



WISC-IV test performance of Grade 3 Xhosa-speaking children:

An extension of a prior South African normative database

by

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(DECEMBER 2015)

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THESIS SUBMITTED FOR THE FULFILMENT OF THE MASTERS DEGREE IN

SOCIAL SCIENCE IN THE DEPARTMENT OF PSYCHOLOGY,

UNIVERSITY OF FORT HARE, EAST LONDON CAMPUS

**Declaration**

I, Alexa Bickell, declare that this dissertation is my own work and that any work that is not mine has been rightfully and properly acknowledged. It is furthermore declared that the material contained in this mini-dissertation has not been submitted to this or any other university in fulfilment or partial fulfilment of the requirements for another degree. It is submitted for the degree of Master of Social Psychology (Counselling Psychology) at the University of Fort Hare, East London.

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## Abstract

**Introduction.** A well-recognized problem exists when commonly employed tests developed in the United States (US) or United Kingdom (UK) are accepted unconditionally for use on local relatively disadvantaged populations, as these tests have questionable validity and therefore incur a high risk of misdiagnosis. Cross-cultural normative research has been conducted in South Africa on some of the Wechsler intelligence scales with respect to participants stratified for level and quality of education, age, race and language, including a study on the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) for learners with Grade 7 education (age 12 to 23). The aim of the current study was to conduct a partial duplication of the earlier WISC-IV South African norming study that specifically targeted a younger group of educationally disadvantaged children at a lower level of education. **Method.** Participants were Black Xhosa-speaking Grade 3 learners in the age range 8 to 9 (N =32 ), who were being schooled in the disadvantaged educational setting of the former Department of Education and Training (former-DET) schools. The WISC-IV results of the current study were statistically compared with the WISC-IV results from Shuttleworth-Edwards, Van der Merwe et al. (2013) study. **Results.** There was a significant lowering of between 20 to 30 IQ points relative to the UK standardisation on WISC-IV scores for this sample of Grade 3 Xhosa-speaking learners, replicating the earlier outcome for Grade 7 Xhosa-speaking learners relative to the UK standardisation. No differences were in evidence within the WISC-IV sample for the female and male participants on any of the indices. There was equivalence between the Grade 3 and Grade 7 Xhosa-speaking learners on all subtest and Index scores with the exception of the Digit Span subtest. **Conclusions.** The results confirm prior research indications of the negative impact of educational disadvantage on IQ test results and the need for this to be taken into account by the availability of socio-culturally relevant norms.

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**List of Abbreviations**

$\alpha$	Alpha
Adv	Advantaged
AR	Arithmetic
BD	Block Design
CA	Cancellation
CD	Coding
CO	Comprehension
DET	Department of Education and Training (Government department for management of Black education systems pre-1994)
Disad	Disadvantaged
DS	Digit Span
FSIQ	Full Scale IQ
HSRC	Human Science Research Council
IN	Information
IQ	Intelligence Quotient
LN	Letter-Number Sequencing
MR	Matrix Reasoning
PCm	Picture Completion
PCn	Picture Concepts
PIQ	Performance IQ
PRI	Perceptual Reasoning Index
PSI	Processing Speed Index
SD	Standard Deviation
SI	Similarities
SS	Symbol Search
VC	Vocabulary

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VCI	Verbal Comprehension Index
VIQ	Verbal IQ
WAIS-III	Wechsler Adult Intelligence Scale – Third Edition
WISC-IV	Wechsler Intelligence Scale for Children – Fourth Edition
WMI	Working Memory Index
WR	Word Reasoning
X	Mean

## **Chapter 1: Introduction**

### **Introduction**

This research project is a partial operational replication of a cross-cultural normative Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) study by Shuttleworth-Edwards, Van der Merwe, Van Tonder and Radloff (2013). The Shuttleworth-Edwards, Van der Merwe et al. (2013) normative study was motivated by a need to develop within group norms for a variety of groups in the cross-cultural South African context with respect to the WISC-IV. In their study of the quality of education, a pronounced determinant of IQ test performance, especially in the South African context, was taken into account, which improved the utility of the WISC-IV norms by Shuttleworth-Edwards, Van der Merwe et al. (2013) compared with other normative studies.

The main aim of this study was to (1) compare the performance of Grade 3 Xhosa-speaking disadvantaged learners with the UK population; (2) to compare the performance of Grade 3 and Grade 7 Xhosa-speaking disadvantaged learners; (3) as well as to compare the performance of female and male Grade 3 Xhosa-speaking disadvantaged learners. The influence of quality of education on intellectual functioning as measured by the WISC-IV was investigated and a general lowering of Full Scale IQ (around 20 – 30 IQ points) in the learners from former-DET schools was found when compared to UK standardisations. This shows that within group norms for this specific group are very important, especially with regard to the ethical and accurate use of the WISC-IV.

The following chapter (Chapter 2) is a literature review of intelligence assessments and the most prominent factors which can affect the outcome of assessments with specific reference to the Xhosa people of the Eastern Cape. The chapter that will follow (Chapter 3) describes the recruitment process of research participants as well as data collection, processing and analysis of the data collected. The results are given in Chapter 4, including

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descriptive statistics and independent t-test comparisons, followed by a discussion of the findings in Chapter 5, which includes strengths, limitations and recommendations for further research.

## Chapter 2: Literature Review

### Introduction

The testing of intelligence has been a major focus in the field of psychology nationally and internationally since its early days. International testing originated with the French psychologist Alfred Binet in the 19<sup>th</sup> century in France (Laher & Cockroft, 2013). Some more widely used IQ tests have since been produced in the United States (US) and United Kingdom (UK). These tests are currently being used nationally and internationally within different cultural groups (Sparrow & Davis, 2000). However, there currently exists a well-recognized problem that psychometric tests developed in the US or UK, when accepted unconditionally for use on local relatively disadvantaged populations, have questionable validity, and therefore incur a high risk of misdiagnosis (Shuttleworth-Edwards, 2012).

In this literature review it will be shown that recent international cross-cultural research and literature reviews have suggested that quality of education plays an important role in the cognitive test results of non-westernized groups (i.e. any group not of western middle class origin, also referred to as ‘non-standard’ group). Differing levels of education attainment and quality of education, associated differential levels of test sophistication and ‘test-wiseness’, varying levels of acculturation to westernized influences, all serve to impact on psychometric test performance in general, including IQ test performance (Shuttleworth-Edwards, 2010). Although there were a few Black South Africans who received a privileged education at independent schools during the 1980s (Gaylard, 2005), in the South African context, as a legacy of the colonial era and apartheid, most Black South Africans received poor quality education.

An introduction to the history of the Wechsler Intelligence Scales will be given as well as the history of the development of intellectual assessment in South Africa. Thereafter,

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common issues in cognitive testing, educational factors and quality of education in South Africa, and difficulties experienced through the language used in IQ testing will be discussed. Some of the existing research and its influences on the current research in connection with quality of education will be discussed, and the Flynn Effect will be explained in relation to the current and previous studies.

### **History of the Wechsler Intelligence Scales**

**Introduction.** During the period of World War I when a need for intelligence measures to screen recruits was established, the original Wechsler-Bellevue Intelligence Scale was released in 1939. This measure yielded scores for both verbal and performance scales in addition to an overall composite score. The Wechsler-Bellevue was also innovative because it provided deviation IQ scores that were based on standard scores computed with the same distributional characteristics for all ages (Wechsler, 2004).

Wechsler (2004) stated that it would be “unreasonable to expect any single measure of intelligence to adequately test all domains in a meaningful and practical way” (p. 3). He was successful in selecting measures that sampled a wide variety of domains (e.g. verbal comprehension, perceptual organization, memory), which have since proven to be important aspects of cognitive functioning and have been included as more discrete domains in revisions of the Wechsler scales. Moreover, he recognized the possibility of obtaining invalid test results when examiners or examinees became fatigued. He therefore selected sufficient numbers of subtests to provide clinically meaningful information regarding an individual’s cognitive functioning in a reasonable time period (Wechsler, 2004).

Wechsler defined intelligence as “the aggregate of global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment” (Wechsler, 2004, p. 3). He also asserted that intelligence is both a *global* entity relating to the

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individual's behaviour as a whole (represented by the Full Scale Intelligence Quotient score or FSIQ) and a *specific* entity, consisting of different distinct abilities (Wechsler, 2004). He thus developed a theory of general intelligence, while also recognising other types of intelligence such as verbal and performance intelligence (Ardila, 1996). Therefore, the focus shifted away from identifying intellectual deficiencies as the primary focus of intelligence testing. As Wechsler (2004) noted:

What we measure with tests is not what tests measure – not information, not spatial perception, not reasoning ability. These are only a means to an end. What intelligence tests measure is something much more important: the capacity of an individual to understand the world about him and his resourcefulness to cope with its challenges (p. 4).

Many different theories of intelligence have developed over the decades, together with many different approaches to the measurement of intelligence. In 1904, Spearman (as cited in Foxcroft & Roodt, 2009) was the first person to suggest that a single general (*g*) factor could be used to explain differences between individuals. This view is based on the fact that different measures of cognitive ability correlate positively with each other, indicating that they measure some shared ability or construct. Even when multiple factors are identified, second order factor analysis usually indicates some underlying general factor. On the other hand, factors specific to a particular activity can also be identified and are known as specific (*s*) factors. As a result, we have the “well known two-factor theory of intelligence that allows for both a general factor (*g*) and specific factors (*s*)” (Gregory, 2007, as cited in Foxcroft & Roodt, 2009, p. 129). Cattell (Gregory, 2007, as cited in Foxcroft & Roodt, 2009) later maintained that Spearman's *g* could be “split into two distinct *g*'s which he called *gf*, or fluid intelligence and *gc*, or crystallized intelligence” (p. 130).

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Thurstone (as cited in Foxcroft & Roodt, 2009) was the main proponent of the multiple factor theory. He identified seven primary mental abilities, namely “verbal comprehension, general reasoning, word fluency, memory, numbers, spatial and perceptual speed abilities” ( p. 130). Eyseneck (as cited in Foxcroft & Roodt, 2009) points out that the proponents of these two opposing theories of intelligence were eventually forced to agree on a similar view of the structure of intellect.

In Wechsler’s (2004) option, the clinician should view each child as unique and take into account attributers other than intelligence, for example Education, when interpreting test results. It has been widely recognized that children with similar test scores may not cope equally well with similar environmental challenges for reasons unrelated to their cognitive abilities (Wechsler, 2004).

**Development and standardization of the WISC-IV.** The original Wechsler-Bellevue Intelligence Scale of 1939 has been frequently updated over the last 60 years (Wechsler, 2004) to incorporate advances in the field of intellectual assessment, as well as to reflect the practical and clinical needs of contemporary society. In 1949, the Wechsler Intelligence Scale for Children (WISC) was developed in order to adapt the subtests of the Wechsler-Bellevue Intelligence Scale of 1939. It adapted the Information, Arithmetic, Similarities, Vocabulary, Digit Span, Comprehension, Picture Completion, Picture Arrangement, Block Design, Object Assembly, and Coding subtests for use with children and formulated a new subtest, namely the Mazes subtest (Wechsler, 2004).

Thereafter, in 1974, the Wechsler Intelligence Scale for Children-Revised (WISC-R) was devised, which retained all 12 subtests from the first edition, but shifted the age range from 5 – 15 years to 6 – 16 years. In 1991, the Wechsler Intelligence Scale for Children – Third Edition, included the deletion of some subtests (Picture Arrangement, Object Assembly, and Mazes) and the addition of new subtests (Picture Concepts, Letter-Number

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Sequencing, Matrix Reasoning, Cancellation, and Word Reasoning). The Full Scale IQ (FSIQ) was retained as an estimate of general intelligence, but the Verbal and Performance IQ's were deleted, and emphasis was placed on interpretation of factor index scores (Verbal Comprehension – VC, Perceptual Reasoning – PR, Working Memory – WM, and Processing Speed – PS) (Canivez, 2014).

The WISC-IV (released in 2003) was intended for use with children aged 6 years to 16 years 11 months. The WISC-IV has been standardised in countries such as America, United Kingdom, Canada, France and Belgium, the Netherlands, Germany, Austria and Switzerland, Sweden, Lithuania, Slovenia, Greece, Japan, South Korea, and Taiwan (Van de Vijver, Mylonas, Pavlopoulos, & Georgas, 2003). It provided a measure of general intellectual functioning (FSIQ) and four index scores. The dual IQ (Verbal and Performance) and index score structure implemented in the WISC-III was no longer utilized. This new framework was supported by clinical research and factor-analytic results (Wechsler, 2004).

The four index scores are the Verbal Comprehension Index (VCI), the Perceptual Reasoning Index (PRI), the Working Memory Index (WMI), and the Processing Speed Index (PSI). Added together they give the Full Scale IQ (FSIQ). Therefore, the WISC-IV developed ten core subtests and five supplemental subtests in its range. Similarities, Vocabulary and Comprehension are the three core subtests that comprised the VCI. The three core Perceptual Reasoning subtests are Block Design, Picture Concepts, and Matrix Reasoning. Digit Span and Letter-Number Sequencing are the two core Working Memory subtests, and Coding and Symbol Search are the two core Processing Speed subtests. All ten core subtests comprising the four indices contribute equally to the FSIQ score (Baron, 2005).

With the change in structure, the VCI and PRI were recommended to be substituted for the VIQ and PIQ in clinical decision-making and other situations where the VIQ and PIQ were previously used or required. This 10-subtest core battery could be supplemented with

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one or more of five supplemental subtests, at least one provided for each of the four index scores (Information and Word Reasoning for the VCI, Picture Completion for the PRI, Arithmetic for the WMI, and Cancellation for the PSI) (Baron, 2005).

Core subtests are administered when composite scores are desired. Supplemental subtests extended the range of cognitive skills sampled, provided additional clinical information, and enabled the practitioner to complete additional discrepancy analyses. When necessary, supplemental subtests could also be used as substitutes for core subtests. If a subtest was invalidated for any reason, a substitution may be necessary. The decision to substitute should be based on clinical need and appropriateness, rather than examiner preference (Wechsler, 2004).

The updated theoretical foundations that were introduced concentrated on improving measurement of fluid reasoning, working memory, and processing speed. Tasks that require fluid reasoning involve the process of “manipulating abstractions, rules, generalizations, and logical relationships” (Carroll, 1993, as cited in Wechsler, 2004, p. 8). Matrix Reasoning, Picture Concepts, and Word Reasoning were incorporated to measure fluid reasoning.

Working memory is the ability to actively maintain information in conscious awareness, perform some operation or manipulation with it, and produce a result. Contemporary research has shown that working memory is an essential component of fluid reasoning and other higher order cognitive processes, as well as being closely related to achievement and learning. To comply with the upgrade, the Letter-Number Sequencing subtest and the Arithmetic subtest were introduced. Based on research indicating greater demands on working memory for Digit Span Backward than Digit Span Forward (Reynolds, 1997, as cited in Wechsler, 2004, p. 9), separate process scores were developed for these tasks.

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Processing speed has been shown to be dynamically related to mental capacity (Kail & Salthouse, 1994, as cited in Wechsler, 2004, p. 9), reading performance and development, reasoning by the conservation of cognitive resources, and the efficient use of working memory for higher order fluid tasks (Fry & Hale, 1996, as cited in Wechsler, 2004, p. 9). Processing speed has been identified as an important domain of cognitive functioning in factor-analytic studies of cognitive abilities (Carroll, 1993, as cited in Wechsler, 2004, p. 9). Processing speed may be especially important to assess in children because of its relationship to neurological development, other cognitive abilities, and learning. Clinical research in developmental cognitive neuropsychology suggests a dynamic interplay between working memory, processing speed, and reasoning (Kail & Salthouse, 1994, as cited in Wechsler, 2004, p. 9).

The revision goals that were drawn from ten years of research included advice from experts in the fields of neuropsychology, school psychology and clinical psychology as well as an extensive review of literature in the areas of intelligence theory, cognitive development, intellectual assessment, and cognitive neuroscience. The five primary revision goals have been to “update the instrument’s theoretical foundations; to enhance clinical utility; to increase developmental appropriateness; to improve psychometric properties; and to increase user-friendliness” (Wechsler, 2004, p. 8). The WISC-IV continued to build upon the work of previous editions.

Table 1 shows a summary of the differences in the subtests between WISC-III and WISC-IV.

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Table 1: *Summary of differences in the subtests from WISC-III to WISC-IV* (Wechsler, 2004, p. 14)

Subtest	Subtest Modifications
Similarities	The Similarities subtest has 23 items, 11 of which are new.
Vocabulary	Vocabulary has 36 items, including four picture items and 32 verbal items. Five verbal items are new and 27 verbal items were retained from the WISC-III.
Comprehension	Comprehension subtest has 21 items. Eleven items were added, and ten items were retained from the WISC-III with little or no change in wording.
Information	The Information subtest has 33 items. Eleven items were added, and 22 verbal items from the WISC-III were retained with little or no change in wording.
Word Reasoning	Word Reasoning has 24 items.
Block Design	The Block Design subtest has 14 items.
Picture Concepts	The Picture Concepts subtest has 28 items.
Matrix Reasoning	The Matrix Reasoning subtest has 35 items.
Picture Completion	The Picture Completion subtest has 38 items, including 13 new items and 25 retained items from the WISC-III.
Digit Span	There are eight items in Digit Span Forward and eight items in Digit Span Backward.
Letter-Number Sequencing:	Letter-Number Sequencing consists of ten items with three trials each.
Arithmetic	Arithmetic consists of 34 items.
Coding	The two age-defined forms of the coding subtest (i.e., Coding A and Coding B) were retained from the WISC-III. Verbatim instructions for both forms have been shortened to be more age appropriate and reduce excess verbiage.
Symbol Search	The two age-specific forms of the Symbol Search subtest (i.e., Symbol Search A and Symbol Search B) were retained from the WISC-III. Fifteen items were added to Symbol Search B to improve the ceiling of the subtest for older children. Verbatim instructions for both forms have been shortened to be more age appropriate and to reduce excess verbiage.
Cancellation	Cancellation consists of two items: one with a random arrangement of visual stimuli and one with a structured arrangement of visual stimuli. Separate process scores are available to describe item-level performance on this subtest.  (Wechsler, 2004, pp. 14–18)

The WISC-IV normative information is based on national standardization samples representative of the U.S. population of children aged 6:0 – 16:11. A stratified sampling plan ensured that the standardization samples included representative proportions of children according to selected demographic variables. An analysis of data gathered in March 2000 by the U.S. Bureau of the Census provided the basis for stratification along the following variables: age, sex, race, parent education level, and geographic region (Wechsler, 2004).

**Age:** The standardization sample for the WISC-IV included 2,200 children, divided into 11 age groups. Each age group was composed of 200 participants.

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**Sex:** The standardization sample consisted of an equal number of female and male children in each age group.

**Race/Ethnicity:** For each age group in the standardization sample, the proportions of Whites, African Americans, Hispanics, Asians, and other racial groups were based on the racial proportions of children within the corresponding age group of the U.S. population according to the March 2000 Census data.

**Parent Education Level:** The sample was stratified according to five parent education levels based on the number of years of school completed. If the child resided with only one parent or guardian, the educational level of that parent or guardian was assigned. If the child resided with two parents, a parent and a guardian, or two guardians, the average of both individuals' educational levels was used, with partial levels rounded up to the next highest level. The five levels of parent education were defined as follows: 0-8 years, 9-11 years, 12 years (high school degree or equivalent), 13-15 years (some college or associate's degree), and 16 or more years (college or graduate degree).

**Geographic Region:** The United States was divided into the four major geographic regions specified by the Census reports: Northeast, South, Midwest, and West.

The WISC-IV covers a wide range of ages and levels of cognitive development, which makes some items too difficult for younger children and other items too easy for older children. Start points and discontinue rules were incorporated to avoid frustrating the child with overly easy or overly difficult items. In the standardization version of the scale, subtest items were ordered according to increasing difficulty as indicated by national try out data. Start points and discontinue rules for the subtests were set generously to allow the child to attempt all passable items, yet limit the number of items presented. Start points were chosen to reduce the number of administered items as much as possible, while ensuring that at least 95% of subtest total raw scores and at least 98% of subtest scaled scores were unchanged

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following the application of the new start point. All start point items had pass rates of at least 95% in all relevant age groups, limiting the occurrence of reversal procedures and ensuring that the majority of children experienced success on the first items of administered subtests. Discontinue rules were set after a specified number of scores of 0 if the proportion of children passing additional items was very small (i.e., <2%). For example, after giving five consecutive incorrect responses on the Similarities subtest, the probability that a child would pass additional items on the subtest became very small. For this reason, the final discontinue rule for Similarities was set at five consecutive scores of 0 in the final version.

For each of the 15 subtests in the battery and five of the process scores, the distribution of each age group's total raw score was converted to a scale with a mean of 10 and a standard deviation of 3. This conversion was accomplished by preparing a cumulative frequency distribution of raw scores for each age group, normalizing these distributions, and calculating the appropriate scaled scores for each total raw score. The progression of scaled scores within an age group and from age group to age group was then examined, and minor irregularities were eliminated by smoothing.

The composite scores (i.e., VCI, PRI, WMI, PSI, and FSIQ) are based on sums of age-corrected scaled scores. To construct the composite score tables for the WISC-IV, five sums of scaled scores (i.e., Verbal Comprehension, Perceptual Reasoning, Working Memory, Processing Speed, and Full Scale) were calculated for each child in the standardization sample.

For each scale, the distribution of the sum of scales scores was normalized and given a mean of 100 and a standard deviation of 15. The appropriate composite score was then assigned to each sum of scaled scores. The resulting composite score distributions were smoothed visually to remove any irregularities, while attempting to keep the means and standard deviations of the scales close to 100 and 15, respectively. The normalization of the

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scale ensured that the composite score distributions would approximate the normal curve for the standardization sample.

Test-age equivalents of the total raw scores indicate the age at which a given total raw score is typically obtained by children of a specific age. In order to derive age equivalents for the subtest total raw scores, the total raw scores that corresponded to a scaled score of 10 were identified in each of the normative age groups for each subtest. If the total raw score for a subtest was identified in two successive age groups, it was assigned to the middle age. If the total raw score bands overlapped by more than one point, the overlap was evenly divided between adjacent age groups. Visual smoothing was then used to remove any remaining irregularities (Wechsler, 2004).

### **History of the development of intellectual assessment in South Africa**

**Introduction.** Psychological testing was originally introduced to South Africa through the British colonists. The development of psychological tests in South Africa followed a similar pattern to that in the U.S. During the early development of western assessment procedures, cultural background on test performance received very little attention. The belief was that inherent abilities were measured by cognitive tests and it was assumed that education or experiences would not have an influence on the measure of these abilities. It was also held that for people who did not speak English as a second language, non-verbal test performances would not be affected by cultural and linguistic backgrounds (Knox, 1914, as cited in Walker, Batchelor, & Shores, 2009).

**Influence of apartheid on development of IQ testing in South Africa.** South African psychometric tests were developed in a context of unequal distribution of resources as a result of apartheid policies. Psychological assessment in South Africa had been a controversial topic, primarily due to its links to South Africa's troubled past and in particular to the apartheid era (Laher & Cockroft, 2013). According to Nzimande (1995, as cited in

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Laher & Cockcroft, 2013), “assessment practices in South Africa were used to justify the exploitation of Black labour and to deny Black people access to education and economic resources” (p. 2).

During the apartheid era (1948 – 1994), employment preference was given to White individuals. Psychometric testing and psychological assessment were misused to support this policy. Tests that were developed and standardised on educated White South Africans were administered to illiterate, uneducated or poorly educated Black South Africans, and the results were used as justification for job reservation and preference. They were used to further justify the logic of the apartheid system by indicating the superiority of the White intellect over the Black intellect. This practice resulted in a general mistrust of psychological assessment amongst the Black population in South Africa (Laher & Cockcroft, 2013). Moreover, the development of crucial thought and active student participation in the learning-teaching process was actively discouraged and students were viewed as mere passive receivers of information (Kallaway, 1984, as cited in Kanjee & Sayed, 2013).

**New era: post 1994.** Since 1994, however, the laws and regulations concerning psychological assessments have changed and the Human Science Research Council (HSRC) has started to direct the development of local measures suitable for South Africa’s diverse population. School readiness testing, as well as routine administration of group tests in schools, was banned in many provinces in South Africa as such testing was seen as being exclusionary and perpetuating the discriminatory policies of the past (Foxcroft & Roodt, 2009). The Employment Equity Act No. 55 of 1998 of South Africa also stated that psychological tests and other similar assessments were prohibited unless “the tests being used (a) have been scientifically shown to be valid and reliable; (b) can be applied fairly to all employees; and (c) are not biased against any employee or group” (Foxcroft & Roodt, 2009, p. 22).

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This led to the problematic issue of culturally relevant test usage in the multi-cultural South African context. Shuttleworth-Jordan (1996) stated "there were various reasons why professionals promoted the view that the use of standard tests, designed in North America or the United Kingdom for application among westernized individuals, should be abandoned for use among Black populations" (p. 97). The impulse was that new culturally relevant and appropriately standardized tests should be designed. Shuttleworth-Jordan (1996), however, made it clear that, whilst the latter impulse evolved out of a legitimate concern for cultural differences between people, it was also a problem for various reasons. Firstly, it did not take into account the dynamic nature of socio-cultural influences in South Africa, nor the different and shifting positions that people occupied along a continuum of lesser to greater levels of urbanization, literacy and westernization. Secondly, commonalities in brain-behaviour relationships and associated cognitive processes that pertain to all human beings were not acknowledged. Thirdly, it reflected misgivings that pertained to the normative-based abilities test paradigm in which people were categorized purely on the basis of test scores (Shuttleworth-Jordan, 1996). Shuttleworth- Jordan (1996), therefore, suggested

that in this extended clinical approach, test results form only part of the overall data base, alongside the clinical history, the pattern and processes of cognitive performance across a series of functional domains, the clinical presentation, and the search for a conceptually coherent set of diagnostic criteria (p. 96).

Thus, in a clinical setting, especially with respect to individuals at the more urbanized, westernized and highly educated end of the continuum, the strategy of "throwing out all commonly employed tests of cognitive functioning and starting from scratch, is neither necessary nor indicated" (Shuttleworth-Jordan, 1996, p. 96).

**Common issues in cognitive testing**

It is generally known that various factors other than age and level of education mediate test performance. Once the WISC-IV had been developed, updated and normed, other factors that could also influence cognitive testing still needed to be addressed. Some of them are socio-cultural influences, culture, illiteracy, and acculturation as discussed below.

**Socio-cultural influences on IQ test performance.** Socio-cultural aspects such as preschool socialization experiences, current language usage, primary language, acquisition of secondary language, levels of education, test sophistication, and socio economic status need to be taken into account when considering cross-cultural test influences as well as racial differences (ethnic factors). Within themselves they may have been considered to cause quantitative changes in cognitive test performance. It is important to be aware of an uncalled for lack of appreciation of the complexity of shifting socio-cultural influences, which may have resulted in erroneous conclusions which handicap rather than safeguard individuals in the test situations. The socio-cultural test influences referred to encompass several closely interrelated variables, including language usage and reading ability, quality and level of educational attainment, socio economic status, and home and schooling socialization experiences (Nell, 1999, as cited in Shuttleworth-Edwards, 2010). These factors affect both crystallized/factual knowledge as well as procedural functions that call upon ‘test-wiseness’ (test sophistication), such as pencil use, self-confidence, familiarity with copying, and concentration in test-taking situations (Shuttleworth-Edwards, 2010). Ardila (1995, p. 146, as cited in Shuttleworth-Jordan, 1996) pointed out that there are multiple examples in the literature in which differences attributed to cultural and even ethnic variances “are simply the result of differences in educational levels” (p. 96). It was therefore suggested that with accelerating educational opportunities in the newly democratized South Africa, research

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resources may well have been profitably spent on the modification and standardization of existing test sources for use with urbanized Black populations. This would have been in preference to embarking on a path of separatist test development which has had limited international relevance, and which may well have amounted to activity which was "no more fruitful than the reinvention of the wheel" (Shuttleworth-Jordan, 1996, p. 97).

It is important to mention again that educational development did not occur as anticipated. Even the development of resources, like the Health Professional Council of South Africa (HPCSA), had been limited and had not developed testing material themselves. Privately owned companies like Jopie van Rooyen and Partners, Saville and Holdworth Limited, Psytech and Mindmuzik (Laher & Cockroft, 2013, p. 4) are distributing the testing material in South Africa nowadays. These organizations took over the test distribution, adaptation and development role. The impact this has had on the local testing arena will be expanded on in a later section on educational factors and quality of education in South Africa.

**Culture and its influence on cognitive testing.** Ardila (1996) suggests in his study of cross-cultural neuropsychology that there are some fundamental characteristics in the human brain and in brain-behaviour relationships that could be expected to be observed in every human subject. Basic cognitive processes are universal, and cultural differences in cognition reside more in the situations to which particular cognitive processes are applied, than in the existence of the process in one cultural group and the absence in the other. Culture, therefore, prescribes what should be learnt and at what age. Culture typically refers to learned experiences that form a way of life shared by a group of people (Lezak, 2012). Culture is transmitted in social interactions that communicates social norms, beliefs, roles, and values and by socially created aspects of the environment such as art, architecture, and tools. Different cultural environments lead to the development of different patterns of abilities.

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Cultural and ecological factors play a role in developing different cognitive styles (Berry, 1979, as cited in Ardila, 1996).

Much discussion has focused on the degree to which variations in cognitive abilities were inherited or the result of environmental influences. Such factors as prenatal and perinatal complications, socio economic level, nutrition and health, family size, education, and birth order were correlated with cognitive performance. Studies of heritability have recently moved into examining patterns of brain development and organization and how racial and ethnic differences contribute to complex environment-brain-cognition interaction. However, most research on heritability of cognitive functioning has been focused on subjects of European descent, a group characterized as a “rather unusual slice of humanity” (Henrich, Heine, & Norenzayan, 2010, as cited in Lezak, 2012). Clinicians, therefore, need to pay attention to cognitive differences between groups with different backgrounds (e.g. urban-rural, continent of origin, etc) that tend to be demonstrated repeatedly, regardless of their origin. These differences raise the possibility of an increased rate of misdiagnoses of impairment, e.g. in neurological disorders such as dementia, when a single set of norms was applied to all groups (Lezak, 2012).

**Illiteracy and its influence on cognitive testing.** Illiteracy was found to be another factor that could affect the development of cognitive abilities, processing strategies, functional brain organization, and processing pathways. According to Manly, Jacobs, Touradji, et al. (1998, as cited in Lezak, 2012), “illiterate persons tend to give poorer performances in many cognitive domains” (p. 377). For instance, real objects might have been named correctly by persons with no formal schooling while they were likely to make noticeably more errors naming photographs and especially line drawings as many of them had little exposure to two-dimensional representations and the more abstract representations of a line drawing (Lezak, 2012). Illiterate individuals were found to have difficulty repeating

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pseudo words, memorizing phonologically as opposed to semantically related word pairs in a paired associated learning task, and generating words beginning with a particular phoneme in a verbal fluency task. Repetition of real words was shown to activate similar brain regions in illiterate and literate individuals, while pseudo words did not (Castro-Caldas, Petersson, et al., 1998, as cited in Lezak, 2012).

**Acculturation and its influence on cognitive testing.** Previous research on Hispanic groups showed a relationship between acculturation and performance on selected tests. These studies explored the relationship of African American acculturation to cognitive test performances and Manly and colleagues (Manly et al., 1998, as cited in Manly, Byrd, Touradji, & Stern, 2004) found that, among neurologically intact African Americans between the ages of 20 and 65, those who were less acculturated (more traditional) obtained lower scores on the WAIS-R Information subtest than more acculturated African Americans. Acculturation levels may have reflected the salience that a particular task had in the everyday life of African Americans. Traditional cognitive measures were based within a dominant culture that emphasized individualism, detail, and speedy performance, whereas traditional African Americans were more likely to ascribe to a belief system that is spiritually based and holistic and that emphasized interpersonal relationships. Less acculturated elders, as well as African Americans who attended poorly funded, segregated schools, may not have been as ‘test-wise’ or as proficient in the implicit and explicit language of neuropsychological assessment (Manly et al., 2004). Although this study was done in the United States, the results are still prevalent for the diverse population groups in South Africa and enhance the findings found by other cross-cultural researchers.

A literature search on this topic done by Walker et al. (2009) revealed similar results, which suggest a pervasive impact of culture on cognition and task performance. In the early

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development of western assessment procedures, the influence of cultural background on test performance received little attention. Knox (1914, as cited in Walker et al., 2009) states that

Cognitive tests were considered to measure inherent ability that would not be influenced by the effects of education or experience, and it was therefore held that in people who did not speak English, non-verbal test performances would not be related to cultural and linguistic background (p. 217).

This assumption persisted despite early findings to the contrary. In order that this problem be surmounted, viz., the uses of different languages, interpreters were used more frequently. This in itself contained some advantages and disadvantages as explicated later.

To summarize, the evaluation of a person's responses in a neuropsychological examination had to take into account the contributions of their social, cultural experiences and attitudes towards test performance, and their feelings about and understanding of their condition. When characteristics of cultural background or socio economic status are overlooked, test source interpretations are subject to conclusions of culturally determined ignorance or underdeveloped skills with brain dysfunction. This gives rise to false positive errors, and to missing evidence of deficit on over-learned or over-practiced behaviour resulting in false negative errors (Lezak, 2012). It is therefore crucial that researchers or clinicians are aware of such factors and attitudes towards testing before using westernised neuropsychological tests on all cultures.

### **Educational factors and quality of education in South Africa**

**South Africa and its legacy of variations in the quality of education.** South Africa has a legacy of variations in the quality of education available to learners. The majority of Black South Africans under the apartheid regime (1948 to 1994) were educated in schools

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run by the Department of Education and Training (DET). The Bantu Education Act of 1953 ensured Government control over education, and that there was separate, differentiated education for each racial group (Boysen, 1993, as cited in Gaylard, 2005). DET schools during this era acquired only 5-25% of the financial resources expended on White Afrikaans and White English first language pupils (Claassen, et al., 2001, as cited in Gaylard, 2005), despite representing more than 75% of the South African population. Kallaway (1984, as cited in Gaylard, 2005) considers private/Model C schooling to be of a superior level while former-DET schooling represents a lower quality of education, also referred to as Bantu Education. As discussed earlier, this has implications for test performance, as quality of education has been found to impact on the individual's acquisition of crystallized knowledge. On the other hand, elite private schools, modelled on the British public schools, as well as superior level government schools, previously designated as Model C schools, catered for socially advantaged White South Africans, focusing on developing problem solving skills and facilitating development of different strategies for learning, while DET schools mainly focused on rote learning as a means to cover the syllabus (Grieve & Viljoen, 2000, as cited in Gaylard, 2005).

Although in the last decade, especially since 1991 when Model C schools became multiracial, many Black learners have been increasingly integrated into the previously White private and Model C schools, a large proportion of Black learners in the country still attend the former-DET schools. These schools are, however, likely to remain relatively impoverished for many decades to come despite revised educational policy which requires a more equitable allocation of resources (due to factors like a high pupil-to-staff ratio; poor salaries with staff shortages; minimal extra-mural activities; and limited facilities in the form of classroom space, desks, reading and writing materials) (Shuttleworth-Edwards, Donnelly et al., 2004). For example, in 1991 a Black school in the Eastern Cape with a thousand

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students had 24 teachers while an equivalent Model C school had 59 teachers. In 2004, both types of schools had about 31 state paid teachers, but the Model C schools paid about 12 additional teachers privately (Van Der Berg, 2004, as cited in Gaylard, 2005). Therefore, despite the change in legislation, former-DET schools continue to be dogged by the legacy of apartheid and former-DET schools, still to this date, are synonymous with disadvantaged education systems.

**Crisis in education in South Africa.** Modisaotsile (2012) is of the opinion that South Africa shows many signs of crisis in education. With high enrolment rates each year, and increasingly poorer grade 12 outputs, it is clear that more attention needs to be focused on the quality of education at former-DET schools. The majority of learners who pass Matric do not meet the minimum requirements for university entrance. In addition, of the number of learners enrolled in grade 1, only half make it through to grade 12.

Modisaotsile (2012) expressed the opinion that there is a lack of good leadership in schools to ensure that teachers attend to their classes diligently and learners take the importance of education seriously. Government in the past did not ensure that teachers received sufficient training and schools lacked the adequate basic resources that should have been available to them. The lack of parental participation in the education of their children, and the impaired functioning of School Governing Bodies, as they were formed in all South African public schools, is also of great concern. This in turn leads to challenges in the placement for pupils who graduated from these institutions for learning (Modisaotsile, 2012).

In an article written by Price (2011) it was investigated why performance by race, even in students from the same privileged schools and middle-class socio economic status, still varied. Three distinct types of explanations were found in the international literature. Firstly, the performance of students is affected by the educational experience of their parents

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(e.g. a mother who was subjected to the system of Bantu Education in former-DET schools might place a heightened emphasis on the value of education - because of her deprived background - but may not always know how to assist, motivate and inspire a child to achieve an A aggregate). This might only resolve itself during the next generation following the new government election in 1994.

Secondly, the South African school system, like most educational systems, favours those who share the 'cultural capital' of that school system (e.g. individual achievement and competitiveness over shared knowledge and collective achievement; science and empiricism over religious, mythological or traditional knowledge).

The third type of explanation for the race differential in educational performance relates to the persistence of racism and racial stereotypes in the experience of the current generation of school children (e.g. daily experience of Black students at high-quality, racially integrated schools, and also outside of the schools, does not protect them from the stereotypes and their effects, and may even exacerbate them). Therefore, ideally, one should have a measure of disadvantage that assesses not only socio-economic disadvantage, but also the many intermediate determinants of school performance (Price, 2011). It is therefore understood to be essential that an evaluation of the schooling system in South Africa takes on importance.

**Socio-cultural influences.** Further studies found that socio-cultural influences encompass a number of closely inter-related variables that are difficult to separate, including language usage and reading ability, level and quality of education attainment, socio economic status, and home and schooling socialization experiences. Ardila (1995, as cited in Shuttleworth-Edwards, Donnelly et al., 2004) notes that culture dictates what is and what is not relevant, and provides models for methods of thought, deeds and emotions, with resultant

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variations in cognitive test outcomes. The acquisitions of language ability and factual knowledge are influenced by the fluency in the following functions under the term 'test-wiseness':

- usage of the pencil
- tasks to be copied
- improved attitudes
- self-confidence, and
- concentration levels in test-taking situations (Ardila, 1995, as cited in Shuttleworth-Edwards, Donnelly et al., 2004, p. 904)

These entrenched classroom-type skills were the most powerful moderators of test performance (Nell, 1999, as cited in Shuttleworth-Edwards, Donnelly et al., 2004). Hence, there was the potential for substantial socio-cultural effects on cognitive test cognition measured in both the verbal and non-verbal areas.

**Socio economic status influencing cognitive testing.** Hulme and Shepherd (2003) in their article about Conceptualizing Chronic Poverty, refer to low socio economic status (SES) as chronic poverty in the sense of “who” is chronically poor, ”“why” they stay poor, and “what” is known about policies to reduce chronic poverty. Westaway (2012) indicates that the continuity between the pre- and post- 1994 periods of poverty is best described by exploring and understanding post-1994 policy decisions and power configurations as an expression of contemporary ‘segregationism’. He argues, that ‘segregationism’ was a foundation stone of South Africa at the moment of its creation in 1910, and that it remains of foundational importance today, 100 years later. Part of this ‘segregationism’ was the implementation of Department of Education and Training (DET) schools and the so called Bantu Education.

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According to Westaway (2012), due to the years of DET schools in South Africa and the Bantu Education, the schooling system of these former-DET schools in the Eastern Cape, South Africa, “is highly likely not to be advancing in quality of education as quickly as schools in the United Kingdom, the United States and Europe, where the WISC-IV tests were standardised” (p. 115). The population from which the sample of participants for this research was drawn consisted of residents of townships which are associated with low environmental complexity due to under development (Westaway, 2012) and much higher susceptibility to disruptions caused by elements of nature such as very cold weather conditions, hot summer conditions, hunger, etc. Living conditions in South African townships are very different from living conditions in former White suburbs of South African towns and cities in which the average living conditions correspond more closely to the average living conditions experienced by the populations used for the UK/US/European standardisations of the WISC-IV tests.

Teachers teaching in these former-DET schools themselves come from the townships surrounding the schools and, as Modisaotsile (2012) explains, their own educational levels are influenced by poverty, their own former-DET education and low socio economic standards (SES) of living lifestyles. Government, therefore, needs to ensure that teachers are trained accordingly and schools have adequate basic resources.

In her press release statement for the Annual National Assessment for 2011 (Modisaotsile, 2012), the Minister of Basic Education, Mrs. Angie Motshekga, stated at the Southern and Eastern African Consortium for Monitoring Education Quality, (Modisaotsile, 2012) that

the results of 2007 had shown some improvement in reading since 2003, but not in mathematics. Many of the learners lack proper foundations in literacy and numeracy

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and so they struggle to progress in the system and into post-school education and training. (p. 2).

This is further corroborated by a newspaper article from IOL News dated 21<sup>st</sup> July 2014, stating that “Matric maths teachers are battling to master the same content their pupils have to deal with, research into a sample of 253 KwaZulu-Natal (KZN) teachers has found” (Jansen, 2014, p. 1). As Jansen (2014) pointed out, most research into what maths teachers know had focused on primary school teaching. These studies pointed to teachers’ poor content knowledge as one of the reasons for pupils’ poor academic results. Research in KwaZulu- Natal (KZN) primary schools in 2010 revealed that none of the teachers were able to achieve 100 percent for a test on the curriculum they were teaching, and 24 percent scored less than 50 percent. Researchers found that as the cognitive level of questions increased, the teachers did progressively worse. One of the reasons given for the occurrence of poor subject

knowledge was the result of the different levels of training teachers received over the past decades (Jansen, 2014).



([www.conservationafrica.net](http://www.conservationafrica.net))

*Figure 1.* A photograph showing typically crowded classroom conditions in former DET-schools

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This article further summarized that education in South Africa is highly unequal. Decades of apartheid policy meant that previously White schools received more funding than schools in Black, Coloured and Indian communities. Many of the inequalities created during apartheid remain today – nineteen years into the new democracy. This was witnessed by the researcher at the four schools, where testing took place, as there were classes with more than 40 learners on a regular basis; toilets that were not in working order; classrooms with barbed wire in front of the windows and on the ceiling for safekeeping of equipment and learners; very slack security systems in place; no or inadequate computer facilities and poorly stocked libraries.



([www.conservationafrica.net](http://www.conservationafrica.net))

*Figure 2.* A photograph of learning conditions of learners in the Eastern Cape

In respect to resources, on Friday 29<sup>th</sup> November 2013, the Minister of Basic Education, Angie Motshekga (“School Infrastructure”, n.d.), published legally binding Norms and Standards for School Infrastructure. For the first time ever it is now the law that every school must have water, electricity, internet, working toilets, safe classrooms with a maximum of 40 learners, security, and thereafter libraries, laboratories and sport facilities (“School Infrastructure”, n.d.). The report further goes to explain that the National Education

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Infrastructure Management System (NEIMS) Report, published in May 2011, provides detailed statistics on the lack of resources at public schools across the country. 3 544 schools do not have electricity; 2 402 school have no water supply; 913 do not have any ablution facilities; 22 938 schools do not have stocked libraries; 21 021 schools do not have any laboratory facilities; 2 703 schools have no fencing at all; and 19 037 schools do not have a computer centre (out of 24 793 public ordinary schools). There are also currently over 400 schools in the Eastern Cape alone that are classified as “mud-schools”, many of them consisting of mud and shacks. The provincial departments had three years to eradicate schools made from inappropriate materials such as mud, wood, metal and asbestos (Malebye, 2011).

Klaasen (2000, as cited in Gradín, 2013) reported a deprivation rate of 67% for Africans in contrast with only 0.6% for Whites in 1993. It has further been shown that the access of economically impoverished South Africans to basic services substantially increased in the early years of the post-apartheid period (from 1993 to 2004). However, 15 years later, in 2008, the differences by race in deprivation regarding several dimensions were still large. For example, according to Gradín’s (2013) calculations, 30% of Africans in 2008 lived in traditional informal dwellings, while two thirds lacked piped water inside their homes, compared with 0.5 of Whites, respectively.



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*Figure 3.* A photograph of typical township living conditions in South Africa

Regarding home equipment, while 18% of Whites lived in households that did not own a refrigerator, television or radio, these percentages shifted to 32% in the case of people of African origin. The differential is also large in terms of the accumulation of deprivation. Less than 2% of Whites lacked all three of these appliances at home, in contrast with 12% of Africans. Likewise, 45% of Africans reported having insufficient (less than adequate) healthcare coverage, more than doubling the level of 19% for Whites in a similar situation (Gradín, 2013).



In summary, these low SES living conditions as well as poorly funded schooling systems and poor quality of education could,

*Figure 4.* A photograph illustrating poor SES living conditions in South Africa

therefore, possibly be factors influencing the low scores in verbal and mathematical skills in former-DET schools in the Eastern Cape region in particular as seen above. The implication

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is, therefore, that whilst verbal tasks and tasks of acquired knowledge are invariably culture sensitive, all performance tasks are ultimately culturally sensitive given sufficient deprivation due to the variable of 'test-wiseness' (Shuttleworth-Edwards, Donnelly et al., 2004). This study lends support to the caution that poor quality of education is likely to be associated with lowering of both verbal and performance functions on the WISC-IV, whereas those individuals with good quality of education are likely to reveal equivalence in WISC-IV test performance in relation to the US, UK and Europe standardization.

Furthermore, a study by Duncan and Brooks-Gunn (2000) suggested that deep or persistent poverty early in childhood affects adversely the ability and achievement of children. In terms of achievement, the risk for poor children relative to non-poor children is 2.0 times higher for grade repetition and dropping out of high school, and 1.4 times as high for having a learning disability. Verbal ability and achievement appear to be more affected by family income than are problem behaviour, mental health, and physical health. Depth of poverty also appears to contribute to children's cognitive outcomes. Children who reside in households with incomes below the poverty threshold have test scores that are substantially lower than those of children living in families with income above the poverty threshold.

This was confirmed in a recent study by DeGarmo and colleagues (1999, as cited in Bradley & Corwyn, 2002) where it was found that each Socio Economic Standard indicator (income, education, occupation) was associated with better parenting, which in turn affected school achievement via skill-building activities and school behaviour. Parcel and Mehaghan (1990, as cited in Bradley & Corwyn, 2002) found that mothers who worked in occupations with a variety of problem solving opportunities and tasks provided more support and warmth and a greater number of stimulating materials. Their children manifested more advanced verbal competence. It is constant with the classic argument of Kohn and Schooler's (1982):

“What parents experience at work, they incorporate into their style of parenting” (as cited in Bradley & Corwyn, 2002, p. 4).

The Chronic Poverty Research Centre (Hulme & Shepherd, 2003) identified a number of categories of individuals, social groups and households who are particularly likely to suffer chronic poverty: those experiencing deprivation because of their stage in the life cycle; those discriminated against because of their social position at the local, regional or national level; household members who experience discrimination within the household; those with long-term or severe health problems and highly challenging disabilities and impairments; people living in remote rural areas, urban ghettos, and regions where prolonged violent conflict and insecurity have occurred. Commonly the chronic poor experience several forms of disadvantage at the same time. These combinations keep them in poverty and block opportunities for improving their livelihoods. The reason for them to stay poor may be at a global level, the nature of capitalist development, at the micro-level, and focusing on the personal characteristics and psychology of poor individuals. The generalized poverty in poor countries means that few resources are available for public or private investment (Hulme & Shepherd, 2003).

### **Language and IQ testing**

**Language, an influential factor on test performance.** Van den Bergh (as cited in Nell, 1994) states that

language can be described as the most influential factor mediating test performance, as the translated version of a test might have denied the testee access to the language medium through which he or she had acquired most of his or her knowledge and experience (p. 101).

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In addition, the language in which the test was administered may make a range of concepts available to a non-native speaker of that language that was inaccessible in the speaker's home language. However, those who spent their early years in one culture using one language and then, as adults, moved to another culture and adopted its language, were likely to have had different linguistic capabilities than those who spoke both languages from birth. Test instructions and concepts might have been understood better when given in one as opposed to the other language with different test score outcomes. Comfortably bilingual people might have responded differently to the same questions depending upon the language in which they were presented. Even different symptoms may have become prominent depending on the language of examination (Lezak, 2012).

The SES in which a child grows up may have a significant impact on language development, whereby exposure seems to be the key word (Louw & Louw, 2012). Children from a low SES are not exposed to the level of home literacy environment needed and therefore lack the language stimulation, which is an integral part of such a development. It also seems that parents from a low SES do not interact verbally with their children as often as do parents with a high SES. Crowded homes also have adverse effects on language development, as parents tend to be less responsive to children which, in turn, leads to a less stimulating learning environment, which then leads to impoverished speech (Louw & Louw, 2012).

This has led to urgency among South African psychologists to translate inventories developed in English in the USA and Britain into African languages (Steele & Edwards, 2008). However, the challenges and pitfalls involved in translations were not always adequately acknowledged. The translation of research instruments are often plagued by practical and methodological difficulties that have threatened the validity of the cross-cultural

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research projects that used them. When inaccurate translations are made, comparative research could point to apparent cultural differences in attitudes or experiences, when in reality the differences are simply semantic and due to the items being interpreted differently because of linguistic shortcomings (Grunert & Scherhorn, 1990, as cited in Steele & Edwards, 2008). Steele and Edwards (2008) further acknowledge that guidelines for cross-cultural translations have to stress the need for meticulous advanced planning as well as a great deal of rigour and sensitivity if they are to successfully adapt scales developed in English in a culturally relevant and comprehensible form while maintaining the meanings of the original items. It was further noted that misunderstandings of the meaning of words and phrases between people who know each other well and who speak the same language is quite common. When transferring material from one language to another, the potential for misunderstandings is even greater, and researchers have commented on the frustration caused by the seemingly intractable problems they encounter in the process (Steele & Edwards, 2008).

Steele and Edwards (2008) indicated that Xhosa was being spoken by an estimated seven million people in South Africa, and is not restricted to a single geographical area within the country, being represented in the urban and rural Eastern Cape, and in many other provinces. As a consequence, the language is replete with different vernaculars as well as inherent differences as a conversational medium. Therefore, while it is clearly preferable to assess an individual in his/her home language, and translations for tests for this purpose are advocated by the International Test Committee (Van der Vijver & Tanzer, 2014, as cited in Steel & Edwards, 2008), this is a specially difficult task in a country such as South Africa with 11 different official languages and language groups with specific vernacular differences. Steel and Edwards (2008) warn that the pitfalls in the translation of tests and inventories are frequently overlooked. Abstract concepts are very difficult to translate in singular words from

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Xhosa to English, hence the need to explain a word. The question of equivalent translation is, therefore, fraught with difficulties in many of the psychological tests (Steel & Edwards, 2008). In summary, although translations are necessary and appear to have a place in this environment, the writer believes it is a very complex task to achieve it ethically and morally correct.

**Use of interpreters and dangers involved in IQ testing.** Although interpreters are at times used to help bridge the gap between different languages, this is not deemed ideal, as they could influence the test taker or the material on hand, especially if they are not familiar with its content (Walker et al., 2009). Foxcroft (2002) therefore stated that interpreters should be trained in the nature of interviewing and psychological measurement, and should have a clear understanding of their role (this is to say that there should be no adding of their own opinion, no prompting of test-takers regarding an appropriate answer, or even the asking of questions in a leading way, etc.) . Walker et al. (2009) mentioned that “when interpreters are required, they should always be familiarized beforehand with standard testing procedures and written translated materials. Afterwards, they should be asked about doubts or problems with meaning and translation” (p. 222).

The generated reports need to highlight interpreter use, the limited restrictions of the approach, and the cultural factors and normative comparisons that would have been made (Heilbronner, 2007, as cited in Walker et al., 2009). However, one needs to take into account that interpreters are likely to be handicapped by the fact that each of the languages being used has concepts for which there are no equivalents, making accurate translations difficult. One way in which this problem could be circumvented is to learn the other language, or at the very least, certain important phrases (Walker et al., 2009).

**Research in connection with quality of education**

**Cross-cultural research.** In the latter part of the twentieth century and during the first decade of the twenty-first century, multiculturalism has become the norm in many countries (Foxcroft & Roodt, 2009). ‘Culture-reduced’ and ‘culture-common’ tests were developed in which the aim was to remove as much cultural bias as possible from the test, by including only behaviour that was common across cultures. With assessments being widely used in recruitment, training in work and organisational settings, and in selection, a new standard is being developed by ISO (the International Organisation for Standardisations) to ‘ensure that assessment procedures and methods are used properly and ethically’ (Bartram, 2008b, p. 9 as cited in Foxcroft & Roodt, 2009, p.14).

**WAIS-III.** A study by Shuttleworth-Edwards, Kemp et al., (2004) compared Model C schools’ education levels to former-DET levels of education with a sample based drawn from the Eastern Cape, South Africa. Stratification was based on two factors of ethnic/language groups (namely White English first language and Black African first language), two factors of the level of education (namely Grade 12 and Graduate) and two factors of the quality of education (namely advantaged and disadvantaged). Scores for the Black African and White English first language groups with advantaged education were comparable with the US standardization, whereas scores for Black African first language participants with disadvantage education were significantly lower (20 to 30 IQ points) than this. Both the Wechsler Adult Intelligence Scale III (WAIS-III) (English administration) as well as the Wechsler Intelligence Scale for Children IV (WISC-IV) (English administration) were used in the carrying out of the above tests (Shuttleworth-Edwards, Kemp et al., 2004).

The statistical analyses consistently revealed “a highly significant effect for both level and quality of education in the direction of poorer performance for the Grade 12 level versus

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Graduates” (Shuttleworth-Edwards, Kemp et al., 2004, p. 910). This proved accurate across both Black African and White English first language groups, as well as for former-DET education in relation to private/Model C education in the Black African first language group. It was noted that for the Black African first language sample, the consequences which resulted for quality of education were even more pervasive than they were for the level of education. For quality of education, there was a significant lowering in connection with poor quality former-DET education relative to good quality private/Model C education across all subtests (Shuttleworth-Edwards, Kemp et al., 2004). Thus we see that this study has provided initial normative guidelines for clinical use, and also produced an awareness of the trends that needed to be followed up by further research and taken into account for standardization purposes.

**WISC-IV.** In South Africa, Shuttleworth-Edwards, Van der Merwe et al. (2013) completed a paper in the field of cross-cultural research within the context of intelligence testing in respect of the WISC-IV, the normative implications of which continue to have crucial relevance for practitioners wishing to employ a WISC-IV in this country.

The WISC-IV is widely used in South Africa, which leads to researchers such as Shuttleworth-Edwards and colleagues to stress that there is still a great need for obtaining preliminary normative data for South Africans. As discussed earlier, the still existing educational inequalities affecting test performance motivated the authors to highlight quality of education as an important variable along with research samples which should be stratified and which should be considered when conducting and interpreting intelligence quotient (IQ) assessments (Laher & Cockroft, 2013).

To address the absence of the availability of norms for the WISC-IV, Shuttleworth-Edwards, Van der Merwe et al. (2013) conducted extensive work in developing cross-cultural norms for Grade 7 children. The aim of her study was to produce an expanded set of

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preliminary comparative norms on the WISC-IV on White English, Black Xhosa, White Afrikaans and Coloured Afrikaans speaking Grade 7 children, aged 12 and 13 years. The sample was further stratified for language/ethnic groups for quality of education, viz. relatively advantaged education within the historically White independent and/or former Model C educational institutions, versus relatively disadvantaged education within the Black and Coloured township education institution (Shuttleworth-Edwards, Van der Merwe et al., 2013). The findings of this study are shown in table 2 below.

Table 2: *WISC-IV data for 12-13 year olds education stratified for ethnicity and quality of education* (Shuttleworth-Edwards, Van der Merwe et al., 2013, p. 41)

Group	1	2	3	4	5	6
Ethnicity	White English	White Afrikaans	Black Xhosa	Coloured Afrikaans	Black Xhosa	Coloured Afrikaans
	Advantaged	Advantaged	Advantaged	Advantaged	Disadvantaged	Disadvantaged
First Language	English	Afrikaans	Xhosa	Afrikaans	Xhosa	Afrikaans
Quality of Education	Private/ModelC	Private/ModelC	Private/ModelC	Private/ModelC	former DET	former DET
<i>n</i>	12	12	12	9	12	12
Test	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>
<b>Subtest Score</b>						
Similarities	14.08(2.35)	8.92(3.03)	12.33(2.35)	7.44(1.59)	6.42(3.50)	4.33(3.20)
Vocabulary	13.75(2.49)	8.42(2.39)	9.08(2.07)	6.78(1.92)	7.08(3.61)	3.17(1.19)
Comprehension	12.92(3.26)	8.75(2.26)	9.58(2.43)	7.89(1.27)	6.50(2.68)	4.58(2.07)
Block Design	11.83(2.66)	10.17(4.28)	8.33(1.92)	7.11(2.09)	6.42(1.93)	4.92(2.02)
Picture Concept	11.67(2.43)	6.67(2.84)	10.00(2.34)	10.00(3.00)	7.67(2.64)	6.92(2.84)
Matrix Reasoning	10.75(2.90)	8.92(2.54)	8.08(2.02)	8.33(1.73)	6.58(1.93)	5.33(2.35)
Digit Span	11.42(3.61)	8.83(2.95)	10.42(2.23)	6.78(2.28)	7.25(2.42)	6.00(2.17)
Letter-Number Sequencing	9.25(2.90)	10.33(2.02)	9.83(2.17)	8.33(3.20)	8.17(3.27)	4.00(3.02)
Coding	8.00(2.66)	8.33(2.77)	7.08(2.64)	6.00(1.23)	5.83(2.73)	6.00(1.95)
Symbol Search	10.75(2.56)	10.25(2.77)	7.33(2.61)	8.56(1.59)	6.92(3.48)	5.00(2.63)
<b>Index Score</b>						
VCI	120.92(14.76)	92.58(12.40)	101.30(10.12)	85.00(6.08)	80.42(13.59)	65.08(11.25)
PRI	111.67(18.10)	97.50(16.83)	92.75(7.57)	90.67(10.09)	80.83(11.21)	73.83(12.04)
WMI	101.25(13.37)	97.00(12.13)	100.08(10.08)	85.67(12.45)	86.50(12.99)	71.00(11.78)
PSI	96.17(14.89)	96.17(15.09)	84.50(12.30)	84.33(6.12)	79.83(16.28)	75.33(11.24)
<b>IQ Score</b>						
FSIQ	112.83(13.17)	94.42(13.25)	93.92(5.85)	82.67(7.43)	77.08(13.79)	64.25(9.73)

Note: Verbal Comprehension Index (VCI); Perceptual Reasoning Index (PRI); Working Memory Index (WMI);

The research outcome was highly equivalent, indicating a lowering of all the subtests and IQ test scores of around 20 to 30 IQ points compared with the UK standardization in association with relatively disadvantaged education, with quality of education being a more

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discriminating variable than race. The norms developed in the work of Shuttleworth-Edwards, Van der Merwe et al. (2013) are widely used by practitioners in South Africa when using the WISC-IV. In using these norms, cross-cultural fairness was enhanced and results were obtained that reflected a more accurate indication of cognitive ability. For example, children with disadvantaged educational exposure may be mistakenly classified as mentally handicapped or intellectually compromised when this was not actually applicable (Laher & Cockroft, 2013).

**WAIS-IV.** Klopper (2014) focused on one of seven normative subgroups that were studied in Shuttleworth-Edwards, Gaylard, and Radloff (2013), namely the Black Xhosa-speaking adults with Grade 12 with disadvantaged schooling who were exposed to poor quality of education. This group was selected, as it proved to be the lowest performing group in the research (Full Scale IQ around 20-30 IQ points lower) of all the groups in Shuttleworth-Edwards, Gaylard et al. (2013). When this study is compared with US/UK standardisation it shows that within group norms for this test group is very important, meaning that it is pertinent to keep in mind the impact on the individual's behaviour, especially with regard to the ethical and accurate use of the WAIS-IV.

Klopper (2014) identified possible reasons for the lower performance on most of the subtests under Verbal Comprehension and Perceptual Reasoning to be likely a function of many factors. The most likely factors were (Klopper, 2014)

- (1) the ongoing poor quality of education in former-DET schools in South Africa, (2) low socio economic status (Hulme & Shepherd, 2003; Westaway, 2012), (3) variances in the population from which the WAIS-IV and WAIS-III samples were drawn, and (4) slight modifications to subtests and test items of the particular subtests" (p. 77).

### **The Flynn Effect**

The Flynn Effect was first discovered by James R. Flynn in a study of the American population (Flynn, 1984) and later he studied 165 participants from 35 countries over the world which included countries from Latin America, Asia, Europe, the USA and commonwealth countries (Canada, Australia and New Zealand) (Flynn, 1987). In his studies he noted an average increase of about three IQ points per decade. The Flynn Effect can be defined as the steady and gradual increase of IQ scores in a population (generational population) over time. Flynn (1987) was the first person to systematically make sure that cross-generational comparison was applied.

The results of these intelligence tests in different countries showed that over the past century average IQ has been increasing at a rate of about three points per decade. Earlier researchers had failed to pay attention to that trend, because IQ scores are always calculated with respect to the average score of the present group. By definition, the average is set to 100. Someone who scores 20% more than the average would therefore get an IQ of 120. But if that person's score was compared with the average for the corresponding group, tested one generation earlier, the final score would be about 130. Flynn was the first to systematically make such cross-generational comparisons (Heylighen, 2000).

The Flynn effect is named after James R. Flynn, who did much to document it and promote awareness of its implications. The term itself was coined by Richard Herrnstein and Charles Murray, authors of *The Bell Curve* (Heylighen, 2000). Although the general term for the phenomenon referring to no researcher in particular continues to be "secular rise in IQ scores", many textbooks on psychology and IQ testing have now followed the lead of Herrnstein and Murray in calling the phenomenon the Flynn Effect (Heylighen, 2000).

### **Rationale for the present study**

From the above review of South African cross-cultural research conducted so far in respect of the Wechsler Intelligence Scales, it is evident that the focus has been on quality of education in South Africans from the ages of Grade 7 upward, whereas there appears to be no research in respect of younger children.

The aim for the current study was to expand the data obtained by Shuttleworth-Edwards, Van der Merwe et al. (2013) which was based on Grade 7 learners in South Africa, stratified for race and language (White English, Black Xhosa, White Afrikaans, Coloured Afrikaans) and quality of education (advantaged private/former Model C schooling versus disadvantaged township schooling/former-DET). The current research, therefore, is a downward replication from Grade 7 learners to Grade 3 learners, with the aim to investigate education as a factor in the mediation of test outcome. The sample was stratified for age (Grade 3 learners, 8–9 years old), language (Xhosa-speaking children), and level of education (former-DET schools) learning in the medium of English.

The decision was made to compare only learners from former-DET schools to the UK norms, as previous studies by Shuttleworth-Edwards, Van der Merwe et al. (2013) had shown that Black Xhosa-speaking Grade 7 learners' outcomes from assessments coming from a background of advantaged schooling were comparable to UK norms. Therefore, replication was decided not to be necessary.

Although the above mentioned data has gone some way to filling a gap in cross-cultural indications in respect of the WISC-IV, further research is needed, especially investigating the effects of education on the outcome of test assessments in younger age groups and different races (Coloured, White, Black, etc), which has been partially addressed in the current study.

### **Chapter 3: Methodology**

#### **Introduction**

This study was a partial operational replication of the study by Shuttleworth-Edwards, Van der Merwe et al. (2013). It is considered a partial replication because while it followed the same methodology as published in Shuttleworth-Edwards, Van der Merwe et al. (2013), the replication was in respect of only one of the subgroups, namely Xhosa-speaking disadvantaged learners. The study was done with control for level of education, quality of education, race and language of origin. The research conducted by Shuttleworth-Edwards, Van der Merwe et al. (2013) incorporated stratification to produce a subgroup controlled for the same variables of level and quality of education, race and language of origin, which means that comparisons could be made between the results from the previous study and results from the current study.

#### **Participants**

The method of participation selection was based on the cross-cultural stratification criteria used in the research by Shuttleworth-Edwards, Van der Merwe et al. (2013) that was conducted in respect of Grade 7 Xhosa children. The aim of their work was to produce an expanded set of preliminary comparative norms on the WISC-IV on White English-speaking, Black Xhosa-speaking, White Afrikaans speaking and Coloured Afrikaans speaking Grade 7 children, aged 12 and 13 years. The sample was further stratified for language/ethnic groups for quality of education viz. relatively advantaged education within the historically White private and/or former Model C educational institutions, versus relatively disadvantaged education within the Black and Coloured township education institution.

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This current study controlled for variables of sex (a relatively balanced number of males and females), ethnicity (Black Xhosa first language), and level of education (Grade 3 learners), age (8-9 years of age) and quality of education (disadvantaged – former-Department of Education/Township schools). This was a non-clinical sample, excluding any children with learning or developmental difficulties, psychiatric or paediatric diagnoses and neurological difficulties. See Table 3 for a summary of the demographic criteria for research participants in the current study.

Table 3: *Summary of the demographic criteria for research participants in the current study*

Ethnicity	Black
Nationality	South African
Language	Xhosa first language with proficiency in English
Quality of education	Disadvantaged, former-DET schooling
Level of education	Grade 3
Age range	8-9 years

For the current study, a total of thirty two (N=32) participants were assessed, thirteen (N=13) male and nineteen (N=19) female. The present research was conducted with a view to being practitioner-oriented, and the small, demographically focused sample, which isolated variables of race in association with level and quality of education, was regarded as suitable for the establishment of a set of preliminary normative guidelines for practitioners using the WISC-IV with Grade 3 Xhosa-speaking disadvantaged children in South Africa, the Eastern Cape, and the East London area, in particular. The research took place against the background of the well described problem in the international literature, that the use of tests developed in the US/UK without appropriate standardization for foreign contexts is deemed problematic for diagnostic as well as placement purposes (Strauss, Sherman, & Spreen, 2006). In particular, stratification for race group in conjunction with level and also *quality* of educational background is considered to be of prime relevance in the multi-cultural

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assessment arena in general (Manly et al., 2004), and again is therefore of particular pertinence in South Africa.

Permission was obtained from the Department of Education to administer the research at four specified schools. See figure 5 for the layout of the Eastern Cape, East London area.



(<https://www.google.co.za/maps/vt/data>)

*Figure 5.* A map of the Eastern Cape indicating the locations where the research participants received schooling.

Non-probability sampling and purposive sampling were used. Non-probability sampling indicates that sampling was not done by random selection while the purposive sampling approach was applied with a certain plan in mind ("Nonprobability Sampling", n.d.). Therefore, sampling did not involve random selection; rather participants were identified by the headmaster/mistress and teachers at three out of the four targeted schools in order to promote a fairly equal distribution between genders. One of the schools was ruled out due to the fact that it was a Secondary School and its affiliated Primary School also had to be ruled out as it was established that teaching did not take place in the medium of English, except for the subjects English and Mathematics. This would, therefore, have skewed the

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results negatively, as the WISC-IV test battery relies heavily on English language proficiency.

Headmaster/headmistress' permission was obtained in writing prior to starting the research process (Appendix 1). Thereafter, parents were contacted to obtain signed consent for the testing (see Appendix 2). Participating children's consent was also obtained (see Appendix 3). Participation was voluntary and testers were free to withdraw from the research at any point in the process.

Exclusion criteria included the presence of a past history of any head injury, relative learning difficulty, repeating of any previous grade, and neurological or psychological disorders which were screened in the form of a questionnaire (see Appendix 4).

In this study a decision was made to consult a translator because of two factors to be taken into account: Firstly, the English proficiency for Grade 3 Xhosa-speaking children at former-DET schools was expected to be rather poor, as the teachers often switched back to teaching in Xhosa instead of English during lessons. Moreover, Watson, Davies and Foxcroft (2006, as cited in Foxcroft & Roodt, 2009) found that merely being educated through the medium of English was not a guarantee that learners were sufficiently proficient in English as a second language even at the end of Grade 12. In fact, the majority were not and neither did they become proficient.

Secondly, this enabled the research to stay in accordance with international standards, where clinicians would normally employ a translator to repeat instructions that are given in English in the child's first language, unless the clinician was sufficiently bilingual to translate. Translators were therefore used to translate the instructions for the varying tests only. The translators also were able to read the instructions from the manual by themselves and had a copy of the record form used for testing in front of them. This helped to try and

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ensure that the standards of international testing could be upheld and minimum influence would be imposed by the translator on the pupil. Testing itself was performed in the medium of English.

The method employed in the present study was thus considered reasonable in keeping with the aims of the study, in that it allowed the researcher to obtain preliminary normative data for clinical utility for the Xhosa disadvantaged participants in the absence of formal standardised translations of the WISC-IV and that it allowed a base for comparison to previous studies conducted for Grade 7 learners (Shuttleworth-Edwards, Van der Merwe et al., 2013). Further, this is typically the method employed currently in clinical settings for pragmatic reasons in the absence of translations for commonly employed US or UK standardized test. Therefore, the acquisition of norms on the basis of this administration procedure has immediate practical applicability in the South African assessment arena in a situation where test translation is an onerous task that takes time, and is difficult to accomplish with limited research resources. Moreover, translation of tests into an African language is not without its own difficulties, given multiple languages and geographical nuances even within a single language.

### **Procedure**

**Data collection.** The data was collected by two Master's level Counselling Psychology students and two Intern Psychologists. Two Xhosa-speaking Master's level Counselling Psychologists and a Management student were used as translators. All the test administrators were trained in the standardised administration and scoring of the WISC-IV according to the manual (Wechsler, 2004). Test administrators were randomly assigned participants from various schools, and care was taken to ensure that each administrator tested a cross section of male and female learners during the respective data collection periods.

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Only learners who met the selection criteria were approached for participation, and screening for exclusion criteria for this study was done with the help of a questionnaire (see Appendix 4) that was completed by the parents or guardian of the learners. Subsequently, the headmaster and class teachers were asked to identify potential participants according to the sampling criteria.

**Test administration.** Firstly, possible participants were screened using a screening questionnaire (see Appendix 4) to rule out any presence of a past history of any head injury, relative learning difficulty, and neurological or psychological disorders.

Thereafter, the full WISC-IV battery (core and supplemental tests) comprising of fifteen tests as per the standardised manual (Wechsler, 2004) was administered to the selected children. Tests were individually administered during early morning school hours. Each test battery was generally completed with participants in a single sitting with a break taken half way through testing, if required. Each test took between 1 hour 20 minutes and 2 hours 15 minutes to administer, depending on the learner's ability. Tests were administered in a room provided by the particular school of the learner and attempts were made to minimize noise and distractions. Data collection took place over a period of five weeks.

**Scoring.** Tests were scored according to the WISC-IV manual (Wechsler, 2004). Responses to the Verbal and Non-Verbal subtests were scored by the four administrators and the researcher as well as the researcher's supervisor. Any discrepancies in results were resolved between the scorers.

Thereafter, the raw scores were converted to scaled, factor index and IQ scores using the UK normative tables according to chronological age categories. Both the researcher and eight independent clinicians, blind to the aims of the study, checked the additions to obtain the raw scores and the accuracy of the scaled, factor index and IQ scores.

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**Data analysis.** For the purpose of descriptive comparison and future clinical practice, normative tables were drawn up for each level of education (Grade 3 and Grade 7), with stratification for race, language, and quality of education. Descriptive statistics were generated to determine the mean scores and standard deviations for all WISC-IV core subtest scaled scores, factor index and IQ scores.

A t-test comparison of each of the following groups was run by a local statistician in order to determine whether there was a significant difference between the previous group of Grade 7 Xhosa-speaking learners, the current group of Grade 3 Xhosa-speaking learners from former-DET schools, males and females and the UK population norms. This was done by comparing the following three criteria with each other:

- 1) The Grade 3 Xhosa-speaking learners versus Grade 3 UK population norms.
- 2) The Grade 3 Xhosa-speaking male learners versus female learners from former-DET schools.
- 3) The Grade 3 Xhosa-speaking learners versus Grade 7 Xhosa-speaking learners from former-DET schools.

The test comparison was done in order to investigate the effects of quality of education on test performance and IQ levels of the original research done by Shuttleworth-Edwards, Van der Merwe et al. (2013) in comparison with the current research. The analyses were replicated for the present study using the newly constituted Xhosa language group of Grade 3 learners, and presented in tables for comparative purposes with the analyses for the original data.

For the post hoc pair-wise comparison, the use of Scheffe's test ensured that the overall level of significance did not exceed a 5% level (0.05) of significance. However, when multiple test measures are being investigated in respect of the same groups (as was the case

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for the present study) it is necessary to make an adjustment in the level of significance towards stringency in order to reduce the risk of a Type I error (i.e. the identification of any significant differences between groups where these do not exist). Such an adjustment (i.e. Bonferroni adjustment) served to protect against Type I error, but did so at the cost of possibly minimizing significance, and therefore increasing the likelihood of Type II error (i.e. failure to identify a real difference). Therefore, in order to protect against Type I error, a Bonferroni adjustment was made towards stringency by setting the level of significance at the 1 % level (0.01). It was decided that any more stringent adjustments than this would inevitably increase the risk of Type II error, especially in light of the small sample numbers.

**Data presentation.** The results will be set out in three tables covering the different comparative groups, including: descriptive statistics, means, standard deviations, t-values and p-values for all fifteen core and subtests for the male/female comparison, ten core tests for the Grade 3 and Grade 7 comparison, index scores and IQ scores.

## **Chapter 4: Results**

### **Introduction**

The results will be presented in the following way:

1. An overview of the research participant demographics will be given under the heading “Participant sex and age distribution”.
2. Descriptive statistics of the current study on the WISC-IV are covered under the heading “Descriptive statistics of the data gathered in this study”.
3. Results for Grade 3 Xhosa-speaking learners versus Grade 3 UK population norms will be provided under the heading “Grade 3 Xhosa-speaking learners versus UK population norms test comparisons and results”.
4. Results for males and females are given under the heading “Male versus female t-test comparisons and results”.
5. Results for Grade 3’s and Grade 7’s are given under the heading “Grade 3 versus Grade 7 t-test comparisons and results”.

### **Participant sex and age distribution**

The total number of research participants who participated in this study was 32. The total population of females who participated was 19 (59.4%). The total number of males who participated was 13 (40.6%).

The participants’ age range was between 8 years 4 months and 9 years 11 months. The mean age of the participants was 9 years 10 months 5 days. This is displayed in table 4.

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Table 4: An age distribution table for research participants with reference to sex distribution

Age	8y4m	8y5m	8y6m	8y7m	8y8m	8y9m	8y10m	8y11m	9y0m	9y1m	9y2m	9y3m	9y4m	9y5m	9y6m	9y7m	9y8m	9y9m	9y10m	9y11m
Male	-	-	-	-	-	2	1	1	2	2	1	-	1	-	2	1	-	-	-	-
Female	1	-	1	1	1	-	-	3	3	1	1	3	1	1	-	1	-	-	-	1
Total	1	-	1	1	1	2	1	4	5	3	2	3	2	1	2	2	-	-	-	1

**Descriptive statistics of the data gathered in this study**

Table 5 shows the descriptive statistics for the different Subtests, Index Scores and Full Scale IQ.

Table 5: Descriptive statistics showing the normative indications with respect to the WISC-IV

Descriptive Statistics					
	N	Mean	Std.Deviation	n	Range
Subtest		Statistics	Statistics		
BlockDesign	32	6,78	2,624	32	10
Similarities	32	5,97	2,633	32	13
DigitSpan	32	10,06	2,094	32	8
MatrixReasoning	32	7,59	2,792	32	8
Vocabulary	32	4,66	1,450	32	8
Arithmetic	32	7,03	2,596	32	7
SymbolSearch	32	6,88	2,393	32	14
WordReasoning	32	6,06	1,523	32	11
Information	32	6,78	1,408	32	10
Coding	32	6,31	2,039	32	8
LetterNumber	32	8,47	3,350	32	11
PictureConcepts	32	9,19	2,389	32	12
Comprehension	32	5,25	2,410	32	7
Cancellation	32	8,00	2,664	32	8
PictureCompletion	32	6,91	2,414	32	6
Index Scores					
VerbalComprehension	32	72,75	8,187	32	34
PerceptualReasoning	32	86,66	12,135	32	46
WorkingMemory	32	95,34	12,592	32	52
ProcessingSpeed	32	81,06	11,001	32	41
FullScale	32	78,68	8,671	32	31

Performance on Symbol Search had the largest range of 14. Other subtests with relative large ranges were Block Designs, Similarities, Word Reasoning, Letter Numbers and Picture Concepts tests, all within the ranges of 10 to 13. The subtest with the smallest range

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was Picture Completion with six points. Arithmetic and Comprehension were similarly small with a range of five to seven points.

The lowest scaled score of 1 was attained in Block Design. The highest scaled score of 16 was attained in Letter Number Sequence.

The index score with the smallest range was Verbal Comprehension with a range of 34 points. The largest range was 52 for Working Memory. The lowest composite score was 55 for Verbal Comprehension. The highest composite score was 120 for Working Memory. Overall, the Full Scale score indicated that the lowest range was 31.

#### **Grade 3 Xhosa-speaking learners and UK population norms test comparisons and results**

Table 6 shows the results of the Grade 3 Xhosa-speaking learners and UK population norms with respect to the different Subtests, Index Scores and Full Scale IQ.

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

Table 6: Comparison between Grade 3 Xhosa-speaking learners and UK population norms

	Grade 3 Xhosa-speaking		Grade 3 UK norms	
	Mean	Std.Deviation	Mean	Std.Deviation
Subtest	Statistics	Statistics	Statistics	Statistics
BlockDesign	6,78	2,624	9,80	3,10
Similarities	5,97	2,633	9,50	2,40
DigitSpan	10,06	2,094	9,60	2,30
MatrixReasoning	7,59	2,792	10,40	2,10
Vocabulary	4,66	1,450	9,80	2,20
Arithmetic	7,03	2,596	9,60	2,50
SymbolSearch	6,88	2,393	10,20	2,30
WordReasoning	6,06	1,523	10,40	2,20
Information	6,78	1,408	9,90	2,20
Coding	6,31	2,039	10,20	2,60
LetterNumber	8,47	3,350	10,20	2,70
PictureConcepts	9,19	2,389	10,00	2,80
Comprehension	5,25	2,410	10,00	2,00
Cancellation	8,00	2,664	10,30	2,90
PictureCompletion	6,91	2,414	10,20	3,10
Index Scores				
VerbalComprehension	72,75	8,187	98,40	9,70
PerceptualReasoning	86,66	12,135	100,30	12,60
WorkingMemory	95,34	12,592	99,10	11,80
ProcessingSpeed	81,06	11,001	101,20	12,40
FullScale	78,68	8,671	99,40	11,20

The comparison indicates that the Xhosa-speaking learner's results were within 20 – 30 IQ points lower than the UK norms for Grade 3 learners, at first testing, as indicated in table 4.4 of the Wechsler Intelligence Scale for Children-Fourth UK Edition (Wechsler, 2004). Scores as low as the Borderline Impaired range were in evidence on some of the indices and IQ scores for the Xhosa-speaking Grade 3 learners with disadvantaged education. The data in table 6 corroborates earlier cross-cultural research as reviewed in the introduction, revealing IQ scores in the Borderline Impaired range for Black disadvantaged Xhosa-speaking learners (Shuttleworth-Edwards, Van der Merwe et al., 2013).

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

**Male versus female t-test comparison and results**

Table 7 shows the results of the t-test comparison between male and female participants with respect to the different Subtests, Index Scores and Full Scale IQ.

Table 7: A t-test comparison between male and female participants who were assessed with the WISC-IV: Subtest Scores and Full Scale IQ Scores.

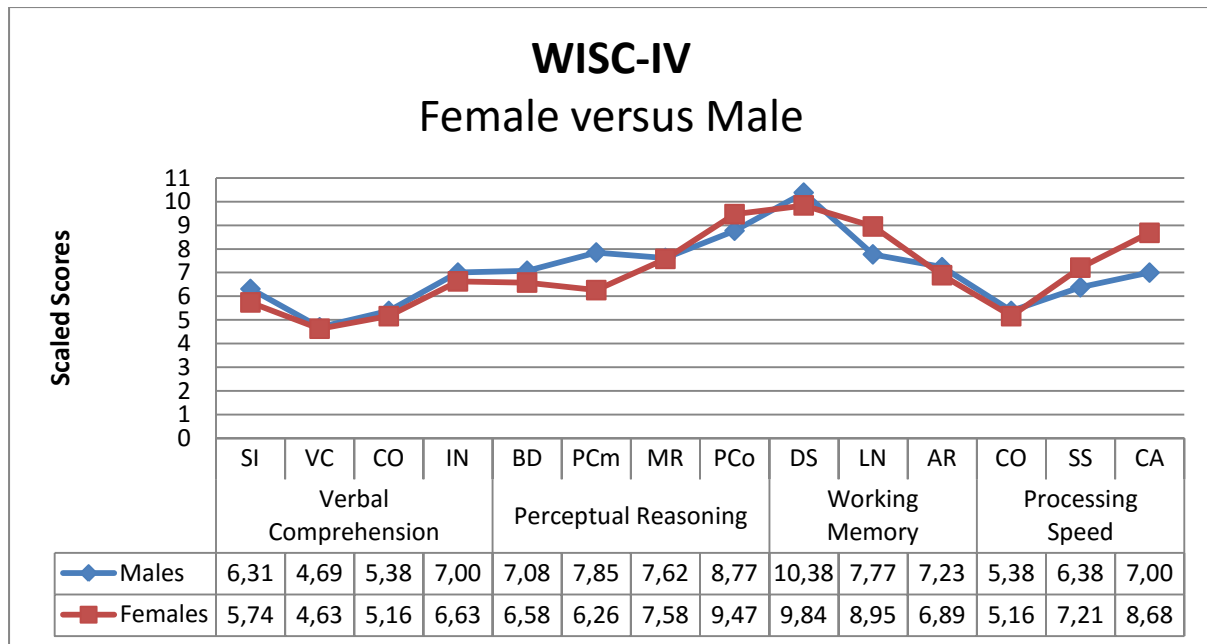
Subtest	Female			Male			T-Value	p-Value
	M	SD	n	M	SD	N		
BlockDesign	6,58	2,168	19	7,08	3,252	13	-0,483	0,634
Similarities	5,74	2,960	19	6,31	2,136	13	-0,596	0,556
DigitSpan	9,84	2,115	19	10,38	2,103	13	-0,714	0,481
MatrixReasoning	7,58	2,931	19	7,62	2,694	13	-0,036	0,972
Vocabulary	4,63	1,257	19	4,69	1,750	13	-0,114	0,910
(Arithmetic)	(6,89)	2,923	19	(7,23)	2,127	13	-0,354	0,725
SymbolSearch	7,21	2,679	19	6,38	1,895	13	0,958	0,346
(WordReasoning)	(6,16)	1,259	19	(5,92)	1,891	13	0,392	0,699
(Information)	(6,63)	1,422	19	(7,00)	1,414	13	-0,721	0,476
Coding	6,42	2,009	19	6,15	2,154	13	0,359	0,722
LetterNumber	8,95	3,597	19	7,77	2,948	13	0,976	0,337
PictureConcepts	9,47	2,653	19	8,77	1,964	13	0,815	0,422
Comprehension	5,16	2,218	19	5,38	2,755	13	-0,257	0,799
(Cancellation)	(8,68)	1,765	19	(7,00)	3,440	13	1,625	0,123
(PictureCompletion)	(6,26)	2,051	19	(7,85)	2,672	13	-1,896	0,068
<b>Index Scores</b>								
VerbalComprehension	72,05	8,256	19	73,77	8,308	13	-0,576	0,569
PerceptualReasoning	86,68	13,128	19	86,62	11,042	13	0,016	0,988
WorkingMemory	96,05	13,567	19	94,31	11,470	13	0,38	0,707
ProcessingSpeed	82,26	11,892	19	79,31	9,742	13	0,741	0,465
FullScale	78,95	8,390	19	78,31	9,402	13	0,202	0,841

Note: The additional subtests (indicated in parenthesis) are not calculated in the Index and IQ scores.

Significance: \*  $p < 0.01$

An independent sample t-test was conducted to determine whether there were any significant differences between males and females on each of the subtests at the  $\alpha = 0.01$  (1% level of significance). There were no significant differences noted.

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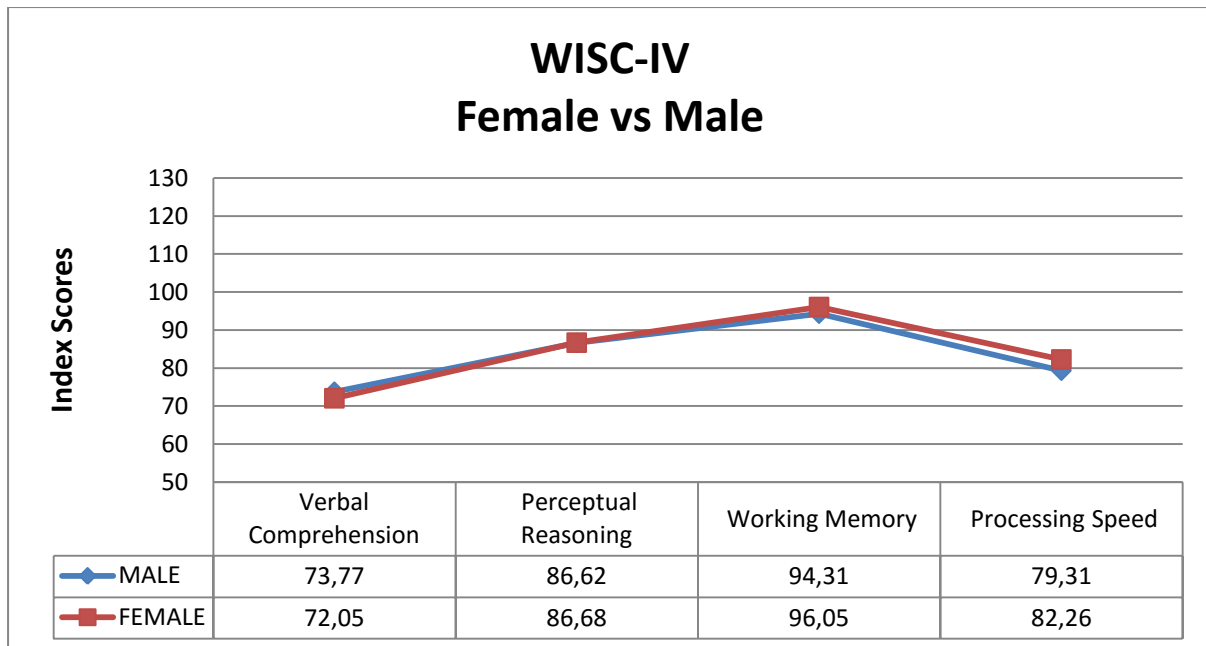


*Figure 6.* A graphic representation showing test performance with respect to Scaled Scores of female and male participants.

This figure indicates that female learners performed higher than male learners on six of the subtests, namely Symbol Search, Word Reasoning, Coding, Letter Numbers, Picture Concepts, and Cancellation. Male learners subsequently scored higher on the rest of the nine subtests, namely Block Design, Similarities, Digit Span, Matrix Reasoning, Vocabulary, Arithmetic, Information, Comprehension, and Picture Completion.

The highest scaled score was reached by males in the subtest Digit Span and the lowest scaled score was reached by females in the subtest Vocabulary.

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*Figure 7.* A graphic representation showing test performance with respect to Index Scores of females and males.

This table shows that there are minimal differences between female and male participants in respect to Index Scores. The highest Index Score was reached by females in Working Memory and the lowest Index Score was reached by females as well, namely Verbal Comprehension.

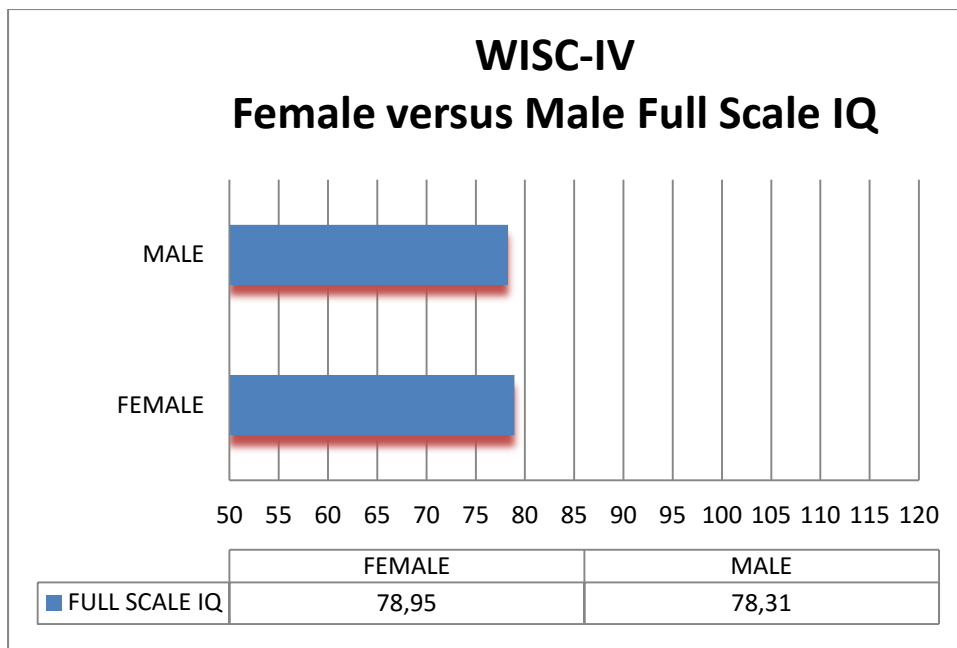


Figure 8. A graphic presentation showing test performance with respect to Full Scale IQ of female and male learners.

Comparing female and male learners’ Full Scale IQ indicated only a marginal difference of 0.64 IQ points, whereby female learners scored the higher IQ scale of 78.95 points and male learners the lower IQ scale of 78.31 points.

**Grade 3 versus Grade 7 t-test comparison and results**

Table 8 shows the results of the t-test comparison of Grade 3 versus Grade 7 learners with respect to the different Subtests, Index Scores and Full Scale IQ.

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

Table 8: A t-test comparison of WISC-IV performance for Grade 3 and Grade 7 Xhosa-speaking learners. Subtest Scores and Full Scale IQ Scores.

	Grade 3			Grade 7			T-Value	p-Value
	M	SD	n	M	SD	n		
<b>Subtest</b>								
BlockDesign	6,78	2,624	32	6,42	1,929	12	0,438	0,664
Similarities	5,97	2,633	32	6,25	3,571	12	-2,86	0,777
DigitSpan	10,06	2,094	32	7,25	2,417	12	3,806	0,000*
MatrixReasoning	7,59	2,792	32	6,58	1,929	12	1,151	0,256
Vocabulary	4,66	1,450	32	7,08	3,605	12	-2,265	0,042
(Arithmetic)	(7,03)	2,596	32	(7,08)	1,505	12	-0,65	0,948
SymbolSearch	6,88	2,393	32	6,92	3,476	12	-0,045	0,964
(WordReasoning)	(6,06)	1,523	32	(6,75)	1,765	12	-1,278	0,208
(Information)	(6,78)	1,408	32	(5,58)	1,881	12	2,289	0,027
Coding	6,31	2,039	32	5,83	2,725	12	0,632	0,531
LetterNumber	8,47	3,350	32	8,17	3,271	12	0,268	0,790
PictureConcepts	9,19	2,389	32	7,67	2,640	12	1,829	0,750
Comprehension	5,25	2,410	32	6,50	2,680	12	-1,487	0,144
(Cancellation)	(8,00)	2,664	32	(10,08)	2,678	12	-2,307	0,026
(PictureCompletion)	(6,91)	2,414	32	(7,42)	3,059	12	-0,58	0,565
<b>Index Scores</b>								
VerbalComprehension	72,75	8,187	32	80,42	13,588	12	-1,834	0,088
PerceptualReasoning	86,66	12,135	32	80,83	11,207	12	1,446	0,156
WorkingMemory	95,34	12,592	32	86,50	12,993	12	2,057	0,046
ProcessingSpeed	81,06	11,001	32	79,83	16,281	12	0,288	0,775
FullScale	78,69	8,671	32	77,08	13,787	12	0,462	0,647

Note: The additional subtests (indicated in parenthesis) are not calculated in the Index and IQ scores.

Significance: \*  $p < 0.01$

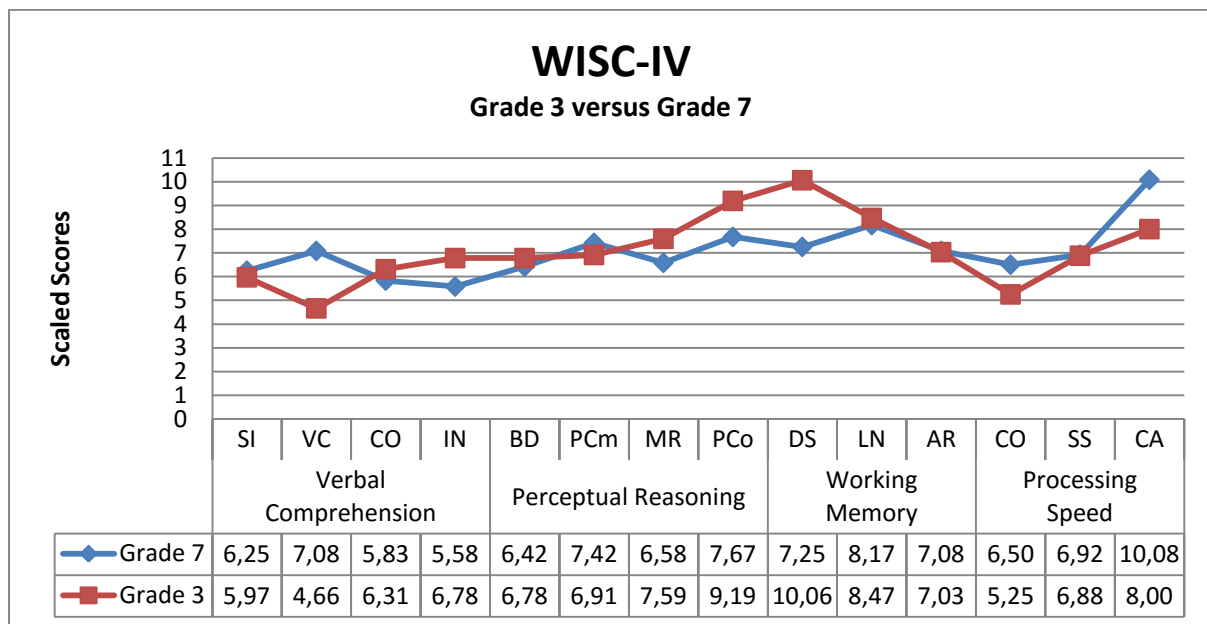
An independent sample t-test was conducted to determine whether there were any significant differences between Grade 3 and Grade 7 Xhosa-speaking learners on each of the subtests at the  $\alpha = 0.01$  (1% level of significance). As indicated in the method section, in order to protect against Type I error, an adjustment was made towards stringency by setting the level of significance at the 1% level (0.01). It was decided that any more stringent adjustments than this would inevitably increase the risk of Type II error, especially in light of the small sample numbers.

The t-test results showed that there was no significant difference on any of the subtests, Index or IQ scores, with the exception of a significant difference between Grade 3

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and Grade 7 learners on Digit Span subtest, with Grade 3 learners scoring higher than Grade 7 learners.

The independent t-test results for the subtest Digit Span: for Grade 3 learners ( $M = 10.06$ ,  $SD = 2.094$ ) and Grade 7 learners ( $M = 7.25$ ,  $SD = 2.417$ ),  $t(42) = 3.806$ ,  $p = .000$  (two-tailed). The magnitude of the difference in the means (mean difference = 2.81, 95 % CI [1.321,4.304]) was very large (eta squared = .239) .

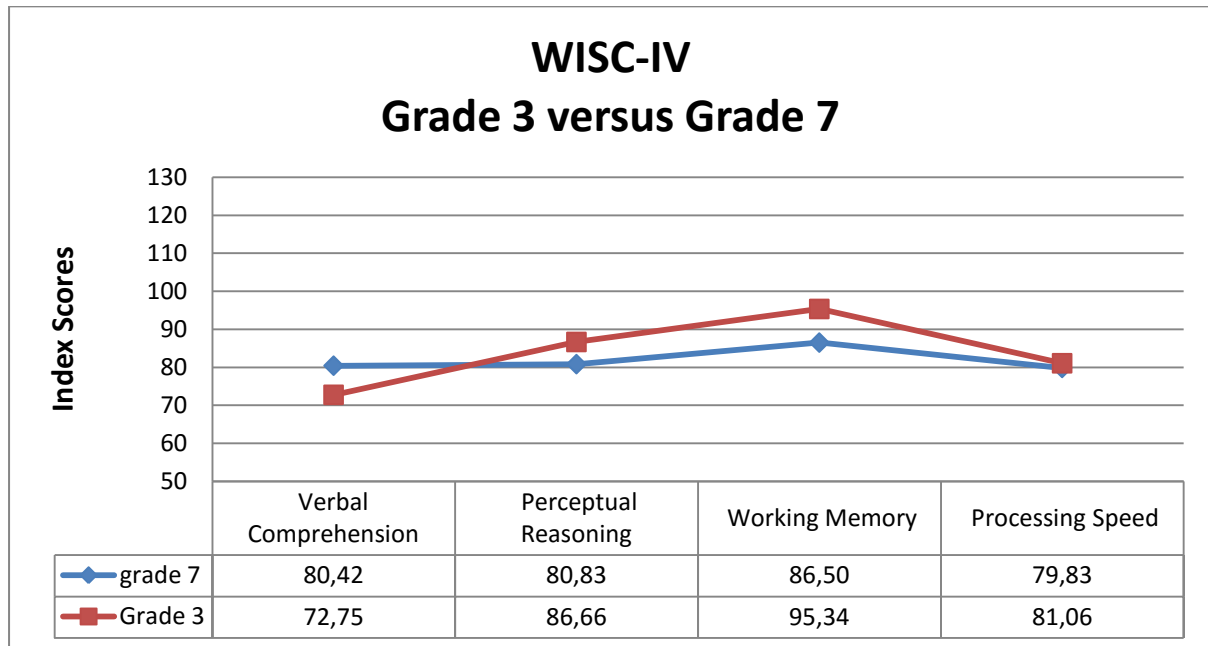


*Figure 9.* A graphic presentation showing test performance with respect to Scaled Scores of Grade 3 and Grade 7 learners.

Descriptively, this figure indicates that Grade 3 learners performed higher than Grade 7 learners on seven of the subtests, namely Block Design, Digit Span, Matrix Reasoning, Information, Coding, Letter Numbers, and Comprehension. Grade 7 learners subsequently scored higher on the rest of the eight subtests, namely Similarities, Vocabulary, Arithmetic, Symbol Search, Word Reasoning, Picture Concepts, Cancellation, and Picture Completion.

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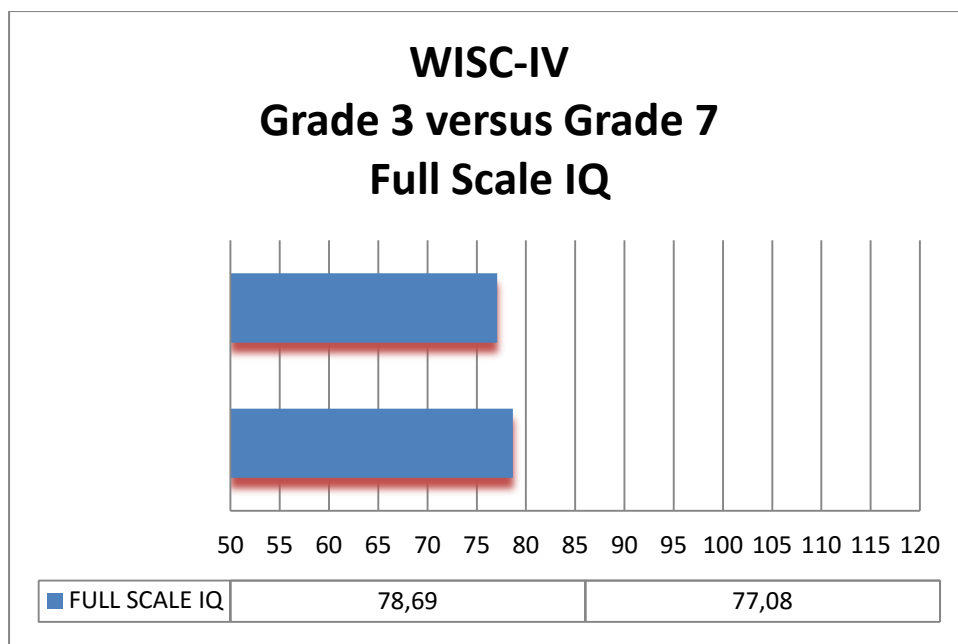
The highest Scaled Score was reached by Grade 7s in the subtest Cancellation and the lowest Scaled Score was reached by Grade 3s in the subtest Symbol Search.



*Figure 10.* A graphic presentation showing test performance with respect to Index Scores of Grade 3 and Grade 7 learners.

Descriptively, this figure shows higher results for Grade 3 learners in Perceptual Reasoning, Working Memory as well as Processing Speed. The highest Index Score was reached by Grade 3 learners in Working Memory and the lowest Index Score was reached by Grade 3 learners in Verbal Comprehension as well.

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*Figure 11.* A graphic presentation showing test performance with respect to Full Scale IQ of Grade 3 and Grade 7 learners.

Descriptively, comparing Grade 3 with Grade 7 learners' Full Scale IQ indicated only a marginal difference of 1.61 IQ points, whereby Grade 3 learners scored the higher IQ scale of 78.69 points and Grade 7 learners the lower IQ scale of 77.08 points.

The next chapter will be discussing the above findings in detail, tying together the themes introduced in the Literature Review and the findings explained in this section.

## **Chapter 5: Discussion**

### **Introduction**

This study was a partial operational replication of the study by Shuttleworth-Edwards, Van der Merwe et al. (2013) as specific methodological components of this earlier research informed the present study. It is considered a partial replication because, while it followed the same methodology as published in Shuttleworth-Edwards, Van der Merwe et al. (2013), the replication was in respect of only one of the subgroups, namely Xhosa-speaking learners.

The main aim of this study was (1) to compare the performance of Grade 3 educationally disadvantaged Xhosa-speaking learners to the UK population; (2) to compare the performance of Grade 3 educationally disadvantaged Xhosa-speaking with Grade 7 educationally disadvantaged Xhosa-speaking learners; (3) as well as to compare the performance separately of female and male Grade 3 educationally disadvantaged Xhosa-speaking learners.

### **Comparison between Grade 3 disadvantaged learners and UK norms**

When comparing Grade 3 Xhosa-speaking learners to the UK standardization a general lowering of results in all the indices of between 20 to 30 IQ points was found in the former-DET education group. These results correlate with results from the Shuttleworth-Edwards, Van der Merwe et al. (2013) findings:

..., the outcome reveals substantive lowering in association with disadvantaged education across all race groups of as much as 20 to 30 IQ points, replicating the earlier South African WAIS-III study of Shuttleworth-Edwards, Kemp et al. (2004), and earlier research in relation to the WISC-R and WISC-III of Zindi (1994) and Brown (1998) (p. 44).

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Dangers associated with test performance in this educationally disadvantaged group compared with their educationally advantaged group were discussed by Shuttleworth-Edwards, Van der Merwe et al. (2013), indicating that “focusing on ethnicity/race differences alone may lead to faulty claims with regard to test performance” (p. 36). Cultural influences, such as levels of English fluency, quality of education, and socio economic status, may therefore better serve as an explanation for variance in test scores (Shuttleworth-Edwards, Van der Merwe et al., 2013).

Possible reasons for the lower performance on most of the subtests in the present study, that accord with the lower scores for an equivalent group in the research of Shuttleworth-Edwards and colleagues, that in turn are 20 to 30 IQ point lower than the UK norms, are likely a function of many factors. These include: (1) the low standard of living (Hulme & Shepherd, 2003; Westaway, 2012), (2), the ongoing poor quality of education in former-DET schools in South Africa (Modisaotsile, 2012) and (3) the influence of the segregation and apartheid era on the level of education (Westaway, 2012). These factors will be further elucidated:

**Low standard of living.** The population from which the sample of participants for this research was drawn consisted of residents of townships which are associated with a low environmental standard of living due to underdevelopment (Westaway, 2012) and much higher susceptibility to disruptions caused by elements of nature such as very cold weather conditions, hard summer conditions, hunger, etc. Living conditions in South African townships are very different from living conditions in former White suburbs of South African towns and cities in which the average living conditions correspond more closely to the average living conditions experienced by populations used for the UK/US/European standardisations of the WISC-IV tests.

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Townships and rural settlements in South Africa are socio-economically deprived (Malebye, 2011). People who live in townships or rural settlements find themselves in areas that are characterised by poverty, unemployment and relatively deprived health and education institutions. Many households and schools in townships in the Eastern Cape still do not have access to electricity, sewerage connections and fresh water, and are not able to obtain services from any telecommunications service providers for online access (Malebye, 2011).

Early studies by Duncan and Brooks-Gunn (2000) have shown that the rate for repeating grades is much higher in poor children relative to more affluent children, as is the case for developing learning disabilities. Furthermore, the quality of a child's home environment, like the warmth of mother-child interaction, the physical condition of the home, and opportunities for learning, account for a substantial portion of the effects of family income on cognitive outcomes in young children. Some children have to walk far distances to schools and their time for studying at home is therefore greatly reduced. Another factor to consider is the financial pressure experienced by lower socio-economic status families leading to conflict between children and parents, lower school grades, reduced emotional health, and/or impaired social relationships (Duncan & Brooks-Gunn, 2000). Some researchers suggest that loss or economic uncertainty due to unemployment, loss of income, underemployment, and unstable work conditions could be the source of conflict between parents and their children and subsequent school problems (Elder, 1974, as cited in Duncan & Brooks-Gunn, 2000). The above mentioned stressors can also cause a decrease in mental health for parents, which can be associated with impaired parent-child interactions and fewer learning experiences in the homes (Bornstein, 1995, as cited in Duncan & Brooks-Gunn, 2000). Low income may lead to residence in extremely poor neighbourhoods, characterized by social disorganization (high levels of unemployment, crime, neighbours who do not monitor the behaviour of their children), and few resources for child development (child care

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facilities, health-care facilities, parks, playgrounds, after-school programmes) (Brooks-Gunn, Duncan, & Aber, 1997, as cited in Duncan & Brooks-Gunn, 2000).

These lower SES living conditions as well as poorly funded schooling systems and poor quality of education could therefore possibly be factors influencing the lowering of IQ indices across the board in former-DET schools in the Eastern Cape region in particular. The implication is that, whilst verbal tasks and tasks of acquired knowledge are invariably culture sensitive, all performance tasks are ultimately culturally sensitive given sufficient deprivation due to the variable of test-wiseness (Shuttleworth-Edwards, Donnelly et al., 2004). This study lends support to the established empirical trend that poor quality of education is likely to be associated with lowering of both verbal and performance functions on the WISC-IV.

As indicated by Louw and Louw (2012), it has become apparent that children from low SES backgrounds who are not exposed to a home environment with high levels of literacy will lack the language stimulation which is an integral part of language development. Crowded homes and lack of parents' verbal interaction with their children will have an adverse effect on language development. Parents tend to be less responsive to their children and the child's environment may be less stimulating to learning than the environment of higher SES conditions, hence leading to impoverished speech (Louw & Louw, 2012).

**Quality of education in former-DET schools in South Africa.** Due to the existence of bantu-education and years of DET schools in South Africa, the schooling system of former-DET schools in the Eastern Cape, South Africa, is highly likely not advancing in quality of education as quickly as schools in the United Kingdom, the United States and Europe where the WISC-IV tests were standardised (Westaway, 2012).

Teachers teaching in former-DET schools themselves come from the townships surrounding the schools and, as Modisaotsile (2012) explains, their own educational levels

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are low, influenced by poverty, their own former-DET education and low SES lifestyles. This in return will have a negative effect on the standard of teaching and learning at former-DET schools and will have an influence on language development in young children (Louw & Louw, 2012). Government therefore needs to ensure that teachers are trained appropriately, teacher's economic standards are lifted adequately to enhance their own educational standards, and that schools have necessary basic resources (Modisaotsile, 2012).

**Post apartheid influences on legislation.** In the South African context the legacy of apartheid has had negative influences on the quality of education at former-DET schools. Furthermore, cultural issues like urbanisation, poor economic opportunities and the low socio-economic status of many South Africans are likely to impact on test performance (Shuttleworth-Edwards, Van der Merwe et al., 2013). In her press release statement for the Annual National Assessment for 2011, the Minister of Basic Education, Mrs. Angie Motshekga, stated at the Southern and Eastern African Consortium for Monitoring Education Quality that “the results of 2007 had shown some improvement in reading since 2003. Many of the learners lack proper foundations in literacy and so they struggle to progress in the system and into post-school education and training” (Modisaotsile, 2012, p. 2).

Klaasen (2000, as cited in Gradin, 2013) reported a deprivation rate of 67% for Africans in contrast with only 0.6% for Whites in 1993. It has further been shown that the access of poor South Africans to basic services substantially increased in the early years of the post-apartheid period (from 1993 to 2004). However, in 2008 the differences in the deprivation by race regarding several dimensions were still large. For example, according to Gradin's (2013) calculations, 30% of Africans in 2008 lived in traditional informal dwellings, while two thirds lacked piped water inside their homes, compared with 5.5% of Whites. Regarding home equipment, while 6, 7 and 18% of Whites lived in households that did not

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own a refrigerator, television or radio respectively, these percentages shifted subsequently to 47, 34 and 32% in the case of people of African origin. The differential is also large in terms of the accumulation of deprivation. Less than 2% of Whites lacked all three of these appliances at home, in contrast with 12% of Africans. Likewise, 45% of Africans reported having insufficient (less than adequate) healthcare coverage, more than doubling the level of 19% for Whites in a similar situation (Gradín, 2013).

The problem in South Africa's multi-cultural society is that race groups are not necessarily homogenous in terms of socio-cultural influences on test outcomes: different socio-cultural variables may characterize subsets of a single race group differentially. The level of acculturation (language, quality of education) is a potent influence on test-taking ability that cuts across racial categories, and therefore normative data on the basis of race group is highly problematic (Shuttleworth-Edwards, 2014).

Furthermore, such differential acculturation factors contribute to the acquisition of skills that influence test-taking performance on both crystallized functions (verbal) like language ability and factual knowledge and procedural functions (non-verbal) like the skill of pencil use, familiarity with copying tasks, confidence and concentration in test-taking situations (test-wiseness), and attitudes towards speed versus accuracy (Shuttleworth-Edwards, 2014).

**Female versus male learners**

There was no statistically significant difference within the WISC-IV sample for the female and male participants and by looking at figure 6 it is clear that there were no significant differences under any of the subtests. It was, however, noted that performance on the Vocabulary subtest was low average, with average scales scores for females  $M=4.63$  ( $SD=1.257$ ), and for males  $M=4.69$  ( $SD=1.750$ ). These overall low findings in the Vocabulary

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subtests might have been influenced by the effects that low SESs have on the development of receptive and productive language of children (Louw & Louw, 2012) which will be elucidated on at a later stage of this chapter.

Comparing the rest of the subtest, only small differences were noted in the Picture Completion subtest, where males scored slightly higher than females, as well as the Cancellation subtest, where females scored higher than males. When comparing this study to the WAIS-IV study conducted by Klopper (2014) with regards to concepts of disadvantaged learners, it becomes apparent that even in his study the only significant differences were found in the Verbal Comprehension Index (VCI), and these were attributed to people's performance increasing proportional to age in the beginning phases of young adulthood (roughly from 18 to 30), which was obviously not relevant for this study. No other statistically significant differences between female and male participants were found (Klopper, 2014).

### **Grade 3 versus Grade 7 learners from disadvantaged schooling systems**

When comparing the Grade 3 versus Grade 7 learners from disadvantaged schooling systems on the subtests, the t-test results showed that there was a significant difference between Grade 3 and Grade 7 learners on the Digit Span subtest, with Grade 3 learners scoring higher than Grade 7 learners by nearly three scaled score points (means of 10.06 versus 7.25, respectively). The small sample size in this study might have had an influence on the outcome of the study and might have resulted in an isolated significant difference shown between Grade 3 and Grade 7 learners. This may have been a chance effect that may require further replication. In contrast, while not significant, descriptively it is evident that there was a tendency for Grade 7 participants to perform higher in the Vocabulary and Cancellation subtests than the Grade 3 learners. One of the aspects that might have had an influence on the

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comparative results of the Vocabulary subtest is the differences in the age distribution between the Grade 3 and Grade 7 learners and the associated possible differences in receptive and productive language acquisition (Louw & Louw, 2012). Furthermore, quality of education may have had an influence on the outcome of the Cancellation subtest, as it relates to reading performance and development (“Wechsler Intelligence Scale for Children-IV. Conceptual and Interpretive Guide,” n.d.).

When comparing the Index scores of the Grade 3 learners with the Grade 7 learners, no significant difference is found. Given the small sample size, that can incur risk of Type II error (failing to take account of a true difference when it exists), and the use of the Bronferonni, an explication of the various scores is warranted.

The Verbal Comprehension Index for Grade 7 approaches significance with Grade 7 being higher than Grade 3. All the other Indices, Perceptual Reasoning (PRI), Working Memory (WMI) and Processing Speed (PSI) indicate a trend for Grade 3 to be higher than Grade 7. The Working Memory Index (WMI) was the highest, approaching significance. These trends will be further explicated.

The fact that the VCI Index was the only Index score where Grade 7 learners were assessed as stronger, could be attributed to the influence of low SES on receptive and productive language, and subsequently on the person’s standard of vocabulary. According to Louw and Louw (2012) receptive language (i.e. the child’s understanding of the spoken or written word) and productive language (i.e. what the child says or what he or she later writes) develop and improve remarkably during early childhood. However, the socio economic status (SES) in which a child grows up may have a significant impact on his or her language development (Hulme & Shepherd, 2003). Exposure seems to be the keyword here as children from a low SES are not exposed to the home literacy environment the same way as children

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from a high SES. They therefore lack the language stimulation which is an integral part of such an environment. It may also be that parents from a low SES do not interact verbally with their children as often as do parents with a high SES. And if they do, it is more often in a non-stimulating way. Crowded homes, typical of low SES households (Westaway, 2012), also play a role as those parents tend to be less responsive to their children. These factors may lead to impoverished speech (Louw & Louw, 2012) which would be more prominent in Grade 3 children than in Grade 7 children.

In the South African context we need to take into consideration, that children from low SES backgrounds often only get exposed to English, as their second language, when entering primary school (Huston & Wright, 1998, as cited in Louw & Louw, 2012, p. 172). Furthermore, a two-way interaction and communication is necessary for acquiring language; in other words, merely listening to a language will not ensure adequate acquisition. Children should practise the pronunciation of words and the construction of sentences when learning a language. Unfortunately, this does not always take place in South African low SES households, as the parents tend to speak in their mother tongue, being Xhosa in the Eastern Cape, to their children. This may take away the advantages that multilingual households could offer the children in the acquisition of language.

The fact that all the other Indices showed a higher performance for the Grade 3 than Grade 7 learners, with the WMI approaching significance, could possibly be attributed to the finding that quality of schooling at the selected schools was estimated to be higher than at some of the schools found in the more remote areas of the Eastern Cape. One of the schools participating in the research was found to have particularly high standards of school equipment, facilities and exposure of children to European standards. They also appeared to manage children with concentration difficulties better due to higher standards of training and

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exposure to psychological knowledge. This could have influenced the results, as better stimulation of the children as well as a higher development of test-wiseness and better concentration ability would have had an effect on the outcome of the test.

### **Strengths of this study**

This study contributes to the national and international research in cross cultural assessment, and specifically further elucidates Shuttleworth-Edwards's argument that quality of education impacts on test performance.

A relative strength of the study is that it is based on an established research design and it extends and refines existing data. By building on the data of Shuttleworth-Edwards, Van der Merwe et al., (2013), which was based on data collected in the year 2008 and which provided norms for use with Grade 7 Xhosa-speaking learners on the WISC-IV, this research has ensured that there are now norms available not only for use with Grade 7 Xhosa-speaking learners but also more far-reaching norms for use with Grade 3 Xhosa-speaking children. Norms for children now cover White English and White Afrikaans, as well as Black Xhosa and Coloured Afrikaans groups for educational level Grade 7, as well as Grade 3 learners in Xhosa-speaking groups. Data pertaining to the above groups are particularly pertinent to the Eastern Cape where Xhosa is the first language of the majority of the population, followed by Afrikaans and English. Individuals representing the cultural/language groups are thus very likely to be encountered in clinical practice in this region.

As a problem situation may arise when using a standard test without norms developed specifically in respect of our non-standard testees as one does not know the extent of lowering that can be attributed to cultural disadvantage or even whether there is any lowering at all. So, conversely in terms of valid and reliable diagnostic and placement interpretations, low scores may be erroneously explained away on the basis of cultural effect, so that low

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scores relative to the standard norms may be erroneously ignored as a sign of brain damage when it is present; and an individual may be erroneously attributed more actual ability than is the case (Shuttleworth-Edwards, Van der Merwe et al., 2013). It is generally accepted that differences in test-taking ability that have been demonstrated between race groups are *not* due to ability per se, rather substantive differences are due to an interrelated set of socio-cultural factors (language of origin, home circumstances, SES, level and quality of schooling) that *may*, but equally may *not*, homogenously characterize a race group as a whole (Shuttleworth-Edwards, Van der Merwe et al., 2013). Therefore, this study is pertinent in the development of culture fair norms in South Africa. Despite the considerable strengths of this study, a number of limitations and cautionary comments apply.

**Limitations of this study**

It was noted by the researcher that the three schools that were ultimately used to draw the sample from were of a slightly higher standard than some of the former-DET township schools that can be found in some other areas of East London. The three schools that were selected were situated in areas close to the main centre of East London and some of them had adequate to good school facilities. This stands in contrast to some other former-DET schools further from the East London centre and in the rural Eastern Cape where school facilities are a lot poorer, schools are surrounded by very poor living conditions, classes have overcrowded classrooms, and teachers switch back to teaching in Xhosa for a lot of subjects.

One of the pre-selected schools had to be ruled out as it was a Secondary School and its affiliated Primary School also had to be ruled out, as they did not teach in the medium of English. The children in the affiliated Primary School were overwhelmed in the testing situation, deeming these results to be invalid. It was also noted by the author that some students from the very poor communities were not used to interacting with White test

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administrators and were very shy despite the presence of a local translator. Rapport was therefore more difficult to build with some children than with others. As this selection process was discussed earlier, it is apparent that these children did not qualify as participants due to the research design employed in this study. This left the testers with the other three schools in the greater East London area.

Furthermore, it needs to be pointed out that one of the qualifying schools has been receiving substantial funding and support on various levels over the last ten years and has improved their standards drastically. They have got good sport fields, a well-stocked library, adequate ablution facilities, a teacher's staffroom and spacious classrooms. In comparison, some of the other schools had poor facilities, basic equipment, were surrounded by poverty, had small classrooms, no staff room and no computer facilities.

It should also be noted that in this study the SES of the participants was not controlled for. However, it seems as if the Black South African Xhosa population in the Eastern Cape who can only afford former-DET schooling are part of an economic sector of society that could be considered socio-economically poor.

Lastly, it needs to be pointed out, that the Flynn effect needs to be taken into consideration when comparing the study by Shuttleworth-Edwards, Van der Merwe et al. (2013) and the current study. Ten years have passed since the data for the former study was collected in the Grahamstown area of the Eastern Cape and, according to the predictions of the Flynn effect, an increase of IQ should have taken place since then, which was not found to have taken place in the current results. However, the Flynn effect might have been off-set by the fact that poverty in the Eastern Cape increases from west to east (Westaway, 2012). This could mean that the socio- economic status of the participants of the first study (Grahamstown) was generally higher than that of the second study (East London) as indicated

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in Figure 5. This would have reduced the levels of performance in the second study and kept the findings of a lowered general IQ level of 20 – 30 points the same in both studies.

**Recommendations**

The results have important clinical applicability when used cautiously for the interpretation of test results. Translators were used as in previous studies to ensure that the testees would understand the instructions in their home language, but testing was performed in the medium of English. Taken together with the earlier studies of Grade 7 Xhosa-speaking learners on the WISC-IV, the present findings suggest that substantial IQ lowering in excess of 20 points in association with relatively disadvantaged education is a relatively robust finding, and probably can be broadly generalized to apply from Grade 3 through to Grade 7 Xhosa-speaking learners at least, as long as they were being educated in the Eastern Cape former-DET schools.

It can still be recommended that further groups should be assessed and normed to confirm the stability of the lowering of IQ results in all indices across the various ages in Xhosa-speaking individuals. Furthermore, this study could be expanded to include other African languages spoken in some of the other provinces of South Africa.

It is apparent from the discussion above that demographically appropriate normative data is crucial within the testing arena when the testee in question speaks an indigenous African first language. Particularly in association with a background of relatively disadvantaged education, there is likely to be significant lowering of scores relative to the UK standardization. The availability of adjusted norms would therefore serve to clarify IQ test outcomes that would otherwise be difficult to interpret, due to intervening socio-cultural test influences. Failure to take heed of such normative indications may result in erroneous predictions and interpretations. This indicates that, although the WISC-IV has a good

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standard for individually administered IQ tests in the western part of the developed world, data such as this serve to confirm the extreme caution that needs to be applied in the application of such tests to other cultures, even when the testees are sufficiently fluent in English to understand the task demands. These culturally fairer norms will then be able to dictate a way forward for the individual client that will be more personalized and designed to take the socio-economic factors as well as the socio-cultural factors into account.

Due to the fact that South Africa is a multi-lingual country, it is even more advisable to produce norms according to the relevant languages spoken in the various areas of the country. According to the 2011 census, isiZulu is the mother tongue of 22.7% of South Africa's population, followed by Xhosa at 16%, Afrikaans at 13.5%, English at 9.6%, Setswana at 8% and Sesotho at 7.6% (*South African Statistics, 2012*). Predominant languages by province (Census 2011 figures) are (*South African Statistics, 2012*):

- Eastern Cape – Xhosa (78.8%), Afrikaans (10.6%)
- Free State – Sesotho (64.2%), Afrikaans (12.7%)
- Gauteng – isiZulu (19.8%), English (13.3%), Afrikaans (12.4%), Sesotho (11.6%)
- KwaZulu-Natal – isiZulu (77.8%), English (13.2%)
- Limpopo – Sesotho (52.9%), Xitsonga (17%), Tshivenda (16.7%)
- Mpumalanga – siSwati (27.7%), isiZulu (24.1%), Xitsonga (10.4%), isiNdebele (10.1%)
- Northern Cape – Afrikaans (53.8%), Setswana (33.1%)
- North West – Setswana (63.4%), Afrikaans (9%)
- Western Cape – Afrikaans (49.7%), Xhosa (24.7%), English (20.3%)

The above demonstrates the urgent need to perform research, as has been conducted in this instance, in the many languages spoken throughout South Africa in all nine regions. It

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also highlights the need for research resources to be assessed to achieve the difficult task of having test material translated into the various main languages spoken throughout this vast country to give everyone equal opportunities. The results from all these studies will lead to normative indicators that will truly empower psychologists to work ethically across all cultures in South Africa.

Future studies on the WISC-IV and later versions of the WISC can focus on constructive replications of the current study. This can be done by duplicating the methodology that was applied in the current study on other cultural, geographic and age groups in South Africa while focussing on groups of people who were exposed to disadvantaged or former-DET schooling. Future studies can also focus on people who received different levels of education.

### References

- Ardila, A. (1996). Towards a cross-cultural neuropsychology. *Journal of Social & Evolutionary Systems, 19*(3), 237.
- Baron, I. S. (2005). Test Review: Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV). *Child Neuropsychology, 11*(5), 471–475.  
<http://doi.org/10.1080/09297040590951587>
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*, 371–99.
- Canivez, G. L. (2014). Construct validity of the WISC-IV with a referred sample: Direct versus indirect hierarchical structures. *School Psychology Quarterly, 29*(1), 38–51.  
<http://doi.org/10.1037/spq0000032>
- Duncan, G. J., & Brooks-Gunn, J. (2000). Family poverty, welfare reform, and child development. *Child Development, 71*(1), 188–196.
- Flynn, J. R. (1984). The mean IQ of Americans: Massive gains 1932 to 1978. *Psychological Bulletin, 95*(1), 29–51.
- Flynn, J. R. (1987). Massive IQ gains in 14 nations: What IQ testing really measure. *Psychological Bulletin, 101*(2), 171–191.
- Foxcroft, C. D. (2002). Ethical issues related to psychological testing in Africa: What I have learned (so far). *Online Readings in Psychology and Culture, 5*(4). Retrieved from [www.wvu.edu/~culture](http://www.wvu.edu/~culture)
- Foxcroft, C. D., & Roodt, G. (2009). *Introduction to psychological assessment in the South African context* (3rd ed.). Cape Town: ABC Press.
- Gaylard, E. . K. (2005). Cross-cultural differences in IQ test performance: Extension of an existing normative database on WAIS-III test performance. *In Press*, 1–79.

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

- Gradín, C. (2013). Race, Poverty and Deprivation in South Africa. *Journal of African Economies*, 22(2), 187–238. <http://doi.org/10.1093/jae/ejs019>
- Heylighen, F. (2000). Increasing intelligence: the Flynn effect. Principa Cybernetica Web. Retrieved from <http://pespmc1.vub.ac.be/flynneff.html>
- Hulme, D., & Shepherd, A. (2003). Conceptualizing Chronic Poverty. *World Development*, 31(3), 403–423. [http://doi.org/10.1016/S0305-750X\(02\)00222-X](http://doi.org/10.1016/S0305-750X(02)00222-X)
- Jansen, L. (2014). Teachers battle with matric maths. *Iol.news*, pp. 1–2. KwaZulu-Natal.
- Kanjee, A., & Sayed, Y. (2013). Assessment policy in post-apartheid South Africa: challenges for improving education quality and learning. *Assessment in Education: Principles, Policy & Practice*, 20(4), 442–469. <http://doi.org/10.1080/0969594X.2013.838541>
- Klopper, C. C. (2014). *WIAS-IV test performance in the South African context: A comparison between existing WAIS-III norms with Grade 12 WAIS-IV norms with reference to varying levels of quality of education in ex-DET schools* (Masters Thesis). University of Fort Hare, East London, South Africa.
- Laher, S., & Cockroft, K. (2013). Contextualising psychological assessment in South Africa. In S. Laher & K. Cockroft (Eds.), *Contextualising Psychological assessment in South Africa: Research and Applications* (pp. 1–14). Johannesburg: Wits University Press.
- Lezak, M. D. (2012). *Neuropsychological assessment*. Oxford University Press.
- Louw, D., & Louw, A. (2012). *Child and adolescent development*. Bloemfontein, South Africa: ABC Printers.
- Malebye, J. (2011). *NEIMS (National Education Infrastructure Management System) Reports May 2011*. Department of Education. Retrieved from <http://www.education.gov.za/LinkClick.aspx?fileticket=hHaBCAerGXc%3D&tabid=358&mid=180>

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

Manly, J. J., Byrd, D. A., Touradji, P., & Stern, Y. (2004). Acculturation, reading level, and neuropsychological test performance among African American elders. *Applied Neuropsychology, 11*(1), 37–46.

Modisaotsile, B. . M. (2012). The failing standard of basic education in South Africa. *Africa Institute of South Africa, 72*. Retrieved from <http://www.ai.org.za/wp-content/uploads/downloads/2012/03/No.-72.The-Failing-Standard-of-Basic-Education-in-South-Africa1.pdf>

Nell, V. (1994). Interpretation and misinterpretation of the South African Wechsler-Bellevue Adult Intelligence Scale: A history and prospectus. *South African Journal of Psychology, 24*(2), 100-109.

Nonprobability Sampling. (n.d.). Retrieved September 6, 2015, from <http://www.socialresearchmethods.net/kb/sampon.php>

Price, M. (2011). “Race” and disadvantage in a university selection policy? *UCT Alumni News*, pp. 1–2. Cape Town.

School Infrastructure. (n.d.). Retrieved December 2, 2014, from <http://www.equaleducation.org.za/campaigns/minimum-norms-and-standards/overview>

Shuttleworth-Edwards, A. B. (2014). *Psychometric assessment in the South African cross-cultural context: Normative data and their application*. Rhodes University.

Shuttleworth-Edwards, A. B., Gaylard, E., K., & Radloff, S. E. (2013). WAIS-III test performance in the South African context: Refinement of a prior cross-cultural normative database. In *Psychological Assessment in South Africa: research and applications* (pp. 17–32). Johannesburg: Wits University.

Shuttleworth-Edwards, A. B., Van der Merwe, A. S., Van Tonder, P., & Radloff, S. E. (2013). WISC-IV test performance in the South African context: a collation of cross-

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

- cultural norms. In S. Laher & K. Cockcroft (Eds.), *Psychological Assessment in South Africa* (pp. 33–59). Johannesburg: Wits University Press.
- Shuttleworth-Edwards, A. (2012). Guidelines for the use of the WAIS-IV with WAIS-III cross-cultural normative indications. *South African Journal of Psychology, Special Issue on Cognitive Science and Neuropsychology in Southern Africa*, 42(3).
- Shuttleworth-Edwards, A. B. (2010). Practitioner guidelines for career counseling in light of cross-cultural influences on WAIS-III IQ test performance. *Journal of Psychology in Africa, Guest Issue*, 20(3), 413–420.
- Shuttleworth-Edwards, A. B., Kemp, R. D., Rust, A. L., Muirhead, J. G. L., Hartman, N. P., & Radloff, S. E. (2004). Cross-cultural effects on IQ test performance: A review and preliminary normative indications on WAIS-III test performance. *Journal of Clinical and Experimental Neuropsychology*, 26(7), 903–920.
- Shuttleworth-Edwards, A., Donnelly, M. J. R., Reid, I., & Radloff, S. E. (2004). A cross-cultural study with culture fair normative indications on WAIS-III Digit Symbol-Incidental Learning. *Journal of Clinical and Experimental Neuropsychology*, 26(7), 921–932.
- Shuttleworth-Jordan, A. B. (1996). On not reinventing the wheel: a clinical perspective on culturally relevant test usage in South Africa. *South African Journal of Psychology*, 26(2), 96–102.
- South African Statistics*. (2012). Retrieved from <http://www.southafrica.info/about/people/language.htm#distribution>
- Sparrow, S. S., & Davis, S. M. (2000). Recent advances in the assessment of intelligence and cognition. *Child Psychology and Psychiatry*, 41(1), 117–131.
- Steele, G. I., & Edwards, D. J. A. (2008). Development and Validation of the Xhosa Translations of the Beck Inventories: 1. Challenges of the Translation Process.

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

*Journal of Psychology in Africa*, 18(2), 207–215.

<http://doi.org/10.1080/14330237.2008.10820188>

Strauss, E. M., Sherman, E. M. S., & Spreen, O. (2006). *A Compendium of*

*Neuropsychological Tests* (3rd ed.). New York: Oxford University Press.

Van de Vijver, F. J., Mylonas, K., Pavlopoulos, V., & Georgas, J. (2003). *Culture and children's intelligence. Cross-cultural analysis of the WISC-III* (Vol. Methodology of combining the WISC-III data sets.). San Diego, CA: Academic Press.

Walker, A. J., Batchelor, J., & Shores, A. (2009). Effects of education and cultural background on performance on WAIS-III, WMS-III, WAIS-R and WMS-R measures: Systematic review. *Australian Psychologist*, 44(4), 216–223.

<http://doi.org/10.1080/00050060902833469>

Wechsler, D. (2004). *WISC-IV (UK). Wechsler Intelligence Scale for Children - Fourth UK Edition*. London: Harcourt Assessment.

Wechsler Intelligence Scale for Children-IV. Conceptual and Interpretive Guide. (n.d.).

Retrieved November 28, 2015, from

<https://www.google.com/search?q=significant+difference+in+Digit+Span+subtest&ie=utf-8&oe=utf-8#q=cancellation+subtest+wisc>

Westaway, A. (2012). Rural poverty in the Eastern Cape Province: Legacy of apartheid or consequence of contemporary segregationism? *Development Southern Africa*, 29(1), 115–125. <http://doi.org/10.1080/0376835X.2012.645646>

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

## Appendix 1

## Informed consent form for headmaster/headmistress

Ref: Headmaster consent form

I \_\_\_\_\_ have been informed of the nature of the research which will include the assessment of grade 3 isiXhosa-speaking children with the Wechsler Intelligence Scale for Children-Forth Edition (WISC-IV) as an extension of a prior South African normative database. This research will be conducted by a Masters Counselling Psychologist (*Alexa Bickell, 0829206973, dale.alex@worldonline.co.za*) and I hereby consent to the participation of my Grade 3 learners to this project.

I understand that:

1. the below-mentioned Masters Counselling Psychologist and Intern Counselling Psychologists are conducting research to provide preliminary normative data on the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) for isiXhosa-speaking first language children, as a requirement for a Masters Degree in Counselling Psychology at Fort Hare University.
2. The research will involve willing isiXhosa-speaking first language Grade 3 children as participant from your school. Participants will be assessed using the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV).
3. Participation in the research is strictly voluntary. Individuals have the right to withdraw from the study at any stage.
4. The information collected on participants will be strictly confidential, with no personal information being disclosed. Access to this data will be restricted to members of the research team. On request, it may be accessed for professional purposes with parental/guardian consent.
5. Data arising out of this project may be used anonymously for thesis and publication purposes.

This study has been reviewed and approved by the University Research Ethics Committee (UREC) for studies involving human subjects. For research problems or questions regarding this study UREC may be contacted through Prof Gideon De Wet at the Govan Mbeki Research and Development Centre (GMRDC) at the University of Fort Hare.

**Consent**

I the undersigned understand the procedures described above. My questions have been answered to my satisfaction, and I agree to the assessment procedures for the WISC-IV for the purposes of this study. My consent is purely voluntarily, and I knowingly give informed consent to use this data for the purposes of this research.

Participants name: \_\_\_\_\_

I consent to the WISC-IV assessment for the purposes of this study

I do not consent to the WISC-IV assessment for the purposes of this study

Participants signature: \_\_\_\_\_

Contact Telephone Number: \_\_\_\_\_

Email: \_\_\_\_\_

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

## Appendix 2

## Informed consent form for parents

Ref: Parent/Guardian consent form:

I \_\_\_\_\_ have been informed of the nature of the research which will include the assessment of my child in grade 3, isiXhosa-speaking, with the Wechsler Intelligence Scale for Children-Forth Edition (WISC-IV) as an extension of a prior South African normative database. This research will be conducted by a Masters Counselling Psychologist (*Alexa Bickell, 0829206973, dale.alex@worldonline.co.za*) and I hereby consent to the participation of my Grade 3 child \_\_\_\_\_ to this project.

I understand that:

1. the below-mentioned Masters Counselling Psychologist and Intern Counselling Psychologists are conducting research to provide preliminary normative data on the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) for isiXhosa-speaking first language children, as a requirement for a Masters Degree in Counselling Psychology at Fort Hare University.
2. The research will involve willing isiXhosa-speaking first language Grade 3 children as participant from your school. Participants will be assessed using the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV).
3. Participation in the research is strictly voluntary. Individuals have the right to withdraw from the study at any stage.
4. The information collected on participants will be strictly confidential, with no personal information being disclosed. Access to this data will be restricted to members of the research team. On request, it may be accessed for professional purposes with parental/guardian consent.
5. Data arising out of this project may be used anonymously for thesis and publication purposes.

This study has been reviewed and approved by the University Research Ethics Committee (UREC) for studies involving human subjects. For research problems or questions regarding this study UREC may be contacted through Prof Gideon De Wet at the Govan Mbeki Research and Development Centre (GMRDC) at the University of Fort Hare.

**Consent**

I the undersigned understand the procedures described above. My questions have been answered to my satisfaction, and I agree to the assessment procedures for the WISC-IV for the purposes of this study. My consent is purely voluntarily, and I knowingly give informed consent to use this data for the purposes of this research.

Participants name: \_\_\_\_\_

I consent to the WISC-IV assessment for the purposes of this study

I do not consent to the WISC-IV assessment for the purposes of this study

Participants signature: \_\_\_\_\_

Contact Telephone Number: \_\_\_\_\_

Email: \_\_\_\_\_

## Appendix 3

## Participant information leaflet and assent form

**PARTICIPANT INFORMATION LEAFLET AND ASSENT FORM**

**Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) and Bender Gestalt II test performance of Grade 3 IsiXhosa-speaking children: An extension of a prior South African normative database.**

**RESEARCHERS NAMES:** Alexa Bickell

**ADDRESS:** Fort Hare University, East London

**CONTACT NUMBER:** 082 920 6973

**E MAIL:** dale.alex@worldonline.co.za

**What is RESEARCH?**

Research is something we do to find new knowledge about the way things (and people) work. We use research projects or studies to help us find out more about disease or illness. Research also helps us to find better ways of helping, or treating children who are less fortunate.

**What is this research project all about?**

This research will investigate if there are any differences in standards and norms between the UK children and the South African IsiXhosa-speaking Grade 3 children.

**The duration of the research project?**

The research will be conducted in the form of an assessment test which will take about 1 ½ hrs per child and the whole duration of the project will take a year at the most.

**Why have I been invited to take part in this research project?**

You have been invited to take part in this project because you are IsiXhosa-speaking, you are in Grade 3 and you are currently receiving your education in English at an ex-Department of Education school in East London.

**Confidentiality**

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

Data arising out of this project will be used anonymously for thesis and publication purposes only. Your parents or your school will not be given this individual data. Your name will not appear on any of the published data either.

### **Who is doing the research?**

My name is Alexa Bickell and I am a Masters Student at the Department of Psychology at the Fort Hare University in East London and I will be administering the tests.

### **What will happen to me in this study?**

We will be doing some verbal and non-verbal test, move some blocks around, and do some counting, reading and maybe drawing. You will be asked some questions that you will answer to the best of your abilities and generally just try your best. However, there are no right or wrong answers!

### **Can anything bad happen to me?**

Nothing bad is expected to happen to you! You might feel a bit nervous at the beginning until you get to know me better and realize that we will just be playing some games that are not much more different than what you are doing at the school. However, if anything worries you during or after the assessment, you can tell myself, your teacher or your parents and they will contact me and we will discuss it.

### **Who else is involved in the study?**

There will be another Masters student from the same University conducting some of the tests as well. Her name is Hanli Palmer and she can be contacted at the University of Fort Hare, East London on 083 695 5044.

### **Can anything good happen to me?**

This study will help lessen discrimination, facilitate more accurate assessment of intelligence across cultures and enlarge the existing cross-cultural normative database.

### **Will anyone know I am in the study?**



Your name will not appear in the study at all. Only my supervisor will see your name mentioned on the form when we check the test results. Your parents, school or the department will not see your name mentioned anywhere.

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

**Who can I talk to about the study?** If you have any questions, please contact me, Alexa, on 082 920 6973.

**What if I do not want to do this?**

Remember, you can refuse to participate in this study and can pull out at any time during the process. We only want you to participate willingly!

Do you understand this research study and are you willing to take part in it?

 YES NO

Has the researcher answered all your questions?

 YES NO

Do you understand that you can pull out of the study at any time?

 YES NO

---

Signature of Child

---

Date

## WISC-IV TEST PERFORMANCE OF GRADE 3 XHOSA-SPEAKING CHILDREN

## Appendix 4

## Children's questionnaire form

Department of Psychology Fort Hare Screening Questionnaire for potential participants

Date: \_\_\_\_\_

Name of Participant: \_\_\_\_\_

Name of Test Administrator: \_\_\_\_\_

*Mark with an X that which is applicable to participant.*

**Academic History**

- has failed a grade at school Y/N
- is undergoing remedial teaching Y/N
- has a learning disability Y/N

**Medical History**

- Is on any medication for any reason Y/N

*If Yes please specify type of medication and reason for medication:.....*

- Has any other neurological disorder Y/N

*If Yes, please specify:.....*

- Has epilepsy Y/N
- Has previously sustained a head injury involving loss of consciousness and/or  
Hospitalization Y/N
- Has any problems involving eyesight Y/N
- Has any problem involving hearing Y/N

**Emotional Well-being**

- Has depressive/irritable mood much of the time Y/N
- Is presently seeing a psychologist/psychiatrist Y/N