12. The Griffiths Mental Development Scales: an overview and a consideration of their relevance for South Africa

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The Griffiths Mental Developmental Scales (GMDS) is one of a variety of tests available for assessing the development of young children. It consists of two separate developmental scales, one scale for infants and toddlers (aged 0–2 years) and the other for young children (aged 2–8 years), making it one of the few developmental tests that can be used to assess children from birth across all areas of their development.

The GMDS was developed in the UK in 1954 by Ruth Griffiths, who observed children in their natural environments while they were engaged in their everyday activities. Griffiths’s purpose was to develop an instrument that contained a comparative profile of abilities across various domains of development, and which would facilitate early diagnosis of deficits in child development. Although standardised in the UK, the GMDS is widely used throughout the world and is especially popular in South Africa (Luiz, Oelofsen, Stewart & Michell, 1995).

In South Africa, testing and assessment have been heavily criticised as possessing limited value for culturally diverse populations (Foxcroft, 1997; Nzimande, 1995; Sehlapelo & Terre Blanche, 1996). Despite these criticisms, it has also been pointed out that, regardless of its flaws, testing remains more reliable and valid than any of the limited number of alternatives. It is argued that since testing plays a crucial role within assessment internationally, the focus should be on valid and reliable tests for use within multicultural and multilingual societies (Plug in Foxcroft, 1997). Thus, one of the aims of this chapter is to determine the extent to which the GMDS is a valid and reliable measure for assessing the development of South African children.

The original GMDS has been extensively researched and compared to other commonly used developmental tests and shown to be valid (Luiz, Foxcroft & Stewart, 2001). Subsequent to the revision of the GMDS Infant Scales in 1996 and the Extended Scales for older children in 2004, research emerged that assessed the strengths and weaknesses of the revised scales, much of which has been done in South Africa (for example, Laughton et al., 2010b; Luiz, Foxcroft & Povey, 2006). What follows is an overview of this research, preceded by a brief description of the GMDS.
The development and structure of the GMDS

The GMDS was developed sequentially as two complementary tests – namely, ‘The Abilities of Babies’ (1954) for infants and toddlers (0–2 years) and ‘The Abilities of Young Children’ (1970) for older children (2–8 years – also referred to as the Extended Scales), a structure which is still in place. Subsequent to the development of the GMDS by Ruth Griffiths, substantial gains in the cognitive and developmental abilities of children have been noticed (Flynn & Weiss, 2007; Lynn, 2009). Referred to as the ‘Flynn effect’, these gains indicate that child development is dynamic and suggest that regular renorming of the GMDS is essential. The first revision of the GMDS commenced in 1996, when a comprehensive review of the infant and toddlers scales was undertaken (Huntley, 1996). In 2004, the GMDS Extended Scales were revised following extensive research, with key participation by South African researchers who led the process (Luiz, Barnard, Knoesen, Kotras, McAlinden & O’Connell, 2004). The descriptions of the scales below refer to these revised versions, unless otherwise indicated.

The GMDS Infant Scales

The Infant Scales consist of five scales (A–E), each evaluating an important dimension of early development. The Locomotor Scale (Scale A) measures developing gross motor skills important for an upright posture, walking, running and climbing. It allows for the observation of physical weakness or disability or defects of movement. The Personal-Social Scale (Scale B) requires more input from the primary caregiver than the other scales, as it measures early adaptive and self-help behaviour typically seen at home, as well as social behaviour that develops through early adult–child interactions. The Hearing and Speech Scale (Scale C) is considered to be the most intellectual scale and evaluates the development of language, by measuring responses to environmental sounds and speech as well as the production of sounds and words. The Eye and Hand Coordination Scale (Scale D) consists of items requiring fine motor handwork and visual ability. It assesses manipulative skills such as visual tracking, reaching and grasping, pen-and-paper skills and object manipulation. The Performance Scale (Scale E) evaluates manipulation skill, speed and precision of work. It assesses the application of developing skills in novel situations and examines simple object exploratory behaviour, object permanence and manipulation of form-board items (Huntley, 1996).

The GMDS is criterion-referenced in nature, and so the child is compared to an established criterion and not to another child. This is important for cross-cultural assessment, as it assesses the degree of mastery of the individual and serves to describe rather than to compare performance. The manual for the Infant Scales allows for raw scores to be converted into a subquotient for each of the five scales, an overall General Quotient (GQ), age in months or percentiles. Expressing the score as a percentile has a number of uses as it allows the professional to track a child’s development over an extended time period using both versions of the GMDS.
Each scale is equally weighted, which allows for the generation of a developmental profile that can be used to produce a visual representation of the strengths and weaknesses of the child. This can be particularly useful when reporting the results to the layperson who may not otherwise understand them (Huntley, 1996). In resource-limited communities, the profile can also guide referral decisions, such as which of the allied medical disciplines will be of greatest assistance to the child. Profiles can also provide a description of a child with a particular disability or syndrome; for example, children with autism show characteristic weaknesses in the Personal-Social, Hearing and Practical Reasoning Scales, and relative strengths in the other scales (Gowar, 2003). A scale can be used in isolation by researchers wishing to investigate a particular developmental domain, as demonstrated by Giagazoglou, Kyparas, Fotiadou and Angelopoulou (2007), who studied the effect of maternal education on the motor development of a child.

In the selection of an assessment tool for research or for clinical practice, the validity and reliability of the tool are important, particularly with reference to the community of the child who is to be tested. The normative sample that was used for the Infant Scales was drawn from six regions in the UK, with the majority coming from an urban community (488:177; urban: rural) and an over-representation of boys (366:299; boys: girls). All the mothers of the sample spoke English to their children. Those children who were known to have a severe disability were excluded (Huntley, 1996). The socio-economic distribution was biased in favour of the higher classes when compared to the 1991 British national census. It must be borne in mind that the normative sample was therefore potentially biased in favour of a higher-functioning group of children (Reyes, Pacifico, Benitez, Villanueva-uy & Ostrea, 2010). The distribution curve of the normative scores for the Infant Scales showed a mean of 100.5 with a standard deviation of 11.8.

Statistical evaluation of the test found the reliability of the tool to be adequate. The internal consistency of the items was measured using a split-level method, and the resulting correlation coefficient, which was corrected using the Spearman-Brown formula, was 0.95. An average standard error of measurement (SEM) of 2.8 was obtained across all the ages and subscores of the Infant Scales, representing an acceptable level of accuracy (Huntley, 1996).

In children who are very young, the development of functional skills can vary widely from one construct to another; for example, one toddler may be more advanced in speaking but relatively slow to walk, whereas another may show the opposite development. It is therefore important to be able to ascertain when the variation in scores from one developmental skill or construct to another is significant, and equally important to ascertain whether the difference between the GQ and a subquotient is statistically significant. When the reliability was calculated for the Infant Scales, it was found that a difference as high as 22 points between subquotients is acceptable (1 per cent confidence) before further investigation or intervention is required (Huntley, 1996). For an illustration of this, see Table 12.1.
Confidence that the test can be trusted to accurately measure the same functional skills over a period of time in the same child is important. This test-retest stability is essential where any form of sequential evaluation is done, whether in research or in clinical practice. The test-retest reliability on the Infant Scales is low under one year of age (ranging from .28 to .48), but highly reliable from the second year onwards (ranging from .82) (Huntley, 1996). This indicates some difficulties with the Infant Scales. In addition, for professionals working with significantly delayed children, the inability to convert raw scores into a meaningful score if the child’s performance is more than two standard deviations below the norm limits the use of the scales in tracking the developmental progress of such children (personal experience and verbal communication with Laughton, 2010). The poor transition from the Infant Scales into the Extended Scales for older children is another weakness (Laughton et al., 2010b). This problem has been identified by the Association for Research in Infant and Child Development (ARICD), which is responsible for monitoring the quality of administration of the GMDS. The ARICD is undertaking a revision of the GMDS which will address the poor correlations between the Infant and the Extended Scales (personal communication with Elizabeth Julyan, 16 June 2010).

South African research on the GMDS Infant Scales

Most of the South African research on the GMDS has focused on the Extended Scales (for example, Allan, 1988; 1992; Bhamjee, 1991; Heimes, 1983; Luiz et al., 2006; Luiz et al., 2001; Mothule, 1990; Sweeney, 1994; Tukulu, 1996). To date, reliability and validity studies have not been conducted in South Africa on the 1996 revision of the Infant Scales, although preliminary studies of face and construct validity have been conducted on the Extended Scales (Barnard, 2003; Kotras, 2003; Luiz, 1994; Luiz et al., 2006; Luiz et al., 2001). Given the difficulty related to the use of appropriate assessment tools with South Africa’s culturally diverse population, and since the British norms are currently used as an evaluation standard for the performance of South African infants, we report here on studies that attempted to determine the appropriateness of the Infant Scales for South African infants.

Amod, Cockcroft and Soellaart (2007) compared the performance of 40 black infants between 13 and 16 months, residing in Johannesburg, to the normative sample of the Infant Scales. Although the groups were not demographically identical, an attempt was made to control for extraneous variables which could

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**Table 12.1** GMDS Infant Scales minimum difference between subquotients, and between subquotient and GQ, required for statistical significance

<table>
<thead>
<tr>
<th>Level of significance</th>
<th>Subquotient/GQ</th>
<th>Subquotients</th>
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<tr>
<td>5%</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>1%</td>
<td>18</td>
<td>22</td>
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*Source: Adapted from Huntley (1996).*
influence the results – namely, age, developmental normality and urban or rural residence – by holding them constant in the analyses, while the variables gender and socio-economic status were controlled for by including them in the research design. The South African infants performed significantly better on the Eye-Hand Coordination and Performance Scales, but significantly poorer on the Personal-Social Scale relative to the normative sample, suggesting differences between the developmental rate of the British and South African infants, with each culture appearing to support a distinct aspect of development. A tentative explanation for the better performance of the local infants is the concept of African infant precocity, first advanced by Falade (1955), who found that Senegalese infants assessed on the Gesell Developmental Screening Inventory were significantly more advanced in areas of fine motor development, eye-hand coordination, problem-solving and object permanence than matched Caucasian American infants. Similar results were obtained with Ugandan infants (Gerber, 1958), Nigerian infants (Freedman, 1974) and African South African infants (Lynn, 2009; Richter-Strydom & Griesel, 1984).

The other main finding from the Amod et al. (2007) study was that the British sample performed significantly better than the local sample on the Personal-Social Scale. Since this scale may be influenced by socio-cultural and/or emotional differences (Griffiths, 1984), this difference could be related to varied child-rearing practices across the two cultural groups. Furthermore, the Personal-Social Scale is one of the least cognitive scales of the GMDS, and requires more input from primary caregivers than the other scales because it measures self-help behaviours typically seen at home, as well as social behaviour that develops through early adult–child interactions (McLean, McCormick & Baird, 1991). Aldridge Smith, Bidder, Gardner and Gray (1980) also found that the Personal-Social Scale of the 1970 version of the GMDS was more sensitive to use by different assessors when evaluating the development of infants from 6 months to 7.25 years, suggesting that results obtained from this scale should be interpreted with caution.

Some previously reported findings do not concur with those of Amod et al. (2007). For example, an investigation of the GMDS profiles of HIV-positive black South African infants found that their mean performance on the Personal-Social Scale was above average (Kotras, 2001). However, there was considerable variability among the infants’ scores, with some infants performing extremely well and others performing well below the average range. Kotras suggested that infants raised in low socio-economic environments are sometimes left with little or no supervision, and hence become more independent at personal-social tasks such as dressing and undressing, holding a cup or using a spoon. The Personal-Social Scale from the Extended Scales shows the lowest correlation with the GQ, which may be indicative of that scale’s cultural bias and of the possibility that it may be measuring attributes different from the other scales (Luiz et al., 2001). Whether this holds for infants as well needs to be determined, but this may be one of the reasons for the difference obtained on this scale by Amod et al. (2007).

In general, the results of Amod et al.’s (2007) study confirmed those of other local studies (Kotras, 2001; Luiz, 1988a; 1988b; 1988c; 1994; Luiz et al., 2001)
that have shown the GMDS (for both infants and children) to be measuring a construct that is consistent across cultures. However, there were also some differences in performance between the South African sample and the norm group that could be attributed to cultural bias in the Infant Scales. Consequently, an examination of item bias or score comparability with a larger sample is necessary to determine whether members of different cultural groups demonstrate specific patterns of responses (Owen, 1991).

A major factor that has been found to affect test performance is level of education, both that of the testee and that of his or her parents (Kriegler & Skuy, 1996; Skuy, Schutte, Fridjhon & O’Carroll, 2001). This means that the use of available internationally relevant tests in South Africa would be a viable option, but only for educated and Westernised individuals, and that less literate, less Westernised and less educated groups may require the development of new and culturally appropriate measures (Nell, 1997). In this regard, Cockcroft, Amod and Soellaart (2008) compared the performance of infants with educated, professionally employed and less educated, nonprofessional mothers on the Infant Scales. The sample consisted of 40 black South African infants aged between 13 and 16 months (21 boys and 19 girls) residing in Johannesburg. The distinction between infants with highly educated, professional mothers and those with less educated, nonprofessional mothers was based on level of education and occupation of the infant’s mother. Fifty per cent of the mothers had some tertiary education and were employed in professional occupations. Of the remainder, 27.5 per cent had received 12 years of formal education, while 20 per cent had completed 10 years of formal education and 2.5 per cent of the mothers had 7 years or less of formal education. None of the latter three groups of mothers were employed in professional occupations. The infants with highly educated, professional mothers performed significantly better than infants with less highly educated, nonprofessional mothers on the GQ and the Locomotor Scale. Allan (1988; 1992) found significant differences between high and low socio-economic English and Afrikaans groups on the GQ and the Hearing and Speech, Eye-Hand Coordination, Practical Reasoning and Performance Scales, although his sample consisted of 5-year-old children. The discrepancy in the ages of the samples in the Allan (1988; 1992) and Cockcroft et al. (2008) studies may partly account for the variation in scales of the GMDS in which differences were found. The effects of maternal level of education and, by association, socio-economic status may become more marked as the child develops, accounting for the more pervasive differences found by Allan.

While home environment plays an important role in the cognitive and academic outcome of high-risk infants, findings are inconsistent with regard to its influence on motor skills (Sommerfelt, Ellertsen & Markestad, 1995). The development of gross motor skills appears to be differentially influenced by the home environment, with infants from lower socio-economic groups performing significantly more poorly than their wealthier counterparts (Goyen & Lui, 2002). This may subsequently impact on their general intellectual functioning, as motor development during these formative years provides a foundation for subsequent development and optimises occupational performance in the areas of self-care,
learning, recreation and play. Further evidence for the close connection between gross motor functioning and intellectual and social development is revealed by the findings of Luiz et al. (2006). Within their sample of 180 4–7-year-old South African children, the more discrete cognitive, motor and personal-social functions tapped by the GMDS were not clearly delineated when subjected to a factor analysis. With the exception of the Performance Scale, all of the scales seemed to tap complex skills or more than one construct, and aspects of the constructs tapped appeared to differ for the various age groups in the study. These findings would support the proposal that the differences found between the infants on the GMDS may become more pronounced and/or widespread with age, and/or that the Infant Scales may overestimate performance in the first year of life. The latter reflects the instability of development in the very young child, and is common to all developmental measures used on infants under one year old.

Further support for this proposal comes from Laughton et al.’s (2010a) longitudinal study of the developmental outcomes of Xhosa-speaking infants from low socio-economic backgrounds. The infants were assessed on the Infant Scales at 10–12 months and again at 20–22 months. Their performance was in the average range at the first assessment and decreased significantly to below age-appropriate levels by the second assessment. The decline in performance was unexpected, and is incongruous with the British norms which do not show such a decline. Possible reasons for this may include the instability of the GMDS in the first year of life, the use of a cohort from only low socio-economic circumstances, and cultural bias in the GMDS. The Hearing and Language Scale was the most affected, showing a decrease of more than one standard deviation. Since language development has been shown to be related to maternal education and socio-economic status (Magnuson, Sexton, Davis-Kean & Huston, 2009), the GMDS may be more discerning when testing language development as the child develops. For example, at 11 months a child is only expected to use 3 words meaningfully, identify 2 objects and try to sing, whereas at 21 months, the child is expected to use 20 words meaningfully, identify 7 objects and use word combinations. Decreases in performance were found on all of the other scales with the exception of the Locomotor Scale, suggesting that the Infant Scales may overestimate performance in the first year. This is due to the volatility in development in the first year of life, and indicates that it is critical to reassess the child after the first year in order to accurately predict functioning of children from disadvantaged circumstances.

The Infant Scales have also been used locally to assess the developmental ability of children with a range of neurodevelopmental disorders. Of these, HIV encephalopathy is currently the most common cause of developmental delay in South African children, with a prevalence of 2.5 per cent in children 12 years and younger. Laughton et al. (2009) compared the developmental outcome on the Infant Scales of four groups of children aged between 10 and 15 months. Group 1 comprised HIV-unexposed, uninfected children; Group 2 had HIV-exposed, uninfected children; Group 3 had HIV-infected children who were receiving antiretroviral treatment (ART) initiated before 12 weeks of age; and Group 4 consisted of HIV-infected children with ART deferred until immunological or
clinical criteria could be determined. As shown in Figure 12.1, Group 4 showed a significant delay in development compared to the other groups, indicating the negative impact of delaying ART.

**Figure 12.1** Developmental outcome in deferred treatment, early treatment, exposed and unexposed infants

Laughton et al. (2010a) also studied 37 HIV-affected children on ART treatment and 41 controls from the same community. The children were followed up over a period of 30 months and tested four times (at approximately 10-, 21-, 31- and 42-week intervals) using both the Infant and Extended Scales. It was found that the HIV-affected group’s locomotor development was initially impaired, but improved to average levels at 42 months. In contrast, performance on the Personal-Social Scale deteriorated significantly in the HIV-affected children. Of significance is that there was a steady decline in the performance of both the HIV-affected children and the control group, again suggesting that the Infant Scales should be used with caution when predicting later developmental outcomes in local populations.

**The Extended Scales**

The Extended Scales for children aged 2–8 years differ in structure from the Infant Scales by the addition of the Practical Reasoning Scale, which appraises
the child’s arithmetical insight and problem-solving skills. The interpretation of the raw score in the 2006 revision of the Extended Scales is norm-based and is not represented as a coefficient, as it was in the first version of the test. The manual allows for scores to be presented as an age equivalent, z-score or percentile.

Prior to the revision of the Extended Scales, systematic research was conducted into the psychometric properties of the scales. It was found that they all tap the same underlying construct – namely, general intelligence, which appeared to be consistent across cultures (Luiz et al., 2001). The research was then extended to determine the construct validity of the items within each scale across three age groups – namely, 5, 6 and 7 years. The results showed that many of the scales tapped more than one construct, and some overlapped. Further, there was also evidence of a cultural bias in the Personal-Social Scale. Magongoa and Venter (2003) used the original version of the GMDS extended scales to examine potential developmental differences between rural black children with well-controlled clonic-tonic epilepsy and typically developing controls. Unsurprisingly, the children with epilepsy performed significantly lower than the controls. Interestingly, the controls obtained quotients between 113 and 120 on all but the Eye and Hand Coordination and Performance Scales. This better-than-average performance suggests that the developmental acceleration found by Flynn and Weiss (2007) and Lynn (2009) is also present in developing communities, and supported the need for restandardisation of the Extended Scales.

The research of Barnard (2003) was intrinsic to the restandardisation of the Extended Scales. It focused on the Practical Reasoning Scale and aimed to generate new items by means of a focus group, a facet analysis to investigate the comprehensiveness of the scale, and testing of the items. Three criteria were used for assessment of the items: negative responses to the items in a survey sent to GMDS users, an assessment of the items’ reliability, and the difficulty of items. If there was a difference in passing the item by different cultural groups or genders, the item was rejected. Although the intention was to standardise the Extended Scales in Britain, the acceptability of the GMDS for use with white South African children was also emphasised because of previous research demonstrating their similarity to the British children (Barnard, 2003).

The normative sample for the Extended Scales consisted of 1 026 children from the UK. They ranged from 3 to 8 years and were evenly distributed across the ages and genders. Most (86 per cent) of the children were from an urban area and belonged to a middle or higher socio-economic group (upper, 32 per cent; middle, 44 per cent; lower, 24 per cent). The children were chosen on the basis of having English as a first language and generally normal development (Luiz, Barnard et al., 2004). Thus, as with the Infant Scales, there is possibly a bias towards a higher-functioning group of children.

The statistical basis for the restandardisation of the Extended Scales is described in the manual (Luiz, Faragher et al., 2006). The reliability of the scales was computed using the Cronbach alpha coefficient. The SEM was found to be very difficult to calculate and it was converted into a confidence range instead.

Once the Extended Scales had been restandardised, extensive research was undertaken to determine the validity of the constructs in each scale. In terms of
local research, Kotras (2003) focused on the validation of the Language Scale. A construct analysis led to the identification of six constructs in this scale: receptive language, basic concepts/conceptualisation, knowledge, memory, reasoning and expressive language. The constructs were found to be equivalent across socio-economic groups and genders for English-speaking children. Knoesen (2005) demonstrated that the Locomotor Scale is made up of seven basic constructs – namely, balance, gross body coordination, visual motor coordination, rhythm, power and strength, agility and flexibility, and depth perception. She expressed concern about the under-representation of some other facets related to locomotor ability, such as speed of movement. Moosajee (2007) explored the construct validity of the Personal-Social Scale and also found that the tasks in the scale were multidimensional, comprising six main constructs (dressing, personal hygiene, feeding, cooperation, self-knowledge and sociability). These constructs were equivalent for all socio-economic groups and both genders. Although the facets in this scale covered an adequate range of items, certain important life skills were not addressed, such as personal safety and security. Povey (2008), on investigating the Eye-Hand Coordination Scale, found that each item in the scale had more than one underlying construct, but that there were underlying constructs that were common to all the items – namely, fine motor coordination, visual-motor integration and spatial orientation. Concern was expressed about the limited variety of skills tested in the Eye-Hand Coordination Scale for the older age group, and recommendations were made that more items be added to test a wider range of abilities. In order to assess the construct validity of the entire Extended Scales (first edition), Luiz et al. (Luiz, Foxcroft & Tukulu, 2004) investigated whether they correlated with performance on the Denver Developmental Screening Test II for 60 Xhosa-speaking children aged between 3 and 6 years. While there was a significant correlation between the measures, the Denver had more items which were culturally biased, and a much higher percentage of children were found to be developmentally delayed on the Denver than on the GMDS. (See Appendix 1 for further discussion of current research on South African use of the GMDS.)

In addition to construct validation studies, there has been interest in comparing the performance of South African children to that of the GMDS normative sample. Van Rooyen (2005) conducted the first such study on 129 children aged 4, 5, 6 and 7 years, across socio-economic and racial groups. He found that the South African children performed significantly better than the normative group on the Locomotor and Personal-Social Scales, while the British children performed significantly better on the more academic Language and Practical Reasoning Scales. The groups’ performance was comparable on the Hand-Eye Coordination Scale, and too variable to be interpreted on the Performance Scale. Van Heerden (2007) conducted a similar study in which the performance of 31 black and white South African children, aged between 5 years and 6 years 11 months, was compared to the Extended Scale norms. The comparison groups were matched in terms of age, gender and socio-economic status. The local children performed significantly more poorly on the Language, Hand-Eye Coordination and Practical Reasoning Scales, while there were no significant differences between the groups on the Locomotor, Personal-Social
and Performance Scales. Kheswa (2009) studied 20 Xhosa-speaking children aged between 3 and 8 years from a low socio-economic environment. The children were grouped according to age and whether they performed below, equivalent to, or above their chronological age on the Extended Scales. There was a trend towards strengths on the Locomotor and Personal-Social Scales, but underachievement on all the other scales. Kheswa (2009) also found that the South African children tended to underperform compared to the British norms on the more academic scales, suggesting a need for caution when using the scales with local populations. Further, there was a progressive deterioration in the scores as the children developed, which has also been observed in longitudinal studies using the Infant Scales and in other developing countries (Laughton et al., 2010b; Reyes et al., 2010). Unfortunately, Kheswa’s (2009) sample was small, and repetition with a bigger sample is warranted to verify their findings. Although exploratory in nature, these differences suggest that the development of local children may be impeded by poor environmental circumstances, such as lack of stimulation and poor nutrition, and that there is a need for appropriate developmental interventions for South African children.

The predictive validity of the Extended Scales was explored by Knoesen (2003), who assessed 93 black, coloured, white and Indian South African preschool children and reviewed their school performance at the end of Grade 1. She found a significant relationship between the Language, Hand-Eye Coordination, Performance and Practical Reasoning Scales and the GQ and academic achievement in Literacy, Numeracy and Life Orientation. The Locomotor and Personal-Social Scales, which are the least intellectual of the six scales, were not significantly related to these academic areas. Limited support exists for idea that there is a relationship between motor skills and academic ability generally (Tramonta, Hooper & Selzer, 1988), while the Personal-Social Scale of the Extended Scales predominantly taps self-help behaviours which are different to the personal-social skills required in the early grades of schooling, the latter being related to the ability of the child to work cooperatively and sustain attention. In general, this study provided supportive evidence for the predictive value of the Extended Scales in identifying children at risk prior to entering formal education.

The possible influence of gender on the Extended Scales was explored by Jakins (2009), who compared the performance of preschool black, coloured and white girls (N = 32) and boys (N = 32) aged between five years and six years 11 months. The groups were matched for socio-economic status and ethnic group, and all had English as their home language. No significant differences were found between the genders, suggesting that the items in the Extended Scales have been appropriately selected to allow equal opportunities for girls and boys to perform.

Like the Infant Scales, the Extended Scales have also been used locally to assess the developmental ability of children with a range of neurodevelopmental disorders. Of these, Foetal Alcohol Spectrum Disorder is a major public health problem, with the highest prevalence rates reported in Wellington in the Western Cape (Viljoen et al., 2005). Adnams, Kodituwakku, Hay, Molteno, Viljoen
and May (2001) compared the neurocognitive profiles on the Extended Scales of 34 Grade 1 children with Foetal Alcohol Syndrome (FAS) and 34 typically developing controls. The FAS children performed significantly more poorly than the controls on higher-order cognitive abilities, as assessed by the Speech and Hearing, Performance, Practical Reasoning and Eye-Hand Coordination Scales. There was a marginal effect on the Personal-Social Scale, which was relatively independent of the other cognitive competencies, suggesting that there is far less difference in adaptive functioning between the groups than on the other higher-order cognitive scales. This provides supportive evidence that FAS children experience difficulty with tasks involving sustained attention, fine motor coordination, problem-solving and verbal reasoning (Conry, 1990; Mattson & Riley, 1998), although studies of language function in such populations have produced inconsistent results. It also suggests that the GMDS – Extended Revised (GMDS-ER) is sensitive to discriminating these abilities in such a population, and may be useful in creating a developmental profile of functioning for children with FAS.

On the basis of the studies reported here, it has been recommended by many researchers that the GMDS be restandardised for South African children, which seems logical given the ever-increasing differences in standard of living between various sectors of South African society (Appel, 2011). However, this is a complicated issue as it raises questions regarding whether restandardising the GMDS implies that the mean should be dropped so that local children appear to be developing normally, when the South African norm may be far lower than the global norm, or whether a ‘gold standard’ should be maintained which clearly demonstrates the influence of poverty, malnutrition and a deteriorating level of education on local children. In addition, the need for developmental screening in South Africa has been widely debated, with substantial support from local researchers and practitioners (Povey, 2008; Van Heerden, 2007; Van Rooyen, 2005). The main arguments against screening are that there is a lack of resources to deal with the numbers of children with developmental delay, and that the identification of more children with difficulties, some of which are likely to be false positives, would further overload the system.

**Conclusion**

Of the 135 million infants born annually throughout the world, more than 90 per cent live in low-income or developing countries (Population Reference Bureau, 2010). Despite this, only a small percentage of published research addresses children who come from such backgrounds (Tomlinson, 2003). Tomlinson cautions that the typical infant lives in an environment that is very different from that inhabited by the typical child development researcher. It is important, therefore, that the different circumstances of infants be considered, particularly in the case of developmental assessment, since social factors such as parental education level and socio-economic status are among the strongest predictors of poor neurodevelopmental outcome in infants. However, the recommendation
that the GMDS be restandardised in South Africa because of the poor performance of local children should be considered carefully, as there is a risk of producing a downgraded measure which will fail to identify the impact of poverty and poor socio-economic conditions on the development of our children.

Note
1 The use of the GMDS is controlled by ARICD, a registered charity administered by a group of paediatricians and child psychologists interested in increasing the understanding of early child development and thereby improving the welfare of children with disabilities. They are responsible for monitoring the quality of administration of the GMDS, by ensuring that users are suitably qualified and understand the psychological and developmental principles that underpin child development. In the past, the use of the GMDS was limited to psychologists with the minimum qualification of a Master's degree, or medical practitioners working in the field of child development. Recently this has been extended to allied medical practitioners such as occupational, speech and physiotherapists. All users are obliged to attend an intensive training course covering both the theoretical and practical aspects of administration of the GMDS.

References


The Griffiths Mental Developmental Scales: their relevance for South Africa


Appendix 1

**Current research: use of the GMDS with South African infants and young children**

A study is in progress using the GMDS to test the efficacy of a UK-developed group psychotherapy programme for mother–baby dyads (Baradon, 2010). The programme aims to intervene in mother–baby dyads with disrupted attachment patterns and has been piloted by Dr Katherine Bain, a researcher from the University of the Witwatersrand, in collaboration with a Johannesburg non-governmental organisation, Ububele, and the Anna Freud Centre in London. In the pilot study, in which groups were run in Johannesburg shelters for mothers and their infants (personal communication, Bain, 2011), the GMDS was used to measure the overall development of the infants, who ranged in age from nine days to three years. The results revealed significant correlations between the GMDS Personal-Social Scale and measures of child responsiveness and how much the child involves the mother in their play (using the Emotional Availability Scales) (Biringen, Robinson & Emde, 1998). This provides further evidence for the cross-cultural applicability of the GMDS.