they do provide useful information about a child’s strengths and weaknesses, and can be used for identifying children for further assessments or preventive intervention (Lonigan, 2005). The screening is intended to serve as a filter for referral for professional intervention, “... not to diagnose a disorder or to plan a treatment approach, but rather to suggest to the professional when and to whom to refer for further diagnostic evaluation” (Kenny & Culberston, 1993, p.73).

Tieman et al. (2005) advocate that screening tools should include measurement in several developmental domains, for example, motor, cognition,

language, and should be inexpensive and relatively short. Referral for a multidisciplinary developmental assessment for targeted screening or comprehensive evaluation should be considered if a screening suggests delays in at least two areas (NJCLD, 2007; Tieman et al., 2005). Screening should identify children at possible risk of special learning needs (Pianta & McCoy, 1997). Tests, according to Meisels (1986), should not be used to make placement decisions without the benefit of a diagnostic evaluation. “A single evaluation based on a solitary instrument” does not give a comprehensive picture of a child, thereby necessitating repeated screenings and assessments that capture levels of functioning at differing points in time (Bordignon & Lam, 2004, p 741).

Screening tools may be a better option for assessing developmental levels as young children are not the best test-takers. Further, limited language facility, lack of self-control and attention and poor motor and social skills make them a difficult group to test (Kenny & Culbertson, 1993; Neisworth & Bagnato, 2004). The terms “screening” and “readiness” are often used interchangeably (Gredler, 1997; Harris, 2007a; Lange & Thompson, 2006; Rafoth, 1997).

2.4 Screening as opposed to diagnosis

Screening should not be confused with diagnosis (Harris, 2007a; Leung, Mak, Lau, Cheung, & Lam, 2010; Satz & Fletcher, 1988), a distinguishing factor between a screening instrument and an assessment or diagnostic procedure being that the former is not meant to identify the causes of or diagnose specific types of learning disorder. It simply identifies those children who are at greater risk and should not require the expertise of a professional for interpretation, as true screening is cost-effective and

rapid and (Panter & Bracken, 2009; Satz & Fletcher, 1988). Diagnostic assessment should be reserved only for those children who have been identified as positive on the screening instrument.

2.5 Readiness tests

Sometimes screening instruments are used as readiness tests for school entry rather than suitability for intervention. According to Gredler (1997, 2000), developmental screening measures and readiness tests often overlap, and it is difficult to make clear distinctions between them. Readiness tests, according to Gredler (1997), are related to school learning tasks that are predictive of school success, and designed to assess specific accomplishments that signify academic readiness (Meisels, 1986; Meisels & Atkins-Burnett, 2005; Myers, 2001). Medical and developmental or even social and emotional risk factors are generally not included in them (Janus & Offord, 2007). Developmental screening tests, meanwhile, are used to identify children who have risks that would affect their potential for success at school. A screening test must sample a variety of developmental tasks, be holistic, integral, sufficiently detailed and focus on performance in a wide range of areas of development, including speech, language cognition, perception, affect, gross and fine motor skills (Bayoglu, Bakar, Kutlu, Karabulut, & Anlar, 2007; Meisels, 1986; Myers, 2001). Myers (2001) argues that school readiness measurements are close to child development measures as development is holistic and integral, and specific skills in the early years are related to readiness for literacy and numeracy.

2.6 The validity of decisions based on screening instruments for placement

According to Tieman et al. (2005), it is important to identify developmental delay so that decisions can be made regarding suitability for special services. One of the criticisms regarding early testing and screening is that some interventions are considered drastic, such as restricting school entry to Grade R or Grade 1 (Gredler, 1997; Pianta & McCoy, 1997, Snow, 2006), and delayed school entry is not considered a limited predictor for later school success (Snow, 2006). Notwithstanding these arguments, the purpose of development of this questionnaire is to cater for children who are starting on such widely differing developmental timetables that it might be better to equalise learning opportunities in the early years, catch up and start formal schooling on an equal footing with advantaged learners. It is easier to catch up in informal set-ups of the pre-kindergarten year or Grade R than in the complex demands of formal schooling. Also, the screening instrument is devised for identification of high risk individuals. A further, consideration should be the statutory requirement for a child to repeat once only in the Foundation Phase. This must be taken into account when making decisions regarding delayed entry and/or promotions.

There are both limitations and uses of early screening, with a possible alternative being a process of “developmental surveillance” coupled with the use of screening tests (Glascoe, 2005). Coined by Dworkin (2004) ‘surveillance’ is a process of monitoring development within the context of the child’s whole life, which entails gathering data from various sources through observation and reports, medical history, physical examinations and broad mental health screens, for example, assessing for Attention deficit-hyperactivity disorder (ADHD). This process offers

opportunities for optimal solutions for addressing developmental delays rather than a narrow focus on holding back children.

2.7 The relevancy and need for screening in the South African context

The *Education White Paper 5* (DoE, 2001) draws attention to the widely disparate social and economic experiences of children before they start school. Both locally and internationally, many children from underprivileged backgrounds are not enrolled in quality child care programmes, nor are they exposed to quality home stimulation in the early years before enrolling in accredited kindergarten or pre-kindergarten facilities (Beirsteker & Dawes, 2008; Hojnoski & Missall, 2006; Snow, 2006). Children from disadvantaged backgrounds need quality educational input to improve their outcomes (Beirsteker & Dawes, 2008), whilst poor-quality early education results in large numbers of children who arrive in pre-Grade R and Grade R without the basic social or academic skills needed for successful school outcomes (Shonkoff & Phillips, 2000). Children enter schools with diverse healthcare needs, cultural and linguistic differences, and many risk factors (C. Ramey & S. Ramey, 2004).

Starting life on such unequal terms places a learner at great disadvantage, whilst sorting and selecting children in the early years has advantages, as they are then more competent to cope with complex demands of learning later on. Screening children at Grade 00 level is contextually relevant in a country that is struggling to meet its commitment to offer quality education to its young citizens, as evidenced by South African children's poor performance by international measurements and standards (Reddy, as cited in Chisholm, 2007). Based on ANA 2011 results, after six

years of schooling in KwaZulu-Natal, literacy in Grade 6 was 39% and numeracy was 31%, more specifically, 1 in 3 cannot read and 7 in 10 cannot count (Medley & Pillay, 2012). The Trends in the International Mathematics and Science study (Timms) continually show this trend even in 2012. While in 2012 the ANA results peaked somewhat, South Africa was one of the 45 lowest performing countries (Jansen, 2012). In the Western Cape, more than 60% of children did not achieve reading and numeracy levels according to the national curriculum goals and 15% at nine years of age (grade 3) could not do basic calculations or read (WCED, 2005). Klop (cited in Beirsteker & Dawes, 2008), tracking literacy levels from Grades R to 3, found that language impairment remained stable across this period. These reports clearly show and strengthen support for *Education White Paper 5* (DoE, 2001) to provide in-depth quality services to children. Screening and early identification comprise just one such need.

In a methodologically rigorous study, Datar (2006) found that delayed entry into kindergarten in at-risk children was associated with significantly higher scores in reading and mathematics at preschool entry, and that performance increased in the first two years of formal schooling. The results are compelling and support the need for screening at-risk children to prevent unnecessary delays in the education process.

2.8 Preventing school failure and grade retentions

While it has been emphasised that it is important to identify children at risk early enough to prevent later school failure, grade retention remains a controversial issue. This study considers delayed entry into Grade R rather than view it through the

lens of retention. Timing of retention as a concept has generally not been included in investigations (Silberglitt, Jimerson, Burns & Appleton, 2006).

2.9 Developmental domains included in the screening measure

Screening must sample various developmental domains and focus on performance in a wide range of areas of development. Current conceptualisations of school readiness are multidimensional. Measures and screening tools include the following domains: physical health, speech and language, cognition or learning approaches, perception (visual and auditory), social-emotional and gross and fine motor skills (Derbyshire, 2006; National Education Goals Panel [NEGP], 1998; Smart et al., 2008). The NEGP (1998) defines school readiness through five domains or pillars: Physical and Motor Development, Social and Emotional Development, Approaches to Learning, Language Development, and Cognitive Development.

This chapter has reviewed the need for a measuring instrument to identify risks and has touched on the issues relating to the concepts of screening, measurement and developmental domains for inclusion in a readiness instrument. The next chapter contextualises the concept of school readiness within various theories that define the concept.

CHAPTER 3

SCHOOL READINESS

3.1 Introduction

The aim of this chapter is to explore the theory that underpins the concept of school readiness and its impact on school adjustment and academic achievement in formal schooling. It also contextualises the theories, predictors and risk factors for learning disabilities. The chapter concludes with an understanding that school readiness is multidimensional at a conceptual and measurement level and should be considered holistically.

School readiness has attracted a considerable amount of attention and debate from many quarters of the public domain (education, economics and political) in recent years. It is increasingly recognised that early learning has lasting influences across the lifespan as it impacts on future educational achievements, adult earnings and even psycho-social adjustments (Barnett & Yarosz, 2007). Developmental theorists, parents and educators also hold a range of beliefs and understandings of the important skills that constitute school readiness and how it develops (Dockett & Perry, 2002; Hair et al., 2006). Parents seem to place importance on cognitive skills, while educators tend to lean towards the importance of socio-emotional development, while educational policy dictates a cut-off age (maturationist viewpoint) for school entry. Political and social concerns have focused on the long term consequences of delayed identification and intervention (Ackerman & Barnett; 2005; Beirsteker & Dawes, 2008; Heckman, 2006; Shonkoff & Phillips, 2000; Snow, 2006), and even the medical world, particularly paediatricians, are called upon to become involved in the

decision-making process of school readiness, as it is considered a developmental service to make early referrals for quality child care for at-risk children (Zuckerman & Halfon, 2003). Definitions of school readiness as a result vary, depending on the emphasis of stakeholders and the theoretical perspective adopted.

The maturational, developmental and ecological perspectives are prevalent theories that underpin the concept of school readiness (McWayne, Fantuzzo, & McDermott, 2004; Rimm-Kaufmann & Pianta, 2000b; Sassu, 2007; Winter & Kelley, 2008). An ecological perspective holds relevance in the South African context as it considers the developing child within the complex multiple systems that have a profound impact on the child's ability to thrive (Dawes & Donald, 2000). Furthermore, this theory is apt in explaining the unequal, vastly disparate beginnings with which children in South Africa currently have to grapple. A wholly developmental approach is a limiting perspective because children are not merely a definition of their internal blueprints but are a developing outcome of interacting environmental and contextual factors.

3.2 The significance of school readiness

School readiness marks an important developmental transition into the formal world of learning and as such is a crucial phase in the life of a child, his/her family and the school that is going to accommodate him/her. It is a general view that the extent to which a child will meet the challenges of the first year in formal schooling will determine the outcomes as either a happy and fulfilling school career or one that is marked by difficulty, negativity and failure, (Dockett & Perry, 2007; Hirst, Jervis, Visagie, Sojo, & Cavanagh, 2011; Whittle, 1982). Children who do not enjoy

positive early transition into formal schooling are bound to experience many predictable negative sequelae (Margetts, 2005; Shonkoff & Phillips, 2000), therefore identifying difficulties prior to school entry and providing interventions is essential to facilitate positive developmental trajectories. School readiness should be understood in terms of the contributions of the early years to children's future development (Janus & Offord, 2007; Shonkoff & Phillips, 2000).

School readiness is fundamentally linked to school achievement; with much research data supporting the argument that acquired skills at school entry have a high correlation with later skills, especially in literacy domains (Snow, 2006). A record number of children in this country start school with significant delays, and as C. Ramey and S. Ramey (2004) argue, it is imperative to provide those in the pre-kindergarten years with effective learning opportunities, as waiting even for kindergarten levels to show signs of delay is too late.

3.3 School readiness: a process in transition and adjustment

The transition to formal school (usually between the ages of four and six) is an important milestone in a child's life, presenting "potential challenges" and entailing significant adjustment at multiple levels (Turnbull, 2006). The classroom environment places demands on cognitive factors such as reasoning abilities, memory and recall. Emotional and social capacities to cope with increased workload, structure and expectations of the school day are also stretched to accommodate growing independence from adults, establishing routines, adhering to rules and "getting along" with peers. Self-regulation, increased attention span and staying alert for longer periods are a further challenge (Rimm-Kaufmann et al., 2000a). The ability to self

regulate is associated with successful school adjustment (Blair, 2002), and major shifts in ecological transitions manifest in this period. Poor adjustment to preschool is a precursor of many difficulties later on, such as dropping out, retention, and school failure (Jimerson, Ferguson, Whipple, Anderson & Dalton, 2002).

3.4 Theoretical and conceptual models of school readiness

The following theories of school readiness were employed as a framework for this study.

3.4.1 The maturational approach

A review of the literature clearly supports that readiness as a term is controversial and not clearly defined (Dockett & Perry, 2002; Sassu, 2007). Graue (1998) describes it as a “murky idea integrally tied to our ideas about how children develop and what we can do to support the process” (p.13), but, historically, the main criterion for assessing school readiness was age (Ackerman & Barnett, 2005; Crnic & Lamberty, 1994). Considered a maturationist perspective, it is based on a “chronological set-point” or cut-off age for school entry and remains a dominant perspective and practice (Snow, 2006).

The maturational approach was largely based on Gesell’s notion that readiness is a biologically determined construct (Gesell, 1940). School readiness as a function of maturation holds that children who are not ready need more time to develop intellectually, socially and physically. Developmental abilities, according to this perspective, proceed in a linear manner that is dependent on an internal clock within the child that indicates a sense of readiness that will improve chances of success at

school (Marshall, 2003). Development is presumed to precede learning, while maturity is necessary for successful learning (Graue & DiPerna, 2000). This approach sees readiness as inherent in the child and focuses on his or her characteristics and potential.

An outcome of this view is a cut-off age for school entry, which leads to the contentious practices of retention, delayed school entry and transition classes (Carlton & Winsler, 1999; Marshall, 2003). A commonly held assumption amongst teachers and parents is that if a child is not sufficiently mature an extra year may put it at an advantage in learning due to development (Marshall, 2003). School readiness is therefore synonymous with age entry, a practice that sparks intense debates and concerns at the end of each school year in classrooms around the world when decisions regarding promotion are made. The cut-off age criterion has become a mandatory practice worldwide (Meisels, 1999), as supported by the writer's personal experience. Many referrals are made by schools and concerned parents who would like to keep a child back an extra year in preschool, to have a psycho-educational assessment made to motivate their request for a repeat year. Policy dictates that children who turn six in their preschool year are legally expected to commence Grade 1.

Age entry varies from country to country and within countries, despite age and maturity being seen as linked concepts (Sassu, 2007; Smith, 2005; Stipek, 2003). Cut-off dates vary from school to school, even in the same city but more particularly across state and private schools. Applying cut-off dates results in a wide difference in age range at the start of school entry. Commonly in South Africa, a Grade 1 class would accommodate an age range from five and half to seven years old. Concern for

this wide age gap is often influential in parents' decision to keep their child back as he/she may be the youngest in class and would have to compete with older learners, thus being disadvantaged. Birthdays close to the cut-off date (30 June in South Africa) tend to result in parents keeping their child back to give the edge for development. This practice sparks debates at a lay and policy level, and such a wide age gap means that there would be a widely differing range of skills and abilities in a single classroom, raising issues around what are the actual "readiness skills" at the starting point. Wide age ranges also place a burden on teachers to address individual needs, and "older" children, by virtue of being held back, place increased demands on more enhanced academic curricula to accommodate their needs

Retaining children at any grade level is a contentious issue (Guèvremont, Roos & Brownell, 2007; Liddell & Rae, 2001). Research yields inconclusive results with most strongly supporting the notion that delaying school entry is not a predictor of academic success, and that children do "catch-up", given the right opportunity (Burkam, LoGerfo, Ready, & Lee, 2007; Datar, 2006; Graue & DiPerna, 2000; Grissom, 2004; Morrison, Griffith & Alberts, 1997; Stipek, 2003). It is suggested that other risks, such as status at birth, parental educational status and parental involvement at school, amongst other environmental variables, be considered and targeted for prevention efforts rather than retention (Blair, 2001; Jimerson, et al., 2002).

Outcomes of studies vary, however, with some showing that younger kindergartners make the same progress in academic subjects, and others indicating that age at school entry have little to do with eventual academic outcomes (Marshall,

2003). Morrison et al. (1997), in comparing progress of older and younger first-graders found that younger ones outperformed their older peers. They concluded that age is an insufficient factor in benefitting from teaching instruction in mathematics and reading in first grade. Stipek (2002) concluded that teaching instruction and schooling experiences contribute more towards the development of reading, literacy and mathematics skills than “time to mature”, and that for skills such as story recall and conservation general maturation may be needed.

Although scant, some research however finds that children who entered kindergarten a year older than their peers, due to maturational development, tend to perform better than their younger counterparts in academic skills and social and emotional adjustment (Nagaoka & Roderick, as cited in Abbott et al., 2010; Teltsch & Breznitz, 1988). Hong and Yu (2007) find some evidence of the positive effects on social-emotional development and higher levels of competence and interest in school subjects in early, middle and late elementary years, as a result of kindergarten retention. Some short-term benefits have been reported for students retained in Grades R to 2 (Ferguson, Jimerson, & Dalton, 2001). McLelland, Morrison and Holmes (2000) found that developmentally younger children have poorer work-related skills, such as listening to directions and complying with teacher demands. Datar (as cited in Ackerman & Barnett, 2005), found that children a year older than their peers had statistically significant better scores in reading and mathematics.

More affluent parents, regardless of state policy, exercise personal choice and opt to give their children, who are eligible for school entry, an extra year, to avoid possible disadvantage later (Marshall, 2003). Poorer parents who would like that

opportunity cannot opt for delayed entry, even if needed, due to the high cost of preschool education. The converse is also true for socio-economic disadvantage, as children from lower income families, who lack cognitive stimulation, are more likely to be retained as preschool levels and become more demanding in their academic focus (Burkam et al., 2007). Boys are more likely to be kept behind because parents, teachers and screening tests tend to identify girls as more socially able and cognitively mature (Graue & DiPerna, 2000; Guèvremont et al., 2007). Age at school entry at best yields mixed feelings, and research findings indicate that it is not always relevant for academic progress and wellbeing. The general agreement is that age is not the best predictor of school readiness, and age and birth dates should not be used as a sole criterion to determine school readiness and subsequent retention. A much better approach would be to use a comprehensive developmental profile.

South African schools adhere to a policy that age determines school entrance, though the South African School Act (1996) makes provision for delayed entry until the year in which a child turns seven. Many private schools use that as a standard criterion and would not accept younger children into Grade 1. Younger children turning six between January and June are accepted into Grade 1, should they meet the readiness requirements dictated by the school.

School readiness, solely as a function of age, is a limiting practice. It does not take into account variance in individual development or the wide age difference of a minimum of at least twelve months between the oldest and youngest child in the same classroom (Stipek, 2002). Reliance on age also overlooks the substantial inequalities in experience with which children enter school, thus affecting academic and other

outcomes (Burkam et al., 2007). Age and maturation confound explanations as to why some younger children may be ready for school and some older ones may not adjust socially or academically (Carlton & Winsler, 1999). Relying on age as a function of developmental milestones does not prepare the child, parent or school for potential problems that would manifest later (Lidz, 2003). Adhering strictly to age criterion also prejudices those children who have school entry skills that would enable them to benefit from starting school. Knowledge, abilities, exposure to home and cognitive stimulation, enriching cultural experiences and access to good quality day care centres contribute to starting skills that advantage some children. Chronological age licenses eligibility for school entry but does not necessarily mean children are ready, as their development is irregular and episodic and their preschool experiences may vary (Ackerman & Barnett, 2005; Saluja, Scott-Little & Clifford, 2000).

While age might be a common denominator for starting school, children in the same cohort vary widely with regard to the different developmental areas. Having older children in kindergarten increases pressure on teachers to escalate the curriculum to accommodate the older child. It also puts pressure on the younger less socially advantaged child to keep up (Dockett & Perry, 2002). This supports the practice of locating the problem with the child. A legitimate concern of delayed school entry is that children's development is individual, unique and rapid. Unreadiness at one point may soon point to a situation of "readiness".

De Wit (2011) draws a distinction between 'maturity' and 'readiness'. School maturity is seen as a function of maturation of physical and mental growth and unfolds according to "individual tempos", therefore maturity cannot be linked to a

specific chronological age as children develop at different rates. Readiness, according to De Wit (2011), is an “educative norm” that requires that children learn at their own pace as they show different degrees of readiness for different types of learning. Age can therefore not be used as a reliable measure of readiness.

In summary, the maturationist approach tends to be narrow, somewhat exclusionary, and overlooks the multi-faceted nature of the learning outcomes as well as the multidimensional nature of development (Denham, 2007). At best, it denies those children an opportunity who need it most (Carlton & Winsler, 1999; Marshall, 2003). School readiness based on age has not worked in practice and paradigm shifts have been needed for the consideration and conceptualisation that account for variables over innate developmental timetables. Age remains a weak predictor of readiness (Stipek, 2003) and thwarts populations of children who need learning exposure most. Schooling experiences have been shown to enhance learning and contribute to children’s working memory, which is a critical tool for complex learning (Ferreira & Morrison, 1994)

The whole issue of age and maturation highlights that *age* and *readiness* are not the same thing (Dockett & Perry, 2002). The maturationist model fails to look at social and environmental factors that are in constant interaction in a child’s life. The many other variables that need to be considered over age are the influence of family characteristics, maternal occupation, social and educational experiences at home and quality of preschool programmes (Hair et al., 2006; NICHD, 2002; Shonkoff & Phillips, 2000). These considerations lead to a broader conceptualisation of school readiness.

3.4.2 An ecological conceptualisation of school readiness

Ecological perspectives view school readiness as an outcome of the myriad environmental experiences that impact on the development, learning and adjustment of a child to the demands of school. School readiness is an outcome of factors within the child, its environment and interactions at multiple levels in a child's ecological system. School readiness is a far more complex phenomenon than simply a process restricted to an age-defined number.

The ecological perspective formulated by Bronfenbrenner (1989) is a useful framework for understanding developmental outcomes from an interactionist perspective, and has relevance to South African children, as political, economic and social contexts are critical in shaping developmental processes (Dawes & Donald, 2000). Developmental challenges and transitions cannot be isolated from the challenges of social issues and barriers to learning (Swart & Pettipher, 2007), and Bronfenbrenner defined four nested systems: microsystem, mesosystem, exosystem and the macrosystem, in which children learn and development is influenced. To understand development within these contexts, Bronfenbrenner introduced the notion of four interacting dimensions, *person*, *process*, *contexts*, and *time*, which undergo change over time as a result of children's maturation and changes in the environment. This implies that children are in dynamic interactions with their environments, each influencing the other at different levels and at the same time having a powerful impact on development. School readiness then depends on multiple factors both within and outside the child. Transition to school creates significant shifts in the child's ecological system as they contend with the demands made of them at academic and

social levels and the physical changes in their new learning environments (McBryde, Ziviani, & Cuskelly, 2004).

School readiness can be viewed holistically within the four interrelated and concentric systems of Bronfenbrenner's theory. The microsystem, the innermost circle, consists of the bidirectional interactions and activities in the child's immediate environment of home and school, classroom and playground, with bidirectional here referring to the reciprocal influences in adult and child relationships. A child with a secure social sense of the world is more likely to make a smoother transition to a new situation than a fearful, anxious one. The mesosystem refers to the relationship between associated microsystems and the resultant relationships. Within this nest the relationship between the home and the school, between the teacher and the parent and between peers is modified. An unsupportive home environment may place the child at risk due to a lack of emotional support, but a caring and supportive teacher may alter that path. These factors create dynamic network relationships that directly and indirectly influence children's transition to school (Rimm-Kaufmann, & Pianta, 2000b). Meosystemic relationships exert influences in children's access to resources and ultimately indirectly impact transitions. Economic disadvantage will in essence affect activities such as sport, leisure and cultural pursuits, enhancing social relationships and academic performance (Peters, Petrunka, & Arnold, 2003). Limited access to recreational resources and poor social support effectively reduce participation of children with special needs in leisure activities (King et al., 2003). In the South African context, the wide range of systems that impact on a child's development is an essential consideration. The development of motor skills is affected by the availability of resources such as play objects, equipment and

opportunities to explore, as it restricts creativity to learn (Lotz, 2003). Physical-motor development is slowed down in children living in restricted environments while socio-economic status influences visual-motor integration (Lotz, 2003)

Ecosystems are those environments that indirectly influence children, such as health services, educational systems, media, and parents' workplace. More distal factors, such as school policies, flexible parental work schedules, and accommodation of cultural diversity, will have a bearing on children's transition to school (Denham, 2005). Flexible parental work schedules contribute to enhanced development. The macrosystem is an embodiment of the wider cultural, values, ideologies and prevailing belief system. Political views and legislations impact on the development of a child, for example, legislation defining catchment areas will place restrictions on parents regarding schools of choice.

The ecological systems theory is most effective in describing the multitude of factors that influence a child's development, with ecological assessments focussing on the interaction between the child and his/her physical, psychological and social environments to capture developmental context (Niesworth & Bagnato, as cited in Stewart, 2010). Ecological approaches are contextual, functional, and relevant, and considered an essential feature of effective transition processes (Graham, 2005).

From an ecological perspective, school readiness is best viewed as an interaction "between the developmental status and the numerous elements of a child's environment" (Snow, 2006, p.30), whilst Mashburn and Pianta (2006) suggest that it should be "more broadly understood as a property or product of the ecologies within

which children are embedded that support their developmental and educational progress” (p.152). Social interactions and transactions among people (peers, parents, and teachers) settings (school, home, child care) and institutions (neighbourhood, communities, governments) determine successful or poor transitions (Mashburn & Pianta, 2006). An ecological view of transition emphasises the importance of the relationship between home and school and the quality of the relationship between the child and the teacher in influencing learning outcomes and successful transition to school (Dockett & Perry, 2002).

The developmental ecological position accommodates school readiness as being actualised by utilising a different environmental setting that provides for more relevant resources than keeping a child back until ready (Bronfenbrenner & Ceci, 1994). Instead of retaining in Grade R, the benefits of a longer day, more intense instruction and a stimulating learning environment would facilitate cognitive and social maturation (Hong & Yu, 2007). The ecological model hypothesises that all layers in combination or in isolation exert influences on children’s developmental pathways and hence accommodate the notion of variable predictors on learning outcomes, be it an intervention strategy, a home-school partnership, poor diet or low birth weight (Liddell & Rae, 2001). External environmental factors contribute significantly to leaning experiences.

3.4.2.1 Environmental risks in school readiness

Emphasis on school readiness increasingly includes factors external to the child as predictors of academic success and school adjustment. Family instability, poverty, lack of social resources, maternal levels of education and preschool

education are contributory factors to the child's readiness for school (NICHD, 2003). These factors are linked to children's developmental differences in language, and cognitive and social skills on school entry (Currie, 2005). Even as early as 18 months, children in low income families and those with less parental education score lower on standardised developmental tests and continue to show differences into the school years (Sirin, 2005). Parental literacy and maternal wellbeing contribute to school readiness levels (Chazan-Cohen et al., 2009), whilst children from socio-economically disadvantaged backgrounds, at risk of socio-emotional problems, face greater challenges at kindergarten entry (Thompson & Raikes, 2007).

In developed and developing countries such as South Africa, poverty is associated with heightened risk of poor school outcomes, grade repetition, drop-out rates, and less than optimal school experiences (Dearing, Berry, & Zaslow, 2006; Dieltiens & Meny-Gilbert, 2009). When these factors are taken into account the view of school readiness shifts from a biological determination of readiness factors to the importance and impact of environmental factors. The correlation between school readiness and environmental factors is inextricably interwoven. Even if adequately developed cognitive capacity is present a hungry child cannot think. Environmental factors can be serious risk factors or barriers to learning and impact on a child's transition to school and subsequent experiences of success and failure. School readiness is undoubtedly a function of factors internal to the child, environmental factors and quality of family life. Within an ecological framework, school readiness is a function of the many contextual influences and connections between home, school and the broader community (Biersteker & Kvalsig, 2007; Dockett & Perry, 2002).

Successful transition to school is facilitated by the relationships between the various layers in the system.

3.4.3 An interactional view of school readiness

A more contemporary outlook to understanding school readiness is within an *interactionist* frame of reference, which posits that school readiness is a product of ongoing transactions between the child's biology (maturation and temperament) and the social interactions in his or her environment. A bidirectional nature of school readiness rather than a linear approach is implied in this view, extended by Vygotsky (1978) to posit learning precedes development because experiences enhance development. Accordingly, age is largely irrelevant and children do not need to be ready for schools, rather the schools need to be ready for the children, by guiding, supporting and instructing them according to their needs. The Vygotskian view holds that waiting for children to mature sufficiently is counterproductive, as it may never happen (Carlton & Winsler, 1999). Denying entry to school because of age unreadiness is in essence denying a child the very experiences that will help him or her cultivate readiness through the culture and learning experiences of the school. This view is consistent with neurobiological perspectives that postulate that due to the plasticity of the human brain, experiences modify brain structures (Massaro, Rothbaum, & Aly, 2006). Such learning experiences provide the skills necessary for successful school transitions and positive educational outcomes (Meisels, 1998).

Piaget (1964) also viewed the development of a child as stimulated by interactions with the physical and social world. Input from peers and teachers stimulate learning either through observation or questioning and it is not only age or

maturation but also interactive stimulation that contributes to readiness for learning. Children are born ready to learn, and according to Vygotsky (1978) and Piaget (1964) learning precedes development, with interactive stimulation rather than age or maturation contributing to readiness to learn new tasks.

When schools become involved in being ready they accommodate diversity in learners, which is especially important in South Africa with its increasing language and cultural diversity. Readiness is a complex interplay between what the child brings at school entry level, the school's preparedness and philosophy, and the connection it has with the families it serves. Readiness is a shared definition between the various stakeholders. Readiness ultimately depends on the beliefs that are held by the invested interest and expectations of various parties that influence decisions about school entry (Graue, 1992)

3.4.4 Constructivist views of school readiness

School readiness has also been viewed in terms of expectations of individual schools (Carton & Winsler, 1999), with children seen as ready in one not being considered so in another. Reasons include cut-off date or a readiness assessment (Ackerman & Barnett, 2005), but many schools, in South Africa, particularly private and better established public schools, have their own assessment criteria to measure readiness, basing their decisions on maturity concerns, a practice influenced by the culture of the school and generally the community. Readiness in this case would target the skills and behaviour that are relevant to the expectations of a particular school. These considerations may best reflect a *social constructionist* view which describes school readiness as “a function of the standards established in a certain

community” (Hair et al., 2006, p.432). From this perspective, school readiness is embedded in a child’s social and cultural context (Graue, 1992), and defined in terms of the shared views, values, meanings of education and resources held by particular schools and the families (parental expectations) that they serve in a specific community (community expectations) (Graue, 1992). This view accepts differences as variability in development rather than deficit, and accepts that one type of schooling experience may be ready for one child and not another, or that there may be a ready child but not a ready school. Just as children are expected to be ready for schools, so schools should be ready for children. School readiness should be framed as an interaction among children, families, schools and communities who share the decision-making process of whether the child delays entry or is ready to meet formal learning challenges (Grace & Berndt, 2006).

Teachers’ and parents’ perceptions and expectations of what constitutes readiness also vary from school to school in the same district and from district to district. Being ready in one school or district may not mean being ready in another (Dockett & Perry, 2002; Graue, 1992; 2006). Both parties hold similar views on school starting before the age of 5 but differ regarding what is more important. Parents, especially those from low-income homes, rate knowledge and ability, identification of letters and numbers and objects as more important (Piotrkowski, Botsko & Matthews, 2000), whilst higher order cognitive, inferential skills are considered less important (Barbarin et al., 2008). Generally, research finds that teachers value self-help skills and those children who are more independent (Thompson & Raikes, 2006). A commonly held belief amongst parents is that it is detrimental for boys to start early as they are immature (Graue, 2006). Gill, Winters,

and Friedman (2006), however, found that self-management, cooperation, and independence are secondary to academic skills in preparation for school by both parents and teachers.

3.4.5 Shifting concepts of school readiness

Apart from maturational and ecosystemic positions, interactionist and constructivist perspectives of readiness are viewed through many different lenses and depend on the individual (Graue, 2006). With a statement by the National Education Goals Panel in 1991 that “all children shall start ready to learn”, the goal of readiness shifted from children being ready to learn to being ready for school (Ackerman & Barnett, 2005; Freeman & Brown, 2008). This placed emphasis on academic work, skills acquisition, curriculum development and learning standards, and generated an industry of “readiness testing” to determine eligibility of entry to school, based on the child’s acquisition of skills (Konold & Pianta, 2005; Snow, 2006). As with the age criterion, skill criteria or readiness status is child-centred, placing emphasis on characteristics and readiness as internal to the child. Emphasis on skills and academics overlooks a holistic, multi-dimensional approach to readiness (Meisels, 2007; Snow, 2006).

It is clear that school readiness encompasses both expectations of children (maturity and supply of skills) and those of schools, and a match between children and schools is needed to maximise the learning opportunities. Ackerman and Barnett (2005) suggest that a definition of readiness should look at the “good enough” in each domain (multiple child and multiple environmental contexts), while at the same time recognising that children’s development is uneven (p.14). As children present with a

wide range of abilities, developmentally appropriate testing and practice is necessary to tailor their learning programmes.

Both the maturationist (age) and skills-driven (individual competencies) approaches have generated an industry around testing, and Graue (2006) criticises readiness checklists as a “developmental buffet” to assess normative skills by comparing to typical aged peers (p.45). Dockett and Perry (2002) take the view that readiness is a relative construct that should be viewed within a contextual framework that takes note of interactions between people, systems and their relationships. Meisels (2007) contends that the high stake emphasis on testing academic readiness neglects dimensions of development such as social-emotional domain and approaches to learning. Abundant research evidence posits that social-emotional competence and self-regulation are important for readiness (Bodrova & Leong, 2003a; Denham, Warren-Khot, Bassett, Wyatt, & Perna, 2012; Raver, Jones, Li-Grining, Zhai, Bub, & Pressler, 2011; Webster-Stratton, Reid, & Stoolmiller, 2008). Mashburn and Pianta (2006) argue that most definitions of school readiness overlook the role of the processes that contribute to the competencies measured in the cognitive, language and literacy, socio-emotional and academic domains. They consider the role of social relationships as central to the acquisition of skills needed for the readiness to learn. Ladd, Herald, and Kochel (2006) found that the ability to master interpersonal challenges at school entry is predictive of later school adjustment.

The call for accountability has had the inverse effect of raising age entry for school by increasing kindergarten standard and preparing children for tasks formerly reserved for Grade 1. This means that children are more mature when they enter

school and the expectation of higher achievement is increased. Parents then hold their children back, thus creating the need for a more enriched advanced curriculum (Marshall, 2003).

An emerging view of readiness looks at the concept of behavioural readiness, i.e., those types of behaviour that enable the child to participate effectively in the classroom. The concept looks at pro-social competencies and the ability to adequately control aggression (Bierman, Torres, Domitrovich, Welsh, & Gest, 2009). This leads to the neurobiological field.

3.4.6 A neurobiological conceptualisation of school readiness

Environments tax children's ability to function and adapt, school being one such environment in the ecosystem of the child. Following from an ecological conceptualisation which views the impact of different environments on children, the neurobiological approach to school readiness asserts that early childhood education should be viewed within the context of specific regulatory demands made of children in the environment of the classroom. Children are expected to adapt to a socially defined role, at which point neurobiological and ecological frameworks intersect. Affective neuroscience holds that emotion, memory and attention are parts of the brain that promote self regulation and undergo rapid development in early childhood, serving an important function in the adjustment to school (Blair, 2002). Emotion-related processes integrate with cognitive processes in self-regulated learning, whilst cognitive growth and social emotional development are interrelated in children (Hong & Yu, 2007). Whether it is the self regulation of emotion or the regulation of attention to execute an academic task, it is seen as a key attribute for successful school

adjustment and academic achievement (Blair & Peters, 2003; Schultz, Izard, Ackerman, & Youngstrom, 2001).

Self regulatory skills are considered even more powerful predictors of school adjustment than intelligence. In a survey of kindergarten teachers, Rimm- Kaufman, Pianta, & Cox (2000) reported that teachers found over half of the children researched lacked the self-regulatory capacities needed to function effectively in the classroom. The relationship between cognition and emotion is seen as an important goal for school readiness. Within the neuroscience framework, emotional reactivity is seen as playing a key role in the higher order processes needed for learning, such as the ability to sustain and select attention. Positive emotional expression assists goal-directed behaviour and optimal functioning, and further supports processes of memory, inhibitory control and attention (Carver & Scheier, as cited in Blair, 2002). Negative emotionality reduces the ability to engage in reflective planning and problem-solving by hampering component parts of information-processing abilities of the executive function (Blair, 2000; Posner, & Rothbart, 2000). Negative emotionality at high levels leads to poor effortful control or regulation, resulting in acting out behaviour or social withdrawal (Blair& Peters, 2003). Poor effortful control leads to poor peer interactions, a significant predictor of early school competence (Fabes, Martin, Hanish, Anders, & Madden-Derdich, 2003), therefore high levels of negative emotionality place children at significant risk of poor school readiness (Blair, 2002). Because of the neuro-anatomical link with cognitive functions in the prefrontal cortex of the brain, negative emotionality hampers higher order cognitive processes (Blair, 2002).

Literature on self regulation indicates social and emotional competency as an important factor in children's adjustment to school (Blair & Peters, 2003). McLelland et al. (2000) found that children who have difficulty controlling negative emotions of anger and distress, socialising with others, paying attention and following directions, do less well at school. Social interaction skills call upon the ability to self-regulate, as does the ability to build and sustain positive relationships with teachers and peers. Relationships serve as a "source of provisions" that facilitate or hinder children's academic progress (Ladd, Birch, & Buhs, 1999), and negative, conflictual relationships with teachers predict academic difficulties in early school (Hamre & Pianta, 2001).

Regarded as the main feature of cognitive self-regulation, Executive Function (EF) comprises memory, planning and problem-solving abilities and is crucial for school-related tasks (Barkley, 2006a). EF skills are linked to cognitive flexibility and the capacity to anticipate and plan ahead when problem-solving (Blair, 2006). Studies suggest that EF functions emerge around the preschool years and entry into formal schooling (Cuevas, Hubble & Bell, 2012).

What is apparent from the many claims to define school readiness is that it cannot be viewed as uni-dimensional. Multiple dimensions (within the child) and multiple domains in the environment (school, parents, and community resources) are involved in school readiness and these must be considered in making decisions based on it. Gullo (as cited in Bordignon & Lam, 2004) advises consideration of "... the multidimensional aspect of learning and development, as well as the multidimensional aspects of the environments in which they occur" (p.23).

3.4.7 A multi-dimensional, holistic view of school readiness

Consensus is emerging that school readiness is a comprehensive, multi-faceted concept that is not only dependent on the inherent qualities and characteristics that children bring to the learning environment but also the contexts (home, school and community) in which learning takes place (Hair et al., 2006): “School readiness is multi-dimensional, highly variable, culturally and contextually influenced over time” (Wesley & Buysse, 2003, p. 353). The National Education Goals Panel articulates a multi-dimensional concept by identifying three components of school readiness: children’s readiness for school, schools readiness for children; and family and community support as the transition to school is made. There is thus much debate as to what constitutes the critical domains of child development for school readiness (Snow, 2006).

School readiness is essentially a transactional, holistic and ecological process and therefore requires a multi-faceted approach to its measurement, as adopted in this research. While it focuses on the children’s readiness and developmental delays for school it acknowledges the contributions made by home and school circumstances and environments in preparing children for schools and their success into the early school years. It recognises that age is not a sole criterion for establishing readiness. Scott-Little and Niemeyer (as cited in Johnson & Buchanan, 2011) postulate that readiness assessments should be age-appropriate and include a range of developmental domains. Berninger (1998) proposes a diagnostic model which is “a multi-domain developmental approach to differential diagnosis of school age disorders.” (p. 97).

Five domains or areas Berninger suggests for assessment are: (1) developmental history; (2) coexisting medical conditions; (3) brain functions (e.g., motor, memory, language, perceptual, executive functions); (4) school functioning; and (5) family, school, and classroom stressors and supports (pp.97-99). Multiple domains function together to facilitate school readiness and subsequent performance, and successful social and interpersonal skills and interactions, ability to self-regulate both cognitively and emotionally, linguistic and cognitive capabilities, physical health and wellbeing are all relevant contributors to the successful transition to school. Social and emotional competencies facilitate the development of each domain and are seen as the key component of school readiness (Sheridan, et al., 2010). Language, pre-literacy skills and phonemic awareness are influential predictors of school readiness, which in turn underpin overall social adjustment (Prior, Bavin & Ong, 2011). Lane and Nadel (as cited in Blair, 2002) point out that cognition and emotion are interrelated and interdependent in the brain. Attention and fine motor skills are strong predictors of later mathematics and reading scores (Duncan et al., 2007; Grissmer, Grimm, Aiyer, Murrah, & Steele, 2010). Many skills, domains and opportunities are required for the process of being school ready.

3.5 Content domains are insufficiently represented in screening and assessment measures.

Each construct in school readiness has meaning only when viewing readiness as a multi-dimensional construct. Single domains cannot be used as sole predictors of school adjustment because each domain in concert with other domains of development contributes to school readiness. Speech impairment for example, is not limited to communication difficulties but impacts on many other domains of

functioning, such as interpersonal interactions, reading and writing skills, handling stress, and other psycho-social demands (McCormack, McLeod, Harrison, & McAllister, 2010). Multiple domains interact to facilitate the transition to school, and an “orchestra of skills” are needed to enable academic learning. Neuroscience provides convincing evidence that motor and cognitive capacities are inextricably linked and since children need opportunities to develop motor skills these cannot be left to chance (Grissmer et al., 2010). Each domain contributes to a child’s readiness for school and overall developmental competence (Duncan et al., 2007).

There is a need for continued attempts for early identification and prediction of early school cognitive performances, for early diagnosis and remediation of risk factors that could interfere with later academic achievement and learning. Early identification of children at high risk of learning and failure is almost mandatory. While cognitive, perceptual and developmental issues will remain the primary focus of preschool assessments, other variables such as motivation, emotional and social behaviour will give a more holistic picture of a child’s supportive or predictive factors to school adjustment (Bordignon & Lam, 2004; Bustin, 2007; Harris, 2007a). Successful functioning at school and in society at large requires proficiency in cognitive as well as social domains (Bordignon & Lam, 2004).

A call is made by researchers and practitioners for a more comprehensive measure of school readiness, and one that goes beyond cognitive domains. For instance, measures of play are generally not included in assessment batteries (Gagnon & Nagle, 2004), and although achievement motivation has been shown to predict school success it is overlooked in assessments (Elliot & Dweck, 1988; Harris, 2007a).

Literature on neuroscience shows clearly that executive function (EF) emerges in the preschool years and is linked to later learning, making it imperative to include this in assessment measures. Snow (2006) suggests that as school readiness is a process from birth to five years of age, that studies on school readiness should include data from infancy and toddlerhood, which is often overlooked because of the disconnection in the literature of an arbitrary cut-off between 0-3years and 3-5 years. However, there is strong evidence from neurobiology that the brain grows phenomenally in the preschool years as well as prior to it (Noble, Tottenham, & Casey, 2005), and a growing body of literature that links premature births and low birth weight to school readiness (Dall'Oglio et al., 2010; Pritchard et al., 2009). Language stimulation before 3 years results in phenomenal differences in children by the age of 3 (Eliot, 2000).

School readiness is undoubtedly more than maturational readiness; it is embedded in a socio-cultural context that includes home-school connections; teachers' views, beliefs, activities and philosophy; school policies, structure and activities; and children's skills and characteristics. School success requires a great deal more than cognitive skills (Blair, 2002). The results of many studies show that "prior achievement is a strong predictor of current achievement" or that "current achievement is a strong predictor of future achievement" (DiPerna, Volpe, & Elliot, 2005, p.309). Delaying interventions for learners at risk of academic difficulties by waiting for them to mature and catch up may be detrimental to the development of academic competencies. Bordignon and Lam (2004) stress the importance of developing preschool instruments that target indicators of later learning, whilst Crinc and Lamberty (2004) take a critical outlook that many readiness tests do not target

those domains that are strongly correlated with later cognitive demands. Rafoth (1997) suggested that early linguistic capacity, phonemic awareness, and verbal memory should be included in assessment and screening measurements as reading skills are essential for educational success. Children's types of learning behaviour, such as attitude, motivation, persistence and flexibility, are related to social and academic accomplishment and should be included in an assessment battery (McDermott, Leigh & Perry, 2002). Screening tests and readiness instruments have been criticised for their narrowly defined content, lack of reliability, validity and measurement of isolated skills (Crinc & Lamberty, 2004; Satz & Fletcher, 1988).

3.6 Implications for school readiness assessments: A comprehensive and dynamic assessment practice

School readiness is a broad concept and marks a significant transitional passage from home to school, two considerably important and influential systems in a child's life. The successful transition and adjustment to school is crucial for optimal learning and academic success, as starting school is not only about the child being ready, but the systems in the child's life being equally available to transform what he or she brings internally to the learning situations. Being ready for school is a socially and contextually embedded phenomenon and therefore a fluid and variable experience. While the definitions of school readiness vary, depending on which aspect is focussed on, an observable, measurable definition of school readiness might still adopt to the background situation.

Within a multi-dimensional, holistic approach to school readiness, assessment is a key to identifying children with difficulties, and "... plays a central role as the

gatekeeper into kindergarten” that should enable the practitioner to “compile a developmental learning profile” for all children, track progress at multiple time points and identify early learning difficulties (Carlton & Winsler, 1999, p.347). It is important that an effective screening test is able to isolate those children at risk of later learning difficulties, apart from those who will not encounter difficulties (Bordignon & Lam, 2004). Gredler (as cited in Bordignon & Lam, 2004) suggested that screening tests should identify at least 75% of those children who would be unsuccessful, whilst Duncan et al. (2007) propose that it would be beneficial to add “domain-specific early skills” to the definition of school readiness, as skills attained early are predictive of later academic achievement to guide interventions aimed at promoting academic competencies prior to primary schooling (p.1429). Early screening and intervention will help sift those children who are truly at risk of learning disability from those that are not.

Screening tools that focus on early vulnerabilities for learning difficulties should include items for both organic and language risks that exist prior to school entry (Lange & Thompson, 2006). They should be able to screen for weaknesses in foundational language skills, phonemic awareness, rapid naming, and letter knowledge, as their role as predictors is well established (Lange & Thompson, 2006; Vellutino, Fletcher, Snowling, & Scanlon, 2004). Preschoolers who struggle with letter names and sounds are likely to struggle with reading acquisition, fluency and vocabulary, and display deficits in spelling (Torgesen, 2002; Torppa, Poikkeus, Laakso, Eklund, & Lyytinen, 2006). A screening tool, although not as comprehensive as a diagnostic measure, can provide a profile of a child’s strengths and weakness and

indicate the need for further assessment and intervention (Lonigan, Allan, & Lerner, 2011). The construction of the questionnaire aims to satisfy the above criteria.

3.7 School readiness and later achievement

School readiness and academic achievement are inextricably linked, with children's school entry skills crucial for both short- and long-term academic success (Duncan et al., 2007). Linguistic and cognitive competencies are as important as social and emotional development (Shonkoff & Phillips, 2000), whilst weaknesses in academic skills, trouble following directions, problems with social skills and difficulty working independently and in a group have been cited by teachers as contributory factors to a difficult transition to school (Rimm-Kaufmann et al., 2000a). School readiness should be about what predicts school achievement and ability to embrace learning. Satz and Fletcher (1988) point out that critical to early screening is the formulation of a set of hypotheses or theories about learning disabilities and their developmental antecedents. Hypothesised risk factors should be able to predict learning status and constructs selected should reliably predict achievement or disability.

3.8 Early identification of risks associated with learning difficulties

It has long been established that early detection of learning problems has favourable long-term benefits. Early identification of children at risk ensures they receive timely intervention to prevent a sense of failure setting in (Leung, Lindsay, & Lo, 2007). Under-diagnosis of learning disorders (LD) and lack of support may result in academic failure and behavioural difficulties compromising the child's functioning over a period of time (Webster-Stratton & Taylor, 2001). Valid

assessment tools to identify risks to learning are crucial in order to put into place intervention strategies (Rothenberger, 2005). It is not the scope of this research to diagnose a specific type of learning disability or to identify its cause, but rather to screen for potential risks linked to later learning difficulties. This highlights the crucial distinction between a screening test from assessment and diagnostic processes (Lindsay & Desforges, 1998).

This research takes the position that those children from birth through to four years who demonstrate developmental delays maybe at risk of later identification of learning disability (NJCLD, 2007). Not all children, however, who show delays are at risk of LD. These delays include atypical patterns of development in the various developmental domains of cognition, motor and sensory abilities, social-emotional adjustment, speech, language and communication and emergent literacy, and they adversely affect later educational performance (NJCLD, 2007). Development across multiple domains is necessary for later school success. The research literature widely asserts that language impairment, academic deficits and related socio-emotional difficulties do not occur in isolation from one another (Bowman, Barnett, Johnson, & Reeve, 2006; Nelson, Benner, Lane, & Smith, 2004).

Learning disorders are considered developmental in nature, emerge prior to kindergarten, and continue into adult life (NJCLD, 2007). McCardle, Scarborough, and Catts, (2001) consider the following as early indicators that a child may have LD: delays in speech and language development; motor coordination; perception; reasoning; social interaction; prerequisites to academic achievement; and other areas relevant to meeting educational goals. These indicators may occur together with problems in self-regulation, attention, or social interaction (McCardle et al., 2001).

The purpose of early identification is to determine which children have developmental problems that may place them at risk of barriers to learning. As children vary in their developmental rates it is difficult to determine whether delays will be resolved or not during the course of development. It is better, however, to screen and intervene and provide opportunities for growth than to “wait and see”. However, not all children who show developmental delays are at risk of learning problems, and risks must be considered within typical developmental expectations.

It is increasingly recognised that kindergarten is the period in which foundational early literacy skills that are predictive of later reading achievement are established (O'Connor, Fulmer, Harty, & Bell, 2005; Scanlon, Vellutino, Small, Fanuele, & Sweney, 2005). Intervention initiated in kindergarten that focuses on phonological recoding and phonemic awareness promotes reading success in Grade 1 for any at-risk kindergartners, thereby altering their reading risk pathways (Vadasy, Sanders, & Peyton, 2006). A plethora of studies have shown that alphabet knowledge and phonological awareness are the strongest predictors of reading achievement in the primary grades (Adolf, Catts, & Lee, 2010; Puolakanaho et al., 2007). To gain maximum benefit from early intervention to improve reading outcomes, children need to be identified early, even before kindergarten (Corriveau, Goswami & Thomson, 2010; Vellutino, Scanlon, Small, & Fanuele, 2006).

This chapter has provided an overall understanding of school readiness and the theories that underlie the concept, and it has drawn a link to the predictors of later school achievement. It has established that school readiness is a multi-dimensional

concept (Snow, 2006), and that there is need to include items or dimensions of school readiness such as motivation, early developmental history, socio-emotional factors, language and literacy, and other risks that are largely ignored in screening and assessment measures for readiness.

The next chapter offers a review of literature and definition of the concepts of the major developmental areas that contribute to the multi-dimensional nature of development and the predictive and risk factors linked to school adjustment and subsequent achievement.

CHAPTER 4

DEVELOPMENTAL DOMAINS DIRECTLY LINKED TO SCHOOL READINESS

4.1 Introduction to the domains and dimensions of school readiness

Chapters 4 and 5 look at a review of the literature that underpins the domains of school readiness, with six constructs determined for inclusion in the final research questionnaire. These could be categorised into two streams, those domains that are directly related to school readiness, i.e., the cognitive, speech and language and perceptual, and those that are indirectly linked to school readiness, i.e., the social/emotional, neurological and developmental. Direct domains of school readiness are those aspects of development that are crucial to acquiring skills for reading, writing and mathematics. Without these it is not possible to progress. Indirect domains of development also contribute to the learning process but are not the defining tools for the acquisition of the skills of reading, writing and mathematics, thus, emotional and social immaturities may delay school entry but a child would possess the fundamental developmental tools to develop the three sets of skills.

Each construct measures different dimensions (these appear in italics next to the domain in the following sentences). Chapter 4 reviews the constructs related to the direct measures of school readiness. These are the **Cognitive** domain, which measures the dimensions of *cognitive ability* and *approaches to learning*; the **Speech and Language** domain, which measures the dimensions of *language* and *speech*; and the **Perceptual** domain, which measures the dimensions of *body awareness* and *spatial development*. Chapter 5 reviews the indirect domains of school readiness which include the **Emotional** domain, which measures the dimensions of *empathy*, *emotional regulation*, and *behavioural inhibition/self confidence*; the **Social** domain, which measures the dimensions of *interpersonal competencies*, *social graces* and *play*; the **Neurological** domain, which measures the dimensions of *gross motor*, *fine motor* and *low Tone*; and the **Developmental** domain, which measures the dimensions of *sensory development (hearing and vision)* and *concentration*.

The literature supports the notion that the criteria for school readiness generally refer to development in six major domains, namely physical, perceptual, cognitive, linguistic, affective-social, and behavioural (Derbyshire, 2006). The NEGP identified five domains of school readiness: (1) physical well-being and motor development, (2) social and emotional development, (3) approaches to learning, (4) language development, and (5) cognition and general knowledge. Physical criteria include motor (gross and fine) development (Walker & MacPhee, 2011). Constructs for the questionnaire were considered within each of these areas. As has been argued it is important to develop a multi-dimensional approach to assess school readiness. As a focus of this research is also on risk factors it has expanded the dimensions to specifically include birth, medical and developmental risks as part of the assessment criteria.

This chapter focuses on the domains of perceptual, cognitive and speech and language development, the fundamental triad for learning and academic competencies. Therefore, they form the direct measures of school readiness.

4.2 Perceptual domain of school readiness

Perceptual development is a fundamental aspect of development in children as it reflects a child's understanding of the environment. Essential concepts develop from perceptual processes, which contribute to language, cognitive development and adaptive skills required for daily living. Each developmental area works in concert with the others by contributing to and developing together. While perceptual development begins in infancy it is in the preschool years that emphasis through play and structured activities (learning skills) heightens its development. These perceptual skills (sometimes referred to as analytical skills) contribute significantly to effective learning in later years. It is through the development of perceptual experiences (formal or informal) that a child acquires basic information, which is later needed at school entry by representing spatial language through the process of symbolically coding and decoding to represent numbers and letters.

The definition of perception is largely dependent on the discipline from which one comes. Some theorists see perception as an intermediate step in information processing between sensation and cognition, implying that it deals with the concrete

aspects of an object and not problem-solving processes (Hammil, Pearson, & Voress, 1993). A perspective favoured for the purpose of this investigation, and one that inherently underlies learning difficulties, is that perception influences and is influenced by cognition, which requires an understanding and comprehension of objects (Martin, 2006). It is a process “where the brain interprets the impulses received from the senses to give it meaning” (Witthaus, n.d., p.11). Perception goes beyond what a child touches, sees and hears to include an interpretation and organisation of the sensory information to make meaning. It involves both a cognitive and sensory component. As a function of the central nervous system it involves the task of integrating the information received from the different senses, e.g., touch, hearing and sight.

4.2.1 Visual perception

Visual perception is critical to the learning process, as 80% of the information is gathered through the visual sense. It involves the ability to manipulate visual information by organising and interpreting it in meaningful ways in response to environmental demands (Dednam, 2011; Kurtz, 2006).

Visual receptive function refers to sensory function of the “oculomotor system which enables the reception of visual stimuli (visual-receptive process)” (Schneck, 2010, p.375). Put simply, it organises the information received from the environment. The components implicated in the process are the eye movements of tracking and scanning (saccadic eye movements), visual fixation, acuity, accommodation, convergence and divergence, and three-dimensional vision.

Visual cognitive function refers to the ability to structure, organise and give meaning by interpreting what is seen. Attention, memory and visual discrimination play a key role in making this happen. The attention system is necessary for higher order cognitive functioning.

Visual perceptual deficiencies are attributed to some form of brain insult to the cerebral cortex that results in difficulties with processing information, and affects the performance of activities of daily living and interacting with the environment (Baron et al., 2009; Hulse, & Dudley, 2010). Visual perception plays an important role in

human cognition, particularly non-verbal intellect. Deficits in visual perception compromise the skills that are necessary for academic learning. The various components of visual perceptual development and visuomotor integration play a significant role in the psycho-physiological development and maturation of children and serve as good indicators of the rate of a child's development, from late preschool to formal schooling (Bezrukikh & Kreshchenko, 2004; Bezrukikh, Morozova, & Terebova, 2009; Feder & Majnemer, 2007). The visual perceptual skills that are considered important to mastering academic work at school entry are: *visual discrimination; form consistency/constancy; visual closure; visual analysis and synthesis; visual sequence, spatial orientation, visual figure ground perception and visual memory*. These are discussed below.

4.2.2 Visual attention

The attention system is a requisite for higher order cognitive functions and for learning to proceed, and without attention there is no learning. Selective attention, vigilance, alertness and shared attention are critical components of visual attention. Impaired visual alertness results in poor sustained attention, over attentiveness or under attentiveness (Kurtz, 2006), whilst difficulties with selective attention result in poor focus on a given target, and an inability to screen relevant from irrelevant information or hold information in the working memory (Shaywitz, 1998; Stenneken et al., 2011). Poor visual attention or attention span has been considered an underlying reason for poor reading in dyslexic children (Peyrin, Démonet, N'Guyen-Morel, Le Bas, & Valdois, 2011), and visual attention is increasingly being confirmed as more critical to reading impairment than the traditional view that links phonological deficits (orthographic) and phoneme awareness (Bosse & Valdois, 2009; Vidyasagar & Pammer, 2010).

Plaza & Cohen, (2007) found that visual attention, one of a multiplicity of cognitive skills, is basic for children both before and during reading acquisition, to build fundamental reading skills. Atypical eye movements and inability to simultaneously process a number of letters for task completion is related to difficulty with increasing the attention span required for reading (Prado, Dubois, & Valdois, 2007). Visual attention span contributes to long-term benefits in reading acquisition, from the early stages of literacy instruction (Bosse & Valdois, 2009). However, other

research, investigating deficits for digits and letter strings in a rapid processing task, firmly supports findings in favour of the phonological (sound-symbol association) deficit hypothesis rather than impaired visual attention processes (Ziegler, Pech-Georgel, Dufau, & Grainger, 2010).

4.2.3 Visual memory

Visual memory refers to the ability to recall accurately what has been seen, and deficits in it lead to inability to retrieve or recognise visual information and to store it in short- or long-term memory. Visual memory deficits result in prolonged response times and a failure to create a visual register. Attention is crucially involved in this skill, whilst lack of attention to stimuli results in retrieval difficulties. Children with visual memory problems have difficulty copying correctly and are unable to remember what they have seen or the visual shape and formation of letters and words, and they require visual cues to assist with writing. In formal schooling, difficulties of mixing small and capital letters in a sentence, inability to print the alphabet from memory, poor legibility, and difficulty with writing the same letter in many different ways on the page, are attributed to visual memory deficits. Deficits in visual memory skills appear to be a significant area of difficulty in children with co-occurring disorders such as developmental coordination disorder, co-occurring reading disability and ADHD (Crawford & Dewey, 2008).

Visual memory sequencing is the ability to recognise that there is a logical sequence to a visual activity and to perceive that there is an apparent order and time relationship in events and the placement of form, pictures or objects. At school level, visual sequencing is required to identify letters in words in a correct order so that they read correctly, e.g., reading “send” rather than “sned” (Dednam, 2011; Kurtz, 2006).

4.2.4 Visual discrimination

Visual discrimination refers to the ability to extract the properties of shape and spatial relationships, making it possible to recognise, match and categorise objects and discriminate position, shape, form and colour (Martin, 2006; Schneck, 2010). An important cognitive function, it also refers to the ability to perceive similarities and differences between objects, shapes and symbols, sort things, and discriminate between colours, position, sizes and shape (Schneck, 2010). Visual discrimination allows for

differentiating between similar looking shapes by identifying subtle differences between them, for example, b/d; u/v; cat/cot. Subtle differences cause difficulty in discriminating between a circle and square, a circle and oval, or between words and symbols that almost look alike, for example, *o* and *a*; *3* and *8*, *not* and *hot*. A child with discrimination difficulties may confuse similar shapes or may have difficulty identifying a similar shape in a complex field. Visual discrimination involves the important concepts and functions of *object (form) perception and spatial vision*.

4.2.5 Object (form) perception and form constancy

Form consistency/constancy is the ability to distinguish between forms, symbols and object, regardless of size, texture or position. At preschool level it would require the ability to identify a shape (e.g., a square), regardless of difference in size, colour or position. At school level it would require the ability to identify words without confusing similar looking letters (p/q, b/d) or words (where, were). This skill is also necessary for the recognition of numbers for counting, and writing, reading and mathematics are seriously affected by a deficit in it (Dednam, 2011; Kurtz, 2006).

Children with form constancy problems will have difficulty recognising forms and objects when presented in different sizes or orientations, or with minor differences in detail. The child may have difficulty in recognising letters or words in different styles or fonts, and this leads to handwriting difficulties. They may not understand the same letter or number when presented in different environments, positions or sizes, or recognise errors in their own handwriting (Schneck, 2010).

4.2.6 Visual closure

Visual Closure is the ability to see that parts can make up a whole or gestalt, and to make sense of part-whole relationships, whereas deficits in it lead to difficulty identifying shapes or objects when presented in an incomplete form (Martin, 2006). There are many educational implications for a lack of ability in this area, and visual closure deficits impact on analysis and synthesis of words in reading. Reading requires an anticipatory component by being able to read a whole word from seeing only parts of it. This enhances reading speed as the individual does not rely on seeing every letter or syllable in a word to make sense of the whole (Dednam, 2011).

4.2.7 Figure-ground perception

Figure-ground perception is the ability to visually focus on a relevant or pertinent detail of an object or figure against a complex, distracting or irrelevant background. Children with figure-ground problems lack good visual search strategies. Control of direction of gaze is considered a prerequisite for efficient visual search (Marr, as cited in Schenck, 2010), whereas deficits in this area lead to reading difficulties as the child struggles to focus on a particular word because of difficulty in blocking out other words on the page. Learners with figure-ground perception difficulties tend to lose their place in a text when reading because of an inability to focus on letters and words they are required to attend to in a multitude of surrounding words (Dednam, 2011).

4.2.8 Spatial vision

Educationally, the perceptual ability of spatial vision makes it possible to use and understand directional language concepts, such as, up, on, in, left, right, behind, in front of. Perception of position in space makes it possible to discriminate between letters and sequences of letters in a words and sentences (Dednam, 2011; Frostig, Lefever, & Whittlesey, 1966; Kurtz, 2006). It is strongly linked with lineage concepts of spatial opposites as in/out; vertical/ horizontal; top/bottom; front/back; high/low. Deficits in spatial vision lead to difficulties in discriminating between the position of objects in space as well as the spatial relation between them in two or three dimensional space.

4.2.9 Visual motor ability / eye-hand coordination

Extensive research evidence indicates that proficiency in visual motor skills even before formal school is a strong predictor of school readiness and a range of later academic skills and success. A significant part of a child's school day requires academic activities that depend on visual motor integration (Feder & Majnemer, 2007; Kurdek & Sinclair, 2000; Sortor & Kulp, 2003; Tseng & Chow, 2000). Visual-motor integration is the ability to coordinate visual perception and finger-hand movements, and is a necessary skill in performing the acts of reading and writing by integrating visual abilities with motor skills (K. Beery, Buktenica, & N. Beery, 2004). Visual motor ability requires a good relationship between visua-spatial perception and fine motor accuracy (Case-Smith, 1998). The integration of perceptual and sensor -

motor abilities makes it possible to reproduce what is seen on paper, whereas weakness in this area results in difficulty copying correctly from a chalkboard or white board, and difficulty forming letters, shapes, and numbers when shown on the board or on the paper. Handwriting comprises the integration of both visual perceptual and motor responses, but as Schneck (2010) estimates, handwriting difficulties affect between 10-30% of school-age children. Daly, Kelley, and Krauss (2003) found a positive relation between copying tasks on the test of visual motor integration and the ability to copy letter forms at kindergarten level. Visual-spatial attention and non-verbal reasoning are important contributory factors to visual-motor integration, whilst maturation plays a significant role in improving visual motor integration (Decker, Englund, Carboni, & Brooks, 2011).

4.2.10 The significance of visual perceptual skills at school

Visual perceptual skills are needed to master schoolwork as well as the daily activities of living (Brown, Rodger, & Davis, 2003; Dednam, 2011; Maki, Voeten, & Poskiparta, 2001). Everyday activities and functioning depend on visual perceptual abilities, such as grooming (taking off and putting on clothes and feeding), recreational activities and age-related developmental tasks (Brown et al., 2003). These are generally referred to as self-help or independence skills, and as they have a strong link to emotional and social competencies they will be discussed further in the emotional / social competencies section.

4.2.11 Visual perceptual skills implicated in reading

Visual perceptual skills have an important relationship with reading and should be considered in the *complex factors* when predicting reading achievement (Bosse, Tainturier, & Valdois, 2007; Dehaene et al., 2010; Kavale, 1982; Vidyasagar & Pammer, 2010).

Poorly developed visual perceptual skills in children with language delay are linked to language difficulties, due to visual discrimination, visual spatial perception deficits, and understanding directional (“in”, “on”, “under”) language (Schneck, 2010). The most important visual perceptions implicated in achieving the basic school tasks are visual discrimination, form constancy, visual closure, visual analysis and synthesis, visual sequence, spatial orientation, visual figure ground perception,

and visual memory, left -right scanning, and rapid visual recognition of words (Al-Hroub, 2010; Dednam, 2011).

Impaired visual perception has diagnostic significance and is an important predictive factor of academic learning as it impacts on reading, writing and spelling and mathematical skills (Feagans & Merriwether, 1990; Kavale, 1982; Sortor & Kulp, 2003; Taylor, 1999; Tseng & Chow, 2000). Difficulties with visual perceptual skills are frequently found in children with learning disorders and, despite normal vision, children with learning difficulties have problems with interpreting and using visual information adequately.

There is however no direct evidence that visual perceptual difficulties cause dyslexia (Martin, 2006). Gibson, Hogben, and Fletcher (2006) investigated auditory and perceptual deficits and its relation to component reading skills, and suggested that dyslexia is not characterised by core deficits in visual and auditory processing. Other researchers argue that there is increasing evidence that phonological problems and reading impairment both arise from poor visual (i.e., orthographic) coding (Vidyasagar & Pammer, 2009). They argue that the dorsal visual stream which controls attention mechanisms that help with scanning of letters also leads to impairments in the visual processing of graphemes, phonemes and phonemic awareness. This view sees dyslexia as a core deficit of the visual system.

The findings suggest that visual processes are important correlates of reading achievement and should be included in the complex factors predicting it, and should be included in assessments at preschool.

4.2.12 Visual perceptual skills implicated in spelling

Critical visual skills needed for spelling are visual-motor integration, visual memory and visual discrimination skills. Poor visual perceptual skills lead to difficulties in writing the letters of a word in the correct sequence (e.g., *dorp instead of drop*), and not seeing the difference between letters that look alike such as b/d; v/w; o/a (visual discrimination skills) are implicated in spelling difficulties. The child has to form a mental image of a word that has to be written (visual memory), and spelling involves decoding, analysis and strategies for remembering letter-sound irregularities.

Visual sequential memory is needed to remember the sequence of letters in words, and visual memory deficit results in being unaware that letters in a word are omitted or incorrectly sequenced (Rosner, 1993). Giles and Terrel (1997), however, postulate that distortions in initial visual registration cause spelling difficulties rather than visual memory deficits. Distorted visual registration at the initial stages leads to an inability to visualise words (Schneck, 2010). Spelling requires intact auditory, visual and integrative processing and involves an understanding of sounds and words, syntax, semantics, morphology and metalinguistics.

4.2.13 Visual perceptual skills implicated in mathematics

Kulp et al. (2004) find that visual perceptual skills, particularly *visual memory*, are significantly related to achievement in mathematics. Visual memory deficits may lead to difficulties with using concrete aids to count, as well as calculator use, in older children. Visual memory deficits are also implicated when working out addition and subtraction sums that require multi-step instructions. Deficits in *visual perceptual skills* result in difficulties in spacing work correctly, as in not aligning columns for calculation. Incorrect answers are therefore a result of poor alignment skills rather than inability to calculate. *Figure ground* problems may contribute to disorganisation in setting rows and columns in a mathematics sum.

Visual spatial skills are fundamental in differentiating and recognising form and shape in space, especially for higher order mathematics. Controlling for cognitive ability and intelligence, **Sortor and Kulp (2003) found a strong association between** visual analysis, visual motor coordination, and visual spatial and visual discrimination skills and visual motor integration. Strong visuo-spatial working memory is a strong executive function in its link **to high ability performance in Grade 1** (Geary et al., 2009). It is suggested that visual processes should be tested when assessing risk factors for mathematics (Schneck, 2010; **Sortor & Kulp, 2003**).

4.2.14 Body awareness, body schema, body part identification

The concept of body awareness is fundamental to perceptual-motor development and is a crucially significant spatial development skill. Problems with body awareness are associated with establishing laterality, dominance, spatial

awareness (“my feet are below my head”), directionality (left/right) and hand dominance (Kurtz, 2008; Reeves & Cermak, 2002).

Body awareness is a component of the physical self concept, and is defined “as the conscious awareness and identification of the location, position and movement of the body and its individual parts in space, the interrelationships among those body parts to its self, as well as to the external environment” (Williams, 1983, p.283). It is a crucial part of development as the body is a point of reference to understand spatial relations and spatial directions in the outside world that can occur only in relation to the body (Kephart, 1971; O’Brien & William, 2010). It is therefore important for a child to have a complete and accurate picture of his/her own body and its position in space. As a physical component, body schema emerges in the sensori-motor phase, which is an important one for the development of body image.

Reflective self awareness is an aspect of internal body awareness which starts around two years of age, and involves the ability to recognise the self by name, as well as oneself in the mirror, and to refer to the self by pointing (Lewis & Ramsay, 2004; Moore, Mealiea, Garon, & Povinelli, 2007). This recognition is the foundational block to the later development of conceptual knowledge about the body and a progression towards self-awareness. Children who show self-recognition demonstrate better personal pronoun use and are able to engage in advanced pretend play (Lewis & Ramsay, 2004). Awareness of self is important for the planning and execution of motor movements. In self-help skills of eating, for example, an awareness of self provides children with the schema of determining the position of their mouth in relation to their body. Finally, body awareness is mastered in sequential order of hand dominance, body part identification and right/left discrimination (O’Brein & Williams, 2010).

Body schema develops through the sensory input or sensations received through the skin, muscles, tendons and joints and the vestibular system (Kephart, 1971, O’Brien & Williams, 2010). It is important for motor planning, i.e., the planning of actions. Occurring with body schema is the development of body image, a knowledge of which is important for the initiation of movement. It is a learnt process that results in knowing the component parts of the body and their relationship

to each other, to other bodies and to space. Poor body image results in difficulties in identifying body parts or automatically being able to perform actions that require the opposite use of limbs, e.g., when asked to move one leg and the opposite arm. Poor body image results in an inability to accurately judge the size of the body in relation to the physical environment. It also results in being unable to identify the body parts of another person.

Body part identification is an important part of learning and assists with communication. It depends on the experiences that a child is exposed to in his or her environment. Children who are exposed to language stimulation can verbally provide labels for body parts, and verbal labels and knowledge of body parts further help to distinguish the body from its component parts. By the age of five, in addition to identifying large body parts, children should be able to label more detailed or remote parts such as eyebrows and thumbs (O'Brein & Williams, 2010). Identifying right and left body parts is also foundational to learning and linked to scholastic activities of reading and writing. Right/left discrimination is an important step in developing body awareness, as it helps to identify body parts on each side. Sensory dominance is awareness that the body is a separate entity from space and helps to further define the body as having two distinct sides. An awareness of the body in relation to other objects in space and of relationships of objects to one another (Williams, 1983), it leads to the preferential use of one side of the body, thereby establishing hand preference or dominance (O'Brein & Williams, 2010).

4.2.15 Auditory perception

Auditory perception refers to what the child does with what he or she hears, and refers to the ability to structure and give meaning to incoming auditory stimuli (sound and language) from the environment (Richard, 2001). Auditory perception is basic to all learning, and some children without any hearing loss still have a variety of listening and related complaints. They have difficulty processing auditory information efficiently and perceiving and understanding sound and language (Keith, 2000). Children with auditory perception problems have difficulty understanding information that is presented verbally, and take longer to respond to questions or work through information and instructions (Richard, 2001; Speake, 2005).

Auditory memory, learning, attention, and phonological analysis and discrimination are considered part of auditory processing. Language processing refers to difficulties in understanding conversations, remembering directions, hearing words correctly and expressing oneself verbally (Bellis; 2003; Richard, 2001). Language processing difficulties are most commonly seen in learning disabilities and are present from early childhood. They do not first make an appearance in formal schooling, however, children are generally only first assessed when they present with spelling and reading problems. Auditory perception skills of auditory memory and auditory discrimination are necessary for school readiness (Pieterse, 2001).

The auditory perception skills that are considered important to master academic work at school entry are: *auditory discrimination, auditory analysis and synthesis, auditory memory and order and auditory figure ground discrimination* (Dednam, 2011).

4.2.16 Auditory memory

Auditory memory refers to the ability to retain and immediately recall information that is received auditorily. Both at preschool and school level, auditory memory includes story memory, command or instructions, and memory for sentences words and digits (linguistically non-meaningful units). *Auditory sequential memory* refers to the ability to immediately recall information (a series of words or numbers) in sequence. At preschool level poor sequential memory is seen in the mispronunciation of multisyllabic words (e.g., butterfly/flutterby; animal/aminal) and will rearrange the sequence of sounds (e.g. hospital/ hostipal; shiver/shriver). At school level it is crucial to remember the sounds of letters in the correct order to spell and read successfully. Auditory sequential difficulties result in an inability to remember in correct order the sounds of words ('screech' may become 'search'), difficulty in recalling rules or steps in a mathematical problem, and problems remembering information that is heard. Memory sequencing difficulties will result in difficulty remembering short sequences of sounds in a word or words in a sentence, as required for spelling, reading, dictation or a mathematics problem. Remembering the sequence of word or words is crucial to understanding language. Difficulties in learning rote sequences at preschool are evident in learning the alphabet, numbers, days of the week, rhymes and songs. Rhyming skills are considered the most

developmentally advanced stage of phonological awareness and boost pre-reading skills (Corriveau, Goswami, & Thomson, 2010; Dednam, 2011; Pieterse, 2001; Richard, 2001).

4.2.17 Auditory discrimination

Auditory discrimination refers to the ability to hear or perceive the similarities and differences between individual sounds or phonemes (e.g., “p”, “b”) and sounds in words (e.g., “pat/ “bat”). Similar sounds in the environment (e.g., that between a car and a truck) may also constitute an area of difficulty. At preschool level, auditory discrimination presents as articulation disorders, whereas at school level the implications are evident in spelling difficulties.

Auditory discrimination refers to difficulties in discriminating between similar sounding speech words and the ability to hear the difference between sounds that are *different* (k/p) and similar (k/g; t/d; p/b). Discrimination difficulties will result in incorrect interpretation of instructions or incorrect spelling (e.g., bat/bad. pat/bat), as well as a specific deficit in the representation and processing of speech sounds. Children’s ability to discriminate between sounds in minimally paired words, e.g., *pin* vs. *bin*, emerges in the preschool years (Dednam, 2011; Ramus et al., 2003; Rosen, 2003; Törmänen & Takala, 2009).

4.2.18 Auditory analysis and synthesis

Auditory analysis and synthesis refers to the ability to analyse words (syllables or phonemes) into component parts and then to synthesise and blend the words into a whole. It is an important pre-reading and pre-spelling skill. At preschool level this skill is reflected in the ability to rhyme words, which requires that a word be broken into beginning, middle and end sounds to form a new word. It also involves the ability to match a sound, speech-sound difficulties become evident at school level as this is an important skill when learners have to spell words they cannot remember. Problems in this area are also seen when learners leave out letters in words when reading or writing (e.g., the car drove at seed [speed]) (Dednam, 2011; Carroll, Snowling, Hulme, & Stevenson, 2003; Lewis, Freebairn, Hansen, Iyengar, & Taylor, 2004; Pieterse, 2001; Richard, 2001).

4.2.19 Auditory figure ground perception

Auditory figure ground perception refers to the ability to isolate sounds and pay attention to spoken language in the presence of background noise, reflecting difficulties in understanding speech in competing background noise. At both preschool and school level, difficulty with this results in distractibility, disruptiveness and fidgetiness. Inability to ignore irrelevant incoming auditory stimuli results in a loss of learning due to attention deficits and poor listening skills (Dednam, 2011; Keith, 2000; Pieterse, 2001; Richard, 2001).

4.2.20 The significance of auditory processing skills for language development

Auditory perception skills are important for language development, and language development in turn is essential for intellectual development. Auditory processing involves the ability to listen, comprehend and respond to information through the auditory channels and therefore works together with language and speech processing functions. Basic to linguistic information is the progression of speech sounds (e.g., c/l/a/d=clad). A strong phonemic foundation is the link to success in reading, writing, spelling and other language-based tasks. Speech and language work together in a synchronised process (Muluk & Yalcinkaya, 2010; Richard, 2001).

The production of phonemes is needed in conversational speech. Oral language is strongly related to phonological sensitivity (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003). Language problems can occur in many areas, such as limited skills in expressive language; limited understanding of spoken language; poor understanding of meaning and use of words (vocabulary); limited conversational skills and abilities; limited skills in narrating or relating experiences and stories; and poor use of grammar. Language difficulties also lead to difficulties with grasping new concepts and the correct interpretation of instructions. To communicate effectively the preschooler must be able to manage various aspects of language (Blewitt, Rump, Shealy, & Cook, 2009; Glennen & Bright, 2005; Tommerdahl, 2009; Torppa, Lyytinen, Erskine, Eklund, & Lyytinen, 2010).

4.2.21 Auditory processing skills and phonological awareness

The auditory perception skills discussed above are key listening skills and prerequisites for the development of oral language and for the acquisition of early

literacy. These perceptual skills require an awareness of speech sounds (phonological awareness), sound units (phonemic awareness), spelling patterns (orthography) and word formation (morphology). Reading in turn depends on these processes. Phonological awareness is an important pre-reading skill, and it is the ability to manipulate, recognise and discriminate the sounds in a language (Corriveau et al., 2010). Phonological sensitivity in turn influences the acquisition of phonemic awareness (Anthony & Francis, 2005; Ziegler & Goswami, 2005), whilst phonological awareness skills and reading show a strong causal relationship (Corriveau et al., 2010; Simmons et al., 2008). The phonological processing skills theory is the predominant explanation for reading disabilities (Vellutino et al., 2004), positing that phonological (speech) processing impairment is the primary cognitive cause of dyslexia. According to this theory, children with dyslexia have difficulty establishing phonological representations that are critical for reading to occur (Snowling, Gallagher, & Firth, 2003). Phonological deficits offer an explanation for difficulties encountered with a wide range cognitive tasks, such as verbal short and long-term memory, slow naming of letters, word-finding difficulties, recognition of digits and colours, and naming of objects (Snowling & Hulme, 2008). While some theorists report that the phonological deficit theory holds irrespective of language background (Caravolas, as cited in Snowling et al., 2008), others hold that phonological abilities are not necessarily the best predictors of future reading ability in transparent orthographic languages (Lyytinen et al., 2006).

Phonological impairment is seen as stemming from a deficit in auditory processing (Corriveau et al., 2010). Auditory perception deficits affect the perception of consonants which then impacts on phonological skills (Mody, 2003). Children with dyslexia have difficulty differentiating between different phonemes, resulting in a speech perception defect. They have difficulty differentiating in the variations of the acoustic characteristics of phonemes that include between-category discrimination (“ba / da”) and within category variations (“la / wa”). Links between children’s sensitivity to speech rhythms and phonological awareness and reading skills are supported in studies (Holliman, Wood, & Sheehy, 2008; Richardson, Thomson, Scott, & Goswami, 2004).

Perception affects cognition, language, spoken and written language and motor ability (Derbyshire 2006). While distinct processes, perceptual information and motor behaviour in general, as well as motor behaviour associated with language processes (oral motor) are coordinated in the learning process, each domain supports the development of the other.

4.3 Speech and language domain of school readiness

Children who have not developed to the level expected for their chronological age in speech and language may have a problem in one or several areas, such as speech (the verbal production of sounds), or language (expressive and receptive language or pragmatics) (Speake, 2005). Speech and language difficulties are considered to be the most common neuro-developmental problem of childhood and affect at least 7% of children, with a strong bias towards boys (Goodyer, 2001; Tommerdahl, 2009). Speech difficulties are also considered the most common communication difficulty in childhood (Dodd & McIntosh, 2010). Despite normal hearing and average intellectual skills these children fail to develop normal speech and language (Leonard, 1998). They show poor language comprehension, have limited spoken vocabulary and have problems pronouncing words. Delayed language skills have an impact on literacy skills and the attainment of reading skills upon school entry (Bernhardt & Major, 2005, Gillon, 2005). Speech and auditory skills play a crucial role in literacy development (Shapiro, Hurry, Masterson, Wydell, & Doctor, 2009).

There is a distinction between the terms 'speech' and 'language', and a child can present with difficulties in both areas. Speech refers to the ability to use sound correctly, while inability to use certain sounds affects intelligibility. Language refers to a system of rules that incorporates tenses, sounds semantics and rules of grammar, and incorporates receptive (language of understanding), and expressive (productive) and pragmatic (social) use of language (Speake, 2005). Areas in language impairment are found in the areas of semantics, morphology and pragmatics.

4.3.1 Speech

The most common speech impairments in preschoolers that are identified by teachers and parents include articulatory, phonological and motor speech disorders (McLeod & Harrison, 2009). These also the most common diagnostic category of

referrals from pediatricians made to speech and language therapists (Mullen & Schooling, 2010). Speech production is considered a motor act and is linked to oral-motor physiology (Nip, Green, & Marx, 2009). It is the most easily identified area of difficulty and therefore should alert the parent or teacher to developmental risk (Speake, 2005). Speech development and production is affected by poor oral and articulatory control, which in turn affects phonetic registers (MacNeilage, Davis, Kinney, & Matyear, 2000). Oral motor control has been strongly linked to language production (vocabulary, grammatical and sentence complexity (Alcock & Krawczyk, 2010), and oral motor skills may be a necessary precursor for language skills (Alcock, 2006).

4.3.2 Language

Language difficulties very early in life are likely to affect children in several different areas, and they are more likely than others to be late talkers (Rescorla, Dahlsgaard, & Roberts, 2000). Speech and language difficulties that persist beyond five years increase the risk of social and attention difficulties (Snowling, Bishop, Chipchase, & Kaplan, 2006). Important indicators for identifying children at risk of literacy problems should focus on the accuracy of phonological representations, severity of the speech difficulty and the presence or absence of language difficulties (Nathan, Stachouse & Goulandris, 1998). Phonological awareness skills are foundational for written language (Nathan et al., 1998). Specific speech and language impairments lead to impaired writing skills, and marked lags in spelling and punctuation (Bishop & Clarkson, 2003). Learning to write was also identified as a skill that was compromised as a result of speech impairment (Bickel & Feldman, 2009; McCormack et al., 2010; Teverovsky et al, 2009). Speech and language problems at two and half to five years of age result in increased reading difficulties in primary school (Catts, Fey, Tomblin, & Zhang, 2002; Scarborough & Dobrich, 1990).

4.3.3 Receptive and expressive language

Receptive language is the ability to understand and comprehend spoken language, and difficulties in this area will be seen in delayed vocabulary and concept formation, and difficulty with following instructions, answering questions, and accessing the meaning of a word when hearing it in conversation. Linguistic concepts include the ability to understand relationships between words and concepts in

sentences (Richard, 2001; Speake, 2005; Tommerdahl, 2009). A good stock of vocabulary has been associated with success at school, and is a potent predictor of later academic achievement with differences in levels of vocabulary at preschool level following a stable path over time (Blewitt et al., 2009; Se´ne´chal & LeFevre, 2002). Dickinson et al. (2003) found support for the view that vocabulary provides the critical basis for the development of phonological sensitivity, which then becomes a key language skill.

Expressive language is related to the formulation or output of language or speech and to the ability to use words to express oneself appropriately by adequately retrieving words in a conversation and expressing it through correct grammar structures in a sequenced, logical manner (Tommerdahl, 2009). During the preschool years, children’s language development continues to grow at a remarkable rate as they develop functional speech and language skills for basic communication, such as making requests and sharing information (Glennen & Bright, 2005). This language development is seen as an essential step for the more challenging, higher order, cognitive tasks needed in the classroom. Glennen and Bright (2005) found that expressive vocabulary skills at age two or three were found to be predictive of social skills and related problem behaviour outcomes at school age. Preschoolers who are able to communicate their ideas well and speak clearly benefit from play interactions (Guralnick, Connor, Hammond, & Kinnish, 1997).

Associations between vocabulary development and reading skills are well documented (Torppa, P. Lyytinen, Erskine, Eklund & H. Lyytinen, 2010), and receptive language difficulties are considered a significant marker for reading disability (Lyytinen et al., 2003, in Torppa et al., 2010). Lyytinen, Eklund, and Lyytinen (2005) found that late-talking toddlers who showed delays in expressive and receptive language showed poorer skills in oral reading, spelling and comprehension in second grade. Torppa et al. (2010) found that receptive and expressive language was the strongest link to reading as measures of letter-naming, rapid naming, morphological and phonological awareness. Children with dyslexia have word-finding difficulties which are defined as “difficulties in retrieving known words from the lexicon” (Van der Lely & Marshall, 2010, p.358). Word-finding is related to

difficulties in accessing phonological representations and rare phonological patterns (Faust, Dimitrivsky & Shacht, 2003; German & Newman, 2007). Prior, Bavin, and Ong (2011) found that the most influential factors in readiness for school were pre-literacy capacities, phonemic awareness, letter knowledge and language competencies.

4.3.4 Motor and language impairment

A complex multi-dimensional and participatory relationship exists between motor and language domains (Iverson, 2000). Locomotor skills such as crawling, walking and climbing heralds a host of opportunities for the development of cognitive, emotional, interactive play and social engagement skills, all of which promote cognition and language. Limited motor skills in the early years negatively impact on the development of other skills. Delayed crawling and walking limits social and cognitive development, and hence communication and language development. Haapanen et al. (2008) found that speedy motor development, such as early walking (i.e., walking unassisted before the typical age of 11 months) was related to speech impairment and unbalanced psychomotor development. Viholainen et al. (2006 b) indicate that co-occurring motor and language difficulties may have an underlying genetic basis. A lack of refined, age appropriate motor skill is linked to impairment in social, cognitive, communication and language areas (Hill, 2010). Children with language delays and disorders also have both gross and fine motor impairments (Hill, 2001). Oral motor control is linked to language skill and considered a precursor for a range of language skills (Alcock, 2006). Children with specific language impairment (SLI) may have a motor impairment (Hill, 2010). Studies generally find that language-impaired children do poorly on fine motor tasks (threading beads, fastening buttons), bimanual coordination (retaining balance on the non-preferred foot), speed of manual movements (using hand and arm gestures), and non-motor skills (such as visual discrimination) (see Estil, Whiting, Sigmundsson & Ingvaldsen, 2003 for a review). Early motor development is linked to delay in language development and reading speed (Viholainen et al., 2006 b).

4.3.5 Language and behaviour

Language and behaviour have a fundamental link, and a large proportion of children with speech and language difficulties have social, behavioural and emotional

problems (SEBD), Beitchman et al., 2001; Tommerdahl, 2009). Research has found that communication difficulties often associated with literacy and learning difficulties are overlooked in learners with social behavioural and emotional difficulties. There is a crucial need to identify speech and language difficulties at an early stage as the link between SEBD is strong (Heneker, 2005). The study found a 90% prevalence of speech and language difficulties in children with behavioural, social and emotional difficulties. It is important to screen learners with behavioural difficulties for speech and language impairment (Jones & Chesson, 2000), as they tend to be socially and emotionally immature. As a result of their communication difficulties they lack confidence, have poor self-esteem and have adverse impacts on learning (Tommerdahl, 2009). Lindsay and Dockrell (2000) found that seven to eight year old children have an enhanced likelihood of emotional and behavioural difficulties.

Speech and language difficulties, including motor behaviour difficulties, attention, social and emotional difficulties, impact on the child's educational progress. Development, specifically in the early years, is not an isolated phenomenon and occurs in concert with the acquisition of skills in other areas. Impairment in one domain of development will impact on another (Karmiloff-Smith, 2007). The acquisition of language involves the amalgamation of a very broad range of abilities and skills (Iverson, 2010). That there is a link between developmental language impairment (DLI), specific language impairment (SLI) and motor development is widely accepted (Webster, Erdos, & Evans, 2006).

Deficits in speech and language place children at risk of social-emotional problems, poor academic attainments, difficulty with interpersonal interactions and handling stress, and other psycho-social demands (Lindsay, Dockrell, Mackie & Letchford, 2005; McCormack et.al, 2010). Children with specific speech and language difficulties therefore present a challenge to education and health systems and are at increased risk of literacy, social, emotional and behavioural problems (Lindsay et al., 2005).

Each domain of development works in concert with others, and deficits in one will affect deficits in others to a lesser or greater degree. Speech and language impairment is clearly linked to motor difficulties, cognitive development, and social

and behavioural problems. The growth of language leads to a significant change in thinking capacities, and hence cognitive development. According to Vygotsky (1978), the development of language in preschoolers leads to social dialogue with competent peers, stimulating communication through conversation, thereby enhancing basic mental capacities which richly contribute to higher cognitive processes. In addition to the formal assessments which can be used by various professionals, including classroom teachers, it is recommended that teaching professionals be provided with relevant information about observational techniques and *screening guidelines* (author's emphasis), which can help to identify speech and language difficulties (Tommedahl, 2009).

A few conclusions can be drawn in the analysis of the speech and language domain. For instance, language forms a basis for the acquisition of reading and spelling; spoken language forms the basis of the auditory symbol system; reading and spelling are basic to the visual symbol system. In essence, the visual symbol system is built on the auditory symbol system, problems in which are likely to herald difficulties in the visual perceptual domains. Research shows a positive relationship between problems in phonetic awareness and reading and spelling. Prediction of reading and spelling problems can be made from an evaluation of the language development of the preschool child.

4.4 Cognitive/ intellectual domain of school readiness

Intelligence and the development of cognitive ability are fundamental and contribute to the learning process and readiness for school. Cognitive development contributes to the growth of intelligence, with cognition referring to the ability to think and utilise the mental capacities of attending, problem-solving, planning, reasoning, and categorising. Almost every aspect of development has some link to emerging cognitive capacities, and the development of language increases concept knowledge. Perceptual development and motor development that are basic to the central nervous system support each other in their development and together advance and enhance cognitive capacities (von Hofsten, 2004).

4.4.1 The role of cognitive development in school readiness

This chapter further includes those aspects of cognitive development, such as humour and kinds of questions children ask that are markers of children's cognitive growth. These constructs are robust indicators of thinking processes, and a deficit in the level of functioning in these cognitive areas should serve as a marker for risks and an indication of the level of cognitive growth. Research suggests that early cognitive development plays a significant role in school readiness (Smart et al., 2008), and has been found to be a relatively strong predictor over other variables, such as gender, family characteristics, parental education and ethnicity, and other child characteristics (Dearing, McCartney, & Taylor, 2001). Smart et al. (2008) report that cognitive school readiness at age 4 to 5 years was a significant precursor of learning outcomes at age 6 to 7 years, and that literacy and numeracy difficulties were highest in children with poor cognitive school readiness skills. This was most evident in children from financially disadvantaged families.

Traditional and curriculum cognitive aspects of school readiness are related to literacy and numeracy skills in primary school. This chapter considers cognitive development from an information perspective framework, which is also fundamental to the "Approaches to learning" domain, an important domain for school readiness according to the NEGP 1995 mandate (McWayne et al., 2004). "Approaches to learning" focuses on the processes that contribute to effective learning and thinking. Learning behaviour, such as task persistence, attention and problem solving strategies skills, amongst others, are considered more important to academic achievement than intelligence scores or academic achievements (Schaefer, Shur, Macri-Summers, & MacDonald, 2004; Yen, Konold, & McDermott, 2004). Learning behaviour contributes to intelligence in predicting academic achievement, and because they are modifiable they serve as good targets to identify risks, and hence timeous intervention (Hahn, Schaefer, Merino, & Worrell, 2009)

4.4.2 Theories of cognitive development and intelligence

The concepts of cognitive skills and their contribution to intelligence has always been a controversial issue and immediately immerses one in the longstanding debate between the nature (hereditary) - nurture (environmental) controversy, and its role in intelligence and intelligence testing. Many theories have been proposed on

cognitive development. For instance, the grand theories of cognitive development of Piaget (1964) and Vygotsky (1986) have focused on biological (Piaget) and social /cultural (Vygotsky) explanations of development. These major theories have been followed by information processing or componential perspectives which look at how neurological underpinnings (memory, attention, problem solving) underlie various mental activities in cognitive development.

Intelligence, however, is more than a sum of components and biological processes, and the multi-faceted views of contemporary intelligence theories hold that intelligence has multiple domains and that intelligence is an outcome of both inner and outer forces. Gardner's (2000) multiple intelligence theory dismisses the idea of a general intelligence in favour of eight independent intelligences, among which are the interpersonal (dealing with people) and intrapersonal (understanding of oneself and emotions) intelligences that are not included in traditional tests of intelligences. However, these underlie the critical outcomes of school readiness, as correctly included in this research in the indirect factors that promote school readiness. Of relevance to this research is also Sternberg's triarchic model of intelligence, which holds that intelligence is made up of three interacting intelligences: *Analytical intelligence*, that calls upon information processing skills; *Creative intelligence*; that involves the capacity to solve problems; and *Practical intelligence*, that involves the application of skills in everyday situations (Sternberg, 2003).

Piaget's theory has had much impact on education through his principles on discovery learning, sensitivity to children's readiness to learn, and acceptance of individual differences. Piaget theorised that children progress through four invariant, universal stages of cognitive development. By the second year of life they are able to cognitively interact with the world through "mental representations". Preschoolers are considered to be in the pre-operational stage (two to seven years), during which time mental representations, language development and make believe play and drawing (which becomes increasingly representational) advance cognitive development. He believed that preschoolers were not capable of the operations of "categorisation" and "egocentrism" (a failure to perceive another's symbolic viewpoint), or distinguishing between "fantasy and reality", "animistic" and "illogical thinking". However, much follow up research has indicated that preschoolers are

indeed capable of many of the functions in this stage of development. Deák, Ray, and Brennenman (2003) found that children's trouble in distinguishing between fantasy and reality is due to the language of the task requirement rather than an inability to make a distinction between the concepts, as suggested by Piaget. Findings that preschoolers do have the ability to globally categorise objects into groups and are not governed purely by appearances also challenge Piaget's assumption that this ability is not apparent in this stage of development (Cheal & Rutherford, 2011; Gelman & Kalish, 2006).

Expanding vocabularies, adults' explanations and development of general knowledge contribute to categorisation skills. Instructions, type of task and cognitive flexibility are other factors that could influence the ability to successfully categorise (Ionescu, 2007). Children between the ages of three and five years have developed boundary categories similar to those in adults in their ability to place emotions in categories on the basis of same and different image pairs. This is relevant in children's social development as it allows them to use social information more efficiently (Blaye & Jacques, 2009). While children have fantastic beliefs in magic and the supernatural, they seem to be aware that magic cannot alter their lives. Even a toddler can distinguish between animate and inanimate because of its ability to categorise and group objects from people. According to Case (as cited in D. Louw & A. Louw, 2007), children's thinking is not influenced by the stage-like progression in Piaget's theory, but rather is due to "executive processing space". This refers to the active, temporary and short-term memory functions which allow for the development of restricted schemes due to capacity to store and operate functions efficiently ("operational efficiency"). With maturation and experience processing, demands of ,for example "conservation", improve.

Vygotsky, a contemporary of Piaget, built on what he felt Piaget lacked: that of the role of cultural input in learning. He placed more emphasis on children's potential for intellectual growth than on their intellectual abilities at any given point. Central to Vygotsky's (1986) theory is the concept of "private speech", in contradiction to Piaget's "egocentric speech". Referred to as self-directed or inner speech, it is the internal dialogue that children use to guide their behaviour and thinking in everyday situations. Vygotsky saw language as foundational to all higher

order cognitive processes, that include attention, problem-solving, recall, categorisation, memorisation, abstract reasoning and self-reflection. There has been research support for Vygotsky's perspective (Berk, 2009), as children who use private speech during challenging activities show higher levels of attention, involvement, improvements in task performance, are less talkative, and show higher levels of creativity (Al-Namlah, Fernyhough, & Meins, 2006; Benigno, Byrd, McNamara, Berg, & Jeffrey, 2011; Daugherty & White, 2008; Winsler, Abar, Feder, Rubio, & Schunn, 2007).

Central to Vygotsky's theory is the concept of *Zone of proximal development* (ZPD), which refers to the ability of a child to achieve a task with adult and peer supervision through questioning, prompting and providing strategies. Cognitive development according to this theory is promoted within social interactions that include the elements of *intersubjectivity* that is arriving at a shared understanding or common perspective through dialogue; and *scaffolding*, that is adjusting support to fit the child's current level of performance (being sensitive to the child's level of need). Language facilitates intersubjectivity and scaffolding, which in turn enhance private speech. Social experience and language are vital for cognitive development (Elias & Berk, 2002; Gmitrova, Podhajecka, & Gmitrov, 2009, Nicolopoulou, de Sá, Ilgaz, & Brockmeyer, 2010; Vygotsky, 1978).

Vygotsky's approach would lend itself easily to the uneven levels of school entry in a diverse and unequal South African context. It would help accommodate the wide discrepancies in cognitive skills as one would work with what the child brings and builds from the child's ZPD. However, it is also the emphasis on the internal verbal dialogue that is not common to cultures that rely less on verbal communication. While Vygotsky held that social interactions and language contribute to the skills of executive processes of learning, the theory does not provide explanations of how these changes occur to advance mental functioning. Information processing theories fill this gap (Berk, 2009; D. Louw & A. Louw, 2007).

4.4.3 Information processing approach to cognitive development

Within an information processing perspective, the concept of cognition or intellectual development in this research looks at the common cognitive processes

involved in the development of thinking such as problem solving, reasoning, concept formation, attention, working or short-term memory , categorizing and cognitive flexibility.

4.4.3.1 Executive function

From information processing perspectives, the above processes are broadly considered Executive Functions (EFs) of the brain, and include both cognitive and behavioural processes that facilitate effective daily functioning and learning (Diamond, Barnett, Thomas & Munro, 2007). EF is composed of memory, planning and problem-solving activities that are highly relevant to school-related tasks and distinct from measures of general intelligence (Blair & Peters, 2003). Another critical aspect of executive is arousal, and modulation of affect/emotion. Executive functions are the cognitive skills that assist one in reaching goal-directed activities (Blair & Peters, 2003), and impairments in EF skills have been implicated in learning disabilities, attention deficit disorders and behavioural problems (Barkly, 2006; Brophy, Taylor, & Hughes, 2002). Executive function is being increasingly recognised as fundamental to children's academic progress and school success (Bull & Scerif, 2001; Diamond et al., 2007; St. Clair-Thompson & Gathercole, 2006), and is more strongly associated with school readiness than IQ scores, or reading and mathematics skills at school entry (Miyake et al., 2000; Nigg, 2000). Executive functions are also implicated in the regulation of emotions, such as anger, disappointment, and frustration, and significantly affect early learning (Carlson & Wang, 2007).

4.4.3.2 Attention

Attention is critical to the learning process and central to almost all areas of academic and psychological functioning. Described as “a process that enables an individual to focus on a selected aspect of the environment, in preparation for learning or problem solving” (Bukatko & Daehler, 2004, p.313), it is central to cognitive processing as it makes it possible to develop memory, concepts and other cognitive skills that predict achievement, language and social outcomes for children (NICHD Early Child Care Research Network, 2003). There are implications for poor attention when children enter the schooling system as those with a poor capacity to attend will have difficulty in learning. Children with greater attention spans show better task

persistence, higher intelligence scores and academic success, and cope better with school demands (Chang & Burns, 2005; Harris, Robinson, Chang, & Burns, 2007b; NICHD Early Child Care Research Network, 2003; Lengua, 2002; Palisin, 1986). By the preschool years, children have the capacity to engage in focused, sustained attention (Vitiello, Greenfield, Munis, & George, 2011).

Difficulties with attention are generally associated with ADHD, which leaves children with this difficulty engaging in tasks that require sustained attention, blocking irrelevant information, planning, reasoning, memory, problem solving in academic and social situations (Barkley, 2006a). Children with specific language impairment have also been found to have compromised sustained attention that contributes to language learning difficulties over time in the absence of clinically significant attention deficit (Finneran, Francis, & Leonard, 2009).

The concepts of sustained and selective attention are important considerations in the learning process. *Sustained* attention is the ability to maintain a persistent focus over time and requires an inner ability or persistence to engage in a goal-directed activity (Barkley, 2006). It is central to effective learning and general functioning. Vitiello et al. (2011) found that attention and persistence are significant contributors to mediating the link between cognitive flexibility and school readiness. Rapid growth and myelination of the frontal lobes of the cerebral cortex contribute to the ability of the preschooler and school-going child in increasing ability to sustain attention (Ruff & Capazolli, 2003). *Selective attention* makes it possible to focus on relevant details in an activity and at the same time ignore irrelevant stimuli and exercise inhibition (Barkley, 2006; Diamond & Gilbert, 1989). Distractibility is the common term for a deficit in selective attention (Mash & Wolfe, 2010). Attention regulation requires both selective and sustained attention to coordinate one's attention during tasks. Poor attention regulation is associated with poor academic and psychological outcomes (Lengua, 2000).

Attention in preschool age children has generally been investigated in those with known attention deficit disorder (NICHD Early Child Care Research Network, 2003). By school entry age (5 to 6 years) most children with ADHD are recognised

for their impulsivity, restlessness and poor sustained attention (Smith, Barkley, & Shapiro, 2010).

Gesell (1976) suggested that readiness is a result of gradual development in the abilities that facilitate learning, i.e., being able to focus on work, sit quietly, attend and follow directions.

4.4.3.3 Inhibition

An important aspect of selective attention, inhibition is the ability to control internal and external stimuli, a broad view of which includes cognitive inhibition perspective or the ability to control interference that is relevant to both motor control and working memory function (Nigg, 2000). Apart from problem-solving and remembering, it allows children to control behaviour in social situations, and there is an ability to inhibit thoughts and behaviour from as early as infancy (Berk, 2009).

Preschoolers, when following games and rhymes with commands, show an ability to exercise inhibition as they choose to follow some commands over others. Inhibition makes it possible to clear irrelevant stimuli and create space in working memory, as well as restraining the urge to respond hurriedly and impulsively. Ivanova (2001) found that a preschooler's performance was distracted more by external distracters than was that of a school-aged child. Studies show a strong link between impulsivity and negative academic outcomes (see Fuhs, Wyant & Day, 2011 for reviews), whilst lower levels of impulsivity and inhibition were associated with higher pre-reading skills in preschoolers from disadvantaged backgrounds, uniquely contributing to higher knowledge and print concept skills (Fuhs et al., 2011).

4.4.3.4 Memory

Memory is central to cognitive development. and learning fails if memory cannot be retrieved adequately. For success at school virtually every subject requires that the child has to rely extensively on memory. The young preschooler relies on memory to learn rhymes, and to remember numbers and letters in sequence. The first grader has to learn basic mathematical procedures, spell simple words, and match sounds to letters, and memory demands increase with each successive grade. Important components are short term, active working and long term memory. The

ability to retain information for short periods is fundamental to many cognitive phenomena such as a language, cognitive control and consciousness (Baddeley, 2000).

Working and short term memory allow for the brief holding of new information, while long-term memory is the permanent storage or long-term base. Active memory is seen as fitting between short- and long-term memory (Levine, 2002), with active working memory enabling one to keep several pieces of information together to complete a task or activity, and is associated with processing aspects of the task (Alloway, Gathercole, & Pickering, 2006). Memory span tasks have generally been used to investigate this construct and have been found to increase with age across all memory tasks (Alloway et al., 2006; Visu-Petra, Cheie, & Benga, 2008). Underlying structures for verbal working memory are in place as early as four years (Gathercole, Pickering, Ambridge, & Wearing, 2004), then younger children rely more on visual codes to remember (4 to 6 year olds), and older children use rehearsal strategies (Visu-Petra et al., 2008).

Working memory as a function of central executive control is important for academic achievement throughout the school years (Diamond et al., 2007). Working memory and inhibition, as EF functions, are found to predict reading and mathematics scores from preschool through to high school (Miyake et al., 2000; Nigg, 2000). Inhibition, working memory and flexible adjustment to attention make up cognitive control. Research shows that good cognitive control skills in preschoolers (age 3 to 5 years) are good predictors of achievement in reading and mathematics from kindergarten through to high school (Blair & Razza, 2007; Duncan et al., 2007). Significant working memory deficits, response inhibition and processing speed are found to be a common factor underlying both reading disability with co-morbid attention deficit disorder (Bental & Tirosh, 2007; Willcutt, Pennington, Olson, Chhabildas, & Hulslander, 2005).

Poor working memory, poor attention or lack of it are a function of executive control and play a crucial role in academic readiness for learning. As significant risk factors in children's school readiness it should be included to assist in making decisions regarding readiness.

4.4.3.5 Cognitive flexibility

Diamond et al. (2007) consider inhibition, working memory, and cognitive flexibility as key components of cognitive functioning. Part of the process of cognitive development is the ability to be flexible, that is the ability to adjust to change with swiftness and switch between perspectives in a learning task (Diamond et al., 2007; Vitiello et al., 2011). Studies suggest that cognitive flexibility is associated with better preschool academic readiness (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Blair & Razza, 2007; Vitiello et al., 2011). A positive relationship exists between cognitive flexibility measured at four to five years of age with literacy and mathematics scores in the first three years of formal school (Bull, Espy, & Wiebe, 2008). Cognitive flexibility at preschool also predicted gains in language and literacy (Bierman et al., 2009), and improvements to children's cognitive flexibility may lead to improved approaches to learning as well as academic school readiness.

4.4.3.6 Problem-solving skills

Problem-solving is a highly complex cognitive activity and includes components of representation, planning, and strategy choice (Bukato & Daehler, 2004), and the ability to use symbols such as objects, pictures, words, to solve problems. By the age of three, children have the cognitive capacity, conceptual knowledge and flexibility that symbols such as objects, pictures and words, can be used to solve problems (De Loache, 2000). The ability to plan an approach to solve a problem demonstrates mature problem-solving approach, and increases in complexity in the preschool through school years. Planning places demands on working memory as children have to remember, weigh alternatives, organise task materials and plan steps in a sequence. Those who give up easily, do not apply strategies, or persevere with strategies that do not work, will experience frustration rather than success and a positive engagement to learning, and are likely to struggle academically (George & Greenfield, 2005).

4.4.4 Approaches to learning

Approaches to learning, also referred to as engagement in learning, is a fairly new domain of school readiness that was suggested by the NEGP (McWayne et al., 2004). It describes distinct, observable behaviour that identifies ways children

become engaged in learning in the classroom by demonstrating the ability to use effective strategies to gain skills and knowledge (Smart et al., 2008). It is considered an important domain of development for preparing at-risk children for the transition into primary school. George and Greenfield (2005) suggest that it should be considered an essential dimension in assessing school readiness. Learning behaviour, such as motivation, persistence, frustration tolerance, initiative, and a positive disposition toward learning, are key factors in the learning process (George & Greenfield, 2005; Kagan, Moore, & Bredekamp, 1995). A child needs to be motivated for academic learning to be successful. McDermott et al. (2002) advocate that competencies in learning behaviour are directly related to academic and social behaviour, and should therefore be included in assessment protocols.

4.4.4.1 Motivation

Motivational qualities are considered an important feature of school readiness as they are key factors in achievement and learning, and are theoretically linked to mastery that is seen in explorative attitudes, competence and task persistence (Grant & Dweck, 2003; Thompson, 2002). Motivation is a complex construct but it is beyond the scope of this research to explore it in depth. An approach in keeping with school readiness is the focus on adaptive motivation, commonly referred to as 'mastery orientation', as opposed to its maladaptive counterpart 'performance orientation' (Harris, 2007a). This encompasses a theme contextualised in most definitions that is a desire to explore, understand and control one's environment (Turner & Johnson, 2003). Children with high mastery motivation engage in productive ways with adults, children, toys, people, and events in ways that encourage learning (Turner & Johnson, 2003). Cognitive flexibility is found to be highly related to motivation in preschool children (Chang & Burns, 2005).

Although little is known about the exact relations between the two components, it is suggested that cognitive flexibility supports children's motivation and enthusiasm by selecting and activating inclinations in response to the learning situation (Deci & Ryan, 2000; Vitiello et al., 2011). Autonomously motivated behaviour is associated with cognitive flexibility, enjoyment, increased levels of creativity and interests in tasks, while persistence as a component of mastery motivation is a significant predictor of reading and achievement scores in both first

and third grades (Howse, Lange, Farran, & Boyles, 2003; Turner & Johnson, 2003). Academic competencies are mediated by mastery motivation, thus influencing cognitive development.

There is ample evidence that mastery motivation is a key component in the approaches to learning dimension, one of the five dimensions stipulated by the NEGP, 1995 (McWayne et al., 2004). Motivation should therefore be included as a readiness assessment as it is teachable, has been shown to improve cognitive abilities and academic performance, and is a marker of child's readiness to engage adequately in the learning process (Harris, 2007a;). Motivation also interacts with the other domains of school readiness, particularly social and emotional competencies. Walker and MacPhee (2011) found that indicators of readiness in the social domain (social skills) and approaches to learning domain (mastery motivation) were significantly related to readiness in the cognitive domain. This reinforces the need to approach school readiness from a multidimensional approach.

4.4.5 Questions and cognitive development

The type of questions children ask is an indication of the level of their cognitive development. *What, when, how* and *why* questions indicate information seeking, as a sign of curiosity and indication of a desire to learn and expand knowledge, and demonstrate an engagement in learning. "Why" questions propel cognitive development, and children ask numerous questions on a daily basis to recruit information. However, it is not always the case that these questions are asked with the intent to use the information gathered in a useful way, to address a problem or an issue to "generate new state of knowledge" (Chouinard, 2007). The purpose of "what, when and how" questions, on the other hand, is to aid conceptual knowledge and problem-solving and therefore an important marker of one's ability to actively participate in the learning process. By the fourth year, developmental theorists agree that *how* and *why* questions predominate, consistent with advancing language development (Berk, 2009). Developmental differences are also reflected in the ability to direct questions to the right sources (or experts), and to ask effective as opposed to ineffective questions. Five-year olds show greater ability in asking the type of question that would help solve a problem (Mills, Legare, Bills & Mejias, 2010).

Asking questions that seek to satisfy curiosity (*when, how, why*) in objects, people, and events, indicates a level of reasoning ability and an alertness to and awareness of their world. Curiosity questions play a forceful role in cognitive development, whilst deep or explanatory questions promote cognitive development and improve academic achievement as they store information in the active working memory, and show how best to use the information to serve their problem-solving. Asking questions at a taxonomic or lower level indicates gathering information for factual, descriptive knowledge, and fixes thinking at a literal level. Problem-solving and conceptual understanding reflect higher order cognitive skills and involve critical and creative thinking (Hus & Aberšek, 2011).

Deeper questions are by nature self-generated and are more effective in the learning process as one is more likely to remember answers to one's own questions than an answer to someone else's. Children ask questions because they are implicitly guided by the knowledge that adults are a useful source of information (Graesser & Olde, 2003). A child will ask questions that depend on his or her existing conceptual structure and readiness to incorporate new information. The active engagement of the learner is a critical factor in learning, and when information seeking is self-generated it is likely to be better remembered as improving memory networks. Information offered is done so from a level that may not be at a child's current conceptual base, so learning and memory may not be promoted (Chouinard, 2007).

Questions that are asked to gain an adults attention or permission to engage in an activity, perceptual questions (is this pink or white?) and irrelevant questions, although needed, do not aid conceptual development. They serve functional purposes and satisfy information at a superficial level. Generally, children take the easier route and ask perceptual questions to solve a problem (Chouinard, 2007). Asking questions should shift from a shallow factual level ("is this a scale?") to deep explanatory level ("How does this scale work?"), indicating that the individual is building up knowledge about concepts (Graesser & Olde, 2003).

Social class and cultural variables influence the level and frequency of questions that children ask. Middle class children tend to ask more curiosity-based questions than do lower income children, who ask more procedural questions. Some

cultures value obedience and quiet in children and may discourage actual question-asking (Harris, 2007a; Maratsos, 2007). Children who feel emotionally secure may well be more confident in asking questions, as on the basis of a trusting relationship (Harris, 2007a). Curiosity is fostered by the intellectual climates of home environment and parental behaviour (Weizman & Snow, 2001). Intellectual attitudes, good quality preschools, and early rich experiences at home foster a love for learning, curiosity and exploration, and build a sense of initiative and self-esteem. Children ask questions in a trusting environment and those with a secure attachment tend to ask more questions. Generally, questions in research have not been investigated from the point of intellectual search, and yet they serve “as an engine for cognitive development” (Chouinard, 2007, p 113).

4.4.6 Humour as a cognitive activity

Humour is a marker of both intellectual and language development, and social activity. As part of a developmental sequence it includes cognitive, linguistic, social and emotional skills that overlap and are mutually interdependent. Motor and visual perceptual skills are also implicated, and humour can be categorised into linguistic and non-linguistic forms that have as their basis the concept of incongruity (E.Cameron, Kennedy, & C. Cameron, 2008; Fitzgerald & Craig-Unkefer, 2008; Southam, 2005). Developmentally, humour in the 4 to 7 year group relies on an advancing stage of conceptual growth, and is referred to as the stage of conceptual incongruity in the humour theory postulated by McGhee (as cited in Southam, 2005). According to McGhee, incongruity is a trait of humour as it involves an element of surprise or violation.

Cognitive definitions of humour focus on the concept of incongruity, which refers to the ability to appreciate ludicrousness and absurdity in situations, events or ideas. A certain level of cognitive sophistication is needed to appreciate incongruity (Cameron et al., 2008), and the contravention of expectations that incongruities produce generates mental activity (Eco, as cited in Puche-Navarro, 2009). Language is a significant cornerstone of much of humour, and the use of playful words, wit, ambiguous meanings and made up words enhances language acquisition and conversational skills. Linguistically, humour contributes to the enjoyment of learning, improves the school atmosphere, promotes learning, and is considered a good

educational tool (Dormann & Biddle, 2006). Joke-telling is popular in the 4 to 7 year age group and relies significantly on linguistics through its use of playful language and wordplay. Common and crucial to the growing language skills in the 3 to 5 year age group is experimentation with sounds of words by altering phonemes to create humour [e.g., super *duper*/super *pooper*] (Cameron et al., 2008).

Humour within a social and emotional perspective is described as any communication that leads to an experience of pleasure, amusement and mirth (Southam, 2005). Humour and wit are part of many social encounters and are intimately related to human nature. They promote peer acceptance and are related to perceived social competence that encourages play relationships by bringing fun into the social encounter. (Lillemyra, Søbstad, Marder, & Flowerday, 2010; Southam, 2005). As intellectual play, humour promotes problem-solving skills in all dimensions of development, i.e., linguistic, cognitive and social (Puche-Navarro, 2009, Southam, 2005). Humour also relies on important visual perceptual skills, since knowledge and understanding of the world is based on important perceptual processes that keep a sense of reality intact. For instance, a picture of an animal wearing human attire evokes humour as one sees the absurdity of the situation. Discerning visual inconsistency is an important skill in the overall learning process. Motor coordination skills are also implicated in the development of humour, and the ability to coordinate and orientate one's body can result in the participation of clownish acts or other forms of physical movements, such as a dance act performed to elicit laughter (Reddy, 2001; Southam, 2005). Humour involves both the ability to generate amusement and the capacity to appreciate and respond to humour in external sources, be it a person, situation or media (pictures, cartoons). Humour is therefore a useful indicator of cognitive ability as well as multilevel domains of development.

This section has reviewed the mental processes and products that are necessary for cognitive development, an essential component of school readiness. It looked at the cognitive concepts of attention, memory, inhibition, problem-solving and cognitive flexibility within an information processing model. The concepts of questioning and humour were introduced as two dimensions of cognitive activity. Types of learning behaviour, such as motivation, attention and persistence, were seen as significant dimensions of school readiness. Learning behaviour not only

contributes to academic success but is ultimately core to emotional and social competencies, as together they contribute to early school success (Fantuzzo et al., 2007). Cognitive maturity is an important component in the readiness to learn and deal adaptively to the challenges of formal schooling, whilst cognitive development is a fundamental link to every domain of a child's development: language, perception, and motor, social, and emotional. Cognitive development influences the growth of intelligence, as other domains influence cognitive growth.

Chapter 4 has discussed the domains of development that are directly linked to school readiness, including perceptual, motor and cognitive areas. Each domain is interdependent, influences and is influenced by the other to promote total development.

CHAPTER 5

DOMAINS *INDIRECTLY* LINKED TO SCHOOL READINESS

Chapter 4 reviewed the literature on those domains that are directly related to school readiness (cognitive, speech and language and perceptual). Chapter 5 reviews social/emotional, neurological and developmental domains, the indirect measures of school readiness. Each domain measures different dimensions.

5.1 The emotional and social competencies domain

The development of social and emotional competencies are of fundamental importance during the preschool years and occur at the same time as motor, cognitive and language skills (Thompson, 2001). Despite this knowledge, emotional development has been underrated as a core capacity in the early childhood years (Denham, 2001; National Scientific council on the developing child, 2004). Paediatric primary care settings routinely screen for developmental delays in motor, cognitive, language delays and developmental disorders for early intervention, but not for social-emotional risks (Briggs-Gowan & Carter, 2008). However, social-emotional competencies are foundational and linked to early school adjustment, social competencies and mental health (Denham, 2001; Fantuzzo et al., 2007).

Historically, early childhood education has focused on the development of academic competencies and the effects of school age entry (Phillips & Shonkoff, 2000). Emotional and social development, previously overshadowed by the importance of cognitive development, is however increasingly being recognised as a significant area of development in learning and the total development of an individual. With the surge of neurobiological research the tide is swinging in education, medicine, economics, and at large scale policy levels asserting strongly that academic competencies are based on emotional and social competencies and are fundamental to later school success (Duncan et al., 2007; Lunenburg, 2000; National scientific council on the developing child, 2007; Pahl & Barret, 2007; Raver, 2002; Raver & Zigler, 1997; Sassu, 2007; Shonkoff & Phillips, 2000; Thompson & Raikes, 2007).

Emotionally and socially well adjusted children do better at school, persist at challenging tasks, communicate well and build and sustain good relationships with

peers and adults (Hair et al., 2006; Pahl & Barret, 2007; Raver; 2002). Children classed as being 'at-risk' of school failure by readiness tests may actually have socially and emotionally maladaptive behaviour patterns that hamper their cognitive skills (Harris et al., 2007). Bustin (2007) saw the need to identify such optimal behaviour in preschool contexts as necessary constructs for inclusion in a school readiness questionnaire. Social and behavioural problems at school entry are related to poor social and academic outcomes, poor language, cognitive, motor skills, increased risk of school failure and poor approaches to learning skills, such as mastery motivation, task engagement and attention (Coolahan, Fantuzzo, Mendez, & McDermott, 2002; Craig-Unkefer & Kaiser 2002; Fantuzzo & McWayne, 2002; Raver, 2002),

Considering the voluminous quantity of research on the important contribution of social and emotional competencies at preschool level to later academic, social and psychological adjustment, it is imperative to include measures of this domain in assessments. Although emotional and social competence are distinctly defined and consist of discreet skills they are so highly interconnected that a discussion of one is difficult without reference to the other, as social and emotional development is interrelated and interdependent (Buckley & Saarni, 2009; Jones, 2008; Raver & Zigler, 1997). Feelings are influenced by social experiences and mediated through social interactions (Goleman, 2006; Jones, 2008; Parkinson, 1996), whereas emotions need a social context in which to develop (Saarni, 2000).

5.1.1 Emotional competence

Emotional competence refers to the ability to express, regulate and understand emotion. (Denham, 1998, 2006; Denham et al., 2003). Both emotion understanding and emotion-regulation contribute to early school adjustment (Shields et al., 2001). Emotions are important because children who face significant emotional difficulty face the risk of early school difficulty (Raver, 2002). Trout, Nordness, Pierce, and Epstein (2003), in a review of literature, found that children at risk of emotional disturbance, when compared to those without disabilities and in other disability categories, presented with poorer grades, higher truancy levels, and higher rates of school dropout. Kindergarten teachers report that of greater concern and more difficulty than teaching numbers and letters was working with children who lacked

motivation, and socio-emotional capacities for socialising with others (Rimm-Kaufmann et al., 2000b).

Attaining emotional competence is a crucial developmental task in early childhood (Kidwell et al., 2010) and has many facets. Researchers and theorists have focused on a variety of measures to elucidate an understanding and measurement of the concept for both assessment and research purposes (Denham, 2006, Rydell, Berlin & Bohlin, 2003; Raver, 2002; Saarni, 2000). Some researchers have studied emotion-knowledge (Downs, Strand & Cerna, 2007; Mostow, Izard, Fine & Trentacosta, 2002) and others placed emphasis on the emotional regulation as a key to emotional competence (Dennis & Keleman, 2009; Eisenberg & Spinrad, 2004; Vaughn, DeLisi, Beaver & Wright, 2009). Whatever the emphasis, all aspects are necessary in understanding the adjustment of the preschool child. Miller, Fine, Gouley, Seifer, Dickstein, and Shields (2006a), in examining the different facets of emotional competence, provide evidence for conceptual similarities in the constructs and conclude that the interrelationship between the facets, *expressed emotions*, *emotion-regulation* and *emotion-knowledge*, are important for child adjustment.

The focus in this research included four facets of emotional competence: *emotion knowledge*, *expressed emotions*, *emotion-regulation* and *social competencies*.

5.1.2 Emotion-knowledge

Emotion-knowledge is indexed by the child's ability to recognise and label expressions of emotion (Izard, 2001a). *Emotion understanding* involves the ability to know one's own emotional state, recognise emotions in others and then effectively communicate by using a vocabulary of feelings (Kidwell et al., 2010). Discerning feelings is important and involves the preschool child's ability to correctly identify specific emotions in self and the facial expressions and emotions of others in various social contexts (Colwell & Hart, 2006; Downs et al., 2007). At preschool level, emotion understanding requires of the child the ability to label correctly the simple and specific emotions of happy, sad, "mad" and afraid (Denham, 1986).

Emotional competence involves the skill of using the vocabulary of emotion to label feelings correctly in oneself and interpret them correctly in another (Saarni,

2000). Children who are able to correctly label facial expressions show more positive social behaviour at age nine (Izard et al., 2001), and adeptness in emotion understanding and awareness is linked to many areas of social competence (Lindsey & Colwell, 2003). Emotion understanding is significantly linked to peer acceptance and maladjustment in interpersonal difficulties (Bongers, Koot, Van der Ende, & Verhulst, 2004; Cassidy, Parke, Butkovsky, & Braungart, 1992; Dodge & Pettit, 2003; McCabe & Altamura, 2011; Mostow et al., 2002).

Affective perspective-taking is an important part of emotion understanding and requires the preschooler to use situational cues to identify the feelings of another person (Colwell & Hart, 2006). It is a critical developmental requirement in the preschool classroom environment and is intricately linked to classroom adjustment at an academic and social level (Miller et al., 2006). Children who have knowledge about emotions are able to successfully steer social interactions to positive outcomes and less conflictual relationships. A lack of emotion-knowledge results in negative peer relationships, which in turn influence motivation, morale and concentration, and have negative impacts on academic performance (Izard et al., 2001).

Emotion-knowledge also facilitates academic competencies, as it impacts on teacher-child interactions in dual ways. Firstly, emotion-knowledge implies verbal skills that would impact in developing positive teacher-child interchanges. Within that relationship children develop the confidence and security to seek help from the teacher. It also influences positive perceptions on the part of the teacher of the child and raises teacher expectations of the child, thus influencing academic performance (Izard et al., 2001).

5.1.3 Emotion-regulation

Varied definitions of *emotion related self-regulation* exist, but in general refer to processes that are used to manage and change one's emotionally state and emotion-related motivational and physiological states and how emotions are expressed behaviourally (Denham et al., 2012; Eisenberg, Hofer, & Vaughan, as cited in Eisenberg, Valiente & Eggum, 2010).

Emotional regulation is considered an important aspect of the emotional-social domain of school readiness. At school entry, children are expected to self-regulate in a number of ways, for example, by awaiting their turn, conforming to rules, sharing, listening, and following directions, amongst many other regulatory demands in the stimulating context of the preschool classroom (Denham, 2006; Denham et al., 2012). Emotion-regulation is the most challenging aspect of emotional development as it requires the ability to regulate emotions. Children who do not feel in control of their emotions are more inclined to outbursts, inattention, and rapid withdrawal from stressful situations (Shonkoff & Phillips, 2000). Emotion-regulation involves coping with heightened positive and negative emotions (Kidwell et al., 2010; Kopp, 1989).

Regulation of emotions is integral to a child's relations with others, and emotionally competent children are able to soothe the negative feelings of others (Fabe et al., 2002). They are able to access behavioural strategies to modulate their feelings and manage the intensity of their reactions to painful and negative feelings (Bustin, 2007). Dysregulated emotion is associated with deficits in social skills and maladaptive behaviours such as anxiety, aggression and hyperactivity, which adversely affect social relationships (Izard et al., 2008; Rich, Shepherd & Nangle, 2008).

Emotional self regulation requires "effortful control" (EC), an executive control function which inhibits a behavioural and emotional response (Eisenberg et al., 2004). It is foundational to successful learning and emotional and social competencies (Liew, Eisenberg & Reiser, 2004). A number of studies document the link between EC and social competencies, such as compliance and cooperation (Coy & Murray, 2001; Kieras, Tobin, Graziano & Rothbart, 2005; Kochanska). Children with great EC express less disappointment in the presence of unfamiliar adults and are better adjusted (Liew et al., 2004). EC involves self awareness and cognitive regulation, enabling a preschooler to inhibit unhelpful responses in a social situation. Children who are better able to inhibit their behaviour have fewer behaviour problems and better social skills (Rhoades, Greenberg & Domitrovich, 2009). Harris et al. (2007) make a strong case for working on "low" effortful control to improve learning outcomes, particularly in impoverished backgrounds.

Emotional regulation skills at a physiological as well as at a cognitive level should be part of school readiness programmes to promote resilience, especially for children living in poverty (Miller et al., 2006). The literature on social and academic competency shows that the ability to self-regulate is crucial in children's adjustment to school transitions, academic achievement and the development of social-emotional competence (Blair & Peters, 2003; Schultz et al., 2001; Shonkoff & Phillips, 2002). It is a core social emotional competence that it is linked to increased risk of failure, if not well developed (Blair & Peters, 2003).

5.1.4 Behavioural inhibition and anxiety

Attachment, separation and individuation are an integral part of social-emotional development. Typically, developing children attain these types of behaviour between the ages of 3 to 5 (Lidz, 2003). The items selected for assessment in the questionnaire highlight risks of anxieties related to separation. Common to the developmental phase of preschool is separation anxiety, which appears early in childhood and may present as a clinically significant problem during the transition to school (Carr, 2006). Separation anxiety emerges during preschool, kindergarten or Grade 1, and it is marked by an excessive and unreasonable fear of school (Mash & Wolfe, 2010). This research refers to basic symptoms of separation anxiety as it tends to be commonly observed in this age group, with an estimated prevalence between 3% and 13% (Eisen & Schaefer, 2005; Klien, 2009). It is quite normal for young children to express a certain degree of fear or anticipation when away from caregivers, but it becomes a problem when the child refuses to go to school or is distressed all the time while at the school.

Inhibited children tend to be fearful, and those with this temperamental style take a while before they approach or communicate with unfamiliar people, tending to stay within close range of safety figures, be restricted in their social behaviours, withdraw in response to novel stimulation, and show fearfulness and restraint (Carr, 2006; Rapee, Schniering, & Hudson, 2009). Emotion-regulation has been considered as playing a role in the development of anxiety symptoms and disorders (Muris, 2006). Studies of infants and children have shown that maintaining attentional focus on a distressing stimulus is associated with generalised distress (Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002). Anxious children appear to lack the skill of flexibility in

controlling attention, an important skill in managing emotion (Lonigan, Vasey, Phillips, & Hazen, 2004). They seem to have low levels of self-efficacy in regulating emotions and tend to rely on safety figures for assistance (Suveg & Zeman, 2004).

5.1.5 Self regulation and school adjustment / academic competency

Critical to early school success is the ability to regulate emotions and behaviour in the classroom (Blair, 2002; Raver, 2002). Inability to dysregulate intense negative emotions and motor activity in the classroom are viewed as disruptive (Miller et al., 2004; Raver, 2002). Ability to regulate emotions and behaviour is critical to meeting preschool goals that require sustained attention such as group reading, story time, and organised games (Miller Gouley, Seifer, Dickstein, & Shields, 2004). Among preschool girls high at risk, the ability to regulate emotions serves as a potential protective factor in reducing behaviour problems in early childhood (Hill, Degnan, Calkins, & Keane, 2006).

Preschoolers who express a great deal of negative emotions, such as hostility and anger, experience more peer rejection and reflect poor social competencies as they are unable to modulate their feelings effectively (Fabes, Hanish, Martin, & Eisenberg, 2002; Hubbard, 2001). Modulating emotions and behaviour in the classroom is essential for promoting engagement in learning and adaptive peer interactions, activities that drive positive school attitudes and adjustment over time (Miller et al., 2004).

5.1.6 Negative emotions and emotional regulation

Emotionally proficient children have a good balance between positive and negative emotions, favouring more positive ones (Kidwell et al., 2010). Managing negative emotions of frustrations, disappointment and hurt feelings, constructively leads to better adjustments and peer relationships in the classroom and playground (Shields et al., 2001). An inability to manage strong, negatively charged emotions leads to feelings of disorganisation, outbursts and isolating behaviour, which in turn affect learning (Olson, Sameroff, Kerr, Lopez & Wellman, 2005). Children who experience frequent and intense negative emotions such as anger do less well in controlling negative responses and feelings and lack an ability to apply effective

strategies to regulate behaviour, thus leading to poor social outcomes (Webster-Stratton & Ried, 2003).

Poorly regulated children react to frustrations aggressively and angrily and tend to be anxious, fearful and irritable, and have difficulty adjusting to classroom routines. They also have poorer relationships with teachers and become increasingly isolated from peers (Denham, Blair, Schimdt, & DeMulder, 2003; Eisenberg et al., 2005; Fabes et al., 2002; Miller et al., 2006). Negative emotional intensity, also referred to as ‘emotional lability’, can be measured through mood swings, anger reactivity and intensity of emotion (Spritz, Sandberg, Maher, & Zajdel, 2010). Moody or emotionally negative children experience greater peer rejection (Stocker & Dunn, 1990). *An inability to maintain an even temper throughout the day* is an example of negative emotional reactivity, whilst the ability to maintain an acceptable level of arousal promotes engagement in classroom learning (Sheilds et al., 2001).

Children better able to tolerate frustration are more able to adjust to the classroom situation, comply with limits, and negotiate cooperative relationships with peers (Sheilds et al., 2001). Distress, particularly is a strong emotion in the classroom and regulating it effectively is linked to positive social development in both preschool and school age children (Denham et al., 2003; Hill et al., 2006). Negative emotionality is a significant developmental risk factor.

5.1.7 Positive emotions

Happiness is generally the single positive emotion in the basic group happy, sad, bad, angry, and scared, with satisfaction and amusement also being linked to it (Averill & Moore, 2000). As discussed in the section on humour, mirth and pleasure are linked to positive learning experiences. Positive emotions, compared to negative emotions, are found to improve a broad range of cognitive functioning, specifically on sequential tasks (Blau & Klein, 2010) in 4 to 5 year olds. Happy children generally make good learners, and positive emotions broaden the scope of physical development, play, behaviour, attention, learning and cognition (Fredrickson, 1998).

It must be noted, however, that even intense positive emotions need regulatory capacities. A child who cannot contain his or her joy and excitement, and shrieks out

and runs around wildly is likely to have disapproving responses from peers. Both positive and negative emotional arousal is associated with peer acceptance (Trentacosta & Izard, 2007).

5.1.8 Primary and secondary emotions

Happiness, anger, sadness and fear are classified as basic or primary emotions (Berk, 2009), commonly referred to as ‘glad, bad, sad and mad’ in preschool lexicons. These four ‘simple’ emotions have received the most research attention in children as they are accompanied by clear and distinct facial expressions (Berk, 2009; Bosacki & Moore, 2004; Colwell & Hart, 2006,). Basic emotions tend to be physiologically based, with self-conscious emotions developing from the second year onwards, and implying an understanding of self and social relations, and cognitive aspects. Denham et al.’s (2002) research shows that shame, empathy and guilt emerge as early as two years of age, and involve an element of self-evaluation as early as three. They also have implications for responses to success and failure. Self-conscious emotions govern both teacher and peer relationships in the classroom, because learning is performance-evaluated. These ‘academic emotions’ can be experienced as negatively expressed feelings of disappointment, guilt or even shame and failure, or positively as expressions of pride (Pekrun, Goetz, Titz, & Perry, 2002)

5.1.9 Self-conscious emotions

The self-conscious emotions of pride, remorse and empathy are investigated in this study. The underlying theme of this group of emotions is an evaluation of one’s behaviour against an external standard (Thompson, Meyer, & McGinley, 2006). Self conscious or social emotions as they are sometimes referred to are important for facilitating the learning process. These emotions emerge by the preschool years and involve a cognitive capacity and an awareness of rules and standards (Lewis, 2011). Self conscious emotions are necessary to facilitate being an effective member of a group. Language plays a significant role in the understanding of complex emotions (Bosacki & Moore, 2004).

5.1.10 Pride, shame, criticism

Pride is described as a self-conscious emotion and emerges in the preschool years and is related to personal competence (Barrett, 2005; Garner, 2003; LaFreniere,

2000). It requires an ability to compare one's performance to a standard (Heckhausen, as cited in LaFreniere, 2000), but differs from the simple emotion of happiness on the basis of personal responsibility and control (Boscaki & Moore, 2004). Experiencing pride indicates pleasure in self achievement, encourages one to share the achievement with others and motivates the child to take on further challenges (Saarni, Campos, Camras & Witherington, 2006). With appropriate feedback, pride is related to greater persistence in difficult tasks and good achievement (Kelly, Brownell, & Campbell, 2000). The preschooler who shows pride in the classroom is internally motivated to continue to succeed. In preschool, as at any other stage of schooling, mastery motivation is crucial to learning, and children with it engage in positive ways of learning and the environment. Completion of difficult tasks often gives way to feelings of pride (Turner & Johnson, 2003), which are related to positive self-worth (Saarni, 1999). Girls show greater expressions of pride over boys, and express their feelings of pride more positively (Stipek et al. as cited in Boscaki & Moore, 2004).

Shame may be experienced in response to failure in easy tasks, and results in a reduction in persistence (Turner & Johnson, 2003). Although it is not tested as a solo item in this questionnaire its outcome as a corollary to pride is strongly linked. High levels of shame and guilt as a result of failure are related to preschool onset of depression, and as Luby et al. (2009a) found, both should be explored in clinical assessments of young children, as excessive amounts of these negative emotions affect competency levels.

The concept of criticism for the purposes of this discussion is included under complex emotions, but while it is not an emotion the response to it and how children meet the challenge constitute an important part of emotional and cognitive development. One of the major challenges they have to cope with when starting school is the ability to deal with criticism of their work and sometimes their abilities. Accepting criticism is a social skill that indicates a willingness to learn from mistakes, and when criticism is accepted in good faith, with calmness rather than anger, it shows the ability to self-regulate. Accepting criticism from peers and adults helps them to socialise better, but as Cutting and Dunn (2002) argue, this requires mature social cognitive ability. Burhans and Dweck (1995) have established that children as

young as four to five are sensitive to criticism and either show a “mastery oriented” or “helpless” pattern of responding. The former is a positive effect in the face of failure, while the latter is negative self-thought, displayed as negative effect, giving up easily and low levels of self-worth.

Cutting and Dunn (2002) theorise that children with better developed “theory of mind”, that is an understanding of other people’s mental state and emotions, were more sensitive to criticism because of the ability to read their minds. They found that at preschool level and a year later children with better developed socio-cognitive understanding reacted more sensitively to teacher criticism because of a well developed and accurate ability to understand another’s motives. This may not necessarily be a positive consequence, however, the advantage to a socially cognitive aware mind is the ability to link thought, behaviour and emotion, allowing children to participate in shared activities such as pretend play, empathy, joking and offering comfort (Cutting & Dunn, 2002). Reacting sensitively to criticism may not necessarily be a bad thing as one can learn from constructive criticism, and there may be an advantage in social interactions if it prompts children to modify their behaviour. However, the important issue is that social cognition and understanding have advantages as social understanding is in place by 4 years of age (Cutting & Dunn, 2002).

5.1.11 Empathy

Empathy is referred to as a social and moral emotion and is therefore considered a significant emotion in interpersonal contexts (Bar-On, 2000). It involves an interaction of cognitions and affect in response to another’s emotional state (Preston & de Waal, 2002), and emerging markedly in the preschool years is foundational to pro-social and altruistic behaviour (Goleman, 2007). It is seen as a key component of emotional competence (Eisenberg, 2000; Saarni, 1999), and the capacity for empathy and emotional connections enhances children’s relationships with teachers and peers (Shields et al., 2001). Rooted in infancy (a primal response), empathy in the preschooler unfolds as the capacity of perspective-taking develops, and awareness that the feelings of another are different from one’s own (La Freniere, 2000). With an emerging self-awareness, the ability to empathise shows recognition and awareness of another’s feeling, a strong indicator of emotional literacy (Goleman,

1996). Knowing how someone else feels is a fundamental human ability (Pool, 1997).

5.1.12 Empathy and emotional regulation

Children good at regulating emotion are more likely to be empathetic, sociable and display greater pro-social behaviour by helping and sharing (Bengston, 2005). Negative feelings such as anger and poor impulse control impact negatively on the ability to take another's perspective, blunting capacity for empathy (Strayer & Roberts, 2004). Empathy as an emotionally competent type of behaviour is a necessary self-efficacy skill for schooling as it incorporates self-regulatory strategies of awareness of one's own emotional state, as well the ability to recognise emotions in others (Hyson, 2004). Thompson and Raikes (2007) identify teacher and peer relationships, conscience development, and emerging capacities for cooperation and compliance, the growth of self-regulation and the development of self-understanding as key factors to school success. A better awareness of emotions and their regulation leads to more empathic perspective-taking and more affectionate relationships (Schutte et al., 2001). Conversely, a deficit in empathy skills is telling and requires the attention of the adult.

5.1.13 Empathy and academic performance

As a core emotional competence, empathy facilitates academic performance because of the cognitive awareness required in responding to emotional situations (Strayer, as cited in Saarni, 1999). Showing empathy is a sophisticated cognitive activity because it involves the use of language of emotions to label feelings, as well as the ability to understand it in self and others. Children who lack this ability have reduced capacity to develop empathy and have less positive behavioural and academic outcomes (Schultz et al., 2001). It is the lack of emotional competency and continuing emotional difficulties that reduce the chance of academic success, leading in some cases to dropping out of school and anti-social and delinquent activities (Raver, 2002). As empathy is a social emotion skill it requires an awareness and sensitivity to group rules and expectations. Focusing, paying attention, following directions, working as part of a group and complying with teacher and classroom demands are academic skills that are facilitated by emotional or social competence

(Raver, 2002), whilst cooperative learning was found to improve verbal mathematics problem-solving skills in preschoolers (Kamuran, 2009).

5.1.14 Remorse, empathy and guilt

Preschoolers are capable of directing and monitoring their own behaviour and show evidence of internalisation of moral standards (Lewis, 2004), with guilt and empathy often discussed together as partner feelings. Guilt in appropriate situations is related to good adjustment (Berk, 2009), and helps children repair a conflict situation, resist harmful impulses and be more considerate in behaviour (Cole, Barrett, & Zahn-Waxler, 1992; Walter & LaFreniere, 2007). Remorse is an important developmental trait, and the ability to show it is a socially and emotionally competent form of behaviour that suggests a level of empathy and perspective-taking. Lack of remorse, reduced empathy and compromised guilt are unemotional traits and indicate a developmental pathway to anti-social behaviour. A deficit in the concern for another's wellbeing, a hallmark of antisocial personality, has its roots early in development and shows a history of disruptive behaviour (Hastings, Zahn-Waxler, Robinson, Usher, & Bridges, 2000). Deficits in remorse and empathy, grouped as callous unemotional traits, are associated with disruptive behavioural disorder (American Psychiatric Association [APA], 2000). As an emotionally regulated type of behaviour, remorse and guilt are linked with 'rule-compatible' types of behaviour and are expected to be displayed following wrongdoing. Expressing remorse and guilt demonstrates pro-social behaviour (Mascolo & Fischer, 2007), and when children experience guilt and remorse they are likely to apologise, make amends and confess to misdeeds. Effortful control and guilt have been shown to play a preventative role in antisocial disruptive trajectories (Kochanska, Barry, Jimenez, Hollatz, & Woodard, 2009).

Assessment of emotions such as remorse should be part of an evaluation as they point to potential risks, and developmental trajectories for disruptive behaviour are stable across time (Kochanska et al., 2007; Timmermans, Van Lier, Cujpers, & Koot, 2008).

5.1.15 Social skills and competencies - social intelligence

Social skills are the basis of social competencies, but there is a lack of consistency in the use of the terms and they are often used interchangeably (Topping, Brenner, & Holmes, 2000). Generally, however, ‘social skills’ refer to what individuals do and ‘social competencies’ to how well they do it (Lidz, 2003). Current definitions encompass the concept of social competency to include the three components of thinking, feeling and behaviour to achieve social tasks (Topping et al., 2000). This involves perception and expression of emotion analysis and understanding of emotion, and the ability to regulate emotion in self and others. Cavell’s (1990) three-tier model, however, is a useful guide when considering the different aspects of social competence in children, proposing that *social skills* (overt behaviours) at the foot of the hierarchy are involved in responding to the demands of a social situation (classroom setting).

Social skills include those that are used in emotional, social and cognitive domains (Raver & Zigler, 1997). The second layer, *social performance*, refers to the effectiveness of the child in social situations and relationships with adults and peer that call upon emotion regulatory skills. At the top of the hierarchy is children’s *social adjustment*, contextualised as a global expression and culmination of social functioning over time (Spritz et al., 2010). Studies of social competence in at-risk children generally focuses on a global aspect, to include classroom adjustment, interpersonal competence and peer relationships, taking into account both skills and performance (Fantuzzo, Sekino, & Cohen, 2004; Shields et al., 2001).

5.1.16 Social graces

Manners are the most basic lessons of social interaction and are acquired in early interactions. Learning basic manners or the skills of elementary interaction, such as saying “please” and “thank you”, “sorry”, and greeting appropriately, teach children the unspoken rules of social harmony. People who lack these skills are not only inept at ‘social niceties’ but also lack the social competency to handle others emotions (Goleman, 1996). Basic manners adhere to the rules of social etiquette, as behaviour that ultimately leads to more effective social interaction, helps build deeper relationships and keeps social exchanges going. The ability to participate in the give and take of conversation, initiate, join, maintain and engage in it, and initiate social

contact, not only indicates social graces but is the fabric of social competencies that facilitate peer and adult relationships. Deficits in this signal difficulties in the elementariness of social interaction. Social graces are one aspect of social interaction skills that contribute to social competencies, but while they are not a primary indicator of school readiness they do facilitate smooth social interchange. Children with good social graces are generally well-liked by peers and teachers, and the quality of children's relationships with peers is influenced by close, supportive relationships with their teachers, both at pre- and primary school level (Rich et al., 2008; Spritz et al., 2010). This impacts positively on classroom learning and behaviour.

If adaptive skills call on practical intelligence then social etiquette relies on social intelligence, and is also considered a non-academic intelligence (Sternberg, 1997). Although a rather dated reference, Thorndike's (1920) definition succinctly describes social intelligence as the ability to understand others, and to behave and act wisely in relation to them. It includes the ability to solve social problems and is composed of procedural knowledge, that is a knowledge of social rules and etiquette, and strategies for applying social knowledge (Hedlund & Sternberg, 2000). Although non-significant correlations were found between social knowledge (knowledge of etiquette rules) and academic intelligence in a college sample (Wong, Day, Maxwell, & Meara, 1995), in young children it remains an important skill as they learn to negotiate the complexities of relationships in an environment that is new and different from home. Although conflicting findings emerge as to whether social and practical intelligence form distinct academic intelligences, due in part to the varied definitions and approaches to understanding them, it is undoubtedly a unique construct, and either requires the cognitive skills of flexibility, thought, problem-solving, application and creativity (Hedlund & Sternberg, 2000).

Both adaptive and social graces are classed as normative readiness, which is considered an important domain of readiness (De Witt, 2011), where 'normative' refers to the acquisition of values and norms that inculcate a sense of discipline. According to de Witt (2011), criteria for it include fitting in easily with routine, bound, adaptive behaviour, such as independence at meal times, using toilet facilities and eating without messing, amongst other self-help skills. Engaging in such activities is a marker of independence and responsibility that is critical to task

completion. Obeying simple rules and regulations, respecting the rights of others and submitting to authority are seen as a part of school readiness. Using common courtesies such as “please”, “thank you” and “sorry” indicate normative readiness. An important part of social competencies that facilitates social intelligence is the art sociability.

5.1.17 Self-help, independence, life skills and school readiness - practical intelligence

Self-help behaviour is adaptive, follows developmentally appropriate milestones and is considered a necessary requirement to meet the demands for school entry, where adaptability “affects the child’s everyday effectiveness in dealing with the environment and later responsibilities in school and life” (Zigler & Styfco, 1997, p.300). As adaptive behaviour, self-help skills are identified in highly regarded assessment measures such as the Vinelands Social Maturity Scale and Vinelands Adaptive Behaviour Scales (Classroom edition) and the Griffiths Mental Scales, to ascertain a level of the child’s developmental functioning in the personal hygiene and personal social domains. Although not comprising school readiness measures, self-help behaviour is considered a necessary life skill that facilitates the readiness to school and fosters academic competence. Figuring out how to tie shoe laces, pull on a difficult garment, and choose appropriate clothing, requires problem-solving skills. Attaining and developing self-help skills indicates a certain level of social and emotional competence as the child learns to express these in socially acceptable ways as he or she negotiates interactions within education, play and the family unit (Bustin, 2007; Shepherd, 2010). Self-help activities encourage independence and motivation, a sense of mastery, improved self-esteem, self-reliance, problem-solving, concept-formation, and memory (Shepherd, 2010). They are also key types of behaviour in the engagement with or approaches to learning domains.

Two fundamental reasons for the investigation of self-help skills as a concept in this research are that emotional-social development and motor delays underpin its development. Both serve as areas in which to identify risks in the child’s development. Motor development is an integral part of self-help skills (Chiarello, Palisano, & Bartlett, 2011), and activities of daily living summon every motor skill (as explored later in this chapter). Coordination, body image, sequencing, visual

motor, visual perception, visual motor integration, spatial skills endurance, midline crossing, postural stability, an understanding of left and right, and coordinating the two sides of the body, are enlisted, for example, in the seemingly simple act of dressing and grooming. Perceptual deficits are signalled in the inability to distinguish the right from the left side of the body.

Kopp, Beckung, and Gillberg (2010) in a diagnosed sample of preschool girls with ADHD and ASD found motor coordination problems were related to a reduced ability in daily life skills, even when performance IQ was controlled. In children with ADHD, sequencing, and memory deficits interfere with adequate completion of a self-care task (Stein, Szumowski, Blondis, & Roizen, 1995), whilst children with autism have delayed motor development and sensory modulation difficulties that impact on activities of daily living. Fine motor coordination difficulties can lead to high frustration levels and therefore test one's emotional capacity and self-regulation skills, an important readiness factor. Physical and motor limitations lead to dependency on caregivers and a sense of helplessness, which in turn affects adjustment negatively as parents fail to provide age-appropriate self-help guidance (Missiuna, Moll, Law, G., King, & S., King, 2006; Wood, McLeod, Sigman, Hwang, & Chu, 2003).

Parents' routine participation in self-help care and intense affection with caregiving tasks maintain immature behaviour that impacts on self efficacy and mastery. Helplessness and dependence increase the risks of anxiety as continued assistance and comfort from the parents creates anxiety about separating from them (Chorpita & Barlow, 1998). Separation anxiety is a common concern in this age group and independence is a critical expectation for school entry. A lack of sufficiency in life skills also has detrimental effects in sporting areas, as children avoid activities because of an inability to change into sporting clothes quickly and efficiently when in grade school. At preschool it hampers "dress up" activities, an important social and learning skill.

Adaptive skills, the ability to adapt to the demands of the environment, reflect a practical, everyday intelligence which is considered a non-academic form of intelligence (Hedlund & Sternberg, 2000; Sternberg, 1997). In keeping with the holistic approach to school readiness, less traditional academic views of intelligence

should be included in generating an understanding of the holistic development of the child. Practical knowledge is about solving real world, everyday problems, skills that the preschooler has to increasingly rely on to negotiate the demands of preschool. However, despite varying cultural expectations, values and beliefs which influence the development of self-help skills, it remains an important marker for successful school adjustment and later achievement, and affects how readiness skills are valued (Galindo & Fuller, 2010).

Assessing and encouraging normative self help behaviour should be assessed because of its negative sequelae for a range of difficulties. It alerts the teacher, parent or practitioner to motor difficulties, social-emotional risks and the further investigation of disorders such as ADHD, Asperger's syndrome, developmental coordination disorder and possible risks of learning difficulties.

5.1.18 Integrating emotional, practical and social intelligence within a tacit knowledge framework for school readiness

A tacit knowledge approach bridges the conceptual and definitional debates about what constitutes each of the above forms of intelligence. Tacit knowledge “is relevant to understanding problems of a task-related, social, or emotional nature” (Hedlund & Sternberg, 2000, p.157). It is about management functions of *self* (understanding emotions and managing them effectively, self-motivation and self-organisation), *others* (interpersonal relationships with peers and adults), and *tasks* (planning tasks, performing specific tasks, e.g., packing one's bag and managing daily activities of living). Insch, McIntyre, and Dawley (2008) propose that this multi-dimensional concept of tacit knowledge includes cognitive (self-motivation and self-organisation), social (task-related and social interaction), and technical (individual and institutional) skills, and found that students with strong skills in each dimension reflected higher academic performance. The social dimension of tacit knowledge is about how to interact with others, and is considered an important dimension of tacit knowledge because meeting task requirements depends on the ability to interact with others, for example, accessing teachers' help in the preschool environment or working cooperatively in a group. In an adult population of students, Tschannen-Moran and Nestor-Baker (2004) found that cooperation and social support was highly referenced.

Tacit knowledge is variously related to the concept of skills, knowledge of experience and practical knowledge (Hedlund & Sternberg, 2000). If academic knowledge is about “knowing what” then tacit knowledge in the school setting is “knowing how”, for instance handling daily problems. Although the literature on tacit knowledge is extensive, widely used in business and relevant to education, there has been little research on how to measure it (Insch et al., 2008). Basic social and adaptive skills are a necessary part of a preschooler’s school day and consideration of its inclusion in measuring for risk is necessary.

5.1.19 Teacher-child relationships as predictors of school readiness

Teacher-child relationships are crucial to a preschooler’s adjustment to school and represent an important aspect of social emotional competence. Experiencing positive relationships in the kindergarten years seems to be important for a child’s first teacher and results in more positive peer relationships in preschool and later years (Espinosa, 2002; Hamre & Pianta, 2001; Rich et al., 2008). Positive relationships with the child’s teacher are associated with more positive and less negative emotions, while conflicted relationships intensify negative arousal, impacting negatively on peer relationships (Izard, 2002a). Management of emotions is crucial in harmonising with peers and adults, attending, working cooperatively and following directions in achieving cognitive outcomes (Denham, 2006; Miller, et.al, 2006). Spritz et al. (2010) found that emotional regulation was a strong predictor of both social skills and contributory to positive relationships with teachers, while emotional dysregulation was a significant predictor of peer likeability and child-teacher conflict. Conflictual relationships with teachers are associated with poorer social competence with peers.

Children learn better in the safety of a nurturing relationship (Shonkoff & Phillips, 2000), and research suggests that teacher and child relationships are crucial to academic and behavioural success, especially for boys (Hamre & Pianta, 2001; Pianta & Stuhlman, 2004). Teacher’s emotional support and quality of interactions resulted in better language and academic skills in four year old pre-kindergarten children over dimensions such as quality classrooms, teacher-learner ratios and teacher qualifications (Mashburn et al., 2008). Children’s functioning in different domains of relationships (social competence) has reciprocal influence on other aspects, and responding to the challenges of establishing good relationships in the

classroom with the teacher and accessing the teacher as a resource is a good indicator of school adjustment (Lidz, 2003).

5.1.20 Play and school readiness

Play provides vital clues to the developmental milestones of children, and observing and assessing it gives an indication of a preschooler's readiness to learn and his or her emotional-social competency levels in negotiating the social world (Lindsey & Colwell, 2003). Importantly, it also provides clues to atypical, disruptive or disconnected play that signal at-risk behaviour. The development of positive peer relationships in the preschool years is associated with academic success in primary and high school years and positive adjustment at preschool level (Ladd, Price, & Hart, 1988).

Play has been widely accepted in education, psychology, occupational therapy and speech and language therapy as a means to promote skills development and enhance language, emotional, social and cognitive competencies. It has the potential for developing children's readiness for school and provides a context to achieve multiple developmental and socialisation skills (Swindells & Stagnitti, 2006). Socio-dramatic play, in particular, provides a context for children to develop the crucial skills and behaviour needed for later academic success, cognitive development and life challenges in general (Bergen, 2002). Also referred to as imaginative, dramatic or pretend play, it is considered the most effective in developing school readiness abilities (Bodrova & Leong, 2003b), and emerges in the toddler years, progressing towards more skilled, mature play by age 4 or 5. This maturity allows for creativity and imagination and should be seen in the play of older preschoolers, whereas immature play is repetitive, does nothing to contribute to learning (Bodrova & Leong, 2003 b) and hence should serve as a warning sign of risk.

Children who engage in disruptive play tend to be unpopular, feel rejected and experience greater difficulty adjusting to school (Gagnon & Nagle, 2004). Withdrawn, non-participative play is a warning sign that developmental norms are not being met, whilst disconnected play or peer interaction difficulties are a marker for early school difficulties and adjustment (Ladd, 1990). Disconnected play is related to lack of motivation, passivity and inattention, while disruptive play is reflected in

hyperactivity and conduct problems (Coolahan et al., 2000). Preschool children with co-morbid internalising and externalising behaviour are at greatest risk of reduced social competence and play difficulties (Cohen & Mendez, 2009). Newton and Jenvey (2011) found that a high incidence of solitary play was associated with problem behaviour and poor social competence, whereas socially interactive play was positively associated with social competence.

Children withdraw from peer interactions for a number of different reasons and may represent a heterogeneous group. Behaviourally inhibited children tend to withdraw from social interaction with peers, are less likely to initiate peer interaction, and are more prone to social-emotional problems (Coplan & Armer, 2007; Coplan, Prakash, O'Neil, & Armer, 2004; Coplan Schneider, Matheson, & Graham, 2010). Inhibited preschoolers display reticent behaviour, such as watching rather than joining other children, or stare into space (Coplan et al., 2004). Socio-dramatic play experiences have been found to be advantageous to impulsive children who lag behind in self-regulatory development (Elias & Berk, 2002).

The Vygotskyian theory of play holds that it is the principal form of behaviour in a child's development (Vygotsky, 1966), and that during play he or she functions beyond the current levels of mastery. This involves three crucial elements: imaginary situation; assigned roles with embedded rules for performing each role assumed in the staged play; and the use of language. Role-taking promotes the concept of perspective-taking in adopting a designated role, and in order to take a part the child has to relinquish his or her own needs and conform to the rules of the play situation. Play breaks down when children do not conform to the rules of the game, as often seen in children with emotional, behavioural and developmental disorders (e.g., Asperger's syndrome). Also having a strong affective component and promoting the development of empathy, perspective-taking is an important consideration in this study as a lack of it signals possible risk and dysfunction. As explained by the theory of mind (ToM), it refers to the ability of children to predict the feelings and behaviour of others to facilitate social interactions (Astington & Jenkins, 1995) According to the Vygotskian perspective, play encourages self-regulation (a fundamental outcome of socio-dramatic play) and impulse control, which are crucial elements in school readiness. Based on a two-year observational study across diverse ethnic and socio-

economic groups, Nicolopoulou et al. (2010) found support for the notion that play develops social-emotional competencies of self-regulation, delay of gratification, perspective-taking and cooperation.

Many *cognitive* strategies are called upon and developed in pretend play, such as problem solving, goal-seeking, negotiation and joint planning (Gmitrova et al., 2009). Neurological benefits are implicated as areas of the brain that involve emotion, language, sensorimotor coordination and language promote the development of dense synaptic connections (Bergen & Coscia, as cited in Gmitrova, 2001). Play serves as an important resource for the acquisition of *social* competencies (Colwell & Lindsey, 2005), seen as critical in effective functioning at school. Positive peer interactions have shown a relationship with academic progress, communicative and social development (Gagnon & Nagle, 2004), providing children with daily opportunities to develop pro-social and communicative skills with authority figures and peers. Play provides an opportunity for children to develop self-regulation, which is the ability to control one's thinking, emotions, behaviour and impulses, which are key aspects of school readiness (Bredekamp, 2004). Children who engage in pretend play have high levels of emotional regulation, which is acquired as part of the social process (Gayler & Evans, 2001).

Play is the natural 'work' of children, and the most favoured social activity engaged in by preschoolers. Experienced as a pleasurable affect of enjoyment and happiness, children feel naturally inclined and motivated to participate in it (Connolly, Doyle, & Reznick, 1988; Bredekamp, 2004), with motivation to play linked to success at all levels of schooling. For instance, a strong relationship exists between language development and pretend play as play stimulates language development at many levels by changing style and tone of speech to enact relevant scripts in different roles and varied contexts (Bredekamp, 2004). The widely accepted importance of language as a dimension of school readiness is also a strong predictor of reading success and is related to social and cognitive development (Snow, 2006). A study investigating the link between self-recognition and personal pronoun use found that pretend play was greater in those children who showed self-recognition (Lewis & Ramsay, 2004). Children with deficits in language comprehension and impairment of speech and language have difficulty in initiating play and have a poor understanding of requests

made by peers (Cohen & Mendez, 2009). Through sustained conversations in play, language skills are developed and vocabulary enhanced.

Play in children on the pervasive developmental spectrum provides vital clues in the assessment process. Atypical or deviant patterns of play signal developmental deviations, and observing play is thus a vital part of the assessment of interaction skills, as for example, signs of autistic spectrum disorder (ASD) are more apparent when the child is playing with peers (Ashley, 2007; Baron-Cohen, as cited in Holt, 2010). Play provides an important assessment tool by providing insight into levels of social participation, the extent to which the child plays alone or engages in interaction or withdrawal from peers. However, play has not been incorporated as a significant area of evaluation or as a separate component of a readiness screening and assessment battery (Gagnon & Nagle, 2004), despite being a crucial marker in picking up mental health issues and disorders. Based on the writer's clinical experience, this is an area of clinical significance, as measures of play can enhance information obtained during assessments and contribute to diagnosis and treatment plans (Cohen & Mendez, 2009; Gagnon & Nagle, 2004).

The research reviewed above indicates that play promotes cognitive skills that may be even more important than direct teaching of alphabet, numbers, colour and counting skills, and therefore an important skill for later school success and academic readiness (Gmitrova et al., 2009).

5.1.21 Culture, ethnicity, social, emotional and academic development

Evidence shows that children from stressful, socio-economically impoverished backgrounds with limited resources may experience problems in social-emotional competencies and a delay in the acquisition of academic skills. Early identification with mental health issues, together with effective referral, have implications for the prevention of academic failure (Fantuzzo et al., 2007; Miller, Seifer, Stroud, Sheinkopf, & Dickstein, 2006b; Xue, Leventhal, Brooks-Gunn, & Earls, 2005).

5.1.22 Academics and social-emotional competencies

Social skills play an important role in academic competencies, and a profusion of literature over the years continuously supports the mediating role of social skills in

academic achievement, from preschool through to elementary and high school (Beebe-Frankenberger, Lane, Bocian, Gresham & MacMillan, 2005; Buhs, Ladd, & Herald, 2006; Henricsson & Rydell, 2006). Certain types of social skills, such as cooperation, compliance, self-control, communication, and assertiveness are found to be critical to academic competency (Beebe-Frankenberger et al., 2005; DiPerna et al., 2005; Meier, DiPerna, & Oster, 2006; Milsom & Glanville, 2010; Walker, & MacPhee, 2011). Assertiveness skills in preschoolers help them to ask a teacher for help when needed for both academic and non-academic tasks. In children with learning disabilities, assertiveness skills are important factors in the ability to self-advocate, instead of relying on parents to communicate needs (Krebs, 2002). Compliance as a social skill is foundational to self-regulation, considered essential to success in early grades (Denham, 2006). Self-regulation predicts emergent literacy skills and performance on achievement tests (McClelland, Acock, & Morrison, 2006), which also most importantly facilitate successful classroom interactions that indirectly affect academic functioning. Early numeracy and literacy skills at school entry and beyond are positively related to self-regulation and pro-social behaviour (McLelland et al., 2000).

A profusion of research literature over the past two decades has shown that children's *emotional* skills in the first few years of schooling provide a solid foundation on which academic competencies are built (Blair, 2002, Denham, 2002; Raver, 2002). Briggs-Gowan and Carter (2008) found that half of the problems identified by teachers in early elementary school were predicted by parental reports at 12-36 months of age. Trout, Nordness, Pierce and Epstein (2003), in a critical review of literature of students with emotional and behavioural disorders, concluded that students with EBD are often academic underachievers. Those who struggle to follow directions, pay attention, "get along" with others, and show poor control of negative emotions of anger and distress, do less well at school (McLelland et al., 2000; Rimm-Kaufman et al., 2000a). Emotion-regulation is intricately woven to emotion-understanding, language skills and academic competencies. Language skills are instrumental in helping children manage their emotions effectively (Eisenberg, Sadovsky, & Spinrad, 2005).

The cognitive aspect of emotion-regulation, i.e., executive attention, attention-regulation, motivation and planning skills, help children to learn and focus in the classroom (Blair, 2002). Fantuzzo et al. (2007) found that regulated behaviour, such as attention-control and favourable social interactions, resulted in positive approaches to learning and reduced classroom behaviour problems. Emotion- and attention-regulation have been positively linked to language reading and mathematics achievement (National Institute of Child Health (NICHD) & Human Development Early Child Care Research Network (HDECRN), 2003; Hill & Craft, 2003; Howse et al., 2003).

5.1.23 Risks of developmental disorders in preschool

Developmental syndromes or disorders are known to present as a combination rather than separate entities (Kooistra, Crawford, Dewey, Cantell, & Kaplan, 2005), as for instance a discussion on any of the major developmental, ADHD, DCD, Asperger's syndrome and learning difficulties will frequently overlap in terms of their symptoms. The purpose of the screening instrument is to identify at-risk factors for further referral and appropriate intervention. Some of the items included are intended to alert the educator to emerging problems or signs of possible childhood disorder, but it is not intended as a diagnostic tool.

Research increasingly confirms that potentially symptomatic behaviour with both internalising and externalising conditions at preschool age show trajectories that will persist with development (Ashford, Smit, vanLier, Cujpers, & Koot, 2008; Bongers, Koot, Van der Ende, & Verhulst, 2004; Timmermans et al., 2008; Visser, Van der Ende, Koot, & Verhulst, 2003). Problematic behaviour, such as clinginess, excessive shyness, picky eating, tantrums, and high activity levels evidenced as part of normal, early development are transient (Campbell, 2006). At the same time, such behaviour is symptomatic of disorders that are emergent in childhood, including ADHD, oppositional defiant disorders and separation anxiety disorders. The more serious biologically-based pervasive developmental disorder also shows clear signs of risk in the preschool period. However, caution is urged against over-pathologising age- and stage-typical behaviour of the preschool child (McClellan & Speltz, 2003). The frequency, intensity, chronicity and social context must be considered to differentiate these types of behaviour as age-typical or of clinical significance.

Campbell (2006) asserts that much of the problem behaviour experienced at preschool is linked to the development of self-regulation, as seen for example in aggression, tantrums, inattention and hyperactivity, whereas social competence skills include following directions, engaging cooperatively in work and play, and appropriate emotional expression. High levels of physical aggression are associated with poor behavioural control and are indicative of developmental deviance (Timmermans et al., 2008). While declining trajectories for aggressive behaviour are recorded for both boys and girls, high levels of aggression at age 4 to 5 tend to reflect a continuing trend of behaviour through development (Bongers et al., 2004).

Despite the cautions applied in considering normative behaviour, concern on the part of parents and child care workers should be expressed with behaviour that is marked. Externalising problems (overactive, oppositional, and aggressive behaviour) in preschoolers are predictive of problems later in childhood (Mesman & Koot, 2001). Males more often than females have behavioural problems that presents early in life, associated with neuro-developmental impairment that often leads to school failure (Moffit et al., 2001, as cited in Bongers, Koot, van der Ende, & Verhulst, 2008).

Bongers et al. (2008) report that individuals with high levels of oppositional trajectories are at risk of low achievement and problematic social interaction. Externalising behaviour, it is argued, interferes with the development of interconnected social, emotional and cognitive competencies that cause a chain reaction of failures in adjustment and have long-term consequences into adolescence and adulthood (Cicchetti & Schneider-Rosen, as cited in Bongers et al., 2008, Moffitt, & Caspi, 2001). Moffitt and Caspi (2001) have also found that delayed motor development at age 3, low intellectual ability, reading difficulties, hyperactivity and low scores on tests of memory, are risk factors for externalising behaviour. Boys, compared to girls and children with poor language skills, are more vulnerable to behavioural problems (Kaiser, Cai, Hancock, & Foster, 2002). In investigating attachment patterns in preschoolers, Kidwell et al. (2010) found a link to poor emotional competencies (emotion-knowledge and emotion-regulation) and call for its inclusion in assessing at-risk preschoolers.

While risk assessment is called for, teachers should be aware that the more serious disorders must be diagnosed and treated by a psychiatrist, paediatrician or psychologist. The following section gives a description of the different disorders that can present in the preschool years.

5.1.24 Externalising disorders

There are a number of externalising disorders that are common in preschoolers.

5.1.24.1 Oppositional defiant disorder

Oppositional defiant disorder (ODD), the precursor to conduct disorder (CD), is based on negative affect and uncooperative behaviour, and is marked by symptoms of hostile, stubborn and defiant behaviour. DSM-IV-TR (APA, 2000) criteria include: uncooperative, argumentative behaviour, defiance, non-compliance, anger and poor temper control, blameful and spiteful behaviour. ODD is found to be a serious, common diagnosable condition in 4 to 5 year olds in a clinical setting, with more frequent occurrence in boys than girls (Gadow, Sparfkin & Nolan, 2001; Keenan, & Wakschlag, 2000). By age 4, ODD symptoms are likely to co-occur with symptoms of ADHD (Barkley, 2006a; Sonuga-Burke, Auerbach, Campbell, Daley, & Thompson, 2005). ODD is frequently co-morbid with ADHD and CD, depression and anxiety (Maughan, Rowe, Messer, Goodman, & Meltzer, 2004). ODD plays a significant role early in life as a starting point for later behavioural and emotional outcomes. Non-compliant behaviour seen in children has been associated with increased risks of conduct problems (Kalb & Loeber, 2003), and the child at preschool enters formal schooling with deficits in academic and social readiness, setting in motion a cycle of dire consequences. Such a child is likely to experience rejection by first grade peers, admonishment by teachers and possibly harsh discipline by parents, shaping life paths accordingly (Dodge & Petit, 2003). Expulsion is not an uncommon consequence in preschoolers with extreme behavioural problems (Gilliam, 2006). Early screening has many implications not only for identifying risks at a personal level, but has mental health costs to the public. The onset of serious disruptive behaviour in the early years sets the stage for marked disruptive behaviour later, establishing a 'life course persistent' path.

5.1.24.2 Attention deficit hyperactivity disorder

Attention deficit hyperactivity disorder (ADHD) is diagnosed as the most common disorder in childhood, with prevalence rates of between 4%-8% of school-age children (Polanzyck & Rhode, 2007). Preschool children attract clinical attention because of their overactive and impulsive behaviour, but diagnosis can be confounded as children in this age group are naturally fidgety, active and talk excessively. More common in boys than in girls (Polanczyk & Jensen, 2008), ADHD is marked by deficits in attention-regulation and behavioural control. Children with ADHD show marked cognitive (executive function) deficits, impairments in academic functioning, learning disorders, poor social and emotional competencies, language difficulties, and motor difficulties (Barkley, 2006a). Academic skills of ADHD children are impaired prior to first grade entry (Barkley et al., 2002), and learning disorders co-occur highly with ADHD. An estimated 80% of children qualify for a learning disorder presenting with language, reading, mathematics and spelling difficulties (Barkley, 2006a; Wilcutt et al., 2007). A significant percentage of children (30%-60%) with ADHD also have speech and language impairment (Cohen et al., 2000), presenting with speech production errors, such as mispronunciations, sequencing difficulties in words and sentences, recounting an event or story, and tangential speech (Mathers, 2006; McGrath et al., 2008).

It has been argued that research into ADHD has placed emphasis on the neurological functions of impulsivity, and executive functions of memory and attention and its related concepts, to the neglect of its motor components, which have been an associated feature of ADHD. The DSM-IV-TR (APA, 2000), however, does not emphasise motor problems, due to the category of developmental coordination disorder, which refers to problems with motor skill acquisition. While there is conflicting evidence regarding the link between the motor skills deficit and ADHD there is strong support that motor dysfunction, independent of over-activity exist with ADHD (Davis, Pass, Finch, Dean, & Woodcock., 2009; Steger et al., 2001; Tervo, Azuma, Fogas, & Fiechtner, 2002).

Support for motor problems and other co-morbidities, such as oppositional defiant disorder, high functioning autism and reading disorders in children with ADHD, have been found (Kadesjö & Gillberg, 2001). Livesy, Keen, Rouse, and

White (2006) document links between EF and motor functions, whilst Pitcher et al. (2003), in a replication of the classic study by the same authors, confirmed that fine motor difficulties were associated with inattentive ADHD and gross motor problems prevalent in combined ADHD types. Koistra et al. (2005), however, found that motor impairment increased as a result of co-occurring conditions such as reading disorder rather than ADHD per se. Davis et al. (2009), focusing on the neurological deficit model of ADHD, found a canonical relationship between sensory motor skills, cognitive processing and academic achievement in ADHD children, suggesting that sensory motor skills are an integral part of the intellectual academic deficits in ADHD children. Other co morbidities indicate that co-occurring ADHD is a reliable predictor of ODD (Thapar, van den Bree, Fowler, Langley, & Whittinger, 2006), and usually occurs with a diagnosis of ODD in preschool children (Lavigne et al., 1996).

The findings underscore the importance of assessing the pre-academic sensory-motor skills, as this is a good predictor of other academic difficulties (Davis et al., 2009). Since EF and motor proficiency develop rapidly in the preschool years, and a link between them has been established, it is critical to include them in assessment batteries to identify deficits earlier (Livesey et al., 2006).

5.1.25. Internalising (emotional) disorders

Internalising problems include anxiety, depression, somatic complaints and withdrawn behaviour (Carr, 2011). There is a strong overlap between anxiety and depression, with anxious children being eight to 29 times at risk of additional depression, as well as later in life (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Negative affect is common to both depression and anxiety (Chorpita, 2002), and predictors from as early as 2 to 5 years of age are significant in identifying children at risk of internalising problems in late childhood (Ashford, et al., 2008). Low socio-economic status of children aged 2 to 3 was also a strong predictor of internalising problems at age 11. Research consistently shows that internalising symptoms at preschool age might be persistent and predictive of later internalising problems (Cronk, Slutske, Madden, Bucholz & Heath, 2004; Xue et al., 2005). Preschool depression has also been validated in studies (Egger & Angold, 2006; Luby, Belden, Pautsch, Si, & Spitznagel, 2009b), and Spence, Rapee, McDonald, and Ingram (2001) found that as early as the preschool years, anxiety

disorders, except for generalised and separation anxiety, begin to cluster into subtypes of anxiety. Since anxiety and depression are closely linked it becomes necessary at this early stage to be vigilant to the signs and symptoms of risk. Referring to a host of studies, Spence et al. (2001) conclude that anxiety is prevalent in preschool and should be taken seriously, whilst studies should focus on specific anxiety disorders and symptoms in this age group. These studies call for early identification to prevent maladaptive developmental trajectories.

Anxious and oppositional behaviour at preschool level significantly interferes with children's interaction with their teachers and peers (Bulotsky-Shearer, Fantuzzo & McDermot, 2008). Dysregulation of emotion and emotional lability are features of maladaptive behaviour and serve as indirect measures of emotional states and affect social competencies (Spritz et al. 2010).

5.1.26 Conclusions

As ADHD, learning disorders, speech and motor difficulties are not only common to varying degrees but also co-occur to significant levels, it is necessary to isolate the indicators that would highlight the possibility of their occurrence. The evidence is strong that emotional and behavioural disorders have short- and long-term impacts on future outcomes and that academic underachievement and problematic behaviour share a reciprocal relationship (Trout et al., 2003). Both emotion-understanding and emotion-regulation underlie externalising and internalising problem behaviour and have a significant impact on children's peer relationships (Izard, Fine, Mostow, Trentacosta, & Campbell, 2002). The research evidence also illustrates that the roots of externalising and internalising indicators emerge in the preschool years, and so cannot be ignored. There are calls to improve screening and treatment opportunities for toddlers and preschoolers with serious emotional and behavioural problems (Raver, 2002), and as with teachers in Head Start schools in the USA, those in this country face many barriers and even greater challenges in referring children for emotional and behavioural difficulties. This is largely due to lack of awareness, and poor access to such resources as mental health support and consultation.

The extensive literature reviewed above has served to demonstrate and reinforce the interconnectedness and interactions of the different domains in the school readiness of the child. The findings support the hypothesis that school readiness is essentially dependent on multiple interrelated skills, supporting the definition of school readiness as a function of multiple domains. A multi-dimensional approach to school readiness is therefore appropriate

5.2 The neurological domain of school readiness

The neurological domain incorporates the dimensions of gross and fine motor development and low tone. Motor development is an essential part of the learning process as it helps children gain mastery over their environment, and there is a close association between perceptual learning and motor or physical proficiency (Kephart, 1971; Piaget & Inhelder, 1969). Perceptual experiences, through the various sensory modalities, contribute to the refinement and development of motor behaviour. Low tone, which is abnormal muscle tone, affects motor movements, balance and control over body position (Kurtz, 2008). The developmental domains, while discussed as separate developmental domains, work in concert in the developing child and together these aspects contribute significantly to the development of effective skills that will later contribute to the academic tasks of reading, spelling and writing, as well as the development of social and emotional competencies.

5.2.1 Motor skills

Motor control advances significantly during the preschool years and involves both the large muscles, such as for hopping and running, and small muscles, such as for grasping a pencil and tying shoe laces. Most fine and gross motor skills at preschool level rely on bilateral coordination, which requires the collaboration of the two sides of the body working in a timed relationship (Cassie Landers Consultative Group on early childhood care and development, 2011). The specific motor skills under discussion in this research topic are: muscle tone, balance, bilateral integration, crossing of the midline of the body, motor planning, and gross and fine motor coordination. Lack of competency in these fields constitute the underlying symptoms of learning problems (Grové, Hauptfleisch, & Sonnekus, 1976; Kurtz, 2008; Rosner, 1993). Motor competence is an important aspect for school readiness and has implications for effective functioning at school, it being a prerequisite for effective

functioning in learning, mastering the school curriculum and promoting intellectual development (Henderson & Sugden, 1992; Kephart, 1971).

There is a marked increase of motor development in the preschool years, making it a critical period of development (Shala, 2009). Here the large muscle (gross motor) development generally precedes that of the smaller muscle groups (fine motor coordination). Younger preschoolers tend to master activities such as jumping, skipping, hopping, and riding tricycles, whilst older preschoolers complement large muscle activity with finer motor skills that require more neural control, greater attention span, more planning and organisation. These basic skills are precursors of the highly sophisticated skills of reading and writing.

Motor development affects child development holistically as it has an impact on ability to adapt to the environment, develop interpersonal interaction, cognition, and social behaviour and play (Saunders, Sayer, & Goodale, 1999; Sun, Zhu, Shih, Lin, & Wu, 2010). It is therefore not an isolated developmental phenomenon, but develops together with other major facets in addition to having an impact on each domain. Motor coordination problems are also strongly associated with emotional difficulties and social skills deficits. Research in a preschool sample of children with motor coordination difficulties found a correlation between anxious or depressed behaviour and motor difficulties and the acquisition of a wide range of self-help skills and social participation (Cummins, Piek, & Dyck, 2005; Eliot, 2000; Iversen, Knivsberg, Ellertsen, Nødland, & Larsen, 2006; Levine, 2002). Many motor skills are required when children engage in play which has a direct impact on their social engagement skills. When age-appropriate motor skills are not achieved, social behaviour may be compromised and the children isolated on the school playground (Bar-Haim & Bart, 2006; Smyth & Anderson, 2000). Evidence shows that integrating daily physical movements into the curriculum increases academic scores and that motor proficiency is positively correlated with sports participation (Piek et al., 2010; Ulrich 1987). As motor abilities impact on social and solitary behaviour it would be useful to include them as a measure in assessments (Bar-Haim & Bart, 2006).

Motor problems are common in specific language impairment (Webster et al., 2006) and in 60% of reading disability (Viholainen et al., 2006b). Viholainen et al.

(2006b) found a connection between early motor development and reading speed. Physical activity stimulates the brain, suggesting that movement is vital to learning. Deficits in motor competence are linked to behavioural and learning difficulties such as reading and the complex motor manipulations required for writing (Lee, Chow, Ma, Ho, & Shhek, 2004; Leonard & Piecuch, 1997; Stjernqvist & Svenningsen, 1999), therefore efficient development of motor skills is fundamental to cognitive development and realising of important academic skills. Motor and language difficulties are increasingly seen as coordinated effects in learning problems (Jancke, Siegenthaler, Preis, & Steinmetz, 2006; Ullman & Pierpont, 2005), and units of language and units of action are essentially interconnected (Smith, 2006). Children with specific language impairment show relatively poor gross and fine motor performance, and deficits in visuo-spatial measures of short-term and working memory (Alloway & Archibald, 2008; Zelaznik & Goffman, 2010).

Memory and learning are facilitated when muscular development is well coordinated, as motor actions reinforce the learning process (Levine, 2002). Both fine motor (e.g., stringing beads together in colour sequence) and gross motor (athletic pursuits) skills improve the neuro-developmental functions of problem-solving, reasoning and working memory (Levine, 2002). Achieving motor milestones is important, because delays or slow development in acquisition constitute a risk factor for lower cognitive achievement.

There is neurobiological evidence for the relationship between cognitive and motor development (Daimond, 2000), suggesting that between five to ten years of abstract aspects of cognitive development, such as executive function, abstraction and behavioural planning, develop at the same time that motor functions such as visual motor control and motor movements do (V.Anderson, P.Anderson, Northam, Jacobs, & Catroppa, 2001; Ferrel-Chapus, Hay, Olivier, Bard, & Fleury, 2002).

5.2.2 Neuroscience and motor abilities

Neuroscience research presents compelling evidence that cognitive and motor abilities are inextricably linked and use various parts of the brain to produce complex cognitive and motor acts in directional ways. Cognitive capacities rely on certain functions of control and modulation located in the cerebellum and basal ganglia

(control motor functions) that are enhanced as motor functions are acquired (Diamond, 2000). Similarly, motor functions linked to the prefrontal region adaptively control the learning process in cognitive development (Diamond, 2000). The different regions of the brain (prefrontal cortex, basal ganglia, and cerebellum) are specialised to perform different types of learning, with the prefrontal cortex involved in unsupervised learning (Doya, 1999). Meanwhile, Seger (2006) suggests that the task of complex categorisation and the execution of sequential, coordinated steps of events over time and motor cognitive tasks are the domain of the basal ganglia, which appears to be essential for certain types of motor skills and implicit procedural operations that require integration (e.g., tying shoe laces and riding a bicycle) (Saint-Cyr, 2003). These events require coordinated movement, as seen in the structural grammatical elements in language or sequencing multiple steps in complex reasoning. Grissmer et al. (2010) draw attention to studies that show that in addition to certain cognitive tasks, such as sequential and categorical learning, learning based on internal or external rewards, acquisition of new skills, tracking and estimation of time durations are dependent on motor development.

Contrary to previous notions that motor and cognitive development occurs independently of each other, with motor development preceding cognitive domains, neuroscience research shows that both these domains are fundamentally intertwined and continue to develop into adolescence (Diamond, 2000). Motor development is as protracted as cognitive development.

5.2.3 Gross motor control

Areas assessed under gross motor in this questionnaire are broadly: *locomotion, balance and manipulation*. These can be further subdivided into *bilateral functions, balance, eye-hand coordination of large muscle function, muscle tone, and midline crossing of large muscle function*.

Gross motor control involves the functions and use of large muscle groups which allows for highly coordinated skills of skipping, running, catching, hopping, jumping and throwing. These activities require the two halves of the body to work in coordination with one another as well as with the eyes (Williams, 1983). Gross motor competency is considered foundational to the other major areas of development,

whilst poor competency is detrimental to all other areas of development, to school readiness and formal schooling (Derbyshire, 2006; Gabbard, 1998; Gallahue & Ozmun, 2002). Children with poor gross motor skills are seen as ‘clumsy’ and likely to be poor at sports (Muter & Likierman, 2008). The adequate development of gross motor skills together with eye-hand coordination, balance and fundamental locomotion skills is an important focus in the preschool years, marking a crucial period for play and physical activities (du Toit & Pienaar, 2002; Shala, 2009).

5.2.4 Gross motor skills and physical activity

A child’s level of physical activity has a strong influence on the development of gross motor skills, with fundamental movement skills such as running, kicking, catching and jumping forming the basis for participation in physical activity, even in adolescence (Okely, Booth & Patterson, 2001; Pienaar, & Badenhorst, 2001). Barnett, van Beurden, Morgan, Brooks, and Beard (2009) found that competence in object control skills such as catching, throwing, and kicking in childhood is a predictor of adolescent physical activity. Motor coordination is an important skill for physical activity during childhood and children who have better developed motor skills are more active and engage in more physical activity than those who have less developed ones (Lopes, Rodrigues, Maia, & Malina, 2011; Williams et al., 2008). Du Toit and Pienaar (2002), in a study of South African children, found that of the 6 year olds in their sample, with the exception of “standing long jump”, performed below the norms and criteria in the developmental averages when tested in eight areas of gross development that covered three categories of movement: *locomotion*, (standing long jump, hopping, and skipping); *balance* (one leg balance and balance walk); and *manipulation* (throwing and catching). Locomotion skills require an integration of two sides of the body, making it possible to use both hands skilfully in the production of writing (du Toit & Pienaar, 2002). Catching and throwing skills, which require eye-hand coordination and also scored below the average in the above study, are crucial in mastering handwriting.

The gross motor skills of locomotion, balance and manipulation also have a significant influence on sporting activities, particularly ball sports. Poor ability in this area affects participation in sport and hence impacts negatively on the development of socialising skills. Motor skills are fundamental to the ‘lifetime movement activities’

of sport and other physical activities. Children who scored highly on locomotion activities spent less time on sedentary activities (Williams et al., 2008), thus delays in motor development are not confined to a specific area of development but also affect self-confidence and motivation (Valentini & Rudisill, 2004). Children with motor difficulties are also excluded by peers from physical activities and often resort to playing with younger children (Bouffard, Watkinson, Thompson, Dunn, & Romanow, 1996). Poor performance in individual and team sport as a result of compromised motor skills reduces a child's level of competency. This has a chain reaction that affects peer relationships and in turn academic achievement. Motor achievements therefore have a significant impact on social relationships and emotional development and contribute to a growing sense of self-esteem and independence. An indirect relationship between motor skills and social and emotional functioning has been found to exist (Cummins et al., 2005; Eliot, 2000; Levine, 2002).

Roth et al. (2010), reviewing literature to show motor development trends over the years, found that coordinative skills have declined in kindergarten children, possibly due to fewer specific motor experiences and a decline in physical activity. Standing long jump and the obstacle course were relatively intact as these may be a result of developmental processes rather than physical activity. Motor skill development (particular object control proficiency (i.e., involving manipulation of an object) should be a key strategy in childhood interventions aiming to promote long-term learning and development. Movement skills in childhood contribute to neural development and later academic and social skills (Ingegerd, 2008; Meyer & Beer, 2012), whilst motor skill proficiency is important in developing physical activity as it has long-term implications for health status in adolescence and adulthood physical activity (Barnett et al., 2009). Regular participation in physical activity has both short- and long-term benefits for children and adolescents across emotional, cognitive physical and social domains (Sallis, Prochaska, & Taylor, 2000).

5.2.5 Gross motor skills and physical contexts

Physical contexts also impact on the development of motor skills, with outdoor play offering varied opportunities and challenges to develop balance and intense vestibular experiences (Case-Smith, 2010). Gross motor skills are compromised in children as a result of inadequate outdoor play, for safety reasons

(Garcia, Coll, & Magnuson, 2000). A similar trend is reflected in South African children (Van Mill, Goris & Westerterp, 1999), who generally do not venture into neighbourhoods for fear of safety. Butcher and Eaton (1989) also found differences in the motor skills of children who engaged in more indoor than outdoor play, since the former limits the development of such upper limb coordination skills as throwing and catching. Oja and Jürimäe (2002), however, found that indoor physical activity was found to be closely related to school readiness scores in six year old boys and girls. Research findings such as these factors should be considered seriously in assessments of and interventions for children.

Children with mild developmental speech and language disorders have been found to have delays in gross motor development, with girls more at risk than boys (Mursepp, Ereline, Gapeyeva, & Paasuke, 2009). This study suggested that neural control of muscles is dependent on the maturation of the nervous system. Very low birth weight children, classified as 'non-handicapped' (survival of infants without a major handicap) are at increased risk of minor developmental sequelae, such as school failure, behavioural problems, learning problems, visual motor integration and gross motor problems, dyspraxia and learning problems (Lee et al., 2004). Gross motor development is an important foundation of learning and so is not an area that should be left to chance (Shala, 2009). Gallahue & Ozmun (1998) emphasise that while maturation is important, environment, opportunity and exposure also play an important role in the development of motor competencies. The latter conditions should be manipulated to promote learning.

5.2.6 Fine motor control

Fine motor control is confined to the use of smaller muscle groups in the hands and fingers, and are needed to manipulate small objects such as a writing instrument (adequate pencil movement), scissors, the pages of a book, building blocks, and assembling puzzles. It is also required for the more refined skills of daily living, such as dressing and undressing, fastening buttons, tying shoes laces and handling eating utensils. An essential component of fine motor control is that it requires the intricate coordination between the small muscles of the hand, the fingers and the eyes (eye-hand coordination and visual motor integration). Visual feedback enables the preschooler to manipulate objects, and these highly skilful movements

make it possible to execute the intricately coordinated activities of drawing, writing, cutting, colouring and pasting. The artful skills of manipulation form the basis for success at primary school in the fundamentals of reading, writing and spelling (Kurtz, 2008; Schneck & Amundson, 2010; Witthaus, n.d.)

Fine motor skills are needed for cognitive activities of writing, reading and speaking. As noted above, writing relies on eye-hand coordination, as well as fine motor skills and bilateral integration of the hands. Speaking involves fine motor skills in the production of sound (Zelaznik & Goffman, 2010) whilst reading requires fine motor dexterity to control eye movement for tracking (Hawelka, Gagl, & Wimmer, 2010; Hutzler & Wimmer, 2004). Fine motor skills are also crucial for the entire developmental process as they impacts on social, emotional and academic development (Jackman & Stagnitti, 2007). The relationship between motor and cognitive developmental domains has been well established (Pitcher et al., 2003), and impaired fine motor function in the early years is linked to poor language acquisition and attention difficulties (Hamilton, 2002; Klimkeit, Sheppard, Lee, & Bradshaw, 2004).

Fine motor skills have been found to be strong developmental predictors of later academic achievement and school performance through to the end of primary school (Beilei, Lei, Qi & von Hofsten, 2002; Grissmer et al., 2010). These skills form the basis of many essential scholastic activities, such as writing speed and quality of handwriting (Stoeger et al., 2008). Children with learning disabilities often avoid writing as they have difficulty keeping pace between writing and thinking, the latter outpacing the former, (Levine, 2002). Grissmer et al. (2010), measuring three drawing tasks, human, figure drawing, design copying and profile drawing (completion of a basic head shape), found fine motor skills to be a consistent and stronger predictor for later achievement in mathematics and reading than gross motor skills. The results of the study explained from a neuroscience basis reveal a motor-cognitive causal link in the development of later academic achievements. Measuring the development and proper acquisition of fine motor skills at preschool level is necessary as it has far reaching implications for formal schooling. Fine motor skills were found to be significant in predicting second grade reading, mathematics and general achievement (Pagani, Fitzpatrick, Archambault, & Janosz, 2010).

5.2.7 Bilateral integration

Bilateral integration is the ability of the body to coordinate the two sides of the body and develop hemispheric specialisation, including the ability of the hands and/or feet to work together. Inherent in bilateral integration is the child's ability to cross the midline of the body. With the development of dominance the child uses the preferred hand to work in the space on the opposite side of the body and can then bring the right hand to the left margin of the paper that is centred on the desk to begin a written exercise (Occupational therapists at Livingstone Primary). Ayres (1972a) wrote that bilateral integration occurred in children with learning disabilities, particularly with reading, whilst Parham and Mailloux (2010) found that additional problems associated with bilateral integration included low muscle tone, lack of hand preference, right-left discrimination difficulties and equilibrium difficulties. Also referred to as vestibular-proprioceptive problems, bilateral integration leads to difficulties in fine and gross motor domains. Impaired balance affects competency in activities such as roller-skating and bicycle riding, amongst other sporting and playing activities that require sophisticated coordination. Poor bilateral integration impacts on the fine motor skills of colouring and cutting with scissors (Parham & Mailloux, 2010). Problems with attention, communication, modulation of arousal and organisation of behaviour are also risks.

5.2.7.1 Laterality

Laterality refers to the neurological and anatomical connection of the extremities and sensory fields of one side of the body that are connected to the cerebral hemisphere on the other side (S. Golubovic, B.Golubovic, & Nikolic, 2009; Kephart, 1971). Laterality is an internal awareness that the body has two sides, a left and right, as well as an awareness that there are differences between them and that the limbs on each side of the body can work independently of each other (Williams, 1983). Laterality is considered to be the "outward manifestation of the cortical integrative activity, manifesting the asymmetric action of the brain hemispheres" (Gustav, Golubovic, & Katic, 2010, p.1). This understanding is important in executing coordinated movements of the body and is required for feeding, dressing, bathing, academic work, playing and daily living (O'Brien & Williams, 2010).

Laterality is learnt from infancy through the movements of balancing, which leads to an appreciation that the right and left side of the body are needed to support each other in bilateral activities (Kephart, 1971). Children with problems linked to learning tend to convert bilateral movements into unilateral activities, for example not supporting a page with the opposite hand when writing with the dominant hand. Laterality plays an important role in academic work, notably with reading and writing problems linked to laterality (Golubovic et al., 2009). An internal sense of laterality as indicated leads to a sense of left and right in the body, thence to an external projection of left and right, as in seeing the difference between the letters “*b*” and “*d*”. Concepts such as “*up*”, “*down*”, “*left*”, “*right*” are visual processes and have meaning only with regard to their position relative to the body.

Laterality is a learnt process that leads to developing one side of the body as the leading or dominant side and then consistently leading with it. This leads to the process of dominance and handedness, in which use is made of a preferred side for hand, foot, eye, and ear. Establishing dominance is important as it helps to develop speed and accuracy with fine motor tasks such as writing and cutting that involve crossing the midline and bilateral integration skills. Establishing dominance allows the other hand to perform the important task of helping to complete an activity in a coordinated way (Lawless, 2012). Hand dominance, which should be established by the age of 5, is critical to performing activities of daily living effectively (Lawless, 2012).

Laterality is an important part of neuropsychological assessments when evaluating children’s level of maturity for school, because it indicates the level of a child’s motor proficiency (Golubovic, Milutinovic, Rapaic, & Kalaba, 2011).

5.2.7.2 Directionality

Directionality refers to the ability to identify the concepts of “right/left”, “top/bottom”; “front/back” , “behind /in front of” into space (that is on objects or other persons) in relation to self. Difficulties with directionality and spatial orientation result in reversals and rotations of letters e.g. “p” “b”, “d”, “q” in reading and writing. Without a concept of orientation most things looks alike, and it also affects the learner’s ability to start a mathematical problem in the right place. By age

six, 50 to 52% of 6 to 7 year olds have achieved left/right directionality (Dednam, 2011; O'Brien & Williams, 2010). Spatial relationships also include ability to sequence, which means that one thing follows another, for example, days of the week and sequencing numbers when counting.

5.2.7.3 Midline crossing

‘Crossing the midline’ refers to the ability of one side of the body to cross over to the other side, by moving across the midline of the body. The midline of the body divides the body into halves, and one cross it, for example with the right hand over to the left side of the body, but problems in this area result in gross and fine motor insufficiency. In typically developing children, midline crossing is established by the preschool years, and by the age of four a child should be able to do so when writing or drawing (Witthaus, n.d.). Insufficient crossing of the midline of the body may result in such actions as turning the page around to complete a written activity, starting away from the margin, drawing on one side of the page only, and adjusting the whole body to a book rather than vice versa, resulting in untidy or inconsistent writing patterns (Kephart, 1971; Witthaus, n.d.).

5.2.7.4 Handedness

‘Handedness’ is an important issue in child development and an indicator of fine motor skill development. According to Williams (1983), hand dominance is apparent by four years of age, and Johnston, Michael, Shah, and Shields (2009) consider left or right hand preference or mixed dominance as an important indicator of a child’s cognitive development. Heilman (as cited in Johnston et al., 2009) suggests that left-or mixed-handedness is linked to atypical cognitive abilities, and of relevance to this discussion are the concerns related to children who have not developed either hand preference. Mixed handedness and weak laterality have been linked to learning disabilities by neurological studies that suggest a lack of strong hand preference characterises “hemispheric indecision” and so reduces academic ability (Nettle, 2003). Other studies have found, however, that left-handedness is associated with cognitive advantage (McManus, cited in Johnston et al., 2009), whilst Corballis, Hattie and Fletcher (2008) found no differences between left- and right-handers on IQ subtests measuring arithmetic, memory and reasoning. Peters, Reimers, and Manning (2006) found lower spatial ability and higher prevalence of hyperactivity, asthma and

dyslexia in individuals with no hand preference, whilst Johnston et al. (2009) found in their sample of approximately 5000 4 to 5 year olds that left-handed and mixed-handed children were less well developed in nearly all measures of development (health), and had lower levels of cognitive ability. Their studies support the claim that mixed-handedness and inter-hemispheric indecision create less than optimal conditions in which cognitive abilities are not allowed to develop, with boys more disadvantaged than girls. Nettle (2003) supports Leask and Crow's (2001) findings that average cognitive ability increases with increasing strong hand laterality in either direction. He cautions, however, that when analysing the relationship between the two concepts they should be conceptually and statistically separated, as overall level of hand skill is positively related to IQ. Laterality and crossing the midline are interwoven.

5.2.7.5 Pencil grip

Handwriting is considered a critical academic skill required throughout schooling and takes up much of the school day. Despite the age of computers, handwriting is an important functional skill that a child has to acquire. Learners who have difficulty with writing exert much more effort and time in writing legibly and keeping up with demands to complete a task. Difficulty with mastering handwriting leads to frustration and anxiety, and may have a negative impact on overall school performance (Dennis & Swinth, 2001). Pencil grasp is an important mechanical aspect for handwriting readiness skills and involves isolated finger movements of the fine motor muscles of the hand. Preferred pencil grasp is acquired in a progressive sequence from immature to mature between the ages 1 to 6 years (Dennis & Swinth, 2001), but atypical grasp patterns or pencil grip reflect fine motor deficits. The dynamic tripod grip is considered an optimal grasp for handwriting performance and emerges around the age of 4, when some children show readiness to write, though others may not be ready until the age of 6 (Schneck & Amundson, 2010).

5.2.7.6 Isolated finger movements

Isolated movements generally refer to the ability to move different body parts separately from one another, for example use of the wrist rather than isolated finger movements when writing (pencil control) and colouring in neatly within the lines of a picture (pencil control). Difficulties in this area result in an inability to make

differentiated movements with the arm or hand, and instead of using finger movements to write the child uses the wrist to assist in executing the movement. ‘Isolated finger movements’ refer to the inadequate isolation of movements that result in poor pencil control and grasp. The wrist is required to be in a neutral position during a grasp activity with the elbow at 90 degrees of flexion (Exner, 2010). The child holds one or more joints in a locked position of full flexion or full extension.

Referred to as poorly graded movements, spasticity is an inability to grade fingertip force and is associated with low tone or muscle weakness, trunk instability and abnormal posture. Incompetence in the hand skills required in everyday activities has many negative effects on children (Mandich, Polatajko, & Rodger, 2003), thus assessing them is important in signalling a problem with muscle control or low tone and arranging for intervention.

5.2.7.7 Eye-hand coordination

Both a visual perceptual and a motor (gross and fine) skill, eye-hand coordination comprises the goal directed hand movements that are coordinated with information from the eye and is central to many activities in a preschooler’s life, from self-help skills of eating to academic skills of writing. Eye-hand coordination involves the “visual guidance of both the eyes and hands, while simultaneously using eye movements to optimize vision” (Crawford, Medendorp & Marotta, 2004, p.10), as well as the synergistic function of the visual system, vestibular proprioception systems, and eye, head, and arm control, in addition to the cognitive functions of attention and memory (Crawford et al., 2004). Eye-hand coordination is also a necessary skill in gross motor activities of catching, throwing and other physical activities that form the basis of physical education and lifetime sporting activities. It is an important visual perceptual skill as visual information is crucial for accuracy of hand movements (Edermann, Murray, Mayer, & Sagendorf, 2004; Frostig et al., 1966; Sailer, Eggert, Ditterich, & Straube, 2000).

5.2.8 Muscle tone

As the tactile system contributes to sensory modulation, so sensations from the vestibular and proprioceptive systems contribute to muscle tone required for effective control of body. Deficits in muscle control impact on fundamental skills that are

needed to execute tasks such as reading and writing. Muscle tone is essential for posture control and for producing motor action, and in the classroom children need to maintain static postures as well as move freely in and out of postural positions (Bart, Hajami & Bar-Haim, 2007; Lane, 2002). Muscle tone is a part of muscle function and refers to strength and endurance of muscle functions. Low muscle tone is implicated in children with learning difficulties as it affects balance, posture, eye-hand and fine motor coordination. Dawson (2009) defines low tone as “the speed with which muscles react to an external stimulus or the degree of resistance to passive manipulation of limbs” (p.2), and it forms the basis for coordinated movement.

Clinically normal muscle tone should allow for a range of movements at the joints, ease of movement into and out of positions, and maintenance of static postures (Lane, 2002). Decreased muscle tone is referred to as *hypotonia*, and low muscle tone results in excessive range of movement but with limited control (O'Brien & Williams, 2010). This is seen especially in desktop posture, as children with low tone cannot retain action for prolonged periods and speed is restricted in the common school tasks of writing and sitting (Smits-Engelsman, Niemeijer, & Van-Galen, 2001). It is important to maintain an upright position, especially for good desktop posture and contributes to the fluid movements needed for reading, writing, drawing and sitting.

Incorrect posture prevents fluid movements and affects the child's endurance for desktop activities. Slouching at the desk, leaning forward, resting head on hands and changing position are signals of poor proximal muscle tone. Dawson (2009) identifies problems with motor planning, ear/hearing, speech and respiration as further symptoms of low tone. In a study of South African children she found that low tone is linked with slow speech, staccato speech, reduced intonation and rhythm, and/or delayed speech (speech milestones) due to reduced muscle tone in the vocal cords and facial musculature.

5.2.8.1 Postural control and low tone

Difficulties with muscle tone have been associated with postural difficulties, antigravity movement, stability and keeping upright positions (Dawson, 2009; Nichols, 2005). Children with low muscle tone have difficulty with head and trunk stability, which contributes to problems with balance (Exner, 2010; O'Brien &

Williams, 2010), which with postural control is needed for skilful and efficient execution of both fine and gross motor tasks (O'Brien & Williams, 2010). Children with low muscle tone have problems with both dynamic (movement) and static (stationary position) balance, leading to frequent injuries, falling and clumsiness, trunk instability and poor body awareness. Hypotonic children have difficulty maintaining an upright anti-gravity posture, while keeping the head in the midline. They may slide down their chair after sitting for a while, not sit still and fidget, resulting in their lying on the desk or using hands to support head postures. Hypotonic children tire easily and have difficulty with task completion, as a result of diminished muscle tone in the shoulder girdle muscles (Dawson, 2009).

Low muscle tone leads to poor gross motor difficulties, for example, jumping with two feet together or sanding on one leg, walking, on a line, half-kneeling, kicking, climbing up and down stairs, cycling and walking on a line. Fine motor deficits are also evident in children with low tone as they have difficulty stabilising materials with the one hand because it requires more strength in stabilising the arms. Girdle instability also results in reduced ability to perform many fine motor skills, such as writing with isolated finger movements. As a result the child uses his or her whole body when writing, drawing, colouring in and cutting (Dawson, 2009).

Low tone has also been linked to eye-hand coordination difficulties because the muscles of the arm and leg react too slowly to a visual stimulus, as is evidenced in various ball skills (Dawson, 2009). Low tone leads to secondary difficulties such as poor concentration, because increased effort is required to maintain upright anti-gravity postures. More effort is also required to complete tasks, often leading to incomplete work and ultimately underachievement. Children with low tone have insufficient stability to assume and maintain postures and activities that require movement (Dawson 2009; Kurtz, 2008). Low muscle tone in the facial area results in an open mouth and drooling, due to the inability to 'grade' jaw movements. It also impacts on speech development (Nip et al., 2009). It is thus important to include low tone in the history taking as it is clearly an at-risk factor in development.

5.3 Developmental domain of school readiness

The developmental domain of school readiness considers the dimensions of attention, and the sensory modalities of vision and hearing, which with touch are key to learning. Many children experience sensory difficulties at birth, which often go undetected. This section reviews each of the modalities.

5.3.1 Sensory development

From birth, children begin to learn through the basic senses. The brain processes the information acquired through the five basic senses of hearing, vision, touch, smell and taste.

5.3.1.1 Hearing

Soon after birth, babies are able to locate a sound in space (sound localisation) and identify patterns of sound (Morrongiello, Fenwick, & Chance, 1990; Saffran, Loman, & Robertson, 2000). The early responsiveness to speech lays the foundation for readiness for language development as well as emotional and social behaviour, therefore hearing impairments are a significant risk factor in development.

Teachers are often unaware of the medical history of their learners and yet knowledge of a history of ear infections, for example, may reduce the adverse effects on children's literacy development. Even mild fluctuating loss should not be underestimated as it has a major impact on children who are already at risk of learning difficulties, reading difficulties, speech and language difficulties, and poor attention skills (Brown, 2006). Episodes of *otitis media* (OM), or middle ear infection, is a common occurrence in early childhood and can cause intermittent hearing loss generally in the range of 15-40 decibels (db), which can negatively impact on speech discrimination (Shapiro et al., 2009; Winskel, 2006). While a high incidence of *otitis media with effusion* (OME) is reported in the first three years of life, its detrimental effects are apparent in preschool years.

Studies have produced equivocal results in their findings on the significant effects of OM on language skills, speech processing difficulties, literacy and other indices (Hogan & Moore, 2003). Some studies have supported considerable negative

sequae in language development in the preschool years and of scholastic, behavioural and emotional difficulties in the school years (Majerus, Amand, Boniver, Demanez, & Van der Linden, 2005; Roberts, Rosenfeld & Zeisel, 2004; Shapiro et al.; Winksel, 2006). Frequent and prolonged ear infections impede the consolidation of speech sounds and phonological processing (Majerus et al., 2005; Zumach et al., 2011)., and children with recurrent early episodes (before age 6) of OM that persisted into the early school years are likely to show poor performance and to have later literacy difficulties, poor task persistence, phoneme identification and discrimination (Rvachew, Slawinski, Williams, & Green, 1999; Winkel, 2006; Zumach, Gerrits, Chenault, & Anteunis, 2011). Other studies, however, have found no difference in the acquisition of language competencies and reported that negative effects disappear with age (Serbetcioglu, Ugurtay, Kirkim, & Mutlu, 2008; Shriberg et al., 2000; Zumach et al., 2011).

Long-term consequences of middle ear infections have been associated with behavioural problems, language, attention and school achievement (Barker et al., 2009; Feagens, Kipp, & Blood, 1994; Serbetcioglu et al., 2008). Learning problems are made worse when the learner is required to learn a second language (Olatoke, Olege, Nwawolo, & Saka, 2008; Roberts et al., 2000).

5.3.1.2 Vision

Vision provides the most basic form of information for humans as the visual system is the major information gathering system (Case-Smith, 2005). Vision contributes to visual perception, therefore inaccurate or confused information will affect output. Visual deficits impact on eye-hand coordination and on cognitive tasks such as reading, writing, locating objects in space and on daily functional skills of dressing and eating. Visual-spatial abilities involve cognitive skills, such as recognising relationships between objects, discrimination of spatial properties such as size and orientation of objects, writing, figuring out geometry problems (Berk, 2009; Kurtz, 2006; Lane, 2002). Vision also influences motor planning and postural control, and one of its functions is the guidance of movement (Lane, 2002).

Refractive errors and other visual anomalies are common in moderate to severe learning disabilities Solan (2004), and good vision is crucial for classroom

skills of copying from the board, completing worksheets, and reading and writing. Deficits with adequate vision lead to behavioural problems that manifest themselves in sustaining attention, task completion and sitting still (Schneck, 2010). The visual processing skills of matching, recall, and recognition - core curriculum requirements in preschool - are reliant on good visual acuity. There is overwhelming research evidence supporting the role of vision in learning disabilities (Scheiman, Gallaway, & Coulter, 1996). Gompel, Janssen, van Bon, and Schreuder (2003), investigating reading difficulties in children with low vision, found that reduced visual input was the only cause of lower reading performance and not the consequence of a lack of orthographic knowledge resulting from less reading experience.

Solan (2004) draws on research that supports the view that both visual and phonological deficits are significantly correlated with reading and learning disorders. He emphasises that visual functional readiness is important at all educational levels and that vision enhances cognitive development. Pammer and Kevan (2007), in an extensive study exploring the contribution of non-verbal IQ, phonological and irregular word reading, challenge the notion that impaired visual sensitivity may be secondary to poor reading skills. Similar findings are reported by Singleton and Henderson (2006), who confirm that the physiology of the eye and brain work together to produce reading text.

As fewer than 5% of children are identified on vision tests, informed observation remains a powerful diagnostic tool (Johnson & Johnson, n.d.; Schenck, 2010). Observation at school would reveal problems in the five broad categories of eye movement, eye teaming, eye-hand coordination skills, visual form perception, and refractive status. There are many observable clues to vision problems in the preschool classroom, including appearance of the eyes (*red, teary, watery*); refractive status (*excessive blinking, rubbing eyes constantly, finding objects within his /her field of vision*); desk work (*frequent headaches*); and eye teaming abilities (*bent posture with desktop activities*).

While the educator and parents are not eye specialists, they could observe for possible visual problems such as squinting, complaints of headaches or fatigue,

shutting one eye and turning the head. Identification could lead to timely intervention, and educators are in a good position to observe these conditions.

5.3.1.3 Touch (tactile system)

According to Ayres (1972), the tactile system is a significant sensory system that contributes to the perception of other types of sensation. It is as important as the visual, auditory, proprioceptive and vestibular systems and is closely linked in the development of physical, emotional and cognitive behaviour. The integration of these sensory systems constitute the foundation of sensory integration theory formulated by Ayres (1972b), who defined sensory integration “as the neurological process that organizes sensation from one’s own body and from the environment and makes it possible to use the body effectively within the environment” (p.11). Deficits result in practical (motor planning) dysfunction and low tone that leads to postural deficit and sensory defensiveness (Bundy & Murray, 2002). A common sensory integrative problem is tactile defensiveness, an outward expression of tactile processing and a problem of identifying the characteristics of touch (Bundy & Murray, 2002; Parham & Mailloux, 2010). Deficits in sensory modulation, i.e., the ability of the central nervous system to grade incoming sensory stimuli rather than overreacting or underreacting, results in sensory defensiveness (Bundy & Murray, 2002). Sensory modulation problems of over-responsiveness result in children feeling overwhelmed by sensory stimuli and reacting defensively to touch, movement, smell, sound and taste (Parham & Mailloux, 2010). This often evokes strong negative emotions, as it creates anxiety, discomfort and distractibility.

As indicated, tactile defensiveness is the most commonly observed sensory modulation disturbance, characterised by hypersensitivity to routine touch sensations. Children with tactile sensitivity react to light touch sensations (brushing hair and teeth) as well as the anticipation of being touched. It also results in avoidance of contact with textures of clothing and food (Kranowitz, 2005), which affects self-care activities such as grooming, dressing and eating. The texture of substances such as glue, finger paint and messy sand or water play causes distress, and avoiding activities which incorporate these may affect classroom performance and participation, as they are potentially important mediums of learning. Social situations that involve close proximity to others are also stressful, such as standing in a queue, accidental bumps,

and playing near others. These can cause an emotional outburst and are threatening to children whose sensory modulation is not synchronised. Generally, responses to these situations result in emotional distress, high frustration levels, fear, aggression distractibility and restlessness.

Tactile defensiveness impacts on the quality of a child's life and is a barrier to learning, as it affects many areas of a child's daily functioning, visual discrimination, motor planning, language, academic learning, social interaction, and emotional security, as well as distorting sensory feedback of body awareness (Kranowitz, 2005). It should therefore form an essential part of a screening battery.

5.3.2 Attention and concentration

Paying attention, listening, sitting still, following instructions, focusing on completion of a task, not being easily distracted and organising oneself, are reflective of engagement in the learning process. According to the South African DoE (n.d.), the abilities to concentrate, pay attention and take responsibility for completing tasks and activities constitute a readiness to learn and are considered critical and developmental outcomes of school readiness. Listening skills are critical in language development and emerging literacy (Smart et al., 2008), and research has shown that inability to sit still, short attention span, and overactivity in the early years are predictive of lower levels of academic performance and problem behaviour (Margetts, 2005; Merrell & Tymms, 2001). Distracted and disorganised children encounter more adjustment difficulties (Margetts, 2002), and such types of behaviour are indicators of school readiness, reflecting developmental immaturities that should alert the educator and parent to possible problems and risks of ADHD. A secondary aim of this research questionnaire is to identify such risks.

As ADHD is diagnosed as the most common of childhood developmental disorders, with prevalence rates of between 4%-8% of school age children (Polanzyck & Rhode, 2007), a discussion of this is necessary. Lahey et al. (2004) report that symptoms of ADHD can be identified in children between 3 and 4 years of age, and that a valid and reliable diagnosis of ADHD can be made in children as young as 3 years and 7 months old (Lahey et al., 2006). Preschool children attract clinical attention because of their overactive and impulsive behaviours, whilst children with ADHD

show marked cognitive deficits (executive function deficits) impairments in academic functioning, learning disorders, poor social and emotional competencies, and language and motor difficulties (Barkley, 2006). Academic skills of ADHD children are impaired prior to first grade entry (Barkley et al., 2002), and learning disorders occur highly. An estimated 80% of children qualify for a learning disorder presenting with language, reading, mathematics and spelling difficulties (Barkley, 2006; Wilcutt et al., n.d.).

Motor performance has been an associated feature of ADHD, with motor dysfunction, independent of over-activity (Brandeis, 2001; Davis et al., 2009; Steger et al. 2001; Tervo et al., 2002). Pitcher et al. (2003), in a replication of the classic study by the same authors, confirmed that fine motor difficulties were associated with inattentive ADHD, with gross motor problems prevalent in combined ADHD types. Davis, Pass, Finch, Dean, and Woodcock (2009), focusing on the neurological deficit model of ADHD, found a canonical relationship between sensory motor skills, cognitive processing and academic achievement in ADHD children, suggesting that sensory motor skills are an integral part of the intellectual academic deficits in ADHD children. The findings underscore the importance of assessing the pre-academic sensory motor skills as they are a good predictor of later academic difficulties (Davis et al., 2009). Since EF and motor proficiency develop rapidly in preschool years, and a link between them has been established, it is critical to include them in assessment batteries to identify deficits earlier (Livesey et al., 2006).

5.4 Medical and developmental background

While not a domain of school readiness, medical and developmental factors should also be taken into consideration as they constitute risk factors for later difficulties with concentration, attention and learning. Physical health, birth difficulties, delayed early milestones of motor, speech and toileting have been associated with later learning outcomes. Dockett and Perry (2001) point out that being physically healthy also contributes to being ready for school. Pre-term births and low birth weight have received much attention in the literature as potential risks for later learning. Early damage to the brain, such as infectious diseases and prematurity, compromise brain development and have long-term consequences for cognitive, emotional and social development (Janus & Offord, 2000; Shonkoff &

Phillips, 2000). Based on the statistical findings it was decided to include medical and developmental background as a checklist to the main questionnaire. These factors alert the examiner to possible risks.

5.4.1 Pre-term / low birth weight infants and school readiness

There is an increasing body of literature that highlights the consequences for school readiness of being born prematurely or with low birth weight (LBW) (Reichman, 2005). According to UNICEF, LBW and gestational age (GA) are used as markers of infant health (Reichman, 2005). Of significance to this research is the category “late pre-term” (birth at 34 to 36 weeks), comprising 70% of pre-term births. Late pre-term children (34 to 36 weeks of gestation) receive much more research attention as they are increasingly recognised as being at risk of neuro-psychological problems. Although at lower risk than very pre-term infants, they pose a greater risk than those born full-term (Dipasquale & Magnano, 2009). These children are likely to experience subtle negative neuropsychological sequelae and are at low risk of neuro-developmental disabilities, such as delay in acquisition of motor skills rather than major disabilities. They show average intelligence with school-related problems and a higher enrolment in special education classes (Baron et al., 2009; Dipasquale & Magnano, 2009; Pinto-Martin et al., 2004). Winders, Burns, Wilkerson, and Steichen (2005) suggest that LBW children have milder forms of dysfunction and subtle behavioural and learning problems that only show up later in their development.

Children born pre-term may have normal IQ but lack ability in visual motor integration, have fine and gross motor deficits, poor executive functions and visual perception, weak spatial skills and poor attention and memory (Böhm, Lundequist, & Smedler, 2010; Salt & Redshaw, 2006; Winders, Burns, Wilkerson, & Steichen, 2005). Testing visual motor and executive functioning, Böhm et al. (2010) found that inattention and hyperactivity in pre-term children increased their risks of visual motor deficits compared to full-term hyperactive children. Pre-term preschoolers with average cognitive capability were found to be at risk of visual-spatial perception difficulties, especially when presenting with complicated information (Feng, Xu, Wang, Guo, & Yang, 2011). Visual-perceptual problems have been suggested as contributing to lags in academic performance (Winders et al., 2005), and are also found to be at risk of impaired school readiness, speech and language delay, grade

retention, major and minor neurological difficulties, and behavioural difficulties (Dall'oglio et al., 2010; Reichman, 2005; Sajaniemi, Mäkelä, Salokorpi, von Wendt, Hämäläinen, & Hakamies-Blomqvist, 2001; van Baar, van Wassenauer, Briët, Dekker, & Kok, 2005).

Educational underachievement has a significant co-morbidity associated with pre-term birth, with difficulties extending across multiple areas of the curriculum. Extensive research shows that LBW infants are more at risk of cognitive delay and school performance than normal birth peers, and that risk of adverse outcomes increases as birth weight decreases (Pritchard et al., 2009; Roberts et al., 2007). Scholastic difficulties in mathematics, reading and spelling have been found to have an inverse relationship between birth weight and disability. Pre-term children have greater difficulty with task completion in reading, spelling and mathematics and have more language difficulties related to grammar and abstraction (Anderson, Doyle & the Victorian Infant Collaborative Study Group, 2003; Avchen, Scott & Mason, 2001; Aylward, 2003). The broader pre-term literature indicates that the poorest performance remains in mathematics and that delays in pre-term children are pervasive and detectable within a year of starting formal school (Pritchard et al., 2009; Roberts et al., 2007).

The implications of the research on LBW is that children need intervention programmes to enhance general cognitive development in the preschool years to improve school readiness, both in advantaged and socio-economically disadvantaged communities (Breslau, Paneth, & Lucia, 2004). LBW studies also find conclusive evidence that those learners of low socio-economic fare worse intellectually and academically than their advantaged peers (Patrianakos-Hoobler et al., 2010). Considering the relationship between LBW and later learning difficulties, it is reasonable to include a question seeking this information in an assessment battery. Winders et al. (2005) suggest that that visual perceptual screening should be part of routine evaluations of preschoolers who are born prematurely, and that "... early identification of specific deficits could lead to interventions to improve achievement trajectories for these high-risk children" (p. 363). With early intervention, learning opportunities are maximised in this at-risk group of children during their transition to school.

5.4.2 Medically associated risks

There are a number of risks associated with the medical conditions of learners.

5.4.2.1 Respiratory infections

Respiratory problems are commonly associated with LBW children, but it is not the scope of this research to define all. Of relevance is that children who present with risk factors for learning and attention seem to have more problems with general health than typical children (Barkley, 2006). Chronic health difficulties such as upper respiratory infection (URI) are reported more often in children with ADHD than in controls (Szatmari, Offord, & Boyle, 1989).

Minor illnesses tend to be a common experience in early childhood, with otitis media (OM) the most frequently diagnosed childhood disease (Bezáková, Damoiseaux, Hoes, Schilder, & Rovers, 2009; Denny & Clyde, 1983; Feagens, Kipp, & Blood, 1994; Teele, Klein & Rosner, 1984). Repeated colds, influenza and respiratory infections are usually associated with OM (Bulut et al., 2007; Daly, Hunter, & Giebink, 1999; Johnson & Holger, 2006). The common cold or URI is prevalent among young children and frequently results in a complication of viral upper respiratory tract infection (Chonmaitree et al., 2008; Winther, Alper, Mandel, Doyle, & Hendley, 2007). Patel, Nguyen, Revai, and Chonmaitree (2007) found respiratory syncytial virus (RSV) common in either middle ear fluid or nasal wash in 16% of all children and 38% of virus-positive children. Although more common in children under 2 years, respiratory difficulties are also associated in preschool with 9 year olds with low tone. Due to reduced tone, the diaphragm a key muscle in breathing, results in shallow breathing and ineffective coughing, precipitating respiratory infections (Dawson, 2009).

Bio-medical risks are an associated feature in children with ADHD and deserve attention as a likely risk to development.

5.4.3 Developmental milestones

Achieving normal developmental milestones is a key factor in the successful growth and development of a child. The purpose of developmental timeframes is to

chart a child's course of development, identify deficits in the various developmental domains and compare performance relative to that of same-age peers (Eliot, 2000; Mash & Wolfe, 2010). To understand developmental differences in children, an understanding of sequences and timetables in typical development is necessary (Meisels & Atkins-Burnett, 2000).

Although most children meet age-expected milestones, considerable variation exists in the age range within which they master age-specific tasks. Some accomplish milestones earlier and some later, but when a milestone is not achieved within an expected age range or time period it is considered a developmental delay. This can occur in one or all of the major developmental domains, i.e., motor, speech and language, cognitive and social and emotional. Developmental delay is associated with later learning disabilities, and both speech and motor milestones were related to subsequent intellectual delay (Murray, Jones, Kuh, & Richards, 2007). Motor and speech development occur with the same predictability and consistency in sequence and across cultures worldwide (Bukatko & Daehler, 2004; Elliot, 2000).

Developmental milestones in most cases are directly linked to neurological development (cognitive and perceptual), therefore knowledge of the different ones is necessary in a checklist for school readiness. Biological and genetic risks may also contribute to early or delayed maturation and therefore developmental milestones must always be evaluated against the background of the child as a whole. It is futile to look at isolated aspects of development as continuity of development is a result of various factors.

The three developmental milestones included for assessment in this study are: *crawling, walking and talking*.

5.4.3.1 Talking milestones

The period between 18 months and 2 years of age heralds a period of rapid vocabulary acquisition and the production of a range of speech sounds. Delayed speech and language milestones have consequences for later learning, and late talkers are an early warning sign of at-risk factors for reading development (Lyytinen & Lyytinen 2004). In the absence of general delay, the accuracy of speech sounds

(articulation) might serve an important marker for later reading difficulties (Lyytinen & Lyytinen, 2004). Early accurate articulation of complex speech sounds in words at two and a half years was found to predict early reading acquisition and performance (Lyytinen & Lyytinen, 2004; Roberts, 2005). Unresolved speech and language difficulties at the commencement of formal schooling has been well established as a link to ongoing literacy difficulties (Nathan, Stackhouse, Goulandris, & Snowling, 2004; Rvachew, 2007).

5.4.3.2 Walking milestones

Most fundamental gross motor skills are acquired with increasing progression in the first two years of life, with walking generally attained between 9 and 17 months (Berk, 2010; Eliot, 2000; Haapanen, Aro, & Isotalo, 2008). Delays in walking (after 18 months) signify possible risk factors for later learning, intellectual and social and emotional development. Viholainen, Ahonen, Cantell, Tolvanen, & Lyytinen, (2006a) found delayed independent walking to be linked to language delays, and age of onset of a motor skill an important consideration when assessing motor milestones. Achieving motor milestones helps a child develop command over the environment and consequently promotes cognitive and emotional growth by expanding a knowledge base. Motor skills are crucial in the learning process and develop even before a child begins to understand language (Eliot, 2000). Crawling, in particular, has been widely debated for its potential as a risk factor and impact on later academic difficulties, but it is generally claimed that if the milestone is missed, learning difficulties or intellectual problems are likely to ensue.

5.4.3.3 Crawling milestones

The omission of the crawling milestone has been linked to developmental delays, and if this obligatory phase, an essential psychomotor developmental stage, is missed it leads to deficits in language and reading acquisition, tactile, kinaesthetic and proprioceptive skills (Delacto, cited in Bottos, Della Barba, & Stefani, 1989; Visser & Franzsen, 2010). The literature indicates that crawling is a multi-faceted process that contributes to the development of sensory and motor systems motor skills such as motor planning, visual perception, body schema and eye-hand coordination (Chapelais & Macfarlane, 1984; Clearfield, 2004; McEwan, Dihoff, & Brosvic (1991). Visser & Franzsen (2010) in a South African study of 5 to 6 year olds, found

support for other findings that showed a link between the failure to attain the crawling milestone and adequate development of pencil grip in that age group. Crawling is a necessary motor function that is needed to build up cross-lateral integration, rhythmic timing ability, and visual-motor control via the vestibular system in the inner ear (Meyer & Beer, 2012).

Crawling strengthens neural connections, particularly those involved in vision and understanding of space or depth perception (Bell & Fox, 1996; Berk, 2009). Adolph, Vereijken and Denny (1998) concluded that crawling promotes arm strength, balance, and coordination, and has beneficial effects on motor development. Crawling is a significant milestone as it helps the infant work out where he/she is in relation to objects in the environment and how they appear from different viewpoints. Adolph and Berger (2006) show that crawling is basic to the nervous system and each area involved (perception and motor) supports development of the other. One cannot take place without the other and perceptual development and motor development are intricately linked, as evidenced from early infancy. The effective coordination of these two systems is crucial for effective acquisition of scholastic learning.

5.5 Conclusion

This chapter has provided a review of the three developmental domains that are indirectly linked to school readiness, namely the social/emotional, neurological and developmental. It has also included a discussion on medical and developmental data for inclusion in a checklist to accompany the questionnaire.

CHAPTER 6

PSYCHOLOGICAL TESTING

6.1 INTRODUCTION

The purpose of psychological testing is a means of obtaining information by measuring a sample of behaviour, as well as measuring the differences between individuals on specified types of behaviours (Anastasi & Urbina, 1997; Foxcroft, 2009; Kline, 2005). Assessment of individual differences is an important aspect of psychological testing and tests also provide information about typically occurring types of behaviour (Owen, 1998). Test development and use are common to the social and educational sciences (Kline, 2005), and since testing is involved in comparing behaviour, scientific approaches to its measurement are necessitated as performance on the instrument is compared against a standard performance of a group (Loewenthal, 2001).

6.2 THE CONCEPT OF MEASUREMENT

Testing lends objectivity to observations of samples to identify components of behaviour, to predict future behaviour and to provide information for feedback and decision-making and assist with making a diagnosis, for example, school readiness, learning difficulties, strengths and personality. Measurement in the social sciences is a skill that is worth cultivating, and to that end a measuring instrument that complies with certain criteria can be valuable. Features include a conceptual definition of the construct, i.e., the attribute being measured must be clearly identified and described, then this conceptual definition has to be translated to an operational definition, taking one into the next step of creating items that will assess the construct.

The purpose of measurement is to achieve objectivity through testing and observation. Measurement is the “transformation of psychological attributes into numbers” (Foxcroft et al. 2009, p.30), and is “essentially an objective and standardised measure of a sample of behaviour (Anastasi & Urbina, 1997, p.4). Measurement is therefore “a controlled and relatively objective procedure by means

of which the behaviour a person is capable of can be determined and assessed against a norm or specific standards” (Owen & Chamberlain, 1989, p.13), and the success of a measuring instrument is having absolute clarity about what is being measured and how well the instrument is compiled. Psychometrics involves the technical aspects of test construction, such as validity, reliability, norms and standardisation, an aim of this research. A measuring instrument could take the form of a questionnaire, test or scale (Loewenthal, 2001).

6.3 APPLICATIONS OF PSYCHOLOGICAL TESTS

Psychological testing has much utility, with psychological tests designed for diverse purposes and focusing on different aspects of behaviour. These include assessment of developmental skills, psychomotor abilities and cognitive abilities, i.e., aptitude or readiness testing, affective measurement such as personality, motivation or emotional traits, interests, attitudes and interpersonal functioning (Anastasi & Urbina, 1997). Testing is an integral part of education and the social sciences as it enables professionals such as psychologists and educators to make informed and appropriate decisions about an individual. It allows one to explore attitudes and abilities of children in educational settings and psychologists to predict behaviour in related contexts (Owen, 1998). Psychological tests provide standardised means for investigating levels of development as well as determining developmental changes in an individual following the effectiveness of interventions or educational procedures (Anastasi & Urbina, 1997). Diagnostics tests are crucial in identifying learners who need special educational services or interventions to address learning difficulties (Owen, 1998). Tests provide information in a way that can be used to guide parents and teachers on issues such as school readiness, placement decisions, curriculum planning, reasons for poor school performance, appropriate remedial programmes and subject and career choices (Domino & Domino, 2006; Owen, 1998; Sattler, 2002).

The test user plays a key role in the testing process, defined by Anastasi and Urbina (1997) as anyone who uses test scores as a source of information to make decisions on the test taker. Educators and school counsellors commonly have access to and administer tests on children for diagnostic information. While they may or

may not score and interpret the test, their role in administering the test has implications for the validity of the scores that emerge. These can be subject to misuse due to inadequate preparation, understanding and insufficient or incorrect knowledge by the test user (Anastasi & Urbina, 1997; Owen, 1998). Teachers have been criticised for not understanding the meaning of the results obtained from psychological tests and the correct use of a test is the responsibility of the test user (Owen, 1998).

Psychological tests are used in a variety of contexts, broadly categorised as clinical, counselling and educational. While separate, the boundaries between the three groups overlap regarding the use of testing material, and boundaries are becoming less clear between the categories as sub-specialities such as forensics, neuropsychology and health psychology evolve (Anastasi & Urbina, 1997). Tests in all three contexts are generally used as part of an assessment process rather than in isolation.

6.3.1 Clinical and counselling settings

Commonly used tests in clinical and counselling settings are a wide range of structured personality tests, projective techniques, intelligence tests, aptitude tests, neuropsychological tests, batteries, and diagnostic educational tests. Clinicians and counsellors use many rating scales and questionnaires, while clinical psychologists generally work in mental health settings and use tests aimed at diagnostic, prognostic and therapeutic decision-making. In clinical settings tests are used with children in relation to problems experienced with learning, or school progress emotional disturbances, difficulties in interpersonal relationships, attitudes and behavioural disorders. Counselling psychologists have traditionally focused on career assessments, occupational choices, and guidance (Anastasi & Urbina, 1997; Kaplan & Saccuzzo, 2005), a role that has expanded and is in continuous development to extend to a variety of activities in both clinical and educational settings.

6.3.2 Educational setting

A repertoire of tests are available in the educational setting for psychologists and educators, with achievement and aptitude tests commonly administered. Psychologists in school settings also administer intelligence, personality, motivation and diagnostic educational tests. Diagnostic and prognostic testing in reading, language and mathematics skills, which entail analysis of a person's strength and weaknesses, are widely accessed. The diagnosis of a learning disability and the planning of a remedial programme is a specialised field for a psychologist in a school setting, and psychologists and educators often overlap in the use of scholastic tests that are standardised to determine age and grade levels in respect of key areas for academics.

Assessment of early childhood education is a noted activity in the educational context, with school readiness tests assessing those skills and types of behaviour that are needed for school entry (Kaplan & Saccuzzo, 2005). They place emphasis on the abilities that are needed for academic work in formal schooling, as well as other prerequisite skills such as general knowledge, attitudes and motivation, as well as emotional, social and life skills that will enhance the transition to formal schooling (Anastasi & Urbina, 1997; De Wit 2011, Snow 2006). School readiness testing has also expanded its function to identify risks to learning in children (Bordignon & Lam, 2004; Kaplan & Saccuzzo, 2005). As preschool measurement is the main focus of this study it will now be discussed in greater detail.

Assessments of young children need to include information across multiple domains, such as language, motor skills, social emotional and cognitive. Doing so provides a profile of strengths and weakness, thus guiding the intervention process and identification of "disadvantaging conditions" (Mcintosh, Gibney, Quinn, & Kundert, 2000). A good psychological examination of children requires reporting of a broad spectrum of behaviour (Anastasi & Urbina, 1997). Due to age, preschoolers constitute a special group of the population and require more sensitive considerations. Group tests are not suitable for children less than six years of age due to limited language development, formal test-taking requirements and behavioural constraints.

Performance or oral tests or rudimentary paper and pencil tasks are better suited to this group (Anastasi & Urbina, 1997), hence the development of suitable, relevant measuring instruments for preschoolers is a serious consideration.

The use of preschool screening instruments is a common practice because of its utility in distinguishing children who are potentially at risk of educational and behavioural problems. Identifying them is a potential first step in the prevention of later academic difficulties (Mcintosh, Gibney, Quinn, & Kundert, 2000). For a preschool measure to be effective it must have sound psychometric qualities and measure multiple domains. Instruments commonly used for kindergarten are developmental screening measures and readiness tests, an extensive discussion of which was in Chapter 2.

Testing is only part of the assessment process and using it in combination with other processes yields more reliable and valid information (Mcintosh et al., 2000). To enhance preschool assessments the need for using multiple sources and cross-disciplinary collaborative practices is highly recommended, as the preschool period is a challenging time of growth and difficulties, so delays may be reflect multiple diagnostic categories (Finello, 2011). Assessment must also involve multiple components (developmental competences, biological circumstances, family) and differing modes of evaluation (school, parents, professionals) (Bordignon & Lam, 2004; Meisels & Atkins-Burnett, 2000).

6.4 ETHICAL ISSUES IN PSYCHOLOGICAL TESTING

Ethical issues in test practice relate to the development of fair tests and assessment practices. A critical issue is testing in South Africa has been that of the development and implementation of cross-culturally fair tests in applying it equitably and fairly (Paterson & Uys, 2005). Tests are discriminatory if they are not standardised for use across all cultural groups through a representative sample (Van De Vijver & Rothman, 2004). The South African law requires that psychologists become proactively involved in creating tests that are fair and unbiased, as stipulated

in the new Employment Equity Act 55 of 1998, Section 8 (*Government Gazette*, 1998):

Psychological testing and other similar assessments are prohibited unless the test or assessment being used (a) has been scientifically shown to be valid and reliable, (b) can be applied fairly to all employees; and (c) is not biased against any employee or group. (Van De Vijver & Rothman, 2004).

Standardisation through scientific procedures of appropriate norming and representative sampling addresses issues of fairness and bias and is a step towards addressing cross-cultural issues in the construction of a test (Foxcroft, Roodt, & Abrahams, 2009; Paterson & Uys, 2005).

Ethical issues also go beyond fairness in test construction to extend to fair assessment practices, which include considerations regarding test-related factors, such as external and internal factors relative to the testee that would impact on its validity. These include variables such as motivation, rapport with the tester, emphasis on speed, language issues, urban or rural considerations, and previous testing experience (Anastasi & Urbina, 1997; Foxcroft, 2011). Test content is an important consideration and is influenced by cultural experience, for example, pictures or objects unfamiliar to a cultural group will affect test scores (Anastasi & Urbina, 1997). Exclusion of any such material was considered in the development of the screening test in this research. Adequate test-taking orientation procedures, familiarity and knowledge of the specific test to be implemented, appropriate selection of measures and good assessment practice are necessary to achieve fair assessment practice. Appropriate interpersonal skills, establishment of rapport with the testee and feedback of results in a meaningful way are ethical considerations (Foxcroft, Roodt, & Abrahams, 2009).

Sound testing and assessment practices are binding ethical considerations in test the construction and taking of tests, particularly pertinent in the South African context both in occupation as well as in education, with its diversity of cultural and linguistic groups. Test development has come under close scrutiny due to the nature of

pluralistic societies, therefore test development has to follow guidelines that comply with ethical procedures at all levels. In testing, these are regulated by the guidelines set by the International Test Commission (Version 2000) and in South Africa by the code of Practice for Psychological Assessment (1998) (Foxcroft et al., 2009).

6.5 TEST CONSTRUCTION

Test construction is an elaborate, logical progression that requires careful planning, evaluation and documentation. Criteria for validity and reliability must be established and then standardised. Descriptive statistical procedures that are required include means, and standard deviations and ranges, skewness and kurtosis, and test score information (Kline, 2005; Loewenthal, 2001).

Foxcroft et al. (2009) provide a comprehensive guide for the phases and steps involved in developing a psychological test: (1) planning phase, which includes the aim and content of the measure; (2) the test plan or format, writing, reviewing and analysing the items; and (3) evaluating the technical properties of the test (reliability, validity, standardisation and norm development). The planning phase is the 'blueprint' to guide the development of the measure. Stating the purpose of the measure, defining the constructs to be measured, justifying the use of the measurement and defining the content are fundamental to planning a test.

6.5.1 Planning stage

The planning stage may be broken down as follows.

6.5.1.1 The Aim of the measure

The test developer must clearly state the purpose of the measure and the attributes and constructs that it will measure. It must clarify the use, for example, whether it would be used as a screening or diagnostic assessment tool. It should specify factors such as the population group for which it is designed, whether it is

norm or criterion referenced, and whether it is to be administered individually or by group.

6.5.1.2 Content of the measure

Identifying the content domain or construct to be measured is the next step in the test development process. Clarity must be achieved on the construct or ‘attribute’ to be measured and must be operationally defined (Kline, 2005; Owen, 1998).

6.5.1.3 Test format and item construction

The choice of a specific item format is determined by the test content. The most common format in questionnaires is the open-ended or closed-ended or forced choice items response choice. Forced choice items include multiple choice or true /false responses (Foxcroft, 2009; Kline, 2005).

6.5.2 Item writing

Item writing has several stages.

6.5.2.1 Drawing up the items

Item development is primarily rooted in theoretical and empirical literature that will guide the scales development both conceptually and operationally (Kline, 2005), after which ideas for the item pool can be drawn from a variety of sources. The items for the Grade 00 school readiness questionnaires were based on a review of the extensive literature, existing tests, the writer’s professional experience and that of other professionals. Professionals consulted included psychologists, speech and language therapists and, most importantly, the teachers directly involved with this age cohort. They formed the subject matter experts due to personal experience and their anecdotal evidence. Pilot questionnaires outlining the areas to be assessed were forwarded to a large number of teachers of well-established schools covering a cross-section of the population.

The item should tap the scale being measured, be written with clarity and concision, phrased unambiguously, contain one central theme, avoid double negatives, be presented in positive language, and be brief, precise and accurate (Foxcroft, 2009; Kline, 2005). A clearly stated item is likely to elicit the desired information and more accurate responses from the respondents, whilst also improving the psychometric properties of reliability and validity (Kline, 2005; Loewenthal, 2001). Foxcroft (2009) reiterates that the “nature of the content should be relevant to the purpose of the measure” (p.70), and accurately stated items enhance the validity and reliability of the construct under measure. Once the pool of items has been refined the next important step is to establish reliability and validity of the measure, with the number of items selected having a bearing on this (Kline, 2005; Loewenthal, 2001).

6.5.2.2 The number of items

The initial pool of items needs to be a minimum of four to five times as large as the number of items actually needed, but as many items as possible are needed to properly assess a construct. Whilst some statistical analyses suggest no fewer than 20 items to measure the construct, most require at least 10 items to establish its reasonableness (Domino & Domino, 2006; Kaplan & Saccuzzo, 2005; Loewenthal, 2001). Too few items may affect reliability measures (Loewenthal, 2001), but too many, whilst not affecting reliability, could fail to improve validity measures because of test weariness and discouragement of the length of the test. Kline (2005) points out that a determining factor regarding the ultimate number of items to include in the final analysis should depend on the number of constructs to be measured and the length of time it will take to respond to the items. If the test is too long it may influence the responses, as fatigue will provide “nonsense” responses and fewer people will be willing to respond (Domino & Domino, 2006; Kline, 2005). While this may have been the case at research level in this study, it may not be a major influencing factor once established as a scientific test and used for the purposes of testing, as the need of the respondent would be different. Also, the test need not be taken on one day. Basic item number for a construct would also be guided by “statistical needs and administrative concerns” (Kline, 2005, p.35).

When there is more than one construct or domain, the number of items considered for the final version of the test must be reduced to shorten the length of time it will take to complete. Loewenthal (2001) suggests that subscale items, i.e., the forms of behaviour that underpin the construct, should number between three and fifteen items.

6.5.2.3 Reviewing the items

Once the initial pool of items has been developed it must be reviewed by a panel of experts through statistical analyses, so as to ascertain whether the items do indeed adequately measure the content domain of the construct they are supposed to. It is at this stage that the wording of the items, grammar, typographical errors, issues of gender fairness, and cultural appropriateness have been accounted for (Domino & Domino, 2006; Foxcroft, 2009; Kline, 2005). If stimulus material is used this also has to be closely scrutinised (Foxcroft, 2009), and the review stage also provides an opportunity to check that administration instructions are clear and easy to follow. Before the pre-run, items have to be rearranged, length of the test finalised and answer protocol decided upon. Badly worded instructions could result in poor performance of an item well constructed.

Pilot testing is recommended at this stage as it helps to determine the length of time the test will take, and to identify duplication and any glitches that may arise (Domino & Domino, 2006). At this stage, some test developers subject test items to statistical analyses and pre-test runs to assist towards length finalisation and re-arrangement of items (Domino & Domino, 2006).

Once a test is constructed and a pre-run is done, the next logical step is to add scientific dimensions to the test by establishing the reliability, validity and power of prediction. This is done through item analysis and item selection.

6.5.2.4 Analysing items (Item analysis)

The purpose of item analysis is to determine which of the initial items should be retained and which discarded. Item analysis is the term used to describe a set of methods used to evaluate the items. As an important part of test construction, item analysis involves assessing item difficulty and item discriminability. This is done through determining item difficulty, item variance, item test correlation and item criterion correlation (Esterhuyse, 1997). Selection and revision of items through item evaluation will improve the quality of a test as “a good test has good items” (Saeed & Noor, 2011, p.43). Good items, however, have to be scientifically determined as reliability and validity depend on their characteristics (Kaplan & Saccuzzo, 2005). Item selection through statistical analyses assists with selecting appropriate items and thereby establishing criteria for validity and reliability. Descriptive statistics are needed to perform the above functions, whilst means and standard deviations of items guide decisions regarding the usefulness of items (Kline, 2005).

The purpose of item analysis is to determine whether each item has served its intended purpose. This process helps determine the difficulty or ease of an item, and whether it discriminates against poor or good performers. This would facilitate differentiating and eliminating items that are too easy or difficult, thus improving the quality of the items, shortening the test, and improving validity and reliability (Anastasi & Urbina, 1997; Esterhuyse, 1997). This process also eradicates bias against certain groups and minimises shortcomings of items. As the Grade 00 school readiness is intended to be used meaningfully and widely it is important that it is a well-constructed test, providing acceptable and relevant target behaviour and serving the purpose of the measurement.

6.5.2.5 Item variance

If variance of an item is too low it is not of much use (Kline, 2005), and generally item variance should be as large as possible. When an item is too easy or too difficult the item variance is small, and a good test discriminates on many levels (Kaplan & Saccuzzo, 2005). The higher the variability of the item the better it will perform, and establishing item variance helps the researcher to select items with wider

variances, thus allowing for and tapping a broad range of difficulty (Kaplan & Saccuzzo, 2005; Vassiliou, 2000). Means and variances for items on a Likert scale are calculated in a way similar to that used for means and variances, and: “The higher the variability of the item and the more the mean of the item is at the centre point of distribution, the better the item will perform” (Kline, 2005, p.95). The Grade 00 readiness test is a test of evaluation, so establishing item difficulty was not needed.

6.5.2.6 Item discrimination

Item discriminability determines whether subjects who performed well on particular items would also do well on the test as a whole (Domino & Domino, 2006). It distinguishes the items that best measure the content domain that the measure aims to assess, and: “Good items consistently measure the same things as the total test is measuring” (Foxcroft, 2009, p.72). The discriminating index (the extreme group method) and item-total correlations are used to determine how to determine the power of an item. The extreme group method compares those that have done well (upper 25%) with those that have done poorly (lower 25%), with the proportion of the difference between the two groups referred to as the discrimination index.

6.5.2.7 Item to total correlation

Item to total correlation refers to the correlations between items in the same test. As part of determining the discrimination index of an item an evaluation of how responses to an item correlate with the total test score is an important statistic. A high test-item or positive correlation on one item will indicate high performance on others (Foxcroft, 2009).

Items with low correlations, on the other hand, indicate that those items are not consistent with the other items and the test as a whole in measuring the same variable and phenomenon under investigation. Such items need to be removed.

6.5.2.8 Item criterion correlation

Item criterion correlation refers to the correlation between an item score and its criterion as it seeks to establish the relationship of the item with other relevant

variable or variables (Domino & Domino, 2006; Kline, 2005) This adds to the discrimination value of an item. Statistical analyses, usually coefficient correlations, carried out for each test item, establish whether the item is empirically related to the criterion. The higher the item criterion correlations of the items, in a test with fixed variance, the higher the criterion related validity of the test (Vassiliou, 2000).

6.5.3 Standardisation, reliability and validity of a test

The three factors of standardisation, reliability and validity of a test are examined as follows.

6.5.3.1 Standardisation

As indicated above, standardisation is a critical part of test construction, and refers to the uniformity of procedure in administering and scoring the test. In order to compare test results the testing conditions have to be the same. The standardisation of a new test requires that consideration be given to every detail that is going to be involved in the testing process, such as materials to be used, time limits, instructions, handling possible queries from test-takers, and the testers' preparation and behaviour. Testing conditions, such as physical environment, familiarity and manner of the tester, affect the standardisation outcomes (Anastasi & Urbina, 1997; Foxcroft, 2011; Owen, 1998).

An important aspect of standardisation is the establishment of norms, as scores on psychological tests are interpreted by reference to those that are representative of the sample in the research (Anastasi & Urbina, 1997). Establishing norms makes it possible to compare test scores to a norm group (a specified group) so that meaningful interpretations to test scores can be made. Test scores have little meaning on their own (Foxcroft, Roodt, & Abrahams, 2009), and raw scores have to be evaluated against data that can be interpreted. This can only be done by the inclusion of a large representative sample that can serve as a backdrop against which to establish the norms. A norm "corresponds to the performance of typical or average persons" (Anastasi & Urbina, 1997, p.7), and an individual's position in relation to a normative

sample can be calculated to provide meaningful interpretation and determine deviations from typically occurring developmental behaviour in the case of the norm group.

Apart from considering the confounding variables of the testing process through administrative, scoring and interpretation procedures to maintain objectivity, consideration of the level of difficulty of an item is an important criterion in maintaining objectivity. The objective measurement of test construction involves establishing reliability and validity of the test in a specified sample (Anastasi & Urbina, 1997).

6.5.3.2 Reliability

The reliability of the measure refers to the stability or the consistency of the measurement and ensuring that it actually measures what it supposed to measure. A test is reliable “if measurement with the test is consistent from one occasion to the other” and “extraneous factors do not interfere with accurate measurement” (Owen & Taljaard, 1996; p.25), points reiterated by Gravetter and Forzano (2011). Reliability refers to the consistency of the data and the results obtained rather than the actual property of the test (Kaplan & Saccuzzo, 2005). It implies that the actual measurement (attribute) is stable, does not change and can therefore be generalised (Domino & Domino, 2006). Theoretically speaking, it refers to score stability shown by a reliability index as individual measurement has an element of error (Gravetter & Forzano, 2011; Kline, 2005). The smaller the error component the greater the consistency and hence reliability. Large error components indicate that the measure is unreliable (Gravetter & Forzano, 2011).

There are five basic ways of determining reliability coefficients, discussed as follows.

Inter item consistency is based on the assumption that each item is the measure of the same variable and is consistently so (Domino & Domino, 2006). The Coefficient

Alpha, also commonly known Cronbach's alpha, is the method of choice for tests with continuous rating scales (Likert scale) as used in this research (Foxcroft, 2009). The Kuder – Richardson (K-R 20) is applicable to items scored on a dichotomous scale (Yes/no; true/false). Both formulae yield a coefficient correlation and require only one test administration. Cronbach's alpha requires a minimum of .70 as an acceptable reliability coefficient (Domino & Domino, 2006; Loewenthal, 2001). Anastasi and Urbina (1997) suggest that standardised measures should have reliabilities of .80 or .90. Variances of the total test and variances of individual items are used to determine the alpha coefficient (Vassiliou, 2000).

Test scorer reliability refers to issues such as test procedure and administration, which reduce error variance. Anastasi and Urbina (1997) consider these as irrelevant factors that can be experimentally controlled. Standardised instructions for tests improve reliability as test administrators follow strictly the instructions of the test. While not necessary to compute correlation coefficients for error variance (Anastasi & Urbina, 1997), good practise would increase reliability measure of the test. Interrater reliability is obtained when test scores are consistent over different times and agreement exists between scores assigned by different raters (Bustin, 2007). Interrater reliability unfortunately contributes to error variance, but to increase it by increasing comparable rater scores, Huysamen (2001) suggests that raters first be properly trained, their ratings compared with one another in a trial run and then discussed, to eliminate any misunderstandings of their conceptualisation, of the attribute being measured as well as their stringency or leniency in rating the attribute. Interrater reliability of a scale can also be increased by identifying as clearly as possible its component parts, so it is specific, identifiable and less prone to subjective interpretation (Huysamen, 2001). Administrative errors such as variations in instructions and interpretations thereof are a strong source of systematic error variance that affects reliability (Foxcroft, 2009). Administration procedures and clarity of instructions that particularly avoid ambiguity contribute to reliability (Foxcroft, 2009).

Spilt half reliability measures the degree of consistency between items, by splitting the set of items into even numbered and odd numbered items. Two sets of scores are obtained for each half. The degree of agreement between the two halves of the test is calculated by the Spearman - Brown formula to establish reliability for the entire test (Domino & Domino, 2006; Gravetter & Forzano, 2011).

Test –retest reliability involves two administrations of the same test within a suitable time interval. The Pearson product moment correlation (r) is used to compute the correlation between the two sets of scores to determine consistency. *Parallel form of reliability* involves giving different but equivalent tests to assess consistency of items.

Factors that affect reliability are the length of the test, and too short a test with fewer items may not produce a reliable measure (Loewenthal, 2001). By lengthening the test with similar items its reliability may be increased (Huysamen, 2001).

Once reliability of a measuring instrument has been established the next step is to determine issues of validity. Reliability is a prerequisite to validity as a measuring instrument is not considered valid unless it is reliable (Gravetter & Forzano, 2011). Reliability and validity are not mutually exclusive, but both partially related and interdependent (Gravetter & Forzano, 2011; Kline, 2005).

6.5.3.3 Validity

Validity refers to how well the test measures the construct it is intended to measure (Domino & Domino, 2006). A formal definition indicates that "...validity is the agreement between a test score or measure and the quality it is believed to measure" (Kaplan & Saccuzzo, 2005, p.135). Whether a test is valid or not depends on the specific purpose for which the test is used (Domino & Domino, 2006). Validity makes it possible to make inferences about test scores, and although validity is considered unitary concept, for convenience it is separated into categories which

define different aspects of validity (Domino & Domino, 2006; Kaplan & Saccuzzo, 2005). A discussion of these follows.

Content validity is a logical starting point in test construction and analysis, as it refers to whether the test adequately covers the representative sample of behaviour or the dimension that is to be measured. Items selected have to be representative and relevant to the domain under study (Domino & Domino, 2006) and a thorough knowledge of the subject matter is required. This is best achieved by consulting experts to judge the relevancy of the items (Loewenthal, 2001) as content validity does not have a numerical value but rather is established through verification of expert knowledge. This can also be done empirically through factor analysis.

Construct validity is the extent to which the test measures a theoretical construct or trait (Anastasi & Urbina, 1997). The validity of the test is derived from the theory that underpins the concept. Construct validity is "...demonstrated when the scores obtained from a measure are directly related to the variable itself" (Gravetter & Forzano, 2011, p.91). Constructs are types of behaviour that are translate into specific operations, namely tests, and in validating a test the construct is validated (Domino & Domino, 2006). The test must be an accurate reflection of the construct, and principle component and factor analyses can be used to assess the construct-identification process of a psychological test (Foxcroft & Roodt, 2005).

Criterion-related validity refers to the degree to which a test correctly predicts the relevant criterion, and depending on whether this is present at the time of testing or whether it will become available only some time after the test is completed a distinction is made between concurrent and predictive validity. The former was not used in this study as the main aim was to establish content and predictive validity, which is the accuracy with which certain types of tests forecasts future success in some areas of learning (Cohen, 2005). Thus, a score that is used to infer performance must actually predict performance (Vassiliou, 2000). Predictive validity is achieved when correlations between one testing and another are shown and when the same sample of individuals assessed the first time are available for the follow-up testing

(Bustin, 2007). It involves a prospective research design as people tested have to be followed up later (Loewenthal, 2001), as was the case in the design of this study. Other forms of predictive validity are naturally established when the measurements of a construct, according to the specific theory on which the construct is grounded, predicts behaviour, because "...theories make predictions about the constructs they contain" (Gravetter & Forzano, 2011, p.88). Predictive validity forecasts performance on a criterion that is going to be measured in the future (Kaplan & Saccuzzo, 2005).

A factor that can affect validity is sample size, and validity coefficients based on small sample sizes tend to be artificially inflated (Kaplan & Saccuzzo, 2005). Larger samples are also better in longitudinal studies as attrition rates affect predictive validity. Validity is fundamental to measurement and central to the understanding of tests and measures in psychology. It is "...strong and compelling" and comparable to the "...validity of medical procedure" (Meyer et al., 2001, p.128). Validity must be established on a representative sample for which the test is intended, and reveals what the test is measuring and under what circumstances (Loewenthal, 2001).

In conclusion, reliability and validity are related concepts and two most important test properties, and the researcher must demonstrate that the constructs under investigation are measured with reliability and show validity that is consistent with the theory or theories. A test that is valid is always reliable but one that is not valid may or may not be reliable. The degree to which reliability and validity were achieved will be addressed in the following chapters.

6.5.4 Publication of test manual

Once norms are established the standardisation process is completed and a test is eligible for publication. A test manual outlining psychometric details must be compiled prior to publication (Foxcroft, 2009), detailing the purpose of the measurement and to whom it can be administered, as well as specifying administration and scoring procedures, outlining the process of test development, providing information on how the reliability and validity of the measure was obtained, and giving the norm group's age, gender, cultural and socio-economic background

and geographical location. Information on how performance on the measure should be interpreted must be indicated (Foxcroft, 2009).

6.6 SUMMARY

In conclusion this chapter has reviewed the steps and concepts of measurement involved in the process of test construction. The following chapter describes the process involved in meeting the needs of establishing a scientific instrument, which is the screening instrument.

CHAPTER 7

RESEARCH METHODOLOGY

7.1 INTRODUCTION

There is a significant need in South Africa for relevant, reliable and valid tests, especially in the field of education. To address past inequities there is a need to create tests that will address the needs of a multicultural school classroom, in addition to which the South African preschool classroom faces the challenging situation of accommodating at the entry phase of education children with diverse and widely unequal early experiences that bear no resemblance to uniform or norm-relevant development for the grade. Children who have no formalised school experience prior to Grades R and 1 are adversely affected by developmental variations (Bordignon & Lam, 2004). Grade R is now a compulsory part of formal education, therefore Grade 00 is an important one on which to focus when identifying learners with developmental lags and needs that necessitate early identification and subsequent redress. This chapter outlines the research process followed in order to develop such a test.

7.2 AIM OF STUDY

As indicated, the goal of this research was to construct a standardised, reliable, valid and cost-effective measuring instrument to identify developmental risk factors in the Grade 00 year for further diagnostic assessment and subsequent intervention, and to determine the predictor variables linked to academic achievement in Grade 1.

7.3 MEANS OF ASSESSMENT

The questionnaire format was an appropriate choice for the target population, although many other methods of data collection exist, even for the preschool population, such as naturalistic observations, self-reports and checklists. For instance, check lists are frequently used by preschool teachers and parents to make far-ranging assumptions on a child's abilities or developmental levels, and often feature in women's magazines and newspapers, usually at the start of the school year. However, while they have limited use as an observational tool they do not provide information

on which to base meaningful decisions. At best they create doubt in vulnerable parents, and as with other related tools such as record forms and schedules they do not have a scientific basis. This was one of the motivations behind the development of the Grade 00 school readiness questionnaire, as it would be based on scientific merit to determine risk and readiness. Naturalistic observations have been frequently used in observations of preschool children, but as with checklists they do not cover a wide range of behaviour or content. While detailed procedures have been developed to increase observer reliability and validity through well-defined observer codes, the issue of normative data remains. Observational techniques are not as exact as standardised tests, are subjective, unstructured and time-consuming (Sattler, 2002), whilst self-report questionnaires, which are a common testing approach, fall out of the ambit of this developmental phase. Preschoolers do not have the developmental or educational capacity to participate in such a process, leaving questionnaires as the most suitable means of data collection, with the added advantage of eliciting structured normative information that can be used under standardised conditions.

Questionnaires, on the other hand, do have shortcomings, as with any other measurement, for example social desirability, halo effect, and central tendency of responses, which may affect the responses. Nevertheless, they remain a useful, objective way of collecting data, and used in conjunction with other assessment methods for children, enhance the assessment process. Burns (1979), on self-rating measures and the self-concept, aptly defended the value of such measures: "...if they are to be rejected then psychology would be seriously limited" (p.77).

The Grade 00 school readiness instrument used a forced choice ('Yes/No', as well as a Likert scale rating) and a performance-based format. Section 1 of the questionnaire, which elicited information on medical and physical development, was structured on the 'Yes/No' response format. The remainder of the questionnaire was rated on a 5-point Likert scale rating that appeared alongside the item being measured. The weighting for the ratings on the Grade 00 school readiness questionnaire was from 1 to 5: qualified by the descriptions 1= "Never", 2= "Seldom", 3= "Sometimes", 4= "Almost Always", 5= "Always". A Likert scale measure is a summated rating scale and allows for continuous responses or more response options.

7.4 PARTICIPANTS

An important consideration in test construction and psychometric measures is of statistical properties such as sample size, test items and means of test scores (Esterhuyse, 1997). An important issue in sampling is adequate size, and to minimise standard error of correlations, 220 respondents are recommended (Kline, 1993). The target population in this study consisted of Grade 00 learners in 2010, in the age cohort of 48-66 months of age, and who were eligible for school entry in 2012. To ensure representivity a large number of Grade 00 learners were selected, with a wide range of demographic factors, such as geographical location (schools central to and south, north and west of Durban), and wide range of socio-economic status (SES) that included advantaged and disadvantaged schools. A wide area (38 schools) was targeted, and the total sample size consisted of 579 Grade 00 learners, drawn from English medium schools. Private, ex-model C and less affluent government and private schools were included. Pre Grade R is mostly a private arrangement and therefore costly, hence the quality of education varies considerably. This favoured this study in terms of its wide representivity.

A total of 67 children were lost to the study due to repetition in Grade 00 or R, parents being reluctant for their children to participate in the follow-up phase in 2012, and a few who emigrated. The final sample group consisted of 512 Grade 00 learners, of whom 252 (49.4%) indicated their gender as male, while 258 (50.6%) indicated female. Two participants did not indicate their gender. The mean age of the participants was 4.55 years (\pm 54 months), with a standard deviation of 0.51 years (\pm 6 months). The majority of the participants were Indian (46.3%), followed by White (29.2%), Black (18.8%) and Coloured (3.3%) learners.

7.5 METHOD OF RESEARCH

As indicated above, a need exists in South Africa for the construction of relevant, reliable and valid tests. Subjecting test construction to rigorous scientific methods of objectivity, fairness and relevance need not disadvantage any group. Test scores have little meaning on their own and raw scores have to be evaluated against data that can be interpreted, which necessitates norms. Psychological tests should also have established reliability and validity before they can be used in practice.

In order to develop such a screening test for Grade 00 learners, the following phases were implemented:

Phase 1: Identification of preliminary items for the eight domains;

Phase 2: Data collection;

Phase 3: Data analyses;

Phase 4: Determining norms.

Each of these phases will now be discussed in more detail.

7.5.1 Phase 1: Construction of preliminary instrument

7.5.1.1 Identification of constructs

Although a plethora of school readiness tests exist they have traditionally focused on cognitive readiness, language competencies and/or motor competencies (Janus & Offord, 2007). The Gesell school readiness test (GSRT) used popularly in the USA and South Africa has been found to be a poor predictor of school readiness, lacking in reliability and validity, time-consuming and requiring interpretation by a clinician (Foxcroft, Roodt, & Abrahams, 2009; Janus & Offord, 2007). Janus and Offord (2007) in a review of available school readiness measures identified the following five commonly used tests: Lollipop Test, Metropolitan Readiness Tests, Peabody Picture Vocabulary Test (PPVT), Phelps kindergarten Readiness Scale and the GSRT, and concluded that none offered a comprehensive, holistic measure of a child's development or readiness for school. Most did not focus on socio-emotional development, account for gross motor skills or focus on maturation, and lacked interrater reliability needed for administration by trained professionals. In addition, they were generally poor predictors of school readiness.

In a review of several South African based tests, such as the School-entry Group Screening Measure (SGSM), School Readiness Test of the University of Pretoria, the School Readiness Evaluation by Trained Testers (STETT), the Nursery School Questionnaire (NQES), the Aptitude Test for School Beginners, and the Herbst Instrument for Measuring Cognitive and Motor Development, Bustin (2007) concluded that either socio-emotional domains were lacking or had not been

comprehensively included, or there was exclusive emphasis on motor development and strong emphasis on cognitive competencies. More importantly, shortcomings of school readiness measures are that they do not serve the purposes for which they are intended, i.e., underpinning skills that will determine progress at school entry; they are not normed for local populations; and they do not include all the developmental domains in evaluation (Foxcroft, 2004; Janus & Offord, 2007; Lidz, 2003). Dimensions such as neuromotor development, developmental milestones, sensory development (hearing and vision), birth and medical history (low birth weight, pre-term births; health, executive function skills, self-regulation, measurement of play, motivation, cognitive activities such as humour, questions children ask, self-help skills, and social graces, have not been included in a single, comprehensive evaluation. Researches who call for the inclusion of these dimensions in screenings and school readiness assessments include Bustin, 2007; Chouinard, 2007; De Witt, 2011; Fantuzzo, Bulotsky -Shearer, McDermot, McWayne, Frye, & Perlman, 2007; Gagnon & Nagle, 2004; Goleman 2007; Hadders-Algra, 2002; Harris, 2007; Hair et al., 2006; Miller, Gouley, Seifer, Dickstein, and Shields, 2004; Ruby, 2007; Shapiro, Schwartz & Santerre, 2002; Winders, Burns, Wilkerson, & Steichen (2005). This research identified the need to develop a holistic measure by incorporating the above gaps into the key developmental domains that would predict the transition to school.

Taking the perspective that school readiness is a multidimensional, multifaceted approach (see Chapter 3, section 3.5) eight major domains were selected for inclusion in the preliminary screening instrument. This was based on a review of the major developmental approaches that define the broad areas of development as *Physical*, which includes motor, sensory and perceptual development; *Cognitive*, which includes cognitive and language development; and *Psychosocial*, which includes emotional and social (Berk, 2009). The domains selected for school readiness assessment embrace the areas of child development and early learning that are necessary for long-term success at school. Each contains two to three different dimensions that tap different aspects and skills of development in that domain. These essential areas of development form the basis for establishing school readiness goals for children (USDHHS, 2010). The domains were divided into directly related and indirectly related domains. ***Directly*** related to school readiness are: *Cognitive* (ability and approach to learning); *Perceptual* (body awareness, auditory and spatial

ability), and *Speech* (speech and language) domains, and those that are *indirectly* related to school readiness are: *Social* (interpersonal competencies, social-regulation behaviour, social graces, play); *Emotional*, (empathy, emotional regulation self confidence); *Neurological* (fine motor, gross motor, muscle tone); *Developmental* (concentration, sensory) and *Independence*.

The *Cognitive* domain is essentially about cognition, which refers to the inner processes of the mind that facilitate the grasping of knowledge through mental activities, such as problem-solving, attending, planning, reasoning and categorising. Two different kinds of cognitive readiness can be identified. The first is academic knowledge, named the *Ability* dimension in this research, which refers to the emergent numeracy and literacy skills that are dependent on teaching instruction (Bierman et al., 2009). The second refers to the processes that facilitate learning, as measured by the *Approaches to learning* dimension.

The *Perceptual* domain refers to the child's ability to classify, combine and recognise information received from the senses and make meaning of it. It therefore involves both a sensory and mental process (Pieterse, 2001; Witthaus, 2006). This domain consists of *Body Awareness*, the *Auditory perceptual* and *Spatial ability dimension*.

The *Neurological* domain assesses motor function. Motor skills allow children to explore and function in the environment. Delays in physical development impact on the ability to learn and are associated with poor educational and developmental outcomes (USDHHS, 2010). The domain consists of *Gross motor* and *Fine motor* dimensions.

The *Speech-Language* domains assess speech and language functions. Language is considered important by most researchers (NEGP, 1998), and is considered the key to learning across all domains (USDHHS, 2010). It consists of the *Language* and the *Speech* dimensions.

The *Emotional* domain assesses emotional competencies and a variety of emotion-related skills, behaviour and social competencies in dealing with situations in

personal and social contexts that lead to positive engagement in school (Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003; Miller et al., 2006; Stefan, Bălaj, Porumb, Albu, & Miclea, 2009). The domain consists of the *Empathy*, *Emotional Regulation* and *Self confidence* dimensions.

The *Social* domain assesses social competencies. Children with poor social competencies struggle to develop and maintain relationships and often experience rejection by peers (Stefan et al., 2009). This domain consists of the *Interpersonal competencies*, *Social regulation behaviour* and *Social graces* dimensions.

The *Developmental* domain assesses the dimensions of sensory development and concentration. The *sensory* dimension assesses difficulties that highlight possible problems in vision and hearing. The *Concentration dimension* assesses difficulties associated with attention deficit disorder (ADD). Lack of attention, distractibility and motor restlessness are barriers to learning. Poor attention is associated with poor academic and psychological functioning (Lengua, 2000).

The *Independence* domain, referred to as ‘normative readiness’, is an important domain in school readiness (de Wit, 2009). Independence and responsibility are life skills that facilitate the transition to school and impact positively on learning outcomes. Also classed as practical life skills and self-help skills, independence is linked to better self esteem and a sense of mastery and control, and improves problem-solving, and concept-formation and mastery (Shepard, 2010).

7.5.1.2 Identification of items

The items for the construction of the preliminary screening instrument were selected from the information obtained in the pilot study and the researcher’s professional experience. Also consulted were a large number of standardised tests, such as the Gesell developmental schedules (Gesell, 1976); Vineland Adaptive Behaviour Scales, Bayley Scales of Infant Development; and various checklists and developmental milestones schedules from a number of sources.

A number of items were included under each section/domain, not limited to a defined, consistent number for each section. Some sections had more test items than others and there was a considerable overlap across domains, as constructs are

integrated and not wholly discrete and therefore intersect to some extent. A total ranging from 19 to 29 behaviours, competencies and/or items were selected for each domain, with a total of 46 items constructed for the general section, including *medical, birth, and developmental* history dimensions.

A pilot study was carried out to help with the identification of relevant domains, as well as generating a pool of items for the preliminary screening instrument. A total of 10 schools were approached to share with the researcher what they considered were areas of importance in their assessment of Grade 00 children. All the schools responded enthusiastically and willingly, some by getting their entire Grade 00 teaching staff to fill in the forms independently. The designation of the educator's role was required (e.g., head of department, principal or teacher) to elicit sound information based on experience. In some cases three responses were received from the same school, in the form of a questionnaire that requested information on the major areas of development. Open-ended questions were directed towards general information that the educator felt was important in understanding the risks involved in this age group. Huysamen (2001) suggests that open-ended questions be used in the pilot study to determine most commonly used responses. In this study they were useful in getting an idea of the most common areas used in the assessment of skills in this age cohort.

The preliminary questionnaire was also completed by three occupational therapists, three speech and language therapists and three psychologists. The three psychologists worked with preschool assessments. In the pool of respondents in the pilot project were included senior educators and a psychologist involved in two developmental units (schools attached to remedial units).

The literature review clearly confirms that the major developmental areas (Motor, Speech, and Language, Perceptual, Cognitive, Social and Emotional and Independence) of medical and developmental background were included, as they have also been found to be predictors of later learning difficulties, hence academic success and school adjustment in the early years.

7.5.1.3 Procedure

A meeting was set up with the superintendent education manager (SEM) from the KwaZulu-Natal Department of Education department informing it of the intention to pursue this research in schools in Durban. A formal letter from the university, explaining the purpose of the research was given (see Appendix A). The rationale, nature, focus and phases of the study were discussed in detail, and verbal permission was granted at the initial meeting. This was followed by a formal letter of permission from the Department giving permission and supporting the need for the research [see Appendix B1 (2010) & B2 (2012)].

The principals of many schools were then contacted by telephone to inform them of the purpose and intention of the research. A wide demographic area was considered, namely the south, north, west and central regions of Durban, so as to include as wide a sampling range as possible and both public and private schools. Schools approached were also representative of the wide racial and ethnic demographics, and positive responses were received from most. Only one school (private) refused to participate, as they felt that they were not comfortable with parents divulging personal information, such as income level, which may be used against them or that their school was happy to use the services of their private psychologist. Schools that did not have Grade 00 were excluded. A total of 38 schools participated.

It was arranged that principals would inform their staff and parents of the research. As there were a large number of schools it was not possible to meet with all the staff or the parents, and most schools informed the parents at parent meetings in the third term, followed by a letter to the parents. Copies of the following letters were sent to the principals: a letter addressed to the principals explaining the nature and need for the research (see Appendix C); a letter to the parents explaining the nature and need for the research (see Appendix D); and a letter from the Department granting permission to proceed with the research (see Appendix B1).

Steps taken to ensure ethical standards were carefully considered. Permission from the Department was sought and granted, consent of the participating schools and parents secured, and anonymity of the learners' and parents' personal information

assured. Information was not included on the computer data base and codes were used to capture data, though names and contact numbers of parents were needed for follow-up purposes, as indicated clearly on the questionnaire. Letters thanking the principals and parents were forwarded following each phase of data collection, and each parent was telephonically contacted for the second phase of the research and reminded of the implementation of the follow-up phase of the research.

The questionnaires were distributed to the various schools at the beginning of the third term of 2010 to give the teachers time for administrative issues of distribution to parents. Many schools decided to complete questionnaires only on those children whose parents were willing to participate. Once completed, the researcher collected the completed questionnaires from the various schools. Most principals coordinated the project, and informed parents either at meetings or through written correspondence of the schools support for the research. Names of schools have been removed to protect anonymity.

7.5.2 Phase 2: Data collection

Data was collected in two different processes, the first to establish construct validity (factor analysis) of the screening instrument, the second to investigate the predictive validity of the final instrument. These two processes took place at different times and will now be discussed.

7.5.2.1 Construct validity

Based on the information received from the pilot project, the items common to the various sources of the information were chosen for selection in the proposed questionnaire. Once finalised the tests were distributed to the schools, in the third term of 2010, with the instruction that they were to be administered in the fourth term. Two sets of questionnaires per child were given, one to be completed by the parent and the other by the educator. The questionnaires were identical as the aim was to establish interrater-reliability.

7.5.2.2 Predictive validity

Data collection to determine the predictive validity of the final screening instrument took place in June of 2012, at the end of the second term of school.

Letters were once again sent to the principals of the primary school outlining the nature of the research (See Appendix E). Letters were sent to parents reminding them of the follow up study (See Appendix F). The same learners that formed part of the original data collection were included in this, the second data collection process. Except for two parents, all those contacted were happy to have their children participate once again.

Reading, Spelling and Mathematics competencies were assessed on three South African normed and standardised tests, to counter the problem of invalid measurements of academic performance. The ESSI reading and spelling tests (Esterhuyse, 1997) and the VASSI maths test (Vassiliou, 2000) was used. Test properties of these tests are discussed below. To ensure response rate, the researcher ensured that testing material supplies were distributed well in advance, packaged conveniently with instructions written clearly, timeframes imposed and telephonic follow up made. Any inconvenience to the school was minimised. The tests were collected from the various schools at their convenience to ensure better response rates.

7.5.2.2.1 The ESSI reading and spelling test

After surveying other standardised scholastic and reading tests the ESSI tests were considered for use as they were screening tests normed and standardised for Grades 1-7 of a South African population. A further reason was that they were short and easy to administer, and the spelling test could be group-administered. The reading test was a sight reading test and diagnostic testing was not the aim of the study. The reading and spelling test consisted of 15 words (for Grade 1) and 20 words for the other grades, graded by difficulty.

Internal consistency for the tests reflects coefficient values higher than 0.80, implying that internal consistency of these tests may be accepted with a large degree of certainty. Internal consistency estimates for grade 1 reflect 0.819 for spelling and 0.867 for reading. Retest reliabilities show correlation coefficients of 0.790 for spelling and 0.849 for reading, which is significant on the 0.01% level. Validity coefficients with English and Maths reflect values of 0.636 and 0.482 respectively.

7.5.2.2.2 *The VASSI mathematics test*

The VASSI is also standardised on a sample of South African children. It can be administered by group, therefore the choice for its use. Kuder-Richardson reliability coefficients for the grade 1 test are 0.85. Test-retest reliability shows a correlation coefficient of 0.53, which is at the 0.01 % level significance. The predictive validity coefficient of 0.38 for the grade 1 group is demonstrated on the 1%-level a significant value.

In summary, the tests meet acceptable levels of reliability and validity and support psychometric properties of good tests. The use of these tests for the research was well motivated in terms of their psychometric soundness.

7.5.3 Phase 3: Data analyses

According to the literature study it was clear that cognitive, as well as socio-emotional aspects of development of the Grade 00 learner should form part of this study. It was also decided to include the medical, physical and developmental factors which were included in part 1 of the preliminary screening instrument. The cognitive as well as the social-emotional factors were reflected in part 2 of the preliminary screening instrument.

The main focus was to identify the domains and dimensions (part 2 of the instrument) with high levels of reliability and validity. In order to do this, item communalities were investigated by means of a principle *component* analysis. This was followed up with principle *factor* analysis (Howell, 2009). During the execution of the principle factor analysis the axes were rotated, as in the Direct Oblimin method, since the items showed significant statistical inter-correlations. The reliability of the different dimensions, which were identified by the principle factor analysis, was investigated by means of the Cronbach alpha coefficient. After the items for the final screening instrument had been identified, a shorter version of the screening test was also developed, so as to improve the practical use of the instrument. To investigate the possible role of the 14 medical and physical developmental factors (part 1 of the instrument) multiple analyses of variance (MANOVA) was utilised.

In order to determine the instrument's predictive validity, the learners who were evaluated with the screening instrument in Grade 00 were followed up in their Grade 1 year. Their academic performance (reading, spelling and mathematics) was measured by means of standardised tests with performance correlated with their performance on the final screening test. If correlation coefficients of 0.3 were found, the analyses would be followed up with a stepwise regression analysis (Howell, 2009) to identify the domains/dimensions of the final screening instrument that best predict the learner's Grade 1 academic performance.

In the final analyses, norms were calculated for the *Comprehensive and Shortened* version of the screening instrument. Before the norms were calculated, an investigation was made as to whether gender played a significant role in the learner's performance in these dimensions/domains. For this purpose, a one-way multiple variance analysis (MANOVA) (Howell, 2009) was conducted with all 19 dimensions, and eight domain scores as the dependent variables, and gender as the independent variable. If a significant result (*F*-value) was obtained with the MANOVA, the analysis would be followed up with a single variance analysis on each of the dependent variables.

In order to determine the practical importance of the statistically significant results, the effect sizes of the results were also determined. To consider the effect size when interpreting the *correlation coefficient*, a coefficient of 0.1 depicts a small effect, 0.3 a medium effect and 0.5 a large effect. To consider the effect size when interpreting the results of an *analysis of variance* (*f*), a value of 0.1 depicts a small effect; 0.25 a medium effect and 0.4 a large effect (Steyn, 1999).

7.5.4 Phase 4: Determining norms

Norms were subsequently calculated for both versions of the screening instrument, and calculated in the form of stanines and percentile ranks. The data that were used to calculate the norms were collected in the last term of the participant's Grade 00 year.

7.6 SUMMARY

The goal of the research was twofold. The *primary aim* was to develop a reliable and valid Grade 00 screening /school readiness measure to identify risk

factors in the early years to provide timeous intervention. A part of this aim was also to equalise the widely discrepant skills that children bring to formal schooling as a result of their vastly differing play and preschool experiences and educational levels, stemming from varied socio-economic backgrounds. The *secondary aim* was to determine whether school readiness skills in the major developmental areas predict academic performance.

Standardised tests and measuring instruments are not easily available to many schools and parents, due simply to the cost. Teachers in the Grade 00 phase often look for guidance in making decisions regarding readiness and appropriate interventions, without necessarily having to make detailed, costly assessments. Experience has shown that in the absence of an easy to access measuring tool, reliance is placed upon hunches and poorly constructed instruments. Making this measure available would serve the needs of a wide sector of the population. Foxcroft et al. (2009) have highlighted the need for developing relevant tests to accommodate a diverse population which would help fulfil a wide gap.

The literature reviews in Chapters 4 and 5 have extensively covered the need for the developmental assessments to be holistic and cover the major developmental areas in a child's growth. This instrument is unique in that it has incorporated items and dimensions into one comprehensive tool. School readiness and screening tests tend to be limited in the areas that are assessed, for example, while most cover cognitive development they do not include an evaluation of a child's approach to learning and dimensions such as motivation or natural robustness for learning. This was demonstrated in the quality of questions the child asks, or hi/hers ability to understand and express humour.

Social and emotional domains assessed in traditional tests (if included) do not evaluate the quality or content of a child's play. This questionnaire has included those aspects considered vital in evaluating a child's risk for learning. School readiness and screening instruments do not cover aspects of early development such as milestone attainment and birth history, yet the research evidence increasingly points to its contribution as a risk to later learning. This study has included a separate checklist to cover this area and the measuring tool would evidently be a useful instrument in

making educational decisions regarding levels of intervention and assisting towards placement decisions. One may conclude that any measuring instrument is valuable only as part of a total ecological assessment process.

CHAPTER 8

RESULTS AND DISCUSSION

8.1 INTRODUCTION

This chapter covers the results of the study and analyses of the data, together with discussion within the framework of the three phases undertaken. In the next paragraphs the statistical analyses will mainly focus on the construct validity and criterion validity of the screening test as well as the determination of norms. Content validity was assured through consultation with educational experts, and will not be discussed further.

8.2 STATISTICAL ANALYSES

8.2.2 Validity and reliability of dimensions

During the initial stages of the analyses of data the main focus was to determine the validity and reliability of the different dimensions which form part of the eight identified domains (construct validity). The statistical analyses for each of the identified domains (Cognitive, Perceptual, Neurological, Speech, Emotional, Social, Developmental and Independence) is presented separately.

Firstly, the descriptive statistics (means and standard deviations) of the items of each domain were investigated in order to investigate possible unexpected values, followed by calculating the kurtosis and skewness quotients for all the items. Items for which the skewness $> |2|$ and/or the kurtosis $> |4|$ were identified were excluded from further analyses as they were deemed unsuitable for factor analysis. The items' communalities were also investigated by means of a principle component analysis, and will be reported on before proceeding with a principal factor analysis. During the execution of the principal factor analysis the axis were rotated according to the Direct Oblimin method, since the items showed significant statistical inter-correlation. It is also important to note that in cases where more than five items showed a high factor loading (higher than 0.30) on a specific factor, only the five with the highest loading were selected. Each of the domains will now be discussed.

8.2.2.1 Cognitive domain

8.2.2.1.1 Descriptive statistics and unidimensionality

The descriptive statistics and component matrix for the Cognitive domain are presented in Table 8.1 below.

Table 8.1: Descriptive statistics for the Cognitive domain (N=512)

Item	\bar{X}	SD	Skewness	Kurtosis	Component matrix
1. Rote count up to twenty or more.	4.23	1.00	-1.294	1.117	.713
2. Count objects by word and touch in one to one (i.e. tally counting) up to at least ten to fifteen	4.13	1.01	-1.047	.408	.722
3. Remember at least four familiar objects shown to him after these are taken away from him. (Visual memory)	3.82	.89	-.484	.027	.694
4. Do quantity comparisons: “larger”, “heavier”, “bigger than”, “more than”	3.81	.90	-.428	-.180	.753
5. Put events into sequence	3.74	.90	-.266	-.398	.799
6. Classify or group according to common themes e.g. people, animals, transport, all the red objects	4.20	.87	-.907	.347	.765
7. Show humour in talk and activities (play)	3.92	.94	-.478	-.522	.669
8. Describe what he/she sees in a picture	4.14	.86	-.667	-.363	.806
9. Persevere with a set task until complete.(work with purpose)	3.99	.97	-.632	-.399	.719
10. Sort objects according to colour, size and shape	4.20	.93	-.990	.462	.714
11. Work towards a timed activity (the idea of speed)	3.62	1.02	-.242	-.591	.672
12. Tell the difference between concepts such as tall/short; hot/cold; same/different	4.19	.85	-.786	-.083	.775
13. Use his/her own initiative to solve a problem	3.51	.87	-.030	-.324	.706
14. Ask When, Why and How questions	3.76	1.08	-.565	-.379	.658
15. Show curiosity	3.96	.97	-.707	.002	.640
16. Have difficulty with games requiring sequencing and coordination, e.g., “Pat a cake”	2.19	.94	.568	.175	-.486
17. Have difficulty keeping simple rhythm	2.19	.95	.666	.303	-.506
18. Show initiative in trying out new things	3.62	.92	-.118	-.475	.597
19. Recognise his/ her own name when written	4.31	.95	-1.342	1.077	.579
20. Show a willingness to learn	4.25	.85	-.870	-.010	.740
21. Have difficulty planning new tasks	2.49	.91	.284	.132	-.475

Table 8.1 indicates that no item reveals a high kurtosis or skewness value and it can subsequently be accepted that the data is spreading normally. According to the component matrix, the analyses across all 21 items display a value $> |0.2|$. To

investigate the underlying factor structure of the Cognitive domain, a principal factor analysis was performed and the results thereof will be discussed.

8.2.2.1.2 Results of factor analysis

Firstly, the KMO test and Bartlett's test were performed on the items of the cognitive domain to determine the suitability of the data for a factor analysis. The KMO test produced a value of 0.939 for the 21 items and the Bartlett's test a value of 6475.429 ($p = 0.000$). It is clear that a value of higher than 0.7 was obtained with the KMO test and that the Bartlett's test showed a significant result on the 1%-level. It can therefore be accepted that the data for the 21 items is suitable for factor analysis.

To determine the specific number of factors/dimensions that could be extracted from the 21 items a principal factor analysis was performed. Factors with eigenvalues > 1 and the scree plot graph were investigated in order to determine the number of factors. A Parallel Analysis was also performed as this method also indicates the specific number of factors represented by the items.

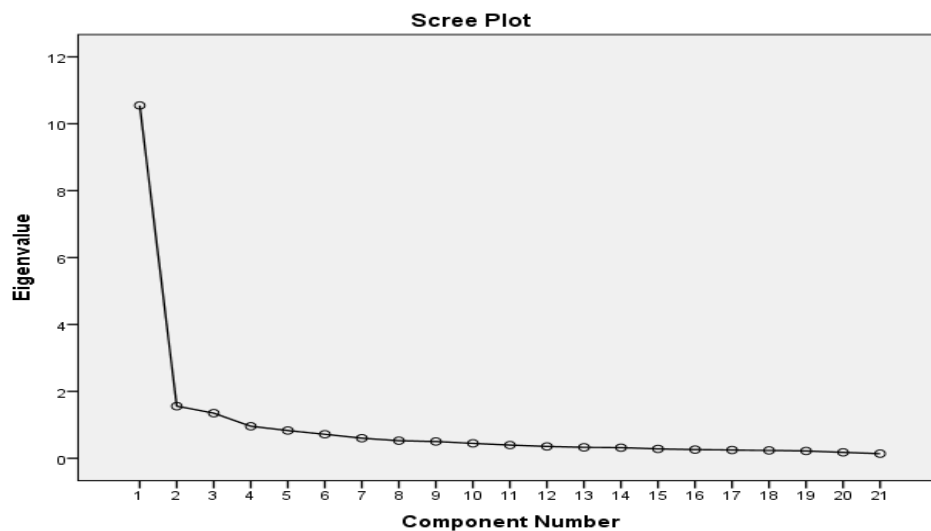


Figure 8.1: Scree plot graph for the cognitive domain

According to the result of the Parallel Analysis as well as the eigenvalues > 1 , two factors were identified. The scree plot graph was subsequently investigated and is depicted in Figure 8.1 (above).

According to the scree plot test there is no clear break in the graph after the second factor, therefore it would appear as if there are two factors present and this structure makes sense theoretically. The results of the factor analysis during which the two factors were rotated in terms of the direct oblimin method are reported in Table 8.2.

Table 8.2: Pattern matrix of the Cognitive domain (N=512)

Item	F1	F2
4. Do quantity comparisons: “larger”, “heavier”, “bigger than”, “more than”	.868	.096
6. Classify or group according to common themes e.g. people, animals, transport, all the red objects	.851	.064
5. Put events into sequence	.774	-.059
2. Count objects by word and touch in one to one (i.e. tally counting) up to at least ten to fifteen	.753	.015
10. Sort objects according to colour, size and shape	.749	.019
1. Rote count up to twenty or more	.744	.018
12. Tell the difference between concepts such as tall/short; hot/cold; same/different	.726	-.078
3. Remember at least four familiar objects shown to him after these are taken away from him. (Visual memory)	.647	-.063
8. Describe what he/she sees in a picture	.567	-.284
9. Persevere with a set task until complete.(work with purpose)	.487	-.261
11. Work towards a timed activity (the idea of speed)	.368	-.332
19. Recognise his/ her own name when written	.363	-.230
15. Show curiosity	-.083	-.790
18. Show initiative in trying out new things	-.128	-.788
14. Ask When, Why and How questions	.026	-.691
20. Show a willingness to learn	.197	-.601
13. Use his/her own initiative to solve a problem	.211	-.545
7. Show humour in talk and activities (play)	.187	-.527
21. Have difficulty planning new tasks	-.002	.501
17. Have difficulty keeping simple rhythm	-.038	.497
16. Have difficulty with games requiring sequencing and coordination, e.g., “Pat a cake”	-.120	.385

According to Table 8.2 it is clear that Item 11, *Work towards a timed activity (the idea of speed)* and Item 19, *Recognise his/ her own name when written*, show double loadings. These items were not used in further analyses.

The results in respect of the eigenvalues and the percentage of variance explained by these two factors are depicted in Table 8.3.

Table 8.3: Results of extraction of factors for the Cognitive domain

Factor	Eigenvalue	Percentage of variance	Cumulative percentage of variance
Factor 1	9.775	44.289	44.289
Factor 2	1.557	5.015	49.304

The principal factor analysis indicates that these two factors explain 49.30% of the total variance in the Cognitive domain. The reliability of these two factors/dimensions was investigated and the results will now be discussed.

8.2.2.1.3 Reliability

The reliabilities of the two different factors/dimensions were calculated in order to determine the inter-item consistency of each dimension. Where it was found that the inclusion of a specific item decreased reliability it was excluded. Using this method the dimensions was compiled as follows:

Dimension 1: Items 2, 4, 5, 6, and 10

Dimension 2: Items 13, 14, 15, 18 and 20

Depicted in Table 8.4 (below) are the descriptive statistics, the reliability of the two dimensions as well as the correlation coefficient between these two dimensions.

Table 8.4: Descriptive statistics, reliabilities and intercorrelations of the two cognitive dimensions

Dimension	Mean	SD	Skewness	Kurtosis	α Coefficient	Correlation	
						1	2
1	20.07	3.81	-.695	-.102	0.884	1	0.63*
2	19.10	3.69	-.460	-.136	0.845		1

* $p \leq 0,01$

According to the kurtosis and skewness values, both dimensions show normal distributions and the Cronbach α coefficients vary between 0.845 and 0.884. These coefficients are all higher than 0.70. According to Nunnally and Bernstein (1994), this indicates acceptable internal consistency. The correlation coefficient between these two dimensions was calculated as 0.63, which represents a large effect size (Steyn, 1999). The results for the perceptual domain will now be discussed.

8.2.2.2 Perceptual domain

8.2.2.2.1 Descriptive statistics and unidimensionality

The descriptive statistics and component matrix for the Perceptual domain are presented in Table 8.5 (below).

Table 8.5: Descriptive statistics for the Perceptual domain (N=512)

Item	\bar{X}	SD	Skewness	Kurtosis	Component matrix
1. Name primary colours	4.47	.90	-1.639	1.739	.750
2. Identify/name at least five to six shapes that are presented to him/her	4.48	.85	-1.704	2.481	.767
3. Show an awareness of the words “left” and “right”	3.93	1.01	-.592	-.400	.717
4. Build a puzzle of 15-25 pieces or more by matching colours or features rather than by trial or error	3.90	1.02	-.582	-.380	.630
5. Orientate an object in relation to another by following the instructions- “under,” “behind”, “above” “in front of” or “next to”	4.08	.95	-.776	-.065	.785
6. Use eyes and hands together with increasing skill e.g., threading beads	4.29	.82	-.934	.454	.703
7. Build a tower of six or more blocks	4.45	.79	-1.460	1.874	.680
8. Copy a model made from blocks that you demonstrate with several blocks e.g. train, bridge, chair	4.05	.90	-.560	-.423	.672
9. Identify differences between two pictures	4.17	2.42	17.656	368.78	.327
10. Find a specific object when presented with a group of objects	4.24	.85	-.859	.008	.731
11. Have difficulty in remembering things heard	2.23	.89	.333	-.089	-.545
12. Ask for repetitions	2.23	.85	.076	-.680	-.422
13. Have difficulty remembering nursery rhymes, songs and poems	1.96	.87	.737	.328	-.578
14. Repeat or sing several nursery rhymes correctly	4.05	.87	-.865	.663	.687
15. Carry out a 3 step verbal instructions with ease: “Go the kitchen. Get the cup. Then bring it to me.”	4.18	.89	-.894	.242	.767
16. Recall information from a story or lesson	3.96	.92	-.650	-.028	.786
17. Point to most large and small body parts	4.58	.68	-1.654	2.412	.825
18. Give the functions of different body parts e.g., Why do you have ears	4.55	.70	-1.570	2.005	.808
19. Identify body parts on someone else	4.51	.74	-1.474	1.777	.809
20. Name the position of different body parts e.g., my legs are below my head, not above it	3.99	.99	-.681	-.275	.726

Table 8.5 (above) indicates that Item 9 (*Identify differences between two pictures*) delivers a high kurtosis and skewness value and is subsequently not used in any further analysis. According to the component matrix, none of the remaining 19

items shows a value of $< |0.2|$ and further analysis of the 19 items was continued. To investigate the underlying factor structure of the Perceptual domain, a principal factor analysis was performed and the results thereof will be discussed.

8.2.2.2.2 Results of factor analysis

Firstly, the KMO test and Bartlett's test were performed on the items of the perceptual domain to determine the suitability of the data for a factor analysis. The KMO test produced a value of 0.936 for the 19 items and the Bartlett's test a value of 6669.860 ($p = 0.000$). It is clear that a value of higher than 0.7 was obtained with the KMO test and that the Bartlett's test showed a significant result on the 1%-level. It can therefore be accepted that the data for the 19 items is suitable for factor analysis.

To determine the specific number of factors/dimensions that could be extracted from the 19 items a principal factor analysis was performed. According to the result of the Parallel Analysis as well as the eigenvalues > 1 , two factors were identified. The scree plot graph was subsequently investigated and is depicted in Figure 8.2 (below).

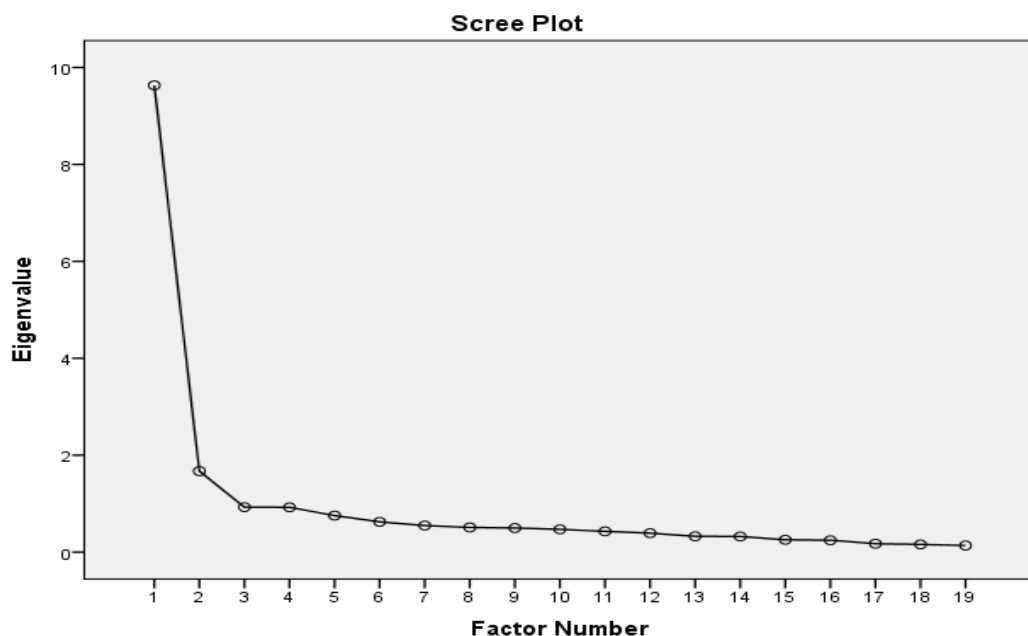


Figure 8.2: Scree plot graph for the perceptual domain

According to the scree plot test there is no clear break in the graph after the third factor. It would therefore appear as if there are three factors present. This structure also makes more theoretical sense. The results of the factor analysis during

which the three factors were rotated in terms of the direct oblimin method are reported in Table 8.6 (below).

Table 8.6: Pattern matrix of the Perceptual domain (N=512)

Item	F1	F2	F3
17. Point to most large and small body parts	.928	-.015	-.029
18. Give the functions of different body parts e.g., Why do you have ears	.913	-.017	-.037
19. Identify body parts on someone else	.859	-.029	.005
1. Name primary colours	.504	.018	.318
2. Identify/name at least five to six shapes that are presented to him/her	.486	-.015	.329
7. Build a tower of six or more blocks	.398	.008	.339
10. Find a specific object when presented with a group of objects	.334	-.267	.230
12. Ask for repetitions	.079	.756	.074
11. Have difficulty in remembering things heard	.087	.748	-.077
13. Have difficulty remembering nursery rhymes, songs and poems.	-.059	.742	.026
14. Repeat or sing several nursery rhymes correctly	.237	-.487	.109
15. Carry out a 3 step verbal instructions with ease: "Go to the kitchen. Get the cup. Then bring it to me."	.317	-.398	.192
16. Recall information from a story or lesson	.218	-.368	.338
4. Build a puzzle of 15-25 pieces or more by matching colours or features rather than by trial or error	-.135	.030	.838
5. Orientate an object in relation to another by following the instructions- "under," "behind", "above" "in front of" or "next to"	.061	-.046	.760
8. Copy a model made from blocks that you demonstrate with several blocks e.g. train, bridge, chair	.122	-.099	.512
3. Show an awareness of the words "left" and "right"	.173	-.112	.504
20. Name the position of different body parts e.g. my legs are below my head, not above it	.210	-.101	.486
6. Use eyes and hands together with increasing skill e.g., threading beads	.234	-.068	.462

According to Table 8.6 (above), it is clear that Item 1 (*Name primary colours*), Item 2 (*Identify/name at least five to six shapes that are presented to him/her*), Item 7 (*Build a tower of six or more blocks*), Item 10 (*Find a specific object when presented with a group of objects*), Item 15 (*Carry out a 3 step verbal instructions with ease: Go to the kitchen. Get the cup. Then bring it to me.*) and Item 16 (*Recall information from a story or lesson*) indicate double loadings. These items were not used in further analyses.

The results in respect of the eigenvalues and the percentage of variance explained by these three factors are depicted in Table 8.7 (below).

Table 8.7: Results of extraction of factors for the Perceptual domain

Factor	Eigenvalue	Percentage of variance	Cumulative percentage of variance
Factor 1	9.631	48.593	48.593
Factor 2	1.671	6.515	55.108
Factor 3	0.928	2.984	58.093

The principal factor analysis indicates that these three factors explain 58.09% of the total variation in the Perceptual domain. The reliability of these three factors/dimensions was investigated and the results will now be discussed.

8.2.2.2.3 Reliability

The reliabilities of the three different factors/dimensions were calculated in order to determine the inter-item consistency on each dimension. Where it was found that the inclusion of a specific item decreased the reliability, it was excluded. Using this method the dimensions was compiled as follows:

Dimension 1: Items 17, 18 and 19

Dimension 2: Items 11*, 12*, 13* and 14

Dimension 3: Items 4, 5, 6, 8 and 20

[Note: * reversed items]

Depicted in Table 8.8 are the descriptive statistics, the reliability of the three dimensions as well as the correlation coefficients between the dimensions.

Table 8.8: Descriptive statistics, reliabilities and intercorrelations of the three perceptual dimensions

Dimension	Mean	SD	Skewness	Kurtosis	α Coefficient	Correlation		
						1	2	3
1	13.65	1.99	-1.555	2.157	0.934	1	0.47*	0.70*
2	15.64	2.76	-.337	.058	0.803		1	0.52*
3	20.31	3.67	-.615	-.091	0.842			1

* $p \leq 0,01$

According to the kurtosis and skewness values, all three dimensions show normal distributions and the Cronbach α coefficients vary between 0.803 and 0.934. These coefficients are all higher than 0.70 and thus indicate acceptable internal consistency. The correlation coefficients between the three dimensions were calculated and vary between 0.47 and 0.70. All three coefficients represent large effect sizes (Steyn, 1999). The results for the neurological domain will now be discussed.

8.2.2.3 Neurological domain

8.2.2.3.1 Descriptive statistics and unidimensionality

The descriptive statistics and component matrix for the Neurological domain are presented in Table 8.9 (below).

Table 8.9: Descriptive statistics for the Neurological domain (N=512)

Item	\bar{X}	SD	Skewness	Kurtosis	Component matrix
1 Walk on tip toe while maintaining his/her balance	4.02	1.03	-1.011	.744	.548
2 Throw a beanbag or ball overhead	4.26	.79	-.767	-.206	.723
3 Catch a beanbag or a bouncing ball against his/her chest with his arms	4.04	.84	-.416	-.720	.667
4 Stand on one foot for 5-8 seconds	4.14	.87	-.905	.626	.704
5 Hop on one foot for 3-5 seconds	4.18	.83	-.803	.209	.718
6 Climb high playground equipment or trees or ladders	4.38	.77	-1.036	.347	.612
7 Walk easily up and down the stairs with one foot per step	4.34	.84	-1.202	1.134	.638
8 Jump with two feet together	4.39	.75	-.965	.085	.682
9 Walk a few steps on a low wall or balancing bar or beam.	4.24	.81	-.721	-.386	.663
10 Somersault	3.28	1.14	-.110	-.298	.463
11 Climb up the steps of a slide or a pool unassisted	4.15	.94	-.564	-.895	.610
12 Maintain an upright standing and sitting position	4.20	.84	-.894	.394	.692
13 Rest his/her head in the "free hand" (non-dominant) when drawing, writing and colouring, instead of supporting the page	2.11	.96	.553	-.132	-.466

14 Hook feet around chair legs as a means of supporting/stabilising the upper body	2.04	.98	.523	-.412	-.427
15 Lie on the desk when writing or drawing	1.87	.90	.633	-.544	-.574
16 Move his/her body or page to complete a desk top activity rather than his/her hand	2.29	.98	.224	-.469	-.496
17 Support his body against a surface such as a wall or desk when standing	1.98	1.02	.855	.138	-.509
18 Accident prone i.e. bumps into things, people, and trips over objects	1.88	.88	.842	.314	-.481
19 Able to maintain an upright posture	3.97	.98	-1.083	1.107	.455
20 Sluggish	1.85	.90	.795	.026	-.447
21 Hold a pencil in a tripod grip i.e. ,with thumb, index and middle finger (pencil grip)	4.10	.94	-.940	.505	.615
22 Control scissors and cut along a straight line	4.17	.83	-.727	-.083	.721
23 Begin to cut around curved lines	4.08	.84	-.566	-.291	.672
24 Copy a cross	3.94	.99	-.594	-.329	.542
25 Draw a person with major body parts	3.94	1.13	-.861	-.097	.521
26 Pick up small objects between his/her fingers and thumb	4.36	.79	-.957	-.036	.801
27 Fasten, unfasten buttons.	4.04	.92	-.508	-.764	.690
28 Cut a picture and then glue it onto a piece of paper	4.44	.77	-1.233	.721	.738
29 Colour in fairly neatly within the lines of a picture	4.09	.96	-.854	.118	.611
30 Have difficulty opening and closing containers.	2.13	.83	.241	-.441	-.509
31 Use the wrist rather than the isolated finger movement when writing (pencil control)	2.50	.99	.223	-.163	-.304
32 Tremble or shake (hands) when writing, drawing, joining dots, puzzles	1.53	.80	1.541	2.216	-.472
33 Show securely right or left handedness when drawing, writing, throwing a ball and passing objects	4.35	.98	-1.697	2.614	.439

None of the 33 items shows abnormal skewness or kurtosis values whilst the communality values all are $>$ than $|0.2|$. Consequently, all the items have been included in the following analyses. To investigate underlying factor structure of the Neurological domain a principal factor analysis was performed and the results thereof will be discussed.

8.2.2.3.2 Results of factor analysis

Firstly, the KMO test and Bartlett's test were performed on the items of the neurological domain to determine the suitability of the data for a factor analysis. The KMO test delivered a value of 0.930 for the 33 items and the Bartlett's test a value of 9187.632 ($p = 0.000$). It is clear that a value of higher than 0.7 was obtained with the KMO test and that the Bartlett's test showed significant result. on the 1%-level. It can therefore be accepted that the data for the 33 items is suitable for factor analysis.

To determine the specific number of factors/dimensions that could be extracted from the 33 items a principal factor analysis was performed. Factors with eigenvalues > 1 and the scree plot graph were investigated in order to determine the number of factors. A Parallel Analysis was also performed. According to the Parallel analysis, four factors were identified while with the factor analysis seven factors with eigenvalues > 1 , were identified. The scree plot graph was subsequently investigated and is depicted in Figure 8.3 (below).

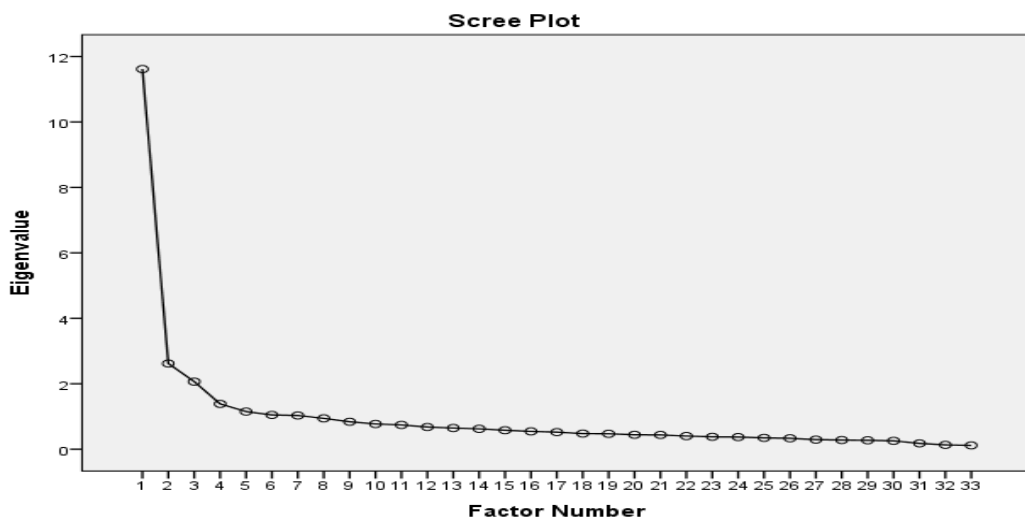


Figure 8.3: Scree plot graph for the neurological domain

According to the scree plot test there is no clear break in the graph after the fourth factor. It would appear that there are four factors present (as confirmed by the parallel analysis). The pattern matrix of the factor analysis during which the four factors were rotated according to the direct oblimin method was investigated. Only Item 16 (*Move his/her body or page to complete a desk top activity rather than his/her hand*) shows a loading of at least 0.3 (0.373) on this factor. All 32 remaining items

have loadings lower than 0.3 on this factor. Consequently, it was decided to test a three-factor model because it theoretically also makes sense. The results of this factor analysis are reported in Table 8.10 (below).

Table 8.10: Pattern matrix of the Neurological domain (N=512)

Item	F1	F2	F3
23 Begin to cut around curved lines	.871	-.031	.025
22 Control scissors and cut along a straight line	.823	.039	-.011
25 Draw a person with major body parts	.743	-.013	.119
29 Colour in fairly neatly within the lines of a picture	.729	-.153	-.173
28 Cut a picture and then glue it onto a piece of paper	.609	.113	-.168
24 Copy a cross	.591	.094	.055
27 Fasten, unfasten buttons	.478	.116	-.233
26 Pick up small objects between his/her fingers and thumb	.415	.326	-.216
21 Hold a pencil in a tripod grip i.e. with thumb, index and middle finger (pencil grip)	.384	.134	-.210
31 Use the wrist rather than the isolated finger movement when writing (pencil control)	-.321	-.014	.013
33 Show securely right or left handedness when drawing, writing, throwing a ball and passing objects	.282	.140	-.081
2 Throw a beanbag or ball overhead	.048	.804	.024
8 Jump with two feet together	-.003	.777	-.003
3 Catch a beanbag or a bouncing ball against his/her chest with his arms	-.002	.740	-.020
4 Stand on one foot for 5-8 seconds	.129	.730	.056
5 Hop on one foot for 3-5 seconds	.169	.728	.077
6 Climb high playground equipment or trees or ladders	-.079	.718	-.054
9 Walk a few steps on a low wall or balancing bar or beam	.078	.685	.012
7 Walk easily up and down the stairs with one foot per step	-.010	.685	-.049
10 Somersault	-.092	.632	.033
11 Climb up the steps of a slide or a pool unassisted	-.011	.499	-.217
1 Walk on tip toe while maintaining his/her balance	.094	.468	-.057
14 Hook feet around chair legs as a means of supporting/stabilising the upper body	.045	.113	.707
15 Lie on the desk when writing or drawing	.027	-.054	.691
17 Support his body against a surface such as a wall or desk when standing.	-.057	.050	.631
13 Rest his/her head in the "free hand" (non-dominant) when drawing, writing and colouring, instead of supporting the page	.038	-.022	.596
20 Sluggish	-.024	.024	.553
18 Accident prone i.e. bumps into things, people, and trips over objects	.002	-.045	.548
12 Maintain an upright standing and sitting position	.065	.310	-.458
16 Move his/her body or page to complete a desk top activity rather than his/her hand	-.101	-.046	.455
19 Able to maintain an upright posture	-.026	.123	-.450
30 Have difficulty opening and closing containers	-.168	-.043	.404
32 Tremble or shake (hands) when writing, drawing, joining dots, puzzles	-.176	-.058	.328

According to Table 8.10 it is clear that Item 11 (*Climb up the steps of a slide or a pool unassisted*) is not successful in indicating a loading of more than 0.3 on at least one of the factors. Item 29 (*Colour in fairly neatly within the lines of a picture*)

indicates a loading of 0.30 or higher on more than one factor. These two items were not used in any further analyses.

The results in respect of the eigenvalues and the percentage variance explained by these three factors are depicted in Table 8.11.

Table 8.11: Results of extraction of factors for the Neurological domain

Factor	Eigenvalue	Percentage of variance	Cumulative percentage of variance
Factor 1	11.617	33.691	33.691
Factor 2	2.619	6.425	40.117
Factor 3	2.066	4.628	44.745

The principal factor analysis indicates that these three factors explain 44.75% of the total variance in the Neurological domain. The reliability of these three factors/dimensions was investigated and the results will now be discussed.

8.2.2.3.3 Reliability

The reliabilities of the three different factors/dimensions were calculated in order to determine the inter-item consistency on each dimension. Where it was found that the inclusion of a specific item decreased reliability, it was excluded. Using this method the dimensions was compiled as follows:

Dimension 1: Items 22, 23, 25, 28 and 29

Dimension 2: Items 2, 3, 4 and 5

Dimension 3: Items 13*, 14*, 15*, 17* and 18*

[Note: * reversed items]

Depicted in table 8.12 (below) are descriptive statistics, the reliability of the three dimensions as well as the correlation coefficients between the dimensions.

Table 8.12: Descriptive statistics, reliabilities and intercorrelations of the three Neurological dimensions

Dimension	Mean	SD	Skewness	Kurtosis	α Coefficient	Correlation		
						1	2	3
1	20.71	3.70	-.665	-.191	0.869	1	0.51*	0.44*
2	21.02	3.45	-.665	-.094	0.897		1	0.40*
3	20.11	3.43	-.404	-.289	0.768			1

* $p \leq 0,01$

According to the kurtosis and skewness values, all three dimensions show normal distributions and the Cronbach α coefficients vary between 0.768 and 0.897. These coefficients are all higher than 0.70 and thus indicate acceptable internal consistency. The correlation coefficients between the three dimensions were calculated and vary between 0.40 and 0.51. All three coefficients represent medium to large effect sizes (Steyn, 1999). The results for the Speech domain will now be discussed.

8.2.2.4 *Speech domain*

8.2.2.4.1 *Descriptive statistics and unidimensionality*

The descriptive statistics and component matrix for the Speech domain are presented in Table 8.13 (below).

Table 8.13: Descriptive statistics for the Speech domain (N=512)

Item	\bar{X}	SD	Skewness	Kurtosis	Component matrix
1 Intelligible and clear	4.07	.94	-.917	.503	.710
2 Slow	1.93	1.06	1.070	.599	-.429
3 Difficult to understand	1.83	.98	1.089	.719	-.665
4 Slurred	1.47	.84	1.761	2.652	-.520
5 Grammatically correct	3.73	.87	-.742	.904	.632
6 Struggle to get words out	1.87	.89	.650	-.442	-.649
7 Look closely at the teachers/parents lips when he/she talks	2.08	1.03	.804	.157	-.235
8 Mispronounces the following sounds; “P” b,p,m,n,d,h,w,t,y,k,g,l,v,r. e.g (thumb/fumb, lello/yello; green/gleen)	2.01	1.08	.778	-.140	-.599
9 Present with sequencing difficulties (reverses words) in sentences when repeating them e.g., Open the door/the door open; the brown dog/the dog brown	1.57	.81	1.226	.660	-.707
10 Rearrange the sequence of sounds e.g. hospital/hostipal; shiver/shriver, fluttereby/butterfly/ psgetthi/spaghetti	1.72	.90	.898	-.297	-.651
11 Present with spoonerism. e.g. “big dog/dig bog”; “the car is stuck/the scar is tuck” “tower bell/tell bower.”	1.44	.74	1.682	2.438	-.594
12 Mispronounce similar sounding letters in words e.g. m/n; b/d; d/t. (mum/nun; that/dat.)	1.64	.84	.922	-.383	-.665
13 Have difficulty discriminating between similar sounds (poor auditory discrimination). e.g. “bat/bad”	1.67	.83	.875	-.464	-.698
14 Often leaves out parts of words (syllable deletion), e.g. “umbrella/ brella” /	1.69	.88	1.036	.361	-.688
15 Carry on talking without paying much attention to what other people are saying	2.24	.99	.392	-.357	-.364

16 Pronounce new words quickly and easily	3.76	.88	-.360	-.127	.773
17 Pronounce words he/she knows correctly	4.17	.82	-.895	.788	.753
18 Tell and retell a story in the correct sequence	3.79	.93	-.498	-.214	.719
19 Easily follow a story he/she tells	3.94	.91	-.677	.199	.745
20 Give a true account of recent events and experience	4.01	.85	-.711	.413	.705
21 Make sentences of four to five words	4.35	.81	-1.277	1.556	.814
22 Use words such as “who, which, what”	4.00	.90	-.549	-.422	.670
23 Use “if” and “but” correctly	3.89	.94	-.474	-.425	.672
24 Say in his/her own words what he/she is doing	4.31	.79	-1.009	.592	.801
25 Say in his/her own word what he/she is feeling	4.15	.90	-.716	-.436	.743
26 Have sufficient vocabulary to give details about him/herself, family/ environment	4.29	.86	-1.154	.970	.839
27 Hold a simple conversation	4.35	.87	-1.383	1.682	.813
28 Name at least 3 of the 7 days of the week	4.41	.88	-1.485	1.565	.738
29 Respond immediately to a question, an instruction or a problem	4.02	.95	-.660	-.285	.685

Table 8.13 (above) shows that no item indicated high skewness or kurtosis values and it can subsequently be accepted that the data was distributed normally. According to the communalities all the items also indicated loadings $>|0.2|$ and analyses of these 29 items was therefore proceeded with. To investigate the underlying factor structure of the Speech domain a principal factor analysis was performed and the results thereof will be discussed.

8.2.2.4.2 Results of factor analysis

Firstly, the KMO test and Bartlett’s test were performed on the items of the Speech domain to determine the suitability of the data for a factor analysis. The KMO test delivered a value of 0.955 for the 29 items and the Bartlett’s test a value of 10742.184 ($p = 0.000$). It is clear that a value of higher than 0.7 was obtained with the KMO test and that the Bartlett’s test showed a significant result on the 1%-level. It can therefore be accepted that the data for the 29 items is suitable for factor analysis.

To determine the specific number of factors/dimensions that could be extracted from the 29 items a principal factor analysis was performed. Factors with eigenvalues > 1 and the scree plot graph were investigated in order to determine the number of factors. a parallel analysis was also performed. According to the parallel analysis only two factors were identified while with the factor analysis four factors

with eigenvalues > 1 , were also identified. The scree plot graph was subsequently investigated and is depicted in Figure 8.4.

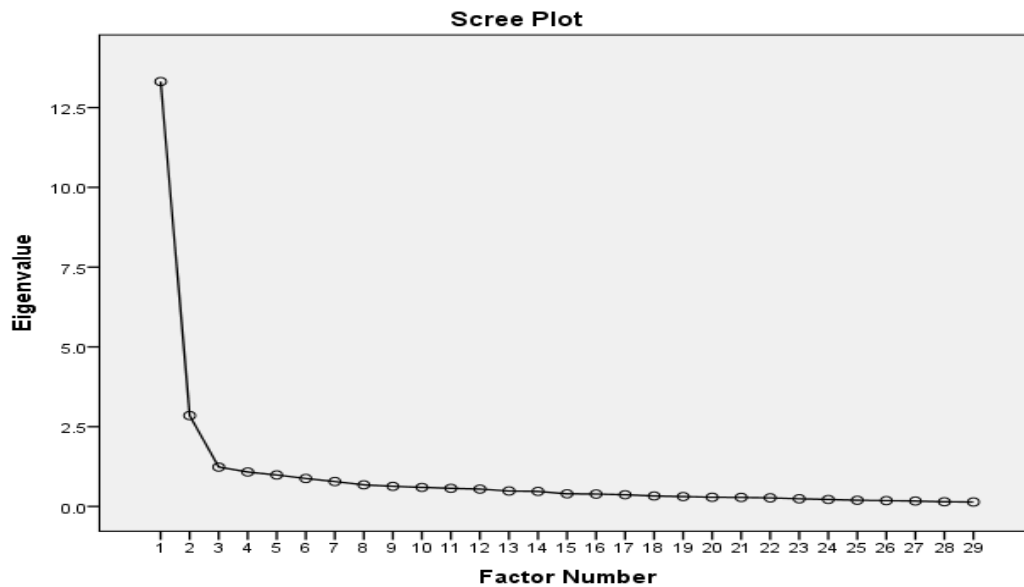


Figure 8.4: Scree plot graph for the Speech domain

According to the scree plot test there is no clear break in the graph after the third factor. The pattern matrix of the factor analysis during which the three factors were rotated according to the direct oblimin was investigated and the loadings of the third factor indicated that only three items, i.e., Item 1 (*Intelligible and clear*), Item 3 (*Difficult to understand*) and Item 22 (*Use words such as “who, which, what”*) showed loadings of at least 0.3 on this factor. All three items, however, also indicate high loadings on factor 1. The remaining 26 items indicated loadings lower than 0.3 on the third factor. Consequently, the items were tested on a two factor model. The results of this factor analysis are reported in Table 8.14.

Table 8.14: Pattern matrix of the Speech domain (N=512)

Item	F1	F2
26 Have sufficient vocabulary to give details about him/herself, family/ environment	.850	-.042
19 Easily follow a story he/she tells	.837	.065
27 Hold a simple conversation	.837	-.022
24 Say in his/her own words what he/she is doing	.827	-.018
18 Tell and retell a story in the correct sequence.	.827	.086
21 Make sentences of four to five words	.819	-.044
22 Use words such as “who, which, what”	.789	.106
20 Give a true account of recent events and experience	.767	.039

25 Say in his/her own word what he/she is feeling	.754	-.024
23 Use “if” and “but” correctly	.740	.050
28 Name at least 3 of the 7 days of the week	.739	-.033
29 Respond immediately to a question, an instruction or a problem	.712	.003
16 Pronounce new words quickly and easily	.578	-.258
1 Intelligible and clear	.524	-.238
5 Grammatically correct	.499	-.169
17 Pronounce words he/she knows correctly	.482	-.341
12 Mispronounce similar sounding letters in words e.g. m/n; b/d; d/t. (mum/nun; that/dat.)	.075	.876
14 Often leaves out parts of words (syllable deletion), e.g. “umbrella/brella” /	.017	.838
10 Rearrange the sequence of sounds e.g. hospital/hostipal; shiver/shriver, flutterby/butterfly/ psgetthi/spaghetti	.054	.832
13 Have difficulty discriminating between similar sounds (poor auditory discrimination). e.g., “bat/bad”	-.038	.785
9 Present with sequencing difficulties (reverses words) in sentences when repeating them e.g. Open the door/the door open; the brown dog/the dog brown	-.055	.777
8 Mispronounces the following sounds; “f” b,p,m,n,d,h,w,t,y,k,g,l,v,r. e.g (thumb/fumb, lello/yello; green/gleen)	.039	.747
11 Present with spoonerism. e.g. “big dog/dig bog”; “the car is stuck/the scar is tuck” “tower bell/tell bower. ”	.038	.741
3 Difficult to understand	-.291	.446
4 Slurred	-.156	.423
2 Slow	-.112	.363
6 Struggle to get words out	-.352	.356
15 Carry on talking without paying much attention to what other people are saying	-.070	.336
7 Look closely at the teachers/parents lips when he/she talks	.035	.306

Item 6 (*Struggle to get words out*) and Item 17 (*Pronounce words he/she knows correctly*) indicates loadings of 0.30 or higher on more than one factor. These two items were not used in any further analyses.

The results in respect of the eigenvalues and the percentage variance explained by these two factors are depicted in Table 8.15.

Table 8.15: Results of extraction of factors for the Speech domain

Factor	Eigenvalue	Percentage of variance	Cumulative percentage of variance
Factor 1	13.314	44.463	44.463
Factor 2	2.848	8.414	52.877

The principal factor analysis indicates that these two factors explain 52.88% of the total variance in the Speech domain. Their reliability was investigated and the results follow.

8.2.2.4.3 Reliability

The reliabilities of the two different factors/dimensions were calculated in order to determine the inter-item consistency on each dimension. Where it was found that the inclusion of a specific item decreased reliability, it was excluded. Using this method the dimensions was compiled as follows:

Dimension 1: Items 18, 19, 24, 26, and 27

Dimension 2: Items 9*, 10*, 12*, 13*, and 14*

[Note: * reversed items]

Depicted in Table 8.16 (below) are the descriptive statistics, the reliability of the two dimensions as well as the correlation coefficient between these two dimensions.

Table 8.16: Descriptive statistics, reliabilities and intercorrelations of the two speech dimensions

Dimension	Mean	SD	Skewness	Kurtosis	α Coefficient	Correlation	
						1	2
1	20.68	3.78	-.998	.939	0.917	1	0.53*
2	21.71	3.66	-.969	.100	0.912		1

* $p \leq 0,01$

According to the kurtosis and skewness values, both dimensions show normal distributions and the Cronbach α coefficients vary between 0.912 and 0.917. Both coefficients are higher than 0.70 and thus indicate acceptable internal consistency. The correlation coefficient between these two dimensions was calculated as 0,53 which represents a large effect size (Steyn, 1999). The results for the Emotional domain will now be discussed.

8.2.2.5 Emotional domain

8.2.2.5.1 Descriptive statistics and unidimensionality

The descriptive statistics and component matrix for the Emotional domain are presented in Table 8.17 (below).

Table 8.17: Descriptive statistics for the Emotional domain (N=512)

Item	\bar{X}	SD	Skewness	Kurtosis	Component matrix
1. Become easily frustrated or angry	2.32	.95	.556	.196	-.413
2. Become easily upset (cry for every little problem)	2.23	.96	.616	.196	-.395
3. Maintain a fairly even temper throughout the day	4.08	.86	-.974	1.188	.526
4. Have evident good/ bad days	2.62	1.13	.321	-.481	-.201
5. Express noticeably different moods within a day	2.22	1.02	.523	-.262	-.347
6. Part from his/her parents easily/enters school without being forced to	4.44	.88	-1.647	2.281	.427
7. Respond to praise and criticism	4.41	.80	-1.279	1.256	.628
8. Show remorse	3.91	.97	-.439	-.599	.579
9. Show empathy e.g., when someone is hurt	4.13	.89	-.681	-.320	.738
10. Recognise how others feel	4.06	.92	-.597	-.454	.751
11. Demonstrate affection e.g., by hugs or kisses or words	3.96	1.13	-.766	-.470	.636
12. Enjoy it when others give affection	4.07	1.00	-.738	-.436	.625
13. React in excess to even a minor injury	2.35	1.05	.613	-.044	-.213
14. Try things never done before	3.39	.96	.127	-.589	.537
15. Fearful of new situations	2.46	.89	.141	.027	-.339
16. Happy to come to school	4.51	.73	-1.634	2.928	.585
17. Clingy or anxious	1.94	.96	.853	.342	-.383
18. Able to tell adults and children what he/she <i>Wants</i> to do	4.21	.85	-.903	.440	.668
19. Able to tell adults and children what he/she has done (e.g. an activity or a drawing)	4.31	.83	-.978	.347	.723
20. Willing to tackle small tasks and instructions with confidence	4.03	.88	-.561	-.352	.743
21. Proud of his/her efforts e.g. a drawing, a building block construction	4.44	.74	-1.116	.481	.697
22. Adapt to change with ease	3.75	.89	-.148	-.558	.604
23. Make a choice between two items	4.09	.78	-.406	-.592	.717
24. Finish a given task/activity without asking every few minutes whether it is right	3.92	.96	-.542	-.377	.575
25. Express basic feelings (mad, sad, glad, bad)	4.04	.92	-.665	-.210	.673
26. Recognise other's feelings (mad, sad, glad, bad)	3.97	.89	-.402	-.691	.743
27. Share the attention of the caregiver with others	4.17	.82	-.582	-.565	.615

Table 8.17 (above) shows that no item indicated high skewness or kurtosis values and it can subsequently be accepted that the data was distributed normally. According to the component matrix values, all the items also indicate loadings $> |0.2|$ and analyses were therefore proceeded with the 27 items. To investigate the underlying factor structure of the Emotional domain a principal factor analysis was performed and the results thereof will be discussed.

8.2.2.5.2 Results of factor analysis

Firstly, the KMO test and Bartlett's test were performed on the items of the Emotional domain to determine the suitability of the data for a factor analysis. The KMO test delivered a value of 0.896 for the 25 (27?) items and the Bartlett's test a value of 8063.923 ($p = 0.000$). It is clear that a value of higher than 0.7 was obtained with the KMO test and that the Bartlett's test showed a significant result on the 1%-level. It can therefore be accepted that the data for the 27 items is suitable for factor analysis.

To determine the specific number of factors/dimensions that could be extracted from the 27 items a principal factor analysis was performed. Factors with eigenvalues > 1 and the scree plot graph were investigated in order to determine the number of factors. A parallel analysis was also performed. According to the parallel analysis as well as the factor analysis three factors were identified. The scree plot graph was subsequently investigated and is depicted in Figure 8.5.

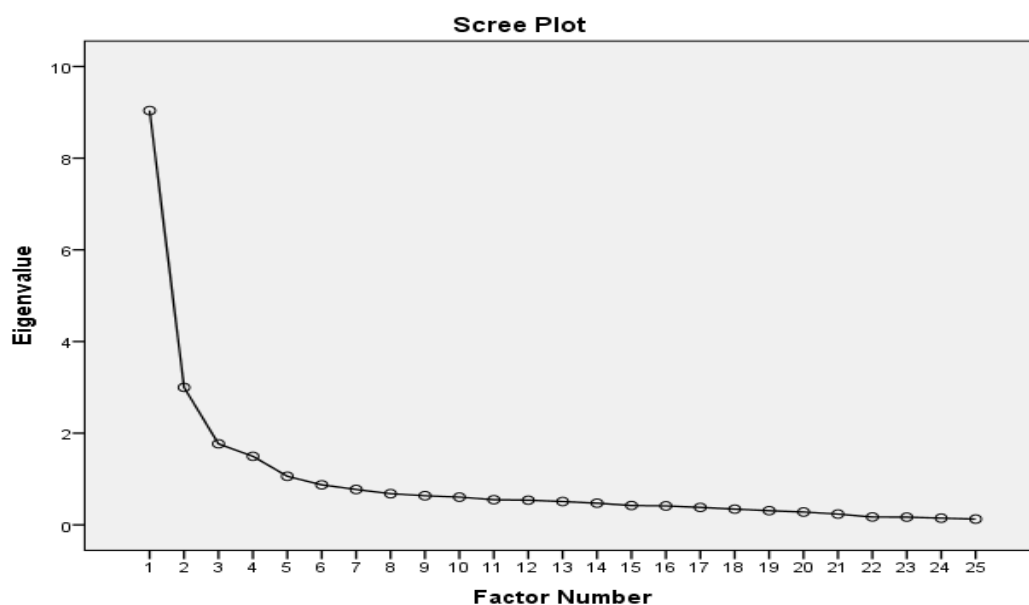


Figure 8.5: Scree plot graph for the Emotional domain

According to the scree test no clear break appears in the graph after the third factor. The results of the factor analysis during which the three factors were rotated according to the direct oblimin method are reported in Table 8.18 (below).

Table 8.18: Pattern matrix of the Emotional domain (N=512)

Item	F1	F2	F3
9. Show empathy e.g. when someone is hurt	.890	-.113	-.081
10. Recognise how others feel	.839	-.127	-.016
11. Demonstrate affection e.g. by hugs or kisses or words	.809	.118	.016
12. Enjoy it when others give affection	.785	.057	-.008
8. Show remorse	.705	-.218	-.153
7. Respond to praise and criticism	.634	-.129	.048
26. Recognise other's feelings (mad, sad, glad, bad)	.605	.083	.360
21. Proud of his/her efforts e.g. a drawing, a building block construction	.519	.011	.349
19. Able to tell adults and children what he/she has done (e.g. an activity or a drawing)	.499	.127	.478
27. Share the attention of the caregiver with others	.328	-.238	.302
1. Become easily frustrated or angry	-.196	.785	.154
5. Express noticeably different moods within a day	-.007	.772	.029
2. Become easily upset (cry for every little problem)	.006	.768	-.058
3. Maintain a fairly even temper throughout the day	.260	-.650	.009
4. Have evident good/bad days	.063	.643	.044
13. React in excess to even a minor injury	.192	.613	-.068
6. Part from his/her parents easily/enters school without being forced to	.096	-.374	.230
16. Happy to come to school	.244	-.345	.291
15. Fearful of new situations	.334	.184	-.704
22. Adapt to change with ease	-.054	-.281	.685
14. Try things never done before	.102	.125	.671
20. Willing to tackle small tasks and instructions with confidence	.373	.004	.566
23. Make a choice between two items	.262	-.193	.537
18. Able to tell adults and children what he/she <i>Wants</i> to do	.415	.178	.531
25. Express basic feelings (mad, sad, glad, bad)	.447	.225	.530
17. Clingy or anxious	.159	.293	-.443
24. Finish a given task/activity without asking every few minutes whether it is right	.209	-.244	.377

According to Table 8.18 (above) it is clear that Item 21 (*Proud of his/her efforts e.g. a drawing, a building block construction*), Item 19 (*Able to tell adults and children what he/she has done, e.g., an activity or a drawing*), Item 27 (*Share the attention of the caregiver with others*), Item 18 (*Able to tell adults and children what he/she wants to do*), Item 25 (*Express basic feelings, e.g., mad, sad, glad, bad*) indicate double loadings. These items were not used in any further analyses.

The results in respect of the eigenvalues and the percentage variance explained by these three factors are depicted in Table 8.19

Table 8.19: Results of extraction of factors for the Emotional domain

Factor	Eigenvalue	Percentage of variance	Cumulative percentage of variance
Factor 1	9.089	33.664	33.664
Factor 2	3.537	13.102	46.766
Factor 3	1.807	6.693	53.458

The principal factor analysis indicates that these three factors explain 53.46% of the total variance in the Emotional domain. The reliability of these three factors/dimensions was investigated and the results will now be discussed.

8.2.2.5.3 Reliability

The reliabilities of the three different factors/dimensions were calculated in order to determine the inter-item consistency on each dimension. Where it was found that the inclusion of a specific item decreased reliability, it was excluded. Using this method the dimensions was compiled as follows:

- Dimension 1: Items 8, 9, 10, 11, 12 and 26
 Dimension 2: Items 1*, 2*, 3, 4*, 5* and 13*
 Dimension 3: Items 14, 15*, 17*, 22, 23 and 24

[Note: * reversed items]

The descriptive statistics, the reliability of the three dimensions and the correlation coefficients between the dimensions are shown in table 8.20 (below).

Table 8.20: Descriptive statistics, reliabilities and intercorrelations of the three emotional dimensions

Dimension	Mean	SD	Skewness	Kurtosis	α Coefficient	Correlation		
						1	2	3
1	24.11	4.69	-.575	-.423	0.893	1	0.61*	0.41*
2	22.34	4.29	-.350	.205	0.805		1	0.45*
3	22.75	3.72	-.118	-.483	0.770			1

* $p \leq 0,01$

According to the kurtosis and skewness values, all three dimensions show normal distributions and the Cronbach α coefficients vary between 0.770 and 0.893. These coefficients are all higher than 0.70 and thus indicate acceptable internal consistency. The correlation coefficients between the three dimensions were

calculated and vary between 0.41 and 0.61. All three coefficients represent medium to large effect sizes (Steyn, 1999). The results for the Social domain will now be discussed.

8.2.2.6 Social domain

8.2.2.6.1 Descriptive statistics and unidimensionality

The descriptive statistics and component matrix for the Social domain are presented in Table 8.21 (below).

Table 8.21: Descriptive statistics for the Social domain (N=512)

Item	\bar{X}	SD	Skewness	Kurtosis	Component matrix
1. Communicate with those alongside him/her	4.39	.75	-.970	.091	.747
2. Engage confidently in a conversation with adults other than his/her parents/ teacher	3.92	1.03	-.586	-.568	.551
3. Take turns in a conversation and respond to what the person is saying	3.94	.92	-.477	-.445	.682
4. Respond to a joke with humour	3.89	.93	-.417	-.543	.620
5. Use words effectively to make a request	4.09	.88	-.717	.048	.662
6. Say "please" when he/she wants something	4.08	.97	-.812	-.063	.675
7. Say "thank you" when given something	4.11	.95	-.824	-.070	.674
8. Wait his/her turn	3.97	.96	-.489	-.690	.624
9. Share a toy or food with peers	3.87	.90	-.275	-.779	.702
10. Settle conflict by verbally communicating rather than fighting, hitting or grabbing	3.63	1.02	-.340	-.485	.579
11. Accept defeat without crying or sulking	3.50	1.04	-.233	-.449	.451
12. Participate in group activities/ ring time	4.10	.94	-.852	.136	.674
13. Engage in meaningful play	4.26	.88	-1.115	.959	.777
14. Play with other children	4.43	.76	-1.142	.513	.707
15. Play imaginatively with playmates	4.26	.89	-.925	-.047	.732
16. Seek the company of other children	4.06	.99	-.821	-.049	.505
17. Play alone	2.21	.91	.285	-.399	-.359
18. Refuse to join others in play	1.72	.81	.950	.455	-.453
19. Overly dependent on one child	1.74	.93	1.098	.575	-.379
20. Disturbs others play	1.96	.94	.742	.141	-.482
21. Argue with peers	2.44	1.03	.209	-.477	-.253
22. Greet people (adults and children)	3.80	1.02	-.587	-.185	.598
23. Offer help	3.74	1.06	-.520	-.326	.618
24. Respond positively to discipline	3.88	1.00	-.638	-.119	.636
25. Walk away when he/she does not get his/her own way	2.37	1.08	.430	-.381	-.182
26. Always insist on his/her own way	2.11	.98	.535	-.270	-.399
27. Comply with teachers/parents/adults requests	4.15	.82	-.656	-.277	.669
28. Use the teacher/parent as a resource for learning or solving problems	4.02	.83	-.288	-.849	.598
29. Help others when needed	3.90	1.01	-.575	-.253	.694

Table 8.21 (above) indicates that none of the 29 items shows an abnormal skewness or kurtosis and should subsequently not influence the normality of the distribution. According to the component matrix values, Item 25 (*Walk away when he/ she does not get his/her own way*) does not indicate a sufficient loading with the cluster nor show any significant correlation with the total score. This item was therefore excluded from further analyses.

To investigate the underlying factor structure of the Social domain a principal factor analysis was performed and the results thereof will be discussed

8.2.2.6.2 Results of factor analysis

Firstly, the KMO test and Bartlett's test were performed on the items of the Social domain to determine the suitability of the data for a factor analysis. The KMO test delivered a value of 0.911 for the remaining 28 items and the Bartlett's test a value of 8685.271 ($p = 0.000$). It is clear that a value of higher than 0.7 was obtained with the KMO test and that the Bartlett's test showed a significant result on the 1%-level. It can therefore be accepted that the data for the 28 items is suitable for factor analysis.

To determine the specific number of factors/dimensions that could be extracted from the 28 items a principal factor analysis was performed. Factors with eigenvalues > 1 and the scree plot graph were investigated in order to determine the number of factors. A parallel analysis was also performed. According to the parallel analysis there are four factors, whilst the factor analysis identified five factors with an eigenvalue > 1 . The scree plot graph was subsequently investigated and is depicted in Figure 8.6.

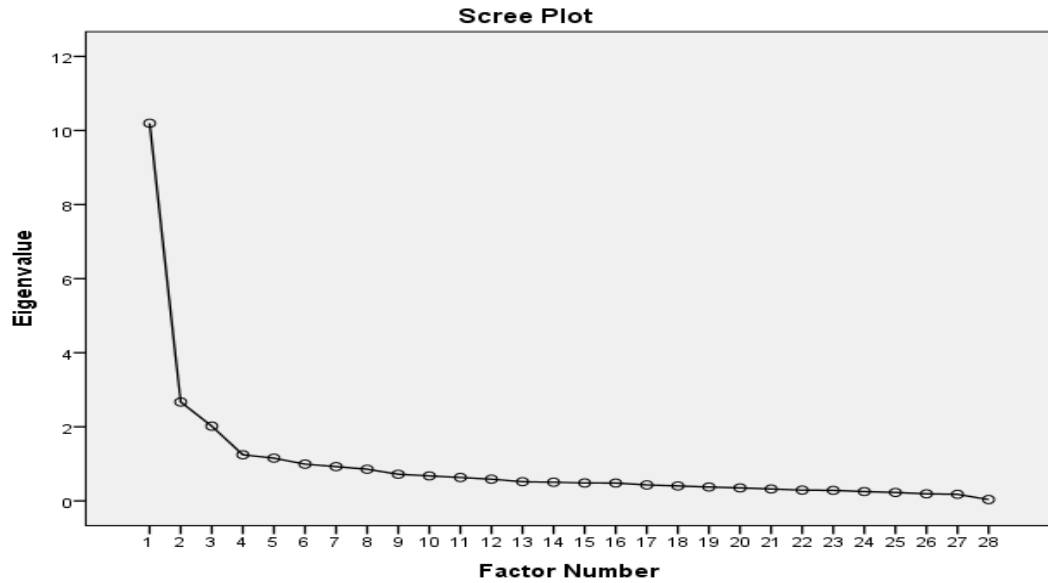


Figure 8.6: Scree plot graph for the Social domain

According to the scree plot test there is no clear break in the graph after the fourth factor. It was subsequently decided to extract four factors for the Social domain. The results of the factor analysis during which the factors were rotated according to the direct oblimin method are reported in Table 8.22 (below).

Table 8.22: Pattern matrix of the Social domain (N=512)

Item	Factor 1	Factor 2	Factor 3	Factor 4
2. Engage confidently in a conversation with adults other than his/her parents/ teacher	.840	.136	-.093	-.046
3. Take turns in a conversation and respond to what the person is saying	.689	-.205	-.043	-.025
4. Respond to a joke with humour	.589	.070	.104	-.137
5. Use words effectively to make a request	.559	-.169	.156	.040
1. Communicate with those alongside him/her	.427	-.016	.116	-.398
28. Use the teacher/parent as a resource for learning or solving problems	.333	-.277	.167	-.001
20. Disturbs others play	.058	.686	-.058	.022
26. Always insist on his/her own way	.042	.686	.211	.162
21. Argue with peers	.100	.624	.089	-.035
8. Wait his/her turn	.007	-.624	.296	.035
10. Settle conflict by verbally communicating rather than fighting, hitting or grabbing	.124	-.592	.139	.044
27. Comply with teachers/parents/adults requests	.186	-.570	.091	-.080
9. Share a toy or food with peers	.198	-.530	.248	.009
11. Accept defeat without crying or sulking	.053	-.517	.002	-.058
24. Respond positively to discipline	.171	-.418	.173	-.097
7. Say "thank you" when given something	-.106	-.067	.989	.019
6. Say "please" when he/she wants something	-.090	-.049	.969	.002
29. Help others when needed	.146	-.018	.539	-.196
23. Offer help	.166	.047	.498	-.166
22. Greet people (adults and children)	.224	.037	.471	-.095
14. Play with other children	-.015	.020	.155	-.816
15. Play imaginatively with playmates	.086	-.003	.203	-.671
18. Refuse to join others in play	.071	.131	.069	.603
17. Play alone	.045	-.039	.058	.593
16. Seek the company of other children	.127	.072	.050	-.523
13. Engage in meaningful play	.233	-.149	.139	-.506
12. Participate in group activities/ ring time	.255	-.109	.122	-.380
19. Overly dependent on one child	-.060	.170	.000	.258

According to Table 8.22 (above) it is clear that item 19 (*Overly dependent on one child*) fails to show a loading of higher than 0.30 on even one of the factors. It is further shown that Item 1 (*Communicate with those alongside him/her*) and Item 28 (*Use the teacher/parent as a resource for learning or solving problems*) displays loadings of 0.30 or higher on more than one factor. These items were not used in any further analyses.

The results in respect of the eigenvalues and percentage variance explained by these four factors are depicted in Table 8.23 (below).

Table 8.23: Results of extraction of factors for the Social domain

Factor	Eigenvalue	Percentage of variance	Cumulative percentage of variance
Factor 1	10.195	34.838	34.838
Factor 2	2.670	7.704	42.542
Factor 3	2.018	5.854	48.396
Factor 4	1.245	2.814	51.210

The principal factor analysis indicates that these four factors explain 51.21% of the total variance in the Social domain. The reliability of these four factors/dimensions was investigated and a discussion of the results follows.

8.2.2.6.3 Reliability

The reliabilities of the four different factors/dimensions were calculated in order to determine the inter-item consistency on each dimension. Where it was found that the inclusion of a specific item decreased reliability it was excluded. Using this method the dimensions were compiled as follows:

- Dimension 1: Items 2, 3, 4 and 5
 Dimension 2: Items 8, 9, 10, 20*, 26* and 27
 Dimension 3: Items 6, 7, 22, 23 and 29
 Dimension 4: Items 13, 14, 15, 16 and 18*

[Note: * reversed items]

The descriptive statistics, the reliability of the four dimensions and the correlation coefficients between the dimensions are shown in Table 8.24 (below).

Table 8.24: Descriptive statistics, reliabilities and intercorrelations of the four social dimensions

Dimension	Mean	SD	Skewness	Kurtosis	α Coefficient	Correlation			
						1	2	3	4
1	15.84	3.00	-.541	-.087	0.811	1	0.43*	0.57*	0.59*
2	23.57	4.21	-.290	-.555	0.842		1	0.46*	0.47*
3	19.64	4.14	-.627	-.015	0.884			1	0.52*
4	21.28	3.37	-.907	.486	0.835				1

* $p \leq 0,01$

According to the kurtosis and skewness values, all four dimensions show normal distributions and the Cronbach α coefficients vary between 0.811 and 0.884. These coefficients are all higher than 0.70 and thus indicate acceptable internal consistency. The correlation coefficients between the four dimensions were calculated and vary between 0.43 and 0.59. All these coefficients represent medium to large effect sizes (Steyn, 1999). The results for the Developmental domain will now be discussed.

8.2.2.7 Developmental domain

8.2.2.7.1 Descriptive statistics and unidimensionality

The descriptive statistics and component matrix for the Developmental domain are presented in Table 8.25 (below).

Table 8.25: Descriptive statistics for the Developmental domain (N=512)

Item	\bar{X}	SD	Skewness	Kurtosis	Component matrix
1 Blink a lot	1.42	.66	1.558	2.037	.500
2 Rub eyes constantly	1.40	.65	1.734	3.415	.478
3 Have red, teary, watery eyes	1.32	.63	2.173	5.181	.388
4 Have frequent headaches	1.43	.80	2.414	6.625	.304
5 Find objects within his/her field of vision	4.10	1.14	-1.361	1.064	-.314
6 Have a bent posture with table top activities	2.06	.92	.399	-.514	.504
7 Holds object or drawing paper too close	1.75	.79	.727	-.098	.443
8 Copy inconsistently (e.g. can copy from a book placed next to him/her but not from the board or worksheet)	2.10	1.09	.901	.182	.285
9 Show high sensitivity to noise	2.22	1.04	.660	-.052	.200
10 Respond when you call his/her name	4.43	.72	-1.232	1.534	-.563
11 Speak loudly enough to be heard	4.00	1.03	-.961	.433	-.147
12 Speaks too loudly	2.17	1.08	.698	-.147	.441
13 Respond to loud sounds e.g., a bell	4.11	1.05	-1.252	1.030	-.215
14 Respond negatively to loud or unexpected noises	2.06	.95	.685	.091	.311
15 Avoid messy, dirty play	2.11	1.00	.580	-.191	-.061
16 Fidget, squirm and rock on the chair	2.55	1.09	.320	-.430	.704
17 Get easily distracted	2.80	1.05	.099	-.450	.797
18 Talk to avoid the task at hand	2.23	1.09	.631	-.224	.710
19 Have difficulty following instructions carefully	2.31	1.04	.555	-.143	.832
20 Fail to pay attention to or pays excessive attention to detail	2.39	.99	.396	-.207	.772
21 Make careless mistakes	2.44	.91	.343	.144	.800
22 Plays with objects in front of him	2.90	1.04	.005	-.325	.487
23 Have trouble organising tasks	2.42	.95	.343	.051	.787
24 Get bored shortly after starting a task	2.32	1.00	.448	-.244	.835
25 Struggle to concentrate on an activity for more than fifteen minutes	2.47	1.13	.372	-.612	.823
26 Focus his/her attention on an instruction long enough to complete it	3.74	1.09	-.644	-.102	-.448

Table 8.25 (above) indicates that Item 3 (*Have red, teary, watery eyes*) and Item 4 (*Have frequent headaches*) have high skewness and kurtosis values and are subsequently not used in any further analyses. According to the component matrix, Item 11 (*Speak loudly enough to be heard*) and Item 15 (*Avoid messy, dirty play*) do not display sufficient loadings with this cluster and consequently they do not show clear correlation with the total score. These items were subsequently also excluded in further analyses. A principal factor analysis was performed on the remaining 22 items.

8.2.2.7.2 Results of factor analysis

Firstly, the KMO test and Bartlett's test were performed on the items of the Developmental domain to determine the suitability of the data for a factor analysis. The KMO test delivered a value of 0.895 for the 22 items and the Bartlett's test a value of 2686.578 ($p = 0.000$). It is clear that a value of higher than 0.7 was obtained with the KMO test and that the Bartlett's test showed a significant result on the 1%-level. It can therefore be accepted that the data for the 22 items is suitable for factor analysis.

To determine the specific number of factors/dimensions that could be extracted from the 22 items a principal factor analysis was performed. Factors with eigenvalues > 1 and the scree plot graph were investigated in order to determine the number of factors. A parallel analysis was also performed, according to which there are only two factors, whilst the factor analysis identified four factors with an eigenvalue > 1 . The scree plot graph was subsequently investigated and is depicted in Figure 8.7.

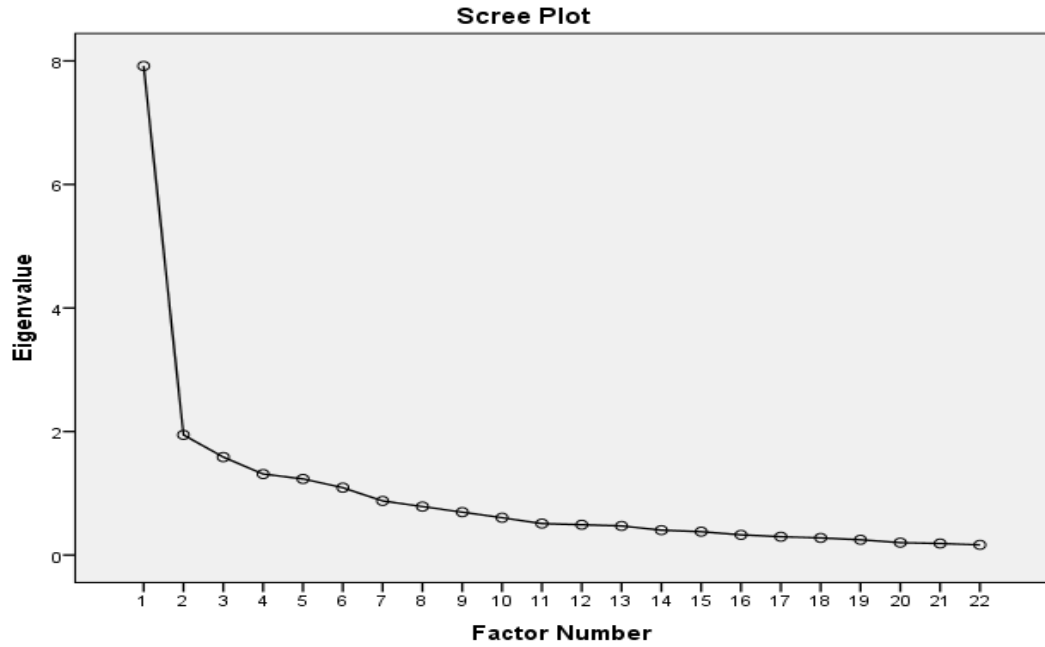


Figure 8.7: Scree plot graph for the Developmental domain

According to the scree plot test there is no clear break in the graph after the second factor. It would appear that there are two factors (as also depicted by the parallel analysis). The pattern matrix of the factor analysis during which the two factors were rotated according to the direct oblimin method was investigated and the results of this analysis are reported in Table 8.26.

Table 8.26: Pattern matrix of the Developmental domain (N=512)

Item	F1	F2
17 Get easily distracted	.907	.096
18 Talk to avoid the task at hand	.865	.156
16 Fidget, squirm and rock on the chair	.862	.182
19 Have difficulty following instructions carefully	.732	-.178
24 Get bored shortly after starting a task	.714	-.212
21 Make careless mistakes	.708	-.131
25 Struggle to concentrate on an activity for more than fifteen minutes	.701	-.180
23 Have trouble organising tasks	.680	-.146
20 Fail to pay attention to or pays excessive attention to detail	.647	-.207
22 Plays with objects in front of him	.549	.088
26 Focus his/her attention on an instruction long enough to complete it	-.402	.071
6 Have a bent posture with table top activities	.295	-.283
12 Speaks too loudly	.250	-.234
1 Blink a lot	.011	-.633
2 Rub eyes constantly	.015	-.588
10 Respond when you call his/her name	-.219	.476
7 Holds object or drawing paper too close	.140	-.427
5 Find objects within his/her field of vision	-.007	.404
13 Respond to loud sounds e.g., a bell	.049	.382
9 Show high sensitivity to noise	-.076	-.364
14 Respond negatively to loud or unexpected noises	.039	-.357
8 Copy inconsistently (e.g., can copy from a book placed next to him/her but not from the board or worksheet)	.124	-.261

None of the following three items, i.e., Item 6 (*Have a bent posture with table top activities*), Item 8 (*Copy inconsistently, e.g., can copy from a book placed next to him/her but not from the board or worksheet*) and Item 12 (*Speaks too loudly*) show a loading larger than 0.3 on any of the factors. These three items were not used in any further analyses.

The results concerning the eigenvalues and percentage variance explained by these two factors are depicted in Table 8.27 (below).

Table 8.27: Results of extraction of factors for the Developmental domain

Factor	Eigenvalue	Percentage of variance	Cumulative percentage of variance
Factor 1	7.918	33.917	33.917
Factor 2	1.945	5.924	39.842

The principal factor analysis indicates of these two factors explains 39.84% of the total variance in the Developmental domain. The reliability of these two factors/dimensions was investigated and the results are discussed below.

8.2.2.7.3 Reliability

The reliabilities of the two different factors/dimensions were calculated in order to determine the inter-item consistency on each dimension. Where it was found that the inclusion of a specific item decreased reliability it was excluded. Using this method the dimensions were compiled as follows:

Dimension 1: Items 16*, 17*, 18*, 19* and 24*

Dimension 2: Items 1*, 2*, 5, 7* and 10

[Note: * reversed items]

Descriptive statistics, the reliability of the two dimensions as well as the correlation coefficients between dimensions are depicted in Table 8.28 (below).

Table 8.28: Descriptive statistics, reliabilities and intercorrelations of the two developmental domains

Dimension	Mean	SD	Skewness	Kurtosis	α Coefficient	Correlation	
						1	2
1	17.80	4.48	-.520	.056	0.902	1	0.47*
2	22.05	2.59	-.753	.047	0.636		1

* $p \leq 0,01$

According to the kurtosis and skewness values, both dimensions show normal distributions and Cronbach α coefficients vary between 0.636 and 0.902. It is clear that domain 2 does not produce a coefficient greater than 0.70. It is further clear that the two dimensions correlate statistically with each other on the 1% level and that this coefficient (0.47) represents a large effect size. Although dimension 2 (Sensory Development) produces a reliability coefficient less than 0.7, it was decided to keep it because it form an important part of the specific domain. The results for the Independence domain will now be discussed.

8.2.2.8 Independence domain

8.2.2.8.1 Descriptive statistics and unidimensionality

The descriptive statistics and component matrix for the Independence domain are presented in Table 8.29 (below).

Table 8.29: Descriptive statistics for the Independence domain (N=512)

Item	\bar{X}	SD	Skewness	Kurtosis	Component matrix
1 Unpack/pack bag by him/ herself	4.47	.79	-1.402	1.358	.805
2 Use a fork, or spoon competently	4.32	.87	-.804	-.814	.683
3 Wash and dry hands	4.71	.60	-2.158	4.332	.854
4 Feed him/herself	4.75	.54	-2.351	5.613	.871
5 Use the toilet independently	4.77	.51	-2.436	6.639	.828
6 Dress/undress him/ herself independently	4.50	.74	-1.323	.986	.758
7 Look after his/her belongings/possessions	4.33	.85	-1.009	.143	.751
8 Seek help in an emergency	4.22	.91	-.752	-.587	.578

Although all eight items, according to the component matrix, indicate sufficient loadings with the cluster and therefore also a clear correlation with the total score, it is clear that three items, i.e. Item 3 (*Wash and dry hands*), Item 4 (*Feed him/herself*) and Item 5 (*Use the toilet independently*) show skewness and kurtosis values which indicate that the data does not distribute normally for these three items. These three items are subsequently excluded from further analyses. To investigate the underlying factor structure of the Independence domain a principal factor analysis was performed and the results thereof will be discussed.

8.2.2.8.2 *Results of factor analysis*

Firstly, the KMO test and Bartlett's test were performed on the items of the Independent domain to determine the suitability of the data for a factor analysis. The KMO test delivered a value of 0.832 for the remaining 5 items and the Bartlett's test a value of 832.916 ($p = 0.000$). It is clear that a value of higher than 0.7 was obtained with the KMO test and that the Bartlett's test showed a significant result on the 1%-level. It can therefore be accepted that the data for the five items is suitable for factor analysis.

To determine the specific number of factors/dimensions that could be extracted from the five items a principal factor analysis was performed. Factors with eigenvalues > 1 and the scree plot graph were investigated in order to determine the number of factors. A parallel analysis was also performed. According to the parallel analysis as well as the eigenvalues > 1 method only one factor was identified, depicted in Figure 8.8 below.

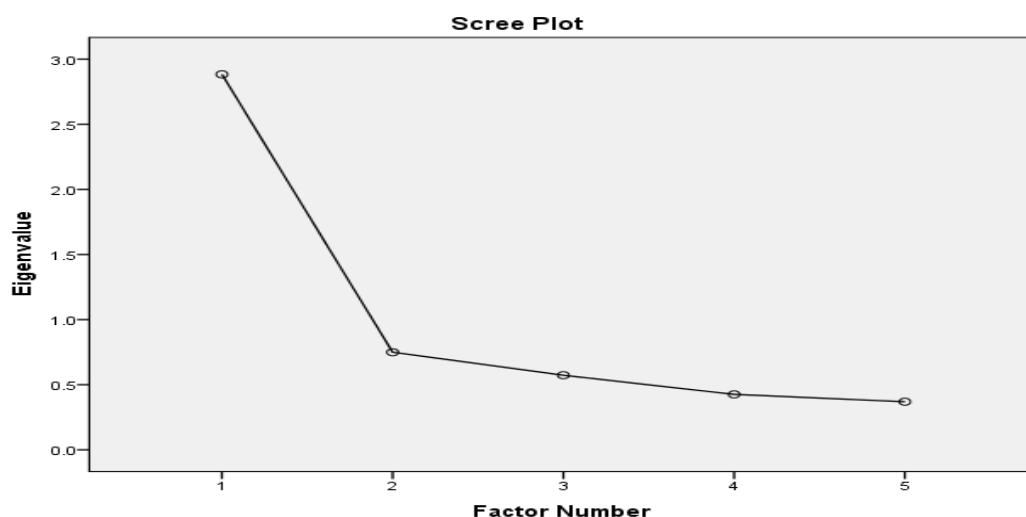


Figure 8.8: Scree plot graph for the Independence domain

Since both methods (eigenvalue >1 and parallel analysis) indicated one factor, the factor analyses were made during which only one factor was extracted. The results are reported in Table 8.30 (below).

Table 8.30: Pattern matrix of the Independence domain (N=512)

Item	F1
1 Unpack/pack bag by him/ herself.	.799
2 Use a fork, or spoon competently	.786
6 Dress/undress him/ herself independently	.735
7 Look after his/her belongings/possessions	.575
8 Seek help in an emergency	.524

From the above table it is clear that all five items show a factor loading of > 0.3 and that they load on the same factor. During further investigation the principal factor analysis indicated that this single factor explains 59.51% of the total variance in the Independence domain. The reliability of this factor/dimension was investigated and the results will now be discussed.

8.2.2.8.3 Reliability

The reliability of the five items was calculated in order to determine the inter-item consistency on this dimension. Only a single dimension score is applicable (Items 1, 2, 6, 7 and 8) and the descriptive statistics and reliability are shown in Table 8.31 (below).

Table 8.31: Descriptive statistics and reliability of the Independence Domain

Dimension	Mean	SD	Skewness	Kurtosis	α Coefficient
1	21.83	3.11	-1.056	.943	0.806

* $p \leq 0,01$

According to the kurtosis and skewness values this dimension shows a normal distribution and Cronbach α coefficients of 0.806. This coefficient is higher than 0.70 which, according to Nunnally and Bernstein (1994), indicates acceptable internal consistency.

8.2.3 Descriptive statistics of final screening instrument

In summary, the minimum and maximum scores, the average, standard deviations, and reliabilities (α -coefficient) for the 19 identified dimensions, and the total scores (sum of scores of the items for a particular domain) for eight domains, are depicted in the table below. The last domain (Independence) does not have separate dimensions and is represented by five items.

Table 8.32: Minimum, maximum scores, means, standard deviations and reliabilities of the 19 dimensions and the eight domain scores

Domain	Dimension	Min.	Max.	Mean	SD	α
COGNITIVE	Dimension 1	5	25	20.07	3.81	0.884
	Dimension 2	5	25	19.10	3.69	0.845
	TOTAL:	10	50	39.17	6.77	0.901
PERCEPTUAL	Dimension 1	3	15	13.65	1.99	0.934
	Dimension 2	4	20	15.64	2.76	0.803
	Dimension 3	5	25	20.31	3.67	0.842
	TOTAL:	12	60	49.60	7.15	0.901
NEUROLOGICAL	Dimension 1	5	25	20.71	3.70	0.869
	Dimension 2	5	25	21.02	3.45	0,897
	Dimension 3	5	25	20.11	3.43	0.768
	TOTAL:	15	75	61.85	8.44	0.890
SPEECH	Dimension 1	5	25	20.68	3.78	0.917
	Dimension 2	5	25	21.71	3.66	0.912
	TOTAL:	10	50	42.39	6.50	0.916
EMOTIONAL	Dimension 1	6	30	24.11	4.696	0.893
	Dimension 2	6	30	22.34	4.288	0.805
	Dimension 3	6	30	22.75	3.723	0.770
	TOTAL:	18	90	69.20	9.450	0.814
SOCIAL	Dimension 1	4	20	15.84	3.00	0.811
	Dimension 2	6	30	23.57	4.21	0.842
	Dimension 3	5	25	19.64	4.14	0.884
	Dimension 4	5	25	21.28	3.37	0.835
	TOTAL:	20	100	80.33	11.67	0.916
DEVELOPMENTAL	Dimension 1	5	25	17.80	4.48	0.902
	Dimension 2	5	25	22.05	2.59	0.636
	TOTAL:	10	50	40.05	6.06	0.847
INDEPENDENCE	TOTAL:	5	25	21.83	3.11	0.806

The Cronbach α coefficients vary between 0.806 and 0.916 for the eight domains. These coefficients are all higher than 0.70 and thus indicate acceptable internal consistency. All 19 dimensions as well as eight domains have a reliability coefficient higher than 0.7 which, for a non-cognitive test can be considered as acceptable.

The mean scores and standard deviations of the domains are also depicted in Table 8.32 (Above). As the number of items for each of the different domains differ the mean scores are not directly comparable. The manner in which to handle this issue will be discussed later in the chapter.

8.2.4 Items of final screening instrument

In Table 8.33 (below), descriptions of each of the different dimensions as well as the specific items which represent each of the dimensions in the final questionnaire are depicted.

Table 8.33: Items per dimension of final screening instrument

Domain	Dimension	Item
COGNITIVE	Ability	Do quantity comparisons: “larger”, “heavier”, “bigger than”, “more than”
		Classify or group according to common themes e.g. people, animals, transport, all the red objects
		Put events into sequence
		Count objects by word and touch in one to one (i.e. tally counting) up to at least ten to fifteen
		Sort objects according to colour, size and shape
	Approach to learning	Show curiosity
		Show initiative in trying out new things
		Ask When, Why and How questions
		Show a willingness to learn
		Use his/her own initiative to solve a problem
PERCEPTUAL	Body awareness	Point to most large and small body parts
		Give the functions of different body parts e.g. Why do you have ears
		Identify body parts on someone else
	Auditory	*Ask for repetitions
		*Have difficulty in remembering things heard
		*Have difficulty remembering nursery rhymes, songs and poems
		Repeat or sing several nursery rhymes correctly
	Spatial ability	Build a puzzle of 15-25 pieces or more by matching colours or features rather than by trial or error
		Orientate an object in relation to another by following the instructions- “under,” “behind”, “above” “in front of” or “next to”
		Copy a model made from blocks that you demonstrate with several blocks e.g. train, bridge, chair
		Name the position of different body parts e.g. my legs are below my head, not above it
		Use eyes and hands together with increasing skill e.g. threading beads
	NEURO-LOGICAL	Fine motor
Control scissors and cut along a straight line		
Draw a person with major body parts		
Colour in fairly neatly within the lines of a picture		
Cut a picture and then glue it onto a piece of paper		
Gross motor		Throw a beanbag or ball overhead
		Jump with two feet together
		Catch a beanbag or a bouncing ball against his/her chest with his arms
		Stand on one foot for 5-8 seconds
		Hop on one foot for 3-5 seconds
Low tone		*Hook feet around chair legs as a means of supporting/stabilising the upper body
		*Lie on the desk when writing or drawing
		*Support his body against a surface such as a wall or desk when standing
		*Rest his/her head in the “free hand” (non-dominant) when drawing, writing and colouring, instead of supporting the page
		*Accident prone i.e. bumps into things, people, and trips over objects
SPEECH	Language	Have sufficient vocabulary to give details about him/herself, family/ environment
		Easily follow a story he/she tells
		Hold a simple conversation
		Say in his/her own words what he/she is doing
		Tell and retell a story in the correct sequence
	*Mispronounce similar sounding letters in words e.g. m/n; b/d; d/t. (mum/nun; that/dat.)	

	Speech	*Often leaves out parts of words (syllable deletion), e.g., “umbrella/brella” / *Rearrange the sequence of sounds e.g. hospital/hostipal; shiver/shriver, fluttereby/butterfly/ psgetthi/spaghetti
		*Have difficulty discriminating between similar sounds (poor auditory discrimination). e.g. “bat/bad” *Present with sequencing difficulties (reverses words) in sentences when repeating them e.g. Open the door/the door open; the brown dog/the dog brown
EMOTIONAL	Empathy	Show empathy e.g. when someone is hurt
		Recognise how others feel
		Demonstrate affection e.g. by hugs or kisses or words
		Enjoy it when others give affection
		Show remorse
		Recognise other’s feelings (mad, sad, glad, bad)
	Emotional regulation	*Become easily frustrated or angry
		*Express noticeably different moods within a day
		*Become easily upset (cry for every little problem)
		Maintain a fairly even temper throughout the day
		*Have evident good/bad days
		*React in excess to even a minor injury
	Self confidence	*Fearful of new situations
		Adapt to change with ease
		Try things never done before
Make a choice between two items		
*Clingy or anxious		
Finish a given task/activity without asking every few minutes whether it is right		
SOCIAL	Interpersonal competencies	Engage confidently in a conversation with adults other than his/her parents/ teacher
		Take turns in a conversation and respond to what the person is saying
		Respond to a joke with humour
		Use words effectively to make a request
	Social regulation behaviour	*Disturbs others play
		*Always insist on his/her own way
		Wait his/her turn
		Settle conflict by verbally communicating rather than fighting, hitting or grabbing
		Comply with teachers/parents/adults requests
		Share a toy or food with peers
	Social graces	Say “thank you” when given something
		Say “please” when he/she wants something
		Help others when needed
		Offer help
		Greet people (adults and children)
	Play	Play with other children
		Play imaginatively with playmates
		*Refuse to join others in play
		Seek the company of other children

DEVELOP- MENTAL	Concentration	*Get easily distracted
		*Talk to avoid the task at hand
		*Fidget, squirm and rock on the chair
		*Have difficulty following instructions carefully
		*Get bored shortly after starting a task
	Sensory	*Blink a lot
		*Rub eyes constantly
		Respond when you call his/her name
		*Holds object or drawing paper too close
		Find objects within his/her field of vision
INDEPENDENCE	Unpack/pack bag by him/ herself	
	Use a fork, or spoon competently	
	Dress/undress him/ herself independently	
	Look after his/her belongings/possessions	
	Seek help in an emergency	

Note: * Reversed items

The final screening instrument consists of 100 items. As indicated in the introduction it is also necessary to research the criterion-prediction of the instrument (as part of its validity). This type of validity investigates the correlation coefficients between the predictors (all dimensions / domains) and a criterion (academic performance), and will now be discussed.

8.2.5 Prediction validity of screening instrument

In order to determine the instrument's predictive validity, the children who were evaluated with the screening instrument in Grade 00, were followed up in their Grade 1 year. Six months after they had started Grade 1, each of these children's Reading, Spelling and Mathematics abilities were tested, in addition to which an overall achievement index was calculated based on the sum total of these three. A maximum total of 50 is obtained if the totals of the three are added up, multiplied by 2 in order to make the percentage. The correlation co-efficient between the dimensions/domains and the learner's achievements are illustrated in Table 8.34 (below). It is important to consider the effect size when interpreting the correlation co-efficient, as this gives an indication of the practical importance of the statistical results. In this case, a coefficient of 0.1 depicts a small effect, 0.3 a medium effect and 0.5 a large effect size.

Table 8.34: Correlation coefficient between learners' Grade 1 achievement in Reading, Spelling and Mathematics and their overall achievement on the 19 dimensions and eight domains.

Domains and dimensions	Overall performance	Reading	Spelling	Maths
Ability	.306*	.236*	.312*	.258*
Approach to learning	.265*	.221*	.287*	.196*
Cognitive – total	.320*	.256*	.336*	.254*
Body awareness	.205*	.180*	.216*	.151*
Auditory	.238*	.252*	.223*	.155*
Spatial	.226*	.161*	.237*	.199*
Perceptual – total	.271*	.237*	.273*	.207*
Fine	.196*	.140*	.202*	.174*
Gross	.020	-.033	.092	.013
Body tone	.120	.104	.151*	.072
Neuro – total	.145*	.092	.190*	.112
Language	.261*	.233*	.275*	.187*
Speech	.193*	.185*	.222*	.114
Speech – total	.265*	.243*	.290*	.175*
Empathy	.091	.097	.117	.041
Emotional regulation	.094	.086	.095	.069
Self confidence	.103	.087	.135*	.057
Emotional – total	.129	.122	.154*	.074
Interpersonal competencies	.138*	.117	.171*	.089
Social regulation	.193*	.186*	.188*	.137*
Social graces	.130*	.112	.128	.108
Play	.118	.098	.113	.099
Social – total	.187*	.167*	.192*	.140*
Concentration	.251*	.201*	.247*	.207*
Sensory	.008	.039	.052	-.046
Developmental – total	.186*	.171*	.204*	.120
Independence – total	.117	.100	.139*	.078

* $p \leq 0,01$

From the table above, it becomes apparent that the Cognitive, Perceptual and Speech domains tend to produce a correlation coefficient of 0.3. These domains form part of the basic (direct) variables which contribute to the basis of school readiness. The other domains (Emotional, Social, Neurological (gross, fine motor, and body tone), Developmental (concentration and sensory) and Independence development are variables which play an integral part in the child's future scholastic achievement and are viewed as indirect variables. The screening instrument's direct variables do therefore display an acceptable predictive validity to predict a Grade 1 learner's academic achievement.

In order to predict a Grade 1 learner's achievement with the assistance of the screening instrument, stepwise regression analysis was used to investigate the

dimensions which produced the best prediction. With stepwise regression, the variable (dimension) with the highest correlation to the criteria is added to the regression equation first. Thereafter, the variable with the second highest correlation to the criteria is investigated to determine whether it should be added to the equation. In this case, the second variable's correlation with the first variable (which has already been added to the equation) is considered. If this correlation is significant it indicates that the second variable is not responsible for a unique percentage of the criteria's variance and will therefore not be added to the equation. In the following steps, a variable (dimension) will only be added to the regression equation if it is responsible for a unique portion of the variance of the criteria (Howell, 2009). In this case, only the total academic achievement (converted to a percentage) has been used as criterion. The results are shown in Table.8.35 (below).

Table 8.35: Results of stepwise regression with overall achievement as criterium

Step	Predictors	R	R ²	Additional vaiance	F	p
1	Ability	0.348	0.121	-	41.031**	0,000
2	Social regulation	0.366	0.134	0.013	4.423*	0.036
3	Sensory	0.400	0.160	0.025	8.931**	0.003
4	Speech	0.413	0.171	0.011	3.914*	0.049

** p<= 0,01

* p <= 0,05

From Table 8.35 (above) it is clear that four dimensions (Ability, Social Regulation, Sensory and Speech) have been added to the regression equation and the corresponding *F*-values indicate that each of the variables (dimensions) contributes significantly on at least the 5%-level of significance to the variance of the criterion (Academic Performance). The four predictors **combined** contribute roughly 17% of the variance in academic performance of the Grade 1 learners. This multiple correlation (R = 0,413) produces an *F*-value of 15.139, which is significant on the 1%-level of significance. These four dimensions could be used to predict Grade 00 learners' academic performance in their Grade 1 year by using the following regression equation:

$$Y' = 2 (\text{ability}) + 0,9 (\text{social regulation}) + 0,8 (\text{speech}) - 1,7 (\text{sensory}).$$

The following example could be used to demonstrate the value of using the equation: Assume that a Grade 00 learner has obtained the following scores on the four dimensions: Ability (18); Social regulation (23); Speech (19) and Sensory (14). According to the abovementioned equation, the predicted score of the learner could be calculated as follows:

$$\begin{aligned} Y' &= 2(18) + 0,9(23) + 0,8(19) - 1,7(14). \\ &= 36 + 20,7 + 15,2 - 23,8. \\ &= 48,1 \end{aligned}$$

This learner's predicted score indicates that he/she will achieve more or less 48% (combined score on Reading, Spelling and Mathematics) in the third quarter of Grade 1.

8.2.6 Medical and physical development

Attempts have also been made to compile a checklist whereby medical information as well as the physical developmental history of the child has been taken into consideration (part 1 of instrument). In this case, the information was obtained from the parents as teachers are not privy to it. The information was then used to determine whether differences regarding the mean dimensions (19) and mean domains (8) scores exist. Information regarding the medical history of the learner is presented in Table 8.36 (below).

Table 8.36: Medical information (N=512)

Item	N	Yes	No
Was it a normal Birth?	458	43.7%	56.3%
Is he/she a healthy child?	461	95.4%	4.6%
Does he/she have a squint?	467	1.7%	98.3%
Does he/she have a hearing difficulty	465	2.2%	97.8%

Based on the table above, birth history appears to be split relatively evenly across the two categories (yes/no). Due to the uneven distribution of the remaining three questions, the categories cannot be compared sensibly and no further analyses were made of them.

As far as physical development information was concerned, information pertaining to the following aspects was collected. The percentages in the table below are representative of the information obtained.

Table 8.37: Physical development information (N=512)

Item	N	Never	Seldom	Sometimes	Almost always	Always
<i>Developmental History:</i> Did the child encounter the difficulty with the following milestones:						
Crawling (e.g., bottom shuffling, bunny hopping, one leg dragging behind)	455	90.5%	4.0%	3.1%	0.4%	2.0%
Walking	455	90.5%	5.1%	1.3%	1.1%	2.0%
Talking	454	80.0%	7.3%	7.5%	3.3%	2.0%
<i>Does he/she</i>						
Have frequent colds and flu	462	13.0%	42.4%	39.0%	4.5%	1.1%
Have frequent ear infections	458	59.6%	29.0%	10.0%	1.3%	0.0%
Have respiratory problems	455	62.0%	19.8%	14.7%	2.6%	0.9%
Show a lack of interest in food	460	30.7%	31.5%	30.2%	5.4%	2.2%
React to textures in food	447	26.0%	25.3%	30.9%	12.3%	5.6%
React to smells in food	454	21.6%	21.8%	33.5%	15.2%	7.9%
Drool	438	81.1%	11.2%	5.5%	1.4%	0.9%
Eats sloppily	446	54.0%	30.0%	14.1%	1.1%	0.7%
Tire easily	453	51.2%	31.3%	15.9%	1.5%	0.0%
Look and feel weak	461	75.9%	20.2%	3.5%	0.4%	0.0%

In order to compare categories, a decision was made to combine the following categories, namely “seldom”, “sometimes”, “almost always” and “always” as the frequencies within each category were too small to make a meaningful comparison. As a result, only the following two categories were used for comparative purposes: “never” and “yes” (which includes “seldom”, “sometimes”, “almost always” and “always”).

By means of a multiple analysis of variance (MANOVA), the 14 variables (listed in the tables above) were used as independent variables and been compared on the mean scores for the 19 dimensions and eight domains. The results of this analysis are shown in the following table. (The last column represents the effect sizes – a value of 0.1 = small effect, 0.25 – medium effect and 0.4 = large effect. Should differences for the means scores be statistically significant, at least on the medium effect, they will be investigated further).

Table 8.38: MANOVA results to test for differences in the dimensions and domain averages according to the 14 independent variables

Independent variable	<i>v</i>	<i>F</i>	<i>p</i>	<i>f</i>
Birth	20;312	0.600	0.912	
Crawling	20;312	1.048	0.405	
Walking	20;309	1.372	0.134	
Talking	20;308	2.149	0.003	0.08
Colds and flu	20;315	1.680	0,035	0.07
Ear infections	20;313	1.162	0.286	
Respiratory problems	20;309	1.049	0.405	
Lack in food	20;314	1.043	0.411	
React to food textures	20;307	1.349	0.147	
React to food smells	20;310	1.770	0,023	0.07
Drop	20;300	0.787	0.730	
Eat sloppily	20;304	1.615	0.048	0.07
Tire easily	20;309	2.279	0.002	0.08
Look and feel weak	20;314	1.770	0,023	0.07

According to the results, significant differences were found for six independent variables in some of the average dimensional and domain scores. The information contained in the last column, however, indicates that these statistically significant differences do not indicate practical significance, since they all show small effect sizes. It can therefore be assumed that the learners medical and physical developmental information do not play an important role in their cognitive and/or social-emotional development.

After the screening instrument was finalised, a decision was reached to compile a shortened version of the instrument. This should increase the usage value of the instrument.

8.2.7 Short version of screening instrument

The shortened version was obtained by identifying the *two items per dimension* with the highest correlation to the factor (refer to previous factor analysis) in question. These items (two per dimension) are then used to calculate a total score for the chosen *domain*. The minimum and maximum scores, mean scores, standard deviations, skewness, kurtosis and reliability of the eight domains (shortened version) are shown in Table 8.39 (below). The shortened version consists only of domains and does not include dimensions.

Table 8.39: Descriptive statistics and reliability coefficients for short version of screening instrument

Domain	Min	Max	Mean	SD	Skewness	Kurtosis	α
Cognitive	4	20	15.59	2.78	-.505	.003	0.754
Perceptual	6	30	24.67	3.62	-.709	.229	0.796
Neurological	6	30	24.98	3.48	-.376	-.573	0.768
Speech	4	20	16.92	2.70	-.824	.255	0.794
Emotional	6	30	22.95	3.59	-.129	-.294	0.728
Social	8	40	32.67	4.76	-.535	-.127	0.792
Developmental	4	20	17.61	2.58	-.685	.592	0.708
Independence	4	20	17.61	2.58	-1.095	.920	0.810

None of the domains produce an exceptionally high kurtosis or skewness value and as a result the data is distributed relatively normally for the different domains. The reliability coefficients are all acceptable, since they are all above 0.7. The items which have been included in each domain are provided in Table: 8.40 (below).

Table 8.40: Items per domain for short version of measuring instrument

Domain	Items
Cognitive	<p>Do quantity comparisons: “larger”, “heavier”, “bigger than”, “more than”.</p> <p>Classify or group according to common themes e.g. people, animals, transport, all the red objects</p> <p>Show curiosity</p> <p>Show initiative in trying out new things</p>
Perceptual	<p>Orientate an object in relation to another by following the instructions- “under,” “behind”, “above” “in front of” or “next to”</p> <p>Point to most large and small body parts</p> <p>Give the functions of different body parts e.g. Why do you have ears</p> <p>*Ask for repetitions</p> <p>*Have difficulty in remembering things heard</p> <p>Build a puzzle of 15-25 pieces or more by matching colours or features rather than by trial or error</p>
Neurological	<p>Begin to cut around curved lines</p> <p>Control scissors and cut along a straight line.</p> <p>Throw a beanbag or ball overhead</p> <p>Jump with two feet together</p> <p>*Hook feet around chair legs as a means of supporting/stabilising the upper body.</p> <p>*Lie on the desk when writing or drawing</p>
	<p>Easily follow a story he/she tells</p> <p>*Mispronounce similar sounding letters in words e.g. m/n; b/d; d/t. (mum/nun; that/dat.)</p>

Speech	*Often leaves out parts of words (syllable deletion), e.g. “umbrella/ brella” / Have sufficient vocabulary to give details about him/herself, family/ environment
Emotional	*Fearful of new situations Show empathy e.g. when someone is hurt Recognise how others feel *Become easily frustrated or angry *Become easily upset (cry for every little problem) Adapt to change with ease
Social	Play imaginatively with playmates Engage confidently in a conversation with adults other than his/her parents/ teacher Take turns in a conversation and respond to what the person is saying *Disturbs others play *Always insist on his/her own way Play with other children Say “thank you” when given something Say “please” when he/she wants something
Developmental	*Get easily distracted *Talk to avoid the task at hand *Blink a lot *Rub eyes constantly
Independence	Unpack/pack bag by him/ herself Use a fork, or spoon competently Dress/undress him/ herself independently Look after his/her belongings/possessions

Note: * Reversed items

In order to determine the statistical relationship between the eight domains for the final and shortened versions of the screening instrument, the correlations between the domains have been calculated for these two versions. The results are shown in Table 8.41 (below).

Table 8.41: Correlation coefficients between the domains of the final and shortened versions of the screening instrument

Domain: Final version	Domain: Shortened version							
	Cog	Perc	Neuro	Speech	Emo	Soc	Dev	Ind
Cognitive	0.946*							
Perceptual		0.958*						
Neurological			0.943*					
Speech				0.970*				
Emotional					0.922*			
Social						0.957*		
Developmental							0.906*	
Independence								0.866*

* $p \leq 0,01$

From this table it is apparent that the eight correlation coefficients all point to a large effect size (Steyn, 1999). It could therefore be accepted that a very high correspondence exists between the two versions. By using the shortened version, a fairly accurate assessment could be made of the learner's achievement on the domain scores.

As was indicated in Chapter 7, the final phase of the study was to identify norms for the screening instrument.

8.2.8 Determination of norms

Norms are needed because a learner's score in a certain domain/dimension can only be measured in relation to the group score to which it is related. In order to do this, the raw scores would have to be standardised, which is done by calculation. Various types of standardised scores exist, but in this study, stanines and percentiles are calculated. In order to convert raw scores to standardised scores it is necessary first to normalise the raw score distributions (Scheepers, 1992). In order to do this probability graph paper was used, which has a scale on the vertical line on the left hand side that indicates the cumulative frequency and the percentile range that could

be read from there. Norms were calculated for both the final (dimensions and domains) and the shortened (domains only) versions.

Before the norms were calculated and an investigation was carried out as to whether gender played a significant role in the learner's performance in these dimensions/domains (for both the final and shortened versions). For this purpose, a one-way multiple variance analysis (MANOVA) (Howell, 2007) was conducted with all 19 dimensions and eight domain scores as the dependent variables and gender as the independent variable. If a significant result (F -value) was obtained with the MANOVA, the analysis would be followed up with a single variance analysis on each of the dependent variables. In order to determine the practical importance of the statistically significant results, which are determined by the analyses, the practical significance of the results would be investigated.

As measure of practical significance, effect sizes (f) are calculated. In order to interpret the effect sizes, the following values are used as a guide: $f = 0.1$: small effect; $f = 0.25$: medium effect and $f = 0.4$: large effect (Steyn, 1999). The aforementioned guidelines were used to judge the practical significance of the results. The corresponding effect sizes are only calculated if statistically significant results (1%-level of significance) are obtained. Results with effect sizes of 0.25 and higher are discussed, since the results with smaller effect sizes are not relevant. The MANOVA results of the final version of the screening instrument are shown in Table 8.42 (below).

Table 8.42: MANOVA results to investigate differences in mean domain and dimension scores for the gender groups on the final version

Variable	Boys		Girls		F	p	f
	\bar{X}	SD	\bar{X}	SD			
Ability	19.57	3.914	20.57	3.663	11.490*	.001	0.17
Approach to learning	18.85	3.781	19.33	3.603	1.771	.184	-
Cognitive - total	38.42	6.911	39.90	6.594	7.014*	.008	0.14
Body awareness	13.43	2.020	13.87	1.940	8.076*	.005	0.15
Auditory	15.12	2.924	16.16	2.492	10.835*	.001	0.17
Spatial	19.97	3.709	20.64	3.617	5.799	.017	-
Perceptual - total	48.52	7.321	50.67	6.830	11.004*	.001	0.17
Fine	19.79	3.816	21.62	3.362	33.220*	.000	0.30
Gross	20.81	3.451	21.20	3.440	.746	.388	-
Body tone	19.64	3.548	20.56	3.246	5.195	.023	-
Neuro - total	60.23	8.502	63.38	8.084	14.379*	.000	0.19
Language	20.25	4.036	21.09	3.484	8.100*	.005	0.14
Speech	21.25	3.884	22.16	3.378	6.259	.013	-
Speech - total	41.50	7.009	43.25	5.861	9.125*	.003	0.16
Empathy	23.16	4.902	25.05	4.291	21.178*	.000	0.24
Emotional regulation	21.90	4.404	22.79	4.139	3.072	.080	-
Self confidence	22.45	3.869	23.05	3.569	1.912	.168	-
Emotional - total	67.51	9.615	70.89	9.023	13.920*	.000	.19
Interpersonal competencies	15.62	3.171	16.05	2.824	3.489	.063	-
Social regulation	22.76	4.232	24.34	4.059	17.079*	.000	0.21
Social graces	19.13	4.090	20.12	4.140	8.807	.003	0.15
Play	21.10	3.275	21.45	3.470	1.801	.180	-
Social - total	78.62	11.433	81.97	11.694	12.771*	.000	0.18
Concentration	16.37	4.556	19.16	3.951	41.043*	.000	0.33
Sensory	21.72	2.536	22.36	2.617	5.852	.016	-
Developmental – total	38.30	5.973	41.70	5.697	32.152*	.000	0.29
Independence – total	21.54	3.000	22.12	3.199	6.380	.012	-

* $p \leq 0,01$

According to the MANOVA results, statistically significant differences (on the 1%-level of significance) in mean scores were found on seven of the domains and nine of the dimensions. For three of the dimension scores (fine motor, empathy and concentration), these differences show medium effect sizes, while for the remaining six dimension scores, the differences show small effect sizes. Only one of the domain scores (developmental-total) rendered a medium effect size. Since none of the statistically significant differences produced a large effect size, it was decided to calculate the norms for the entire group (as opposed to calculating gender dependent norms).

The results to determine the effect of gender on the mean domain scores for the shortened version are shown in the following table.

Table 8.43: MANOVA results to investigate differences in mean domain scores for the gender groups on the shortened version

Domain	Boys		Girls		F	p	f
	\bar{X}	s	\bar{X}	s			
Cognitive	15.46	2.79	15.72	2.78	1.144	.285	-
Perceptual	24.17	3.72	25.15	3.47	8.429*	.004	0.14
Neurological	24.49	3.47	25.46	3.43	10.283*	.001	0.15
Speech	16.60	2.89	17.22	2.48	6.579	.011	-
Emotional	22.35	3.70	23.53	3.38	13.033*	.000	0.17
Social	32.04	4.70	33.28	4.75	10.946*	.001	0.16
Developmental	15.34	2.67	17.00	2.22	48.950*	.000	0.34
Independence	17.36	2.48	17.85	2.67	7.546*	.006	0.13

* $p \leq 0,01$

According to the MANOVA results, statistically significant differences (on the 1%-level of significance) in mean scores were found on six of the domains. Only for the one domain score, Developmental, do the differences in mean scores show a medium effect size. The other statistically significant differences all produce small effect sizes. Therefore, it was decided to calculate the norms of the group as a whole in this case for both the versions of the tests (comprehensive and shortened version) as well.

Norms were subsequently calculated for both versions of the screening instrument in the form of stanines and percentile ranks. The data that was used to calculate the norms was collected in the last term of the participant's Grade 00 year. A brief discussion of the stanines and percentile ranks follows.

8.2.8.1 Standardized scores

8.2.8.1.1 Stanine scale

The stanine scale is a normalised nine-point standard scale. It produces standard scores which range from 1 to 9 with an average of 5 and a standard deviation of 1.96. Each stanine value represents a specific percentage, as indicated in Table 8.44 (below).

Table 8.44: Percentages and description of stanine scale

Percentage testees	Stanine	Cumulative percentage	Description	Estimated % of testees
Lowest 4,01%	1	4,01%	Very poor	4%
Next 6,55%	2	10,56%	Poor	19%
Next 12,1%	3	22,66%		
Next 17,47%	4	40,13%	Average	54%
Middle 19,74%	5	59,87%		
Next 17,47%	6	77,34%		
Next 12,1%	7	89,44%	Good	19%
Next 6,55%	8	95,99%		
Highest 4,01%	9	100%	Very good	4%

In the second column, a description is provided of the learner's performance for the relevant dimension/domain in terms of the stanine achieved. If a learner's score corresponds to a stanine of 1, it means that the learner's performance with respect to this domain/dimension is very poor. Stanines could, however, also be combined, for example, stanines 4, 5 and 6 which would indicate that the learner's performance is average. The percentages in the last column indicates that approximately 4% of the norm group's scores correspond to a stanine of 1 (lower group) and a stanine of 9 (higher group).

8.2.8.1.2 Percentile rank

The percentile scale produces a finer description of the test subject's score than the nine point stanine scale. The percentile weighting of a specific score is the percentage of learners in the norm group which obtained a score equal to or lower than the specific score. From Table 8.44 (above) it could be derived that if a learner's raw score is converted to a stanine score of 7, it would mean that 77.34% of the norm group obtained a score which was lower than the particular learner. Furthermore, we could derive that 89.44% of the norm group obtained a similar or lower score and that 10.56% obtained a higher score than the particular learner.

It is recommended that a stanine of 5 be viewed as the threshold when the screening instrument is used to assess a learner. According to Table 8.44, it could be concluded that a stanine score of 5 indicates that approximately 60% of the norm group obtained a similar or lower score. If a learner obtained at least 60%, it could be accepted that he/she performed relatively well on the specific dimension/domain.

8.2.8.2 Norms for the final (Comprehensive version) screening instrument

Three tables with norms are shown for the final version. The first includes the direct (basic) dimensions; the second the indirect dimensions and the third the eight different domains.

Table 8.45: Norms for the direct dimensions

Stanine	Percentile	Cognitive	Approach	Body	Auditory	Spatial	Fine motor	Gross	Body tone	Language	Speech
1	4	5 – 12	5 – 11	3 – 8	4 – 10	5 – 12	5 – 12	5 – 13	5 – 13	5 – 12	5 – 13
2	11	13 – 14	12 – 13	9 – 10	11	13 – 14	13 – 15	14 – 15	14 – 15	13 – 15	14 – 15
3	23	15 – 16	14 – 15	11	12- 13	15 – 17	16 – 17	16 – 17	16 – 17	16 – 17	16 – 17
4	40	17 – 19	16 – 18	12 – 13	14	18 – 19	18 – 19	18 – 19	18	18 – 19	18 – 20
5	60	20 – 21	19	14	15 – 16	20 – 21	20 – 21	20 – 21	19 – 20	20 – 21	21 – 23
6	77	22	20 – 21	-	17	22 – 23	22- 23	22 – 23	21 – 22	22 – 23	24
7	89	23-24	22- 23	-	18 – 19	24	24	24	23 – 24	24	-
8	96	-	24	-	-	-	-	-	-	-	-
9	100	25	25	15	20	25	25	25	25	25	25

Table 8.46: Norms for the indirect dimensions

Stanine	Percentile rank	Empathy	Emo Regulation	Self confidence	Interper competencies	Soc reg behaviour	Social graces	Play	Concentration	Sensory	Independence
1	4	6 – 14	6 – 13	6 – 15	4 – 9	6 – 15	5 – 11	5 – 13	5 – 8	5 – 16	5 – 15
2	11	15 – 17	14 – 16	16 – 17	10 – 11	16 – 17	12 – 13	14 – 16	9 – 11	17 – 18	16 – 17
3	23	18 – 19	17 – 18	18 – 19	12	18 – 19	14 – 15	17 – 18	12 – 14	19	18 – 19
4	40	20 – 22	19 – 20	20 – 21	13 – 14	20 – 22	16 – 18	19 – 20	15 – 16	20 – 21	20 – 21
5	60	23 – 25	21 – 23	22 – 23	15 – 16	23 – 24	19 – 20	21 – 22	17 – 18	22	22
6	77	26 – 27	24 – 25	24 – 25	17	25 – 26	21 – 22	23	19 – 20	23	23 – 24
7	89	28 – 29	26 – 27	26 – 27	18 – 19	27 – 28	23 – 24	24	21 – 23	24	-
8	96	-	28 – 29	28	-	29	-	-	24	-	-
9	100	30	30	29 - 30	20	30	25	25	25	25	25

Table 8.47: Norms for the domains

Stanine	Percentile rank	Cognitive	Perceptual	Neurological	Speech	Emotional	Social	Developmental	Independence
1	4	10 – 25	12 – 34	15 – 44	10 – 28	18 – 52	20 – 56	10 – 28	5 – 15
2	11	26 – 29	35 – 38	45 – 49	29 – 32	53 – 56	57 – 64	29 – 32	16 – 17
3	23	30 – 33	39 – 43	50 – 54	33 – 37	57 – 60	65 – 70	33 – 35	18 – 19
4	40	34 – 37	44 – 48	55 – 59	38 – 41	61 – 65	71 – 76	36 – 38	20 – 21
5	60	38 – 41	49 – 51	60 – 64	42 – 44	66 – 71	77 – 84	39 – 41	22
6	77	42 – 44	52 – 54	65 – 68	45 – 47	72 – 76	85 – 90	42 – 44	23 – 24
7	89	45 – 46	55 – 57	69 – 71	48	77 – 81	91 – 94	45 – 47	-
8	96	47 – 48	58 – 59	72 – 73	49	82 – 84	95 – 96	48 – 49	-
9	100	49 – 50	60	74 – 75	50	85 – 90	97 – 100	50	25

To illustrate how the norm tables should be used, the following example is provided. In the table below, the raw scores which could possibly be obtained by a learner on the respective dimensions are shown with the corresponding stanines for those raw scores (as obtained from the norm tables above). The total scores for the domains were obtained by summing the raw scores of the relevant dimensions.

Table 8.48: Example of the conversion of raw scores to stanines for a learner according to the final version

Type	Dimension/Domain	Raw score obtained	Corresponding Stanine
D	Ability	22	6
I	Approach to learning	19	5
R	Body awareness	15	9
E	Auditory	17	6
C	Spatial	24	7
T	Fine	23	6
	Gross	25	9
	Body tone	19	5
	Language	22	6
	Speech	22	5
I	Empathy	24	5
N	Emotional regulation	16	2
D	Self confidence	20	4
I	Interpersonal competencies	14	4
R	Social regulation	19	3
E	Social graces	16	4
C	Play	23	6
T	Concentration	18	5
	Sensory	22	5
T	Cognitive – total	41	5
O	Perceptual – total	56	7
T	Neuro – total	67	6
A	Speech – total	44	5
L	Emotional – total	60	3
	Social – total	72	4
	Developmental – total	40	5
	Independence – total	22	5

Note: For example: Cognitive total = ability (22) + approach to learning (19) = 41.

In Figure 8.9 (below), a graphical representation of the information is depicted of raw scores to stanines

Type	Dimension/Domain	Stanine								
		1	2	3	4	5	6	7	8	9
D I R E C T	Ability					*	*			
	Approach to learning					*				
	Body awareness									*
	Auditory						*			
	Spatial							*		
	Fine						*			
	Gross									*
	Body tone					*				
	Language Speech					*	*			
I N D I R E C T	Empathy					*				
	Emotional regulation		*							
	Self confidence				*					
	Interpersonal competencies				*					
	Social regulation			*						
	Social graces				*					
	Play						*			
Concentration					*					
Sensory					*					
T O T A L	Cognitive					*				
	Perceptual							*		
	Neurological						*			
	Speech					*				
	Emotional			*						
	Social				*					
Developmental Independence					*					

Figure 8.9: Graphical representation of the distribution of raw scores according to the stanine scale for the final version.

It is apparent that the learner obtained a stanine of 5 or higher with respect to the direct dimensions. As far as the indirect dimensions are concerned it is however apparent that a stanine of 5 was obtained on three dimensions (empathy, concentration and sensory), while a stanine of higher than 5 was only obtained on one dimension (play). A stanine score of lower than 5 was obtained for emotional regulation, interpersonal competencies, social regulation and social graces. This is also illustrated in the lower portion of the graph where a stanine of lower than 5 was obtained for the emotional and social domains. It would therefore appear that these aspects should be focused on when preparing a learner for Grade 1.

8.2.8.3 Norms for the short screening instrument

Norms for the shortened version were calculated for each of the eight domains and are presented in Table 8.49 (below).

Table: 8.49: Norms for the short version

Stanine	Percentile rank	Cognitive	Perceptual	Neurological	Speech	Emotional	Social	Developmental	Independence
1	4	4 – 9	6 - 16	6 – 17	4 – 10	6 – 16	8 – 22	4 – 10	4 – 11
2	11	10 – 11	17 – 19	18 – 19	11 – 12	17 – 18	23 – 26	11 – 12	12 – 13
3	23	12	20 – 21	20 – 21	13 – 14	19	27 – 28	13	14 – 15
4	40	13 – 14	22 – 23	22 – 23	15	20 – 21	29 – 31	14 – 15	16
5	60	15	24 – 25	24 – 25	16 – 17	22 – 23	32 – 34	16	17 – 18
6	77	16– 17	26 – 27	26 – 27	18	24 – 25	35 – 36	17	19
7	89	18	28	28	19	26 – 27	37 – 38	18	-
8	96	19	29	29	-	28	39	19	-
9	100	20	30	30	20	29 - 30	40	20	20

For illustrative purposes on how to use the normalised tables for the shortened version of the screening instrument, the following example is given. In Table 8.50 (below) the raw scores are shown which could possibly be obtained by a learner on the various domains (shortened version) with the corresponding stanines for those raw scores (as obtained from the norm tables above). (Since this is the shortened version, only the domains and not the dimensions are considered).

Table 8.50: Example of converting the raw scores to stanines for a learner according to the shortened version

Type	Dimension/Domain	Raw score obtained	Corresponding Stanine
	Cognitive – total	13	4
T	Perceptual – total	21	3
O	Neuro – total	24	5
T	Speech – total	15	4
A	Emotional – total	25	6
L	Social – total	38	7
	Developmental – total	17	6
	Independence – total	20	9

Note: For example: Cognitive total = ability (22) + approach to learning (19) = 41.

This information is presented graphically in Figure 8.10 (below).

Domain	Stanine								
	1	2	3	4	5	6	7	8	9
Cognitive				*					
Perceptual			*						
Neurological					*				
Speech				*					
Emotional						*			
Social							*		
Developmental						*			
Independence									*

Figure 8.10: Graphical representation of the distribution of raw scores according to the stanine scale for the short version

It is clear that the learner obtained a stanine of 5 with respect to the direct dimensions on only the neurological domain. On the other direct domains (cognitive, perceptual and speech), a stanine score of 5 was obtained. However, as far as the indirect domains (emotional, social, developmental and independence) are concerned, stanines higher than 5 were obtained. This indicates that more focus should be placed on the direct domains in order to prepare a learner for Grade 1.

8.3 SUMMARY OF RESULTS

The purpose of the present study was the development of a school readiness screening instrument for Grade 00 (pre Grade R) learners. From the results presented in this chapter it can be seen that the eight domains and 19 dimensions of development measured at preschool level contribute to school readiness.

Principal component and principal factor analyses were conducted to reduce the large number of items to a relevant few factors/dimensions so that the final pool of items retained would have construct and predictive validity. Total variance of the extraction of factors were as follows for each of the eight domains: Cognitive (49.30% on two factors); Perceptual (58.09% on three factors); Neurological (44.75% on three factors); Speech (52.88% on two factors); Emotional (53.46% on three factors); Social (51.21% on three factors); Developmental (39.84% on two factors); Independence (59.51% for a single factor).

The Grade 00 final screening instrument showed high reliability coefficients within each dimension and domain. Strong inter-item consistencies between the dimensions on each domain were also identified. In summary, the reliabilities of the 19 dimensions vary from 0.636 (sensory development) to 0.934 (body awareness), while for the eight domains the reliabilities vary from 0.806 (independence) to 0.916 (speech and social development). Sound statistical reliability measures led to a 100 item final screening instrument.

A shortened version of the screening instrument which contains eight domains (no dimensions) was also developed. The reliabilities of these eight domains vary between 0.708 and 0.810, showing acceptable reliability coefficients above 0.7. A high correlation exists between the domain scores for the final and shortened versions of the screening instrument.

The predictive validity of the final screening instrument was also investigated. According to the correlations between the learners' performance on the screening instrument (in Grade 00) and their reading, spelling and arithmetic abilities in Grade 1, evidence was found that specifically the Cognitive, Perceptual and Speech *domains* are good predictors of later achievement in Grade 1. Stepwise regression analyses were performed and the *dimensions* of Ability, Social Regulation, Sensory and Speech were identified as the best predictors and could be used to predict Grade 00 learners' academic achievement in Grade 1. These four predictors combined contribute roughly 17% of the academic achievement of the Grade 1 learners. These results also indicate that the teacher's ratings of the domains of school readiness have important implications for subsequent performance at school.

Norms were calculated in the form of stanines and percentile ranks for both the final and shortened versions of the screening instrument. The data used for the norms was collected in the last term of the participant's Grade 00 year.

The psychometric properties of the newly developed Grade 00 school readiness/screening instrument has been established as a reliable, valid and standardised measuring instrument in assessing school readiness for Grade R entry. This instrument fills a gap as there is no such standardised measuring instrument

available for this age group or one that has been representative of different cultural groups.

Chapter 9

Conclusion

This chapter explores the implications of the study undertaken, considers some of its strengths and limitations and gives direction for future study.

The study confirmed many others in finding that the dimensions of ability, approaches to learning, speech, language, auditory and perceptual skills and visual spatial skills are predictive of first grade schooling outcomes (Dall'oglio' et al., 2010; Shapiro, Hurry, Masterson, Wydell & Doctor, 2009). In particular, cognitive measures produced the highest correlation co-efficient of 0.320, also corresponding favourably with previous research, as cognitive factors have been highlighted as one of the best predictors of school success and achievement test performance in Grade 1 (Konold & Pianta, 2005; Kroukamp, 1991; LaParo & Pianta, 2001). The speech and language and perceptual domains also reflect results consistent with previous findings that these skills also have predictive value for reading and mathematics (Augustyniak, Cook-Cottone, & Calabrese, 2004; Kurdek & Sinclair, 2001). That speech and language was found to be a strong predictor of later achievement supports the theory that there is strong developmental continuity between emergent literacy skills and later reading skills (Lonigan, 2005).

9.1 The value of this research

This study was an important undertaking as it was motivated by the need to fill a gap in a new political landscape. Testing material and assessment instruments in South Africa is loaded with political and cultural baggage of a discriminatory past. Tests available are generally normed for specific ethnic groups or have excluded one or another group. The SETT (Joubert, 1984), for example, excluded Blacks from its sample group of White, Indian and Coloured children. Other research addressed either exclusive samples of Indian (Ramphal, 1972) or Black children (Ras, 1987). With such fragmented testing material available and almost two decades into racially integrated schools the need for a preschool assessment measure that is universal has been glaring. With the exposure to common curriculums over at least two decades, a generation of children now exist who conform to common educational expectations in

integrated schools, albeit unequal starting points at entry level. Testing material has to address this integration in an effort towards culture fair testing and be reflective of the current status of integrative schooling. The development of the Grade 00 school readiness, screening instrument is a step in this direction.

Much attention has been given to the identification of preschool characteristics that predict academic achievement (Prior et al., 2011; Snow, 2006). The general research trend has been to place emphasis on single or univariate measures to predict school success. Cognitive abilities have been widely accepted as the best predictor of school readiness and future school performance (Duncan et al., 2007; Kurdek & Sinclair, 2001; Snow, 2006). However, recent research has shown that other variables, such as social-emotional competencies also mediate academic success (Bustin, 2007; Sheridan, Knoche, Edwards, Bovaird, & Kupzyk, 2010; Trentacosta & Izard, 2007). The aim of the present study was to develop a comprehensive inclusion of the many developmental dimensions that would measure school readiness in the age cohort (48-66 months) and predict later achievement.

Combining the direct domains of school readiness with the indirect domains of school readiness in one instrument that, as used in this research, offers a balance to assessing the predictor variables. Prior, Bavin and Ong (2011) write that the literature targets one or another dimension, leading to an imbalance in findings and that the social-emotional predictors are over-emphasised in relation to the significance of language and cognitive influences. The social-emotional competency dimensions in this study confirm that these attributes play an integral part in school readiness and subsequent achievement but that they constitute the indirect variables that mediate the transition to school. The findings of this research confirm that cognitive, perceptual and language dimensions remain the most powerful influences of school readiness. Hair et al. (2006) contend that below average cognitive and language skills, together with compromised social and emotional competencies, are predictive of the poorest outcomes in the school years.

An important goal in the development of any test should be its practical utility in targeting intervention based on the results of performance on the test (Kelly & Peverly, as cited in Augustyniak, Cook-Cottone, & Calabrese, 2004; Neisworth &

Bagnato, 2004). To this end, a measure of school readiness should provide domain-specific scores as well as an overall readiness score. Domain-specific scores are critical for accurate prediction of academic achievement in areas such as reading, spelling and mathematics. While some tests have adequate reliability and validity they lack empirically based domain-specific scores (Augustyniak et al., 2004). The development of the Grade 00 school readiness/screening instrument was based on this observation.

Just as equal education for all is a constitutionally driven mandate, so there exists a critical need to make sound testing and assessment tools accessible to all. Previously disadvantaged as well as under-resourced schools lack access to appropriate testing material as well as the training to implement complicated, lengthy testing material. Testing instruments are generally costly and therefore deny access to essential services. Devolution of skills in neuropsychological assessments is called upon to address the lack of accessibility to services such as testing and intervention (Watts, 2008; 2012). Educators therefore are in a prime position to utilise measuring instruments that are accessible, affordable, easy to implement and interpret, as well as being psychometrically sound, valid, reliable and appropriately normed (Costenbader, Rohrer, & Difonzo, 2000; Foxcroft, 2011). The development of the Grade 00 school readiness/screening instrument addresses this need in its construction of a psychometrically sound cost-effective measuring instrument.

An aim related to the relevancy and cost-effectiveness of testing material is that conventional tests such as the traditional IQ test are far too costly as they require the expert services of psychologist and are not suitable for planning or monitoring progress. IQ tests are limited in their relevance to instructional interventions and do not offer “adequate item density for detecting change” (McDermott, Leigh, & Perry, 2002; Neisworth & Bagnato, 2004, p.203). The need for tests that can detect and direct the need for relevant interventions is necessary in age of accountability, and the Grade 00 readiness test /screening instrument addresses this call directly.

While many measures of school readiness exist for the grade R learner, standardised assessment tools are not available for the pre-Grade R learner. Testing materials should be sensitive, displaying fine gradation of skills and providing a pool

of items that are sensitive to an age or skill range, as necessary to track progress (Neisworth & Bagnato, 2004). Best practice in psychology and education should promote assessment measures that facilitate skills growth over time (Hojnoski & Missall, 2006). The development of the measuring instrument in this research fills this gap and has immense value for education, practice, policy and research.

The value of this screening assessment, with a cut-off point, can identify children with both developmental disorders and those at risk of difficulties in the various developmental domains. It can be used easily by educators and clinicians to identify preschool children in need of further evaluation.

9.2 Implications of the study

The study has implications at various levels.

9.2.1 Policy level implications

Early childhood education is increasingly expanding its boundaries beyond education and being framed from the perspectives of health, policymakers, researchers, and the public domains. As a result the goal towards sound, standardised assessment systems and tools is imperative in an era of accountability (Ackerman & Barnett, 2005).

The current study suggests that child development is holistic and integrative and that multiple domains contribute to academic outcomes. The findings also suggest that cognitive, perceptual and speech and language competencies contribute directly to academic success in Grade 1, while the indirect domains of school readiness play a significantly supportive role in school readiness. This suggests that educators and educational policies must incorporate the information of the interdependency of children's early skills and the interconnectedness of the different domains of school readiness to inform curriculum design (McWayne, Fantuzzo, & McDermott, 2004). Children's development must be promoted across all areas (National Institute of child Health and Human Development, 2003).

The findings support other studies in which language competencies and pre-literacy capacities are found to be the most influential factors in readiness for school

(Prior, Bavin, & Ong, 2011). That speech and language is a significant predictor of academic competency in Grade 1, as found in the current study, suggests that much more emphasis be put on incorporating strong language and literacy programmes, both at preschool and Grade 1 level. Pre-literacy enrichment should be recommended for all children before school entry, especially for those at risk (Prior, Bavin, & Ong, 2011). Second language factors and socio-economic disadvantage heighten this risk and are currently reflective of a critical feature of South African education.

The approaches to learning behaviour and social regulation behaviours in this study was also found to be significant dimensions in school readiness, indicating a need for educators to be trained to focus on non-academic areas of development that promote readiness for school and those types of learning behaviour to enhance academic readiness skills (Hojnoski & Missall, 2006; McDermott, Leigh, & Perry, 2002)

A much greater political policy implication of this research is that early childhood education policies should place emphasis on a multidimensional view of school readiness, rather than focusing on singular dimensions such as cognitive skills. With the alarm raised over poor national exams, such as the ANA results, the recommendations are to push for cognitive aspects of development by putting more effort into teaching methods and curriculum design rather than, for example, emotional and social competencies and learning behaviour that facilitate learning and are foundational to academic success.

Government mandates as outlined in White Paper 5 are to include specific curricular goals to promote children's development across all areas. This research facilitates this process through its multi-dimensional developmental approach and can assist the teacher and curriculum design by identifying teachable skills that would contribute to academic success (McWayne, Fantuzzo, & McDermott, 2004). This research should not lie on a library shelf but be translated into a fully integrated curriculum package for the Grade 00 classroom.

Although not a focus in this research, factors such as enrolment rates in Grade 00 and quality preschools had a bearing on data collection and hence the findings in

this study. This aspect will be discussed in detail under limitations of the study. Enrolment rates in Grade 00 or pre-K (as known in the USA) is steadily increasing (Barnett & Yarosz, 2005), however it has many implications as children start behind compared to those from more privileged educationally stimulating home backgrounds. More privileged children generally have an earlier exposure to schooling, starting at Grade 000, thus widening inequalities in access to preschool education. Quality preschools have also been found to impact on cognitive and social-emotional outcomes up to second grade (Peisner-Feinberg et al., 2001). The implications at policy level are that efforts need to be made to improve access as well quality of education.

A major implication for South African education is the need to place emphasis on pre-Grade R education. Many schools do not have Grade 00, so children start at grade R to compete with many who have had the benefits of structured stimulating Grade R experience.

9.2.2 Practice level implications

The development of the Grade 00 school readiness instrument provides a means for identifying at-risk preschoolers early in the educational experience. Its multidimensional approach offers the opportunity to assess various levels of development and highlights the importance of identifying a multitude of skills critical to the successful transition to school (Prior, Bavin, & Ong, 2011; Snow, 2006). More importantly, the Grade 00 school readiness instrument has the potential to link assessment to subsequent interventions based on the results obtained in the test. Used properly the screening instrument can guide the test user in determining which area of development should be prioritised for intervention, for example, a stanine score of 2 on the social regulation dimension would be a target for intervention. The diagnostic use of the Grade 00 school readiness instrument would also help make a decision about whether or not the child should progress to Grade R, fulfilling the main aim of this research. It should be reiterated that the purpose of this instrument should not be solely as a practice for exclusion but rather to identify the risks and provide appropriate interventions. Hence, this screening tool can be administered at Grade 00 entry, providing an initial reflection at developmental level and, should problem areas be found, relevant interventions can be implemented and a reassessment made later in

the year to monitor progress. This is an important facet of this instrument as it provides the opportunity for instruction in areas in which a child lacks skills. This is pertinent in the case of underprivileged and historically disadvantaged children who, due to environmental deprivation, perform poorly in tests, and erroneous conclusions drawn that he or she is not ready for school (Luiz, Foxcroft & Tukulu, 2004).

A practical feature of this measuring instrument is the availability of a shortened version of the test which is also standardised and normed. A high correspondence exists between the comprehensive and shortened versions, and an accurate assessment can be made of the shortened version. However, should any doubt exist regarding area of difficulty the longer, comprehensive version could be administered for more in-depth information.

The Grade 00 school readiness instrument would serve a valuable tool for clinicians from various professions as well as for educators. As indicated at the outset, speed, efficiency, affordability, brief and an easy to administer instrument were the primary aims to facilitate assessments, because of time and cost constraints (Costenbader, Rohrer, & Difonzo, 2000). The Grade 00 screening instrument serves this purpose.

9.2.3 Implications for interventions

The Grade 00 measuring instrument is versatile enough for an educator to plan a curriculum based on the developmental areas in the instrument. The items in the questionnaire serve a description of the essential developmental building blocks that is linked to a child's school success. The areas included in the measuring instrument are in keeping with the legislative mandate of outcomes-based education learning and teaching (DoE, 1997; 2002). Each of the developmental areas in the questionnaire can position itself into a learning outcome that can be integrated into a programme, for example, a learning outcome for an integrated numeracy programme would include a requirement for the learner to have a concept of his/her body in space by using concepts such as in "in front", "behind", "on top of" "left", "right", "top", "bottom" (Davin & van Staden, 2012; De Witt, 2011; USDHSS, 2011).

For the psychologist there are a number of areas open for possible intervention strategies and for planning programmes around specific domain elements, such as social regulation behaviour of conflict resolution, developing social competencies, emotional regulation, labelling and identifying feelings and developing self-confidence. As Bustin (2007) concludes in her findings on social-emotional development “if we identify those behaviours that predict social functioning and school adjustment we can design programmes that facilitates children’s competence”, (p 149). There are many opportunities for succinct intervention plan, with intervention in the early years having been shown to prevent maladaptive developmental trajectories for positive outcomes (Luby et al., 2009). There are a plethora of interventions for social-emotional interventions that improve these competencies and thereby have a positive outcome on other developmental areas (Domitrovich, Cortes, & Greenberg, 2007; Webster-Stratton, 2004; Webster-Stratton, Reid, & Stoolmiller, 2008). Early identification of inhibitory control difficulties, for example, is beneficial for targeting children at risk of maladaptive outcomes (Rhoades et al., 2009).

The interdependence of domain elements lends itself to a comprehensive, holistic treatment approach that can incorporate various areas of development into intervention as each developmental domain provides information in relation to other domains. Poor fine and gross motor skills are found to impact on self-esteem, confidence and test anxiety; inadequate language skills have a bearing on behavioural and emotional difficulties; poor motivation and persistence which describe engagement in learning behaviours impact on academic outcomes; and executive function deficits such as effortful control and concentration negatively impact on school adjustment and academic competencies (Blair, 2002; Denham, Warren-Khot, Bassett, Wyatt, & Perna, 2012; Liew, Eisenberg, & Reiser, 2004; McWayne, Fantuzzo, & McDermott, 2004; Sheild, Dickstein, Seifer, Giusti, Magee, & Spritz, 2001; Stoeger, Ziegler, & Martzog, 2008; Tommerdahl, 2009).

Relevant to both the educator and the psychologist is that research shows that learning behaviour, such as motivation, persistence and flexibility, an important dimension in this research, can be taught. These types of behaviour and those from

other domains, such as emotional-social competencies, are more amenable to intervention than intelligence (McWayne, Fantuzzo, & McDermott, 2004).

The instrument also has the potential to alert those concerned to possible risk of disorder, such as examining further deviant patterns of play, atypical milestones, oppositional behaviour tendencies and tactile sensitivities. The instrument can be used for selecting children for further investigation (Lonigan, 2005).

Parental intervention is another area that can be effectively targeted from the use of this instrument. Giving parents feedback and specific recommendations for target areas based on the outcomes of the assessment fulfils the aim of testing and assessment. If recommendations and interventions do not follow assessments the purpose of an assessment may have no value in or of itself. Such specific information obtained from the results from the measuring instrument can guide specific intervention strategies. The Grade 00 measuring instrument can be used as a catalyst for both early identification and implementation of interventions based on sound and accurate measurement.

A test is only part of an assessment battery, and the Grade 00 screening instrument must be used in conjunction with other assessment procedures such as interviews, other cognitive and behavioural tests as the need arises in response to the referral question.

9.3 Limitations of the study

Any research undertaking is not without problems, and the limitations of the study must be addressed.

9.3.1 Defining the domains and dimensions of school readiness and limitations of the measuring instrument

Although great effort and care were put into determining dimensions and items that underpin relevant types of behaviour and differentiating these accurately, there was some overlap, for example, cognitive activities such as sorting objects according to colour, size, and shape could easily be reflected as perceptual behaviour. The interpersonal competency “respond to a joke with humour” is in essence a

cognitive activity, which supports the notion that development does not present itself in strict compartmentalisation and that skills merge. While not necessarily a limitation it was a question of where best to accommodate an item. This in itself confirms that the dimensions are interrelated and assert the integrated nature of development. The dimension inclusions were guided as indicated in the pilot project by what is assessed in actual classrooms (a priori rationale) and existing assessment and screening tools. Perhaps factor analyses might help to further empirically define domain specificity as Augustyniak et al. (2004) advocate in their study.

With regard to domain specificity a limitation was the somewhat inadequate inclusion and rating of the items in the General: Medical/Physical section. Respondents did not take the opportunity to provide qualitative information, although space was provided for this.

As no single measure can be conclusive, because it only measures a sample of behaviour, the selection of items for each dimension may well be challenged. Rydell et al. (2003), for example, argue that a problem with questionnaire items of emotional functioning is that they are often similar to those that actually test adaptation.

9.3.2 Limitation of the questionnaire

The length of the questionnaire definitely had an impact on the return rate, and had it been shorter, participation rates would have been much better. In aiming for inclusivity of items, as many items as possible are needed to assess a construct (Domino & Domino, 2006), however, fewer educators and parents responded (Kline, 2005). A further limitation of the study was the low rate of parental consent in most schools. Teachers were asked to distribute questionnaires to parents, thus consent rates varied across classrooms. Vitiello et al. (2011) suggest that to increase response rates, teacher approval and involvement must be increased or parents be directly recruited. A further reason for lack of or reluctance to consent was that some parents felt threatened by the assessments, believing it may be used to keep their child back in Grade 00 or that their child had been identified as being at risk and therefore was being assessed. Fear and inconvenience are factors that affect consent (Hayman, Taylor, Peart, Galland, & Sayers, 2001)

Second language issues did impact on return rates of the questionnaire, with parents not proficient in the English language battling to complete it. While many poorly resourced schools willingly participated, a disadvantage was that the parents struggled with language issues and “academic speak”. Some schools took the time to sit through with parents to complete the questionnaires, however this may lead to translator bias.

Another limitation was that inter-rater reliability could not be established as test returns from parents were incomplete. This would be material for a future study, given more resources of time and funding. Establishing relationships with parents prior to testing could be a way forward to alleviate this difficulty. Informal feedback to the researcher by parents who gave consent indicated that they recognised the value of the research but lacked the commitment to complete the questionnaire.

An interesting observation was that “refugee parents” were reluctant to give medical, birth and developmental history as they felt that this was too personal. Good data was lost as parents and teachers from the more underprivileged schools did not take time to fill in the information. There was an evident difference in the information provided from the more established schools, the educators in which appeared to have it on file. It is the practise in better functioning schools to do in-depth interviews with parents to secure family and medical and developmental backgrounds. The quality of schools undoubtedly affected response rates. Quality of schools is regulated amongst other variables by the quality of the relationships established with children as well as their parents and staff education (Wiltz & Klein, 2001).

Paucity of responses to questions was also reflective of socio-economic status. Parents from less privileged backgrounds had difficulty completing the parent questionnaires and in many cases only the educator forms were used in the statistical analyses. This was a limitation of the study as parental background and educational status were not taken into account when designing the questionnaire.

A shortcoming of the questionnaire method, as extensively discussed in Chapter 6, is its reliance on observation. Unfortunately, preschool children cannot

participate in self evaluations and teachers and parents have to be relied on. The results of this research suggest that teachers were on the whole a reliable source of observation.

9.3.3 Extraneous variables

A public servants' strike in August 2010 seriously affected the participation of underprivileged schools in the study. Lost time had to be made up for and completing a questionnaire was simply an inconvenience. For schools in which the principals were involved and committed the return rate of the questionnaires was much higher and greater quality of responses noted. While most private schools were supportive, the parents were less committed, probably due to this questionnaire being just one more thing in the business of school demands that parents face.

The ethnicity and religious background of the researcher had an impact on the participation, with certain schools being more supportive because they identified with the researcher's ethnicity.

Many variables could have affected the results in the second phase of the research, as children from the original preschools had diversified to many different schools so teaching and learning experiences differed vastly. Different schools stressed different aspects of the curriculum in the first six months, which might have cofounded some of the academic scores. Some schools place greater emphasis on language skills in the first six months whilst others do not introduce certain maths concepts until the third term of the year. Further, although standardised instructions accompanied the ESSI and VASSI tests, and were given to each participating school, it is hoped that these were meticulously followed. As there were 81 schools in the second phase of the research it was not possible to administer the tests personally. Despite these difficulties the pre-school variables did accurately predict achievement in Grade 1.

9.3.4 Sample composition

While the strength of this research makes its claim on representatively of a wide demographic and socio-economic status, there remains an uneven distribution of population groups. Coloured children represented 3.3%, while Indian children made

up 46.1% of the sample, followed by White children at 29.1% and Black children at 18.8%. The study was limited to a specific urban geographical area. Future studies could look to including rural areas in the sample. The measure could also be administered to single population groups as many schools in designated areas still only accommodate specific population groups. This would provide for the establishment of norms exclusive to a group to address culture fairness of the measuring instrument.

Grade 00 is still very much a private enterprise. While much effort has been extended in fulfilling White Paper 5's promise to establish preschool classrooms to foundation phase schools, this is limited to grade R. Very few government schools have a Grade 00 attached to them, and in effect a large segment of the population is excluded from such an important phase of schooling. Where private schools catering for the needs of the Grade 00 child do exist, in under-resourced communities the quality of instruction is hardly comparable to same-aged peers in more privileged schooling areas. Grade 00 learners are not singled out as a grade, thus a wider selection of children was automatically excluded from a potential sample. The problem is that this situation widens the gap at school entry, and children without Grade 00 exposure have to compete with the many who have been exposed to the stimulation of a structured Grade R classroom.

9.3.5 Follow-up period

A major problem with follow-up studies is the attrition rate. Although not a significant percentage in this study, it required intensive effort and time to follow up every participant in the research to ensure participation in the second phase. Given the almost two-year gap between the phases of data collection it required renewed and extensive efforts to securing and track participation of subjects. Repeated phone calls were made to parents who participated in the initial phase. Other reasons for non-participation were that a number of children had repeated either Grade 00 or Grade R and were thus not eligible for participation in the second phase; families had relocated to other provinces; two families had emigrated and two children went on an early holiday (before term end). Informal feedback from some parents and schools indicated that the Grade 00 school readiness instrument aided in the decision to keep the child behind.

9.3.6 Concluding comments on limitations

Despite development progressing in universal stages, cultural variations exist in the expressions of development. Although care was taken to ensure that items measuring constructs were not discriminatory it is likely that some would meet criticism. Psychometric measures will always carry a degree of methodological difficulty.

This research stressed the need for an ecological approach to evaluating the whole child. While the various dimensions of development were considered in the development of the whole child, it does not take into account the eco-systemic variables that influence the development. Poverty, home circumstances, previous exposure to education, quality of early environments, parents and educational backgrounds are some of the factors that influence school transitions and academic experiences.

9.4 Recommendations for future research

An outcome of any research is to provide an impetus for future research possibilities and make recommendations based on the findings. Some of these are discussed here.

As the Grade 00 school readiness screening instrument showed good predictor variables to achievement in Grade 1, a longitudinal follow-up study should be conducted with the same cohort in later grades to ascertain whether achievement is on an upward trend, is being maintained or is showing a downward trend. The implication for school readiness could also be explored for subsequent primary and secondary school grades. Much evidence remains anecdotal in reference to the link between academic competencies in later school years (senior primary and high school) and retaining children due to social-emotional immaturity in local population groups. This area could be a possible future study to see whether children lacking in the social-emotional domain would catch up cognitively with those who show overall positive profiles on the screening instrument (Hair et al., 2006).

This research instrument could be replicated with different population groups to establish culturally relevant norms, especially in the case of previously

disadvantaged groups. As educational experiences are widely different from school to school in urban areas alone, this research instrument should be implemented in various geographical locations to cross-validate the findings. Norms for rural and urban schools should also be explored, using the same measuring instrument.

In relation to separate norms, another area of future research could explore social competency and independence dimensions, and their links to cognitive capacities. An important deciding factor in school readiness assessments is social-emotional competencies and self-help behaviour. Often a lack of these skills is considered an “at-risk factor” and children are kept behind. There are large variances across cultural groups. Galindo and Fuller (2010) show in their study of Latino kindergartners that gaps in literacy and numeracy may well be due to factors other than poor social competencies. To develop greater appreciation of the role of other factors to cognitive competencies in cross-cultural samples would be worthy of further investigation.

Further investigation linking the predictor variables of cognitive, perceptual, speech and language to standardised measures of cognitive potential such as the Junior South African Individual Scales (JSAIS) might establish further criterion validity. Further studies, could also look at the relationship between the direct domains, such as cognitive, and social emotional competencies to investigate the association between these in local samples.

Some of the factors that could not be isolated in this study are the impact of certain variables that could have had an influence on academic outcomes in grade 1. These factors, such as the actual preschool experience in terms of its academic orientations, resources, school and classroom characteristics, could have contributed to the associations between school readiness profiles and achievement in Grade 1. Singling these out for investigation as they might serve moderators for future studies would contribute to the literature for children with at-risk profiles, such as second language learners, low SES, and medical risks (Hair et al., 2006).

This research presents findings for consideration by an education department that is struggling to rise above the tide of educational inequalities. Their involvement

in supporting and perhaps funding further projects emanating from this research would be of immense value. One of the problems encountered in this study was to secure the full participation and commitment of parents and teachers. Unfortunately, due to poor parental response rate, inter-rater reliability could not be established. As a directive from the Department, perhaps participation of teachers and parents could be enhanced to ensure better and more quality responses. This study could be replicated to establish findings in this regard. Educators and parents are more likely to participate if this is seen as a government initiative rather than a private research enterprise.

The findings of this research should be seriously considered; especially at policy level. Since cognitive, language and perceptual areas have strongly emerged as direct predictors of academic achievement in Grade 1, investments should be made in creating or enhancing existing literacy and numeracy programs from preschool level through to formal schooling. Greater investment must also be made into pre-school programmes to enhance the predictor variables in such research. This must be considered in the wake of the 2012 Annual National Assessments (IOL-News, 3 December, 2012) results, in which performance has raised concern over the poorly performing Mathematics marks at Grade 9 level. While foundation phase results showed improvements statistically, experience on the ground reflects differing opinions on the standard of these tests.

Although not a research focus of this study, the staggering differences in the quality and access or lack of services at Grade 00 (pre-K) could not be ignored and directly and indirectly would have affected findings. If school success can be predicted at this phase of development, government initiatives should be invested in this direction. Quantity must not be compromised for quality and educationally effective programmes (Barnett & Yarosz, 2005). Much government initiative needs to be invested into improving the quality of education at Grade 00 level. As access is increased, so should quality be raised. Government and private enterprises should fund projects to explore specific dimensions and domains of development and their influence on other areas. An area worthy of further exploration and in keeping with current research interests is in the contribution of effortful control and approaches to learning and its influence on academic success (Fantuzzo et al., 2007). It is not

enough to invest in methods (whatever they be) to improve functioning in academic subjects, but rather interventions directed at the variables that would promote academic competencies such as emotional-social competencies should also be provided.

9.5 Summary of results and conclusion

The development of the Grade 00 screening instrument has established sound psychometric properties and provides an accurate assessment of children's developmental levels and potential for success. The use of this instrument can preempt unnecessary failure at Grade 1 level by identifying risks early in a child's educational life and providing relevant interventions and sound decision-making regarding areas of risk. Failure in Grade 1 results not only in academic failure but the secondary risks of emotional difficulties, such as lowered self-esteem.

Starting school is a major milestone in a child's life and if positive can alter a child's perception of the most important stage. Thus, starting with confidence is a basis for a successful journey, whilst addressing difficulties early in life and providing the right interventions will ensure better competencies and attitudes.

This Grade 00 preschool readiness screening instrument has the potential to serve as a basis for curricular planning and a developmental approach to teaching. Teachers should teach developmentally. The cost effectiveness of this instrument is a step forward to the commitment to uplift accessibility for all of South Africa's children, not just a privileged few.

The current study should make a significant contribution to the growing literature on the significance of adopting a multidimensional assessment approach to school readiness as development is holistic and does not occur in isolated pockets.

Children enter school showing a wide diversity in skills as a consequence of normal developmental differences, as well as prior schooling and home experiences. Schools should adopt an approach to accommodate individual differences at the Grade 00 level guided by the opportunity offered by the measuring instrument. Consistent, accurate assessment is important for both research and practice as they open up

opportunities to relevant services (Shapiro, 2009). As Ackerman and Barnett (2005, p.1) argue, psychologists and “educators should discontinue using invalid tests to determine readiness for kindergarten. Such tests lead to poor decision-making, wasted funds and lost opportunity for some children”.

In summary, the results of this study provide support for early school screening based on sound psychometric properties and opportunity to determine intervention options.

This study helps to advance an understanding of the indicators that predict school readiness. At the same time it also provides a rich understanding of the complex interaction of the factors that impact on the promotion of school readiness within a multi faceted, holistic framework. Finally the research is a useful and positive contribution towards South Africa’s developing educational needs for its youngest citizens who can be steered onto a pathway of lifelong adaptive functioning. This development of the Pre-Grade R school readiness screening honours the call made by the Nelson Mandela foundation to extend a service to the country and contribute in any way for the upliftment of the disadvantaged in particular.

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UNIVERSITEIT VAN DIE VRYSTAAT
UNIVERSITY OF THE FREE STATE
YUNIVESITHI YA FREISTATA

Fakulteit Geesteswetenskappe / Faculty of the Humanities
Departement Sielkunde / Department of Psychology



31 May 2010

The Executive Director
Dept of Education and Culture
Private Bag
Durban
4000

Dear Sir

Request for permission to conduct research in the foundation phase.

As part of the research component of a PHD degree in Psychology I intend to conduct research in the foundation phase of education with grade 00 learners. My thesis will focus on the development of a screening instrument to identify at risk learners in grade 00 who are seeking admission to grade R. Their teachers and parents will be required to fill in a questionnaire in the third term (October 2010). This sample of learners will be followed through in grade 1 (June 2012) when they will be tested on scholastic skills (Reading, Spelling and Maths). This will be in the form of a group test which will be administered by the researcher and would take about 50 minutes.

As grade R is a compulsory year it has become necessary for educators and parents to rely on valid, reliable and objective criteria to make more informed decisions. Once a child repeats grade R, it reduces his or her chance of repeating another year later in the foundation phase, due to the ruling that a child may not repeat a year in the foundation phase. So careful consideration needs to be given to promotion to grade R.

Psycho-educational assessments are a costly enterprise and out of reach of most learners, parents and schools. It is the intention of the researcher to create a quick, practical, cost and time effective screening instrument for widespread use by teachers and practitioners that will add value to South African research. It becomes a responsibility in this multicultural society with a high degree of integration and equally wide economic and social disparity to provide access to cost effective testing and interventions. Developing a screening devise of this nature would be work *towards* creating a relevant product suited to the unique needs of a diverse South African population.

The tests will be delivered and picked up by the researcher to the participating schools for the educators to complete at a time suits them best. The same test will be given to parents to be completed at home. This will allow the researcher to draw comparisons between the teacher's and parent's perception of the child. This would not disrupt any teaching time and would in fact assist teachers in their end of year assessments of the child. The results of the study, which will in essence be the creation of an instrument, will be given to the schools that participated in the study. The department would also be given a copy.

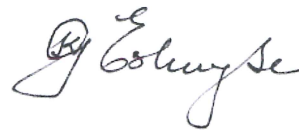
Letters explaining the nature of the study will be sent to the parents for their permission to administer the questionnaire to their child.

The university would be happy to let the department have a copy of the research. The research should add to the growing body of knowledge and in a country where a sound education is still a “privilege” it is important to assist in making testing and interventions more accessible.

Yours sincerely



Shireen. A. Mohamed
Educational Psychologist &
PHD Student (Child Psychology)



Prof. K.G. F. Esterhuyse
Head of Department (Psychology)

**PROVINCE OF KWAZULU-NATAL
DEPARTMENT OF EDUCATION
UMLAZI DISTRICT**

CLUSTER A MANAGEMENT CENTRE

Ethekekwini REGION

**ISIFUNDA SASETHKEKWINI
STREEK**

eTHEKEKWINI

6 ACTON ROAD, UMBILO, 031 2741900

May 2010

Dear Principal

Permission to conduct a longitudinal research for the development of a screening instrument for at risk learning difficulties in grade 00 in 2010 and grade 1 in 2012

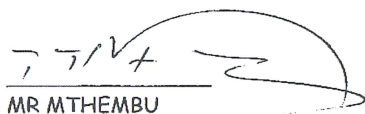
The Department of Education has granted Shireen Mohamed, a PhD student at the University of Free State, permission to conduct a longitudinal research in the Durban Schools, for the period 2010 and 2012.

The research is fully supported by the department as it sees benefit for education as a whole as well as the department in the early identification of at risk learners for learning difficulties. It further supports this process, as the intention is to create a cost effective measuring instrument to benefit all learners. A scientifically valid, reliable and easily accessible measuring instrument will add value to the assessment process of young learners.

The department wishes Mrs. Mohamed every success in the research and looks forward to receiving a copy of the findings.

The support of the schools is highly appreciated.

Yours faithfully


MR MTHEMBU
S.E.M. CITY WARD

**PROVINCE OF KWAZULU-NATAL
DEPARTMENT OF EDUCATION
UMLAZI DISTRICT**

CLUSTER A MANAGEMENT CENTRE

Ethekwini REGION

ISIFUNDA SASETHEKWINI

eTHEKWINI STREEK

6 Acton Road Umbilo, Durban 4001

☎ 031 2741900

February , 2012

Dear Principal

Permission to conduct a longitudinal research for the development of a screening instrument for at risk learning difficulties in grade 00 in 2010 and grade 1 in 2012

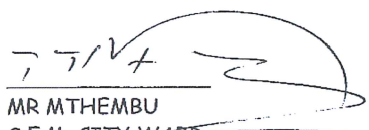
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The department wishes Mrs. Mohamed every success in the research and looks forward to receiving a copy of the findings.

The support of the schools is highly appreciated.

Yours faithfully


MR MTHEMBU
S.E.M. CITY WARD



25 August 2010

Dear Principal

As part of the research component of a PHD degree in Psychology I intend to conduct research in the foundation phase of education utilizing grade 00 learners over a three year period, beginning this year in the fourth term (October 2010). My thesis will focus on the development of a screening instrument to identify at risk learners in grade 00. This sample of learners will be followed through in grade 1 (June 2012) when they will be tested on scholastic skills (Reading, Spelling and Math's). The aim of the follow up in grade 1 is determine the predictive value of the instrument in terms of academic performance. This would ultimately lead to the construction of reliable and valid screening instrument for the grade 00 year.

As grade R is a compulsory year it has become necessary for educators and parents to rely on valid, reliable and objective criteria to make more informed decisions. Once a child repeats grade R, it reduces his or her chance of repeating another year later in the foundation phase, due to the ruling that a child may not repeat twice in a phase. In view of that careful consideration needs to be given to promotion into grade R.

Psycho-educational assessments are a costly enterprise and out of reach of most learners and, parents and schools. It is the intention of the researcher to create a reliable valid, practical, cost and time effective screening instrument for widespread use by teachers and practitioners that will add value to South African research.

I am keenly aware of the years of experience you have in this field and would value your participation greatly. I will leave a set of questionnaires at the school ready to be used for administering. A coding system will be used to identify the child's name so that he /she could be correctly included in the sample again in grade 1. The grade 00 teacher is kindly requested to complete the checklist on each child. **This would not disrupt any teaching time and would in fact assist teachers in their end of year assessments of the child.** The teacher is welcome to use this checklist for their personal assessment of the child this year. The educator will not be required to score the checklist. I will collect the questionnaires once they are completed and will feedback the findings once the research is completed.

Please encourage your parents to participate in the research.

Yours sincerely

Shireen. A. Mohamed
Educational Psychologist &
PHD Student (Child Psychology)

Prof. K.G.F. Esterhuysen
Head of Department (Psychology)

UNIVERSITEIT VAN DIE VRYSTAAT
UNIVERSITY OF THE FREE STATE
YUNIVESITHI YA FREISTATA

Fakulteit Geesteswetenskappe / Faculty of the Humanities
Departement Sielkunde / Department of Psychology



30 May 2010

Dear Parent

Permission for your child's educator to administer a screening test to assess your child's levels of readiness for grade R.

As part of the research component of a PHD degree in Psychology I intend to conduct research in the foundation phase of education utilizing grade 00 learners in the third term (October 2010). My thesis will focus on the development of a screening instrument to identify at risk learners in grade 00 children who are seeking admission to grade R. This sample of learners will be followed through in grade 1 (June 2012) when they will be tested on scholastic skills (Reading, Spelling and Math's). This will be in the form of a group test which will be administered by the researcher and would take about 50 minutes.

As grade R is a compulsory year it has become necessary for educators and parents to rely on valid, reliable and objective criteria to make more informed decisions. Once a child repeats grade R, it reduces his or her chance of repeating another year later in the foundation phase, due to the ruling that a child may not repeat a year in the foundation phase. So careful consideration to transition to grade R becomes even more important.

Psycho-educational assessments are a costly enterprise and out of reach of most learners and, parents and schools. It is the intention of the researcher to create a quick, practical, cost and time effective screening instrument for widespread use by teachers and practitioners that will add value to South African research. The questionnaire would also give scientific validation to the ad hoc observations and practices that are generally relied on.

Upon completion of the research, which would result in the creation of a testing instrument for the benefit of the learner, the school would be given a copy of the test for use in the future. Your child will remain anonymous and all the information is highly confidential. In grade 00 (October 2010) the teacher will complete a questionnaire assessing the child's levels of functioning. The parent will also be given the same questionnaire to complete at home. This will allow the study to draw comparisons between teacher and parent ratings. In grade 1 (June 2012) the learners will be tested on scholastic skills (Reading, Spelling and Math's). This will be in the form of a group test which will be administered by the researcher and would take about 50 minutes. A comprehensive coding system has been designed to enable the researcher to follow the learner through to grade 1.

Thank you for taking the time to read this letter.

Yours sincerely

Shireen. A. Mohamed
Educational Psychologist &
PHD Student (Child Psychology)

Prof. K.G.F. Esterhuysen
Head of Department (Psychology)



30 May 2010

Letter to the School

Dear _____

As part of the research component of a PHD degree in Psychology I intend to conduct research in the foundation phase of education utilizing grade 00 learners over a three year period beginning this year in the third term (October 2010). This sample of learners will be followed through in grade 0 (2011) and grade 1 (2012). My thesis will focus on the development of a screening instrument to identify at risk learners in grade 00 children seeking admission to grade R.

As grade R is a compulsory year it has become necessary for educators and parents to rely on valid, reliable and objective criteria to make more informed decisions. Once a child repeats grade R, it reduces his or her chance of repeating another year later in the foundation phase, due to the ruling that a child may not repeat a year in the foundation phase. So careful consideration to transition to grade R becomes even more important.

Psycho-educational assessments are a costly enterprise and out of reach of most learners and, parents and schools. It is the intention of the researcher to create a quick, practical, cost and time effective screening instrument for widespread use by teachers and practitioners that will add value to South African research.

I am keenly aware of the years of experience you have in this field and would value your input greatly. I will leave a set of questionnaires at the school ready to be used for administering. A coding system will be used to identify the child's name so that he /she could be correctly included in the sample again in grade R. The grade 00 teacher will have to complete the questionnaire on each child. Once completed I will collect the questionnaires. I will score and analyse and feedback the findings by January 2011.

The reason to follow up the grade 00 sample into grade R is to determine the predictive value in terms of academic performance.

Yours sincerely

A handwritten signature in black ink, appearing to read 'K.G.F. Esterhuyse'.

Shireen. A. Mohamed
Educational Psychologist &
PHD Student (Child Psychology)

Prof. K.G.F. Esterhuyse
Head of Department (Psychology)

1 March 2012

Dear Principal

Longitudinal research project -2010-2012

As part of the research component of a PHD degree in Psychology, I am gathering data for the second part of my longitudinal research. A large sample of learners was assessed in grade 00 in the fourth term of 2010. This sample of learners is now being followed through in grade 1 (June 2012). They will be tested on scholastic skills (Reading, Spelling and Maths). The aim of the follow up in grade 1 is to determine the predictive value of the measuring instrument constructed for the purposes of this study. This would ultimately lead to the construction of a reliable and valid screening instrument to identify learners at risk for learning prior to formal school entry.

As grade R is a compulsory year it has become necessary for educators and parents to rely on valid, reliable and objective criteria to make more informed decisions. Once a child repeats grade R, it reduces his or her chance of repeating another year in the foundation phase, due to the ruling that a child may not repeat twice in a phase. In view of this, careful consideration needs to be given to their promotion into grade R.

Psycho-educational assessments are a costly enterprise and out of reach of most learners, parents and schools. It is the intention of the researcher to create a reliable valid, practical, cost and time effective screening instrument for widespread use by teachers and practitioners that will ultimately add value to South African research and address the needs of its children.

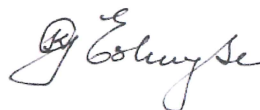
The learners will be tested on standardised tests normed for South African children. Spelling (15 words) and Maths (20 sums) are group tests and Reading (15 words) is individually administered. The entire testing should take no longer than 45 minutes. The end of the second term (June 2012) is targeted. Prior arrangements will be made to avoid any disruption to the schools program.

Parents' permission has been secured. A reminder letter will be sent to them. I have attached a copy for your records. I have also attached a list of names of the children who according to records are attending your school. The letter of permission from the department is also attached. I look forward to your support.

Yours sincerely



Shireen. A. Mohamed
Educational Psychologist &
PHD Student (Child Psychology)



Prof. K.G.F. Esterhuysen
Head of Department (Psychology)

1 March 2012

Dear Parents

Standardised testing as a follow up of your participation in a research project in 2010.

I greatly appreciated your voluntary participation in my research in 2010. You and your child's teacher completed a questionnaire assessing your child's level of functioning in grade 00. As indicated at the outset, I would be testing them on South African normed and standardised tests in Reading, Spelling and Maths in June 2012. School personnel will most likely administer the tests which should not take more than 45 minutes. You will not have to complete any questionnaire this time. Only the children will be tested. The tests will provide the child's level of performance in each of the above areas and will be a good benchmark in terms of their progress. Results will be made available.

My sincere thanks to you once again. Your participation in this research is a step forward for the enhancement of children's educational needs in South Africa.

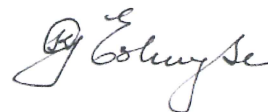
Should you have any query please do not hesitate to contact me on 0822025667 or via e mail

samohamed@telkomsa.net).

Yours sincerely



Shireen. A. Mohamed
Educational Psychologist &
PHD Student (Child Psychology)



Prof. K.G.F. Esterhuysen
Head of Department (Psychology)

The short version of the measuring instrument

Domain	Items
Cognitive	Do quantity comparisons: “larger”, “heavier”, “bigger than”, “more than”. Classify or group according to common themes e.g. people, animals, transport, all the red objects.. Show curiosity. Show initiative in trying out new things
Perceptual	Orientate an object in relation to another by following the instructions- “under,” “behind”, “above” “in front of” or “next to”. Point to most large and small body parts. Give the functions of different body parts e.g. Why do you have ears. *Ask for repetitions. *Have difficulty in remembering things heard. Build a puzzle of 15-25 pieces or more by matching colours or features rather than by trial or error.
Neurological	Begin to cut around curved lines Control scissors and cut along a straight line. Throw a beanbag or ball overhead Jump with two feet together *Hook feet around chair legs as a means of supporting/stabilising the upper body. *Lie on the desk when writing or drawing
Speech	Easily follow a story he/she tells. *Mispronounce similar sounding letters in words e.g. m/n; b/d; d/t. (mum/nun; that/dat.) *Often leaves out parts of words (syllable deletion), e.g. “umbrella/ brella” / Have sufficient vocabulary to give details about him/herself, family/ environment
Emotional	*Fearful of new situations. Show empathy e.g. when someone is hurt. Recognise how others feel. *Become easily frustrated or angry *Become easily upset (cry for every little problem) Adapt to change with ease.
Social	Play imaginatively with playmates. Engage confidently in a conversation with adults other than his/her parents/ teacher. Take turns in a conversation and respond to what the person is saying. *Disturbs others play. *Always insist on his/her own way Play with other children. Say “thank you” when given something. Say “please” when he/she wants something
Developmental	*Get easily distracted. *Talk to avoid the task at hand. *Blink a lot. *Rub eyes constantly.
Independence	Unpack/pack bag by him/ herself. Use a fork, or spoon competently. Dress/undress him/ herself independently. Look after his/her belongings/possessions.

Note: * Reversed items

The Comprehensive Version of the Screening Instrument

Domain	Dimension	Item
COGNITIVE	Ability	4. Do quantity comparisons: "larger", "heavier", "bigger than", "more than".
		6. Classify or group according to common themes e.g. people, animals, transport, all the red objects..
		5. Put events into sequence.
		2. Count objects by word and touch in one to one (i.e. tally counting) up to at least ten to fifteen
	Approach to learning	10. Sort objects according to colour, size and shape.
		15. Show curiosity.
		18. Show initiative in trying out new things
		14. Ask When, Why and How questions.
PERCEPTUAL	Body awareness	20. Show a willingness to learn.
		13. Use his/her own initiative to solve a problem.
		17. Point to most large and small body parts.
	Auditory	18. Give the functions of different body parts e.g. Why do you have ears.
		19. Identify body parts on someone else.
		12. *Ask for repetitions.
		11. *Have difficulty in remembering things heard.
	Spatial ability	13. *Have difficulty remembering nursery rhymes, songs and poems.
		14. Repeat or sing several nursery rhymes correctly
		4. Build a puzzle of 15-25 pieces or more by matching colours or features rather than by trial or error.
		5. Orientate an object in relation to another by following the instructions- "under," "behind", "above" "in front of" or "next to".
		8. Copy a model made from blocks that you demonstrate with several blocks e.g. train, bridge, chair.
NEUROLOGICAL	Fine motor	20. Name the position of different body parts e.g. my legs are below my head, not above it.
		6. Use eyes and hands together with increasing skill e.g. threading beads.
		23 Begin to cut around curved lines
		22 Control scissors and cut along a straight line.
	Gross motor	25 Draw a person with major body parts.
		29 Colour in fairly neatly within the lines of a picture
		28 Cut a picture and then glue it onto a piece of paper
		2 Throw a beanbag or ball overhead
		8 Jump with two feet together
	Low tone	3 Catch a beanbag or a bouncing ball against his/her chest with his arms
		4 Stand on one foot for 5-8 seconds
		5 Hop on one foot for 3-5 seconds
14 *Hook feet around chair legs as a means of supporting/stabilising the upper body.		
SPEECH	Language	15 *Lie on the desk when writing or drawing
		17 *Support his body against a surface such as a wall or desk when standing.
		13 *Rest his/her head in the "free hand" (non-dominant) when drawing, writing and colouring, instead of supporting the page.
		18 *Accident prone i.e. bumps into things, people, and trips over objects.
	Speech	26 Have sufficient vocabulary to give details about him/herself, family/ environment
		19 Easily follow a story he/she tells.
		27 Hold a simple conversation,
		24 Say in his/her own words what he/she is doing.
		18 Tell and retell a story in the correct sequence.
		12 *Mispronounce similar sounding letters in words e.g. m/n; b/d; d/t. (mum/nun; that/dat.)
		14 *Often leaves out parts of words (syllable deletion), e.g. "umbrella/ brella" /
		10 *Rearrange the sequence of sounds e.g. hospital/hostipal; shiver/shriver, fluttereby/butterfly/ psgetthi/spaghetti.
		13 *Have difficulty discriminating between similar sounds (poor auditory discrimination). e.g. "bat/bad".
		9 *Present with sequencing difficulties (reverses words) in sentences when repeating them e.g. Open the door/the door open; the brown dog/the dog brown.
		9. Show empathy e.g. when someone is hurt.
		10. Recognise how others feel.
		11. Demonstrate affection e.g. by hugs or kisses or words.

EMOTIONAL	Empathy	12. Enjoy it when others give affection.
		8. Show remorse.
		26. Recognise other's feelings (mad, sad, glad, bad)
	Emotional regulation	1. *Become easily frustrated or angry
		5. *Express noticeably different moods within a day
		2. *Become easily upset (cry for every little problem)
		3. Maintain a fairly even temper throughout the day.
		4. *Have evident good/bad days
	Self confidence	13. *React in excess to even a minor injury
		15. *Fearful of new situations.
		22. Adapt to change with ease.
		14. Try things never done before.
23. Make a choice between two items.		
SOCIAL	Interpersonal competencies	17. *Clingy or anxious.
		24. Finish a given task/activity without asking every few minutes whether it is right.
		2. Engage confidently in a conversation with adults other than his/her parents/ teacher.
		3. Take turns in a conversation and respond to what the person is saying.
	Social regulation behaviour	4. Respond to a joke with humour.
		5. Use words effectively to make a request.
		20. *Disturbs others play.
		26. *Always insist on his/her own way
		8. Wait his/her turn.
	Social graces	10. Settle conflict by verbally communicating rather than fighting, hitting or grabbing.
		27. Comply with teachers/parents/adults requests
		9. Share a toy or food with peers.
7. Say "thank you" when given something.		
6. Say "please" when he/she wants something		
Play	29. Help others when needed.	
	23. Offer help.	
	22. Greet people (adults and children).	
	14. Play with other children.	
	15. Play imaginatively with playmates.	
DEVELOPMENTAL	Concentration	18. *Refuse to join others in play.
		16. Seek the company of other children
		13. Engage in meaningful play.
		17 *Get easily distracted.
	Sensory	18 *Talk to avoid the task at hand.
		16 *Fidget, squirm and rock on the chair
INDEPENDENCE	19 *Have difficulty following instructions carefully.	
	24 *Get bored shortly after starting a task.	
	1 *Blink a lot.	
	2 *Rub eyes constantly.	
	10 Respond when you call his/her name.	
	7 *Holds object or drawing paper too close	
	5 Find objects within his/her field of vision	
	1 Unpack/pack bag by him/ herself.	
2 Use a fork, or spoon competently.		
6 Dress/undress him/ herself independently.		
7 Look after his/her belongings/possessions.		
8 Seek help in an emergency.		

Note: * Reversed items