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Wechsler Abbreviated Scale of Intelligence: Preliminary normative data for 12-15-year-old
English- and Afrikaans-speaking Coloured learners in the Western Cape

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COMPULSORY DECLARATION

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature: _____ Date: _____

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ABSTRACT

The Wechsler Abbreviated Scale of Intelligence (WASI) is an internationally recognized brief measure of general intellectual functioning. The WASI was developed, standardized, and normed in United States on a predominantly White sample. Despite this fact, and the fact that there are no South African norms for the instrument, it is used in a variety of clinical and research settings in this country. This situation is problematic, particularly because South Africa is an exceptionally diverse and multicultural country, and because the accurate interpretation of intelligence test performance relies on the use of appropriate normative data. The current study had two primary objectives. First, I set out to describe the development of a culturally and linguistically adapted version of the WASI suitable for use in English and Afrikaans first-language speakers. Second, I set out to establish, for that adapted instrument and for English and Afrikaans first-language speakers aged 12 to 15 years and resident in the Western Cape, a preliminary set of locally appropriate norms, stratified by age, language, and quality of education. This study provides valuable guidelines for collection and use of normative data for research and clinical purposes in South Africa.

Keywords: Wechsler tests; intelligence tests; culture-fair; adolescents; quality of education; normative data.

INTRODUCTION

The effects of socioeconomic status, education, culture, and ethnicity on intelligence test performance have been widely documented, and continue to present much controversy and debate (Cohen & Swerdlik, 2005; Owen, 1998; Pretorius et al., 2009). The administration of intelligence tests in a country like South Africa, where issues like cultural differences, educational disparities, and sociopolitical disadvantages are particularly relevant, presents numerous challenges to clinicians and researchers.

During the apartheid era, the White minority imposed extreme racial division on the Black (African, Coloured, and Indian) majority.¹ Apartheid policies meant that Black individuals had to live and receive schooling separately from Whites; they were discriminated against and were refused equal opportunities. Despite the end of apartheid, the many years of discrimination and deprivation experienced by Black individuals has left a complex legacy that is currently evident in almost all spheres of South African society (van der Berg, 2009).

Performance on intelligence tests is one of the spheres in which that legacy is evident. Black people in South Africa routinely obtain significantly lower test scores than European and American normative samples on intelligence tests (Anderson, 2001; Lynn & Owen, 1994; Shuttleworth-Edwards et al., 2004; Viljoen, 1992). For instance, Skuy, Schutte, Fridjhon, and Carroll (2001) measured test performance on an English administration of the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974) and the Individual Scales for African Language Speaking children (IS-A; Landman, 1991) in a sample of healthy, neurologically intact South African Black African students with varying home languages ($N = 152$, age range 8-15 years). Their results demonstrated that, compared to published American norms, the South African students scored poorly (many in what might be described as the “impaired” range) on many of the subtests. This study illustrated the point that only locally-appropriate normative data should be used in interpreting performance on intelligence tests.

Globally, the practice of psychological assessment (in clinical neuropsychology, for instance) is, to an important degree, dependent upon the development of appropriate normative data. The validity of test results is compromised when inappropriate norms are applied; assessment is, in this case, effectively rendered meaningless. In South Africa, almost all popular and commonly-used psychological tests were developed in English-speaking

¹Throughout this thesis, I will use the term “Black” in the generic sense (i.e., to refer collectively to Black African, Coloured, and Indian individuals).

countries such as the United States and the United Kingdom. This situation arises because there are too few (or no) locally developed South African tests and normative datasets, and thus foreign tests and norms set the standard.

The ethical dilemma facing South African clinicians, of course, is whether to use locally developed tests that might be of relatively poor psychometric standard, or to use the available foreign tests that are psychometrically sound but that feature locally-inappropriate normative data. Neither option is palatable; both can too easily lead to misdiagnosis due to incorrect inferences based on unsuitable normative data (Ferrett, 2011). This situation is clearly not ideal, and South African clinical and research psychologists are duty-bound to correct it.

The study described here aimed to collect and describe preliminary normative data for a culturally modified and appropriately translated Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999), a commonly-used brief test of intelligence, for Coloured English- and Afrikaans-first-language speakers, aged 12 to 15 years, in the Western Cape. Although the WASI is not only intended for use with these particular demographic groups, the methods used to modify and translate the test, and to collect the normative data, provide a template for how normative data might be collected for other WASI-suitable populations in South Africa.

Theories of Intelligence

The conception and development of our current understanding of intelligence and its application is wrapped in a long and complex history that dates back to the ancient Greek philosophers. Aristotle (384 BC - 322 BC) distinguished *orexis*, referring to emotional and moral functions, from *dianonia*, which refers to the intellectual functions of man. *Dianonia* was then later translated by Cicero (106 BC - 43 BC) as *intellegentia* (*inter* within, *legere* choose or discriminate) which may in some instances refer to the *speculative capacity of the human mind* (Vernon, 1960).

More than a century has passed since these definitions and concepts were formulated, and yet the measurement of intelligence remains a contentious topic that has ignited debate amongst academics. The main source of this contention stems from the inability of the field to reach consensus on a standard definition for intelligence. Boring (1886-1968) took the view that intelligence is whatever intelligence tests measure. This statement, although apparently extreme, is not an isolated view; many contemporary psychologists hold a similar attitude (Richardson, 2002).

Intelligence tests were originally created with the objective of measuring a variety of elements in order to estimate general intellectual functioning. However, as is the case with many other theories in psychological science, models of intelligence have evolved through a succession of paradigms put forward to clarify our understanding of what exactly constitutes the concept. In order to understand the contemporary status of intelligence tests, it is necessary to outline some of the most influential theories that have emerged in the last 100 years. In the subsections below, I discuss, briefly, the theories of Spearman, Vernon, Thurstone, Guilford, Gardner, Sternberg, and Cattell-Horn-Carroll.

Spearman's two-factor theory. Spearman postulated that all scores on all tests, even when measuring abilities that vary greatly from one another (e.g., music ability and mathematics), are positively correlated. This meant that all abilities had a common core aspect; Spearman (1904) referred to this common element as the *g*, or general ability, factor.

Spearman's theory of *g* is based on a mathematical-statistical model. This model demonstrates how tests can be developed and used collectively to measure *g*. Spearman's theory of intelligence was the first to have scores based on statistical analysis, and, essentially, it aimed at producing psychological tests that would measure the *g* factor in each individual. According to this theory, existing intelligence tests that generally measured a variety of abilities should be replaced by a single test that measured, primarily, the *g* factor. According to Spearman, tests that are best suited for this purpose are those concerned with abstract reasoning, such as Cattell's (1941) Culture Fair Intelligence Tests.

According to Horn (1989), Spearman's theory can be described as an essence theory, the essence being an understanding of correlations and relations. Spearman's theory hence forms the basis of many theories of intelligence. For instance, Rimoldi (1948) stated that it could be possible for a single factor to be explained by the combination of many cognitive abilities, and numerous subsequently-developed tests were based on this theory. These tests were developed in attempts to understand the processes that inform the correlations and relations of cognitive abilities in order to measure intelligence. The most popular of these tests are Spearman's (1927) matrices tests (better known as Raven's matrices (1938)), and Koh's (1923) blocks, which form the foundation of the Block Design subtest of the Wechsler scales.

Vernon's hierarchical model of abilities. Vernon's (1950) model places Spearman's *g* factor at the top of a hierarchy of abilities; on the next level are two broad group factors known as *verbal education* and *practical-mechanical aptitudes*. The verbal education factor

is in turn divided into verbal and numeric sub-factors, while the practical-mechanical factor is divided into sub-factors such as spatial and mechanical information (Owen, 1998).

According to Vernon (1950), the relationships between these factors are complex. The *g* factor dominates the higher-order factors (i.e., verbal education and practical-mechanical), while those factors dominate the factors lower on the hierarchy. Sub-factors such as logical reasoning and numeric and fluency abilities are dominated by the verbal education factor, whereas sub-factors such as mechanical information, spatial ability, drawing, handwork, and reaction time are dominated by the practical-mechanical factor. Even with this web of relationships, however, Vernon (1960) argued that the *g* factor was paramount in determining whether an individual would succeed in life or not: Those with high *g* factors would be more likely to do better in most areas of their lives than those with lower *g* factors. Lohman and Hagan (2001) developed the Cognitive Abilities Test based on Vernon's theory, which matches the appropriate teaching method to a child's cognitive ability.

Thurstone's multiple factor theory. Thurstone (1935) argued that intelligence was composed of a number of factors known as *primary mental abilities*. The first of these is Verbal Comprehension, which is evaluated in tests of reading comprehension, verbal analogical reasoning, and vocabulary. The second is General Reasoning, which is evaluated in tests where the examinee is expected to find a particular rule or trend buried within a series of data points. The third is Word Fluency, which is evaluated in tests that require the examinee to name as many words as possible beginning with a particular letter. The fourth is Memory, which is assessed in tests of rote memory (e.g., word-pair association tests). The fifth is Number, which is evaluated in tests that estimate the speed and accuracy of arithmetic calculations. The sixth is Spatial, which is evaluated in tests where the examinee is confronted with geometric shapes. The seventh and last is Perceptual Speed, which is assessed in tests where the examinee is expected to indicate differences and similarities between visual stimuli.

These factors formed the foundation of the new intelligence test Thurstone developed, called the Test of Primary Mental Abilities (Thurstone, 1941). For Thurstone, the primary mental abilities were crucial to the model of intelligence mainly because of their practical application.

Guilford's Structure of the Intellect theory. According to Guilford's (1967) model of intelligence, an individual's performance on an intelligence test can be attributed to almost 150 different intellectual factors, which are organized along three dimensions: Operations, Contents, and Products. The concept of Operations refers to what the examinee is responsible

for, and includes five categories: cognition, memory, divergent production, convergent production, and evaluation. The concept of Contents refers to the actual information used to carry out the Operations, and consists of four categories: figures, symbols, words, and behaviour. The concept of Products refers to the way in which the information is processed by the examinee, and consists of six categories: unit, classes, relations, systems, transformations and implications.

In Guilford's model, then, each test has not one but three dimensions (Operations, Contents, and Products). These operate together in the following fashion: When a test is administered an examinee is required to use an *Operation* on particular *Content*, which results in a *Product*.

Many scholars (e.g., Horn, 1968; Owen, 1998) have questioned the validity of Guilford's methodology because he failed to include the *g* factor in his formulations. In addition, they criticized his model on grounds that it did not adequately describe how the interactions of the different dimensions enable the factors. Nevertheless, Guilford's theory recognized that intelligence is not one-dimensional, and that human ability and skills are diverse and need to be understood in this way. Therefore Guilford's theory has received widespread acceptance and acknowledgement.

Gardner's theory of multiple intelligences. Gardner's (1983) theory suggests that every individual possesses the potential to develop numerous kinds of intelligences. According to this theory, people possess eight kinds of intelligence: *linguistic* as in the ability to read a book; *logical* as in the ability to solve a mathematical problem; *spatial* as in the ability to, for instance, parallel park a car; *musical* as in the ability to play an instrument; *bodily-kinaesthetic* as in, for instance, dancing which requires fine motor movements; *interpersonal* as in social interactions with others; *intrapersonal*, which refers to the understanding of one's self; and *naturalistic intelligence*, which can be divided into two sub-factors (spiritual awareness and existential awareness of life) and which refers to having a greater sensitivity to nature.

Within this theoretical framework, these different kinds of intelligence are independent in that they develop at different times in each individual. However, Gardner (1983) states that even though these intelligence areas are independent they are also related (e.g., when an individual improves in one area there may be an overall enhancement in all other areas).

Sternberg's triarchic theory of intelligence. This theory is also referred to as 'successful intelligence theory' (Sternberg et al, 1981). According to Sternberg (2000),

intelligence can be understood as the ability to understand your weaknesses and strengths and adapt to the environment in order to succeed. However, success is defined by the socio-cultural context in which the individual finds him/herself. According to Sternberg (2004), behaviour considered intelligent in one culture or context may be considered stupid in another. For this reason, Sternberg postulates that the understanding and assessment of intelligence cannot be divorced from its context. Intelligent behaviour is determined by the context in which we find ourselves.

The theory distinguishes three aspects of intelligence: Analytical, Creative, and Practical. *Analytical intelligence* refers to the traditional understanding of academic success as intelligence. More specifically, it calls on skills such as analyzing, interpreting, and evaluating stimuli. These skills allow us to solve complex problems. *Creative intelligence* refers to the ability to be able to cope in unfamiliar situations and learn from these experiences. *Practical intelligence* is the ability to adapt to the environment (e.g., being street smart).

The external validation of the triarchic theory of successful intelligence has been tested using correlational studies, cultural studies, and instructional studies. The internal validity of the theory is based on various confirmatory factor analytic studies. In order to demonstrate the validity of his theory, Sternberg developed the Sternberg Triarchic Abilities Test (STAT; Sternberg, 1993). Using the STAT, Sternberg conducted several studies to test the predictions of his theory. In one of the validation studies, 368 learners were being taught psychology in three different ways. The first teaching method placed a great deal of emphasis on memory tasks. The second method emphasised analytical thinking. The last method used Sternberg's triarchic method, which emphasized analytical, creative, and practical intelligence. Learners who were taught using this triarchic method performed better than those who were taught using the other teaching methods (Sternberg, 1999b).

Cattell-Horn-Carroll theory. The Cattell-Horn-Carroll (CHC) theory combines the Cattell-Horn (Horn & Noll, 1997) and the three stratum (Carroll, 1993) theories of cognitive abilities. As such, CHC theory is based on a hierarchical model of the intellect that holds three strata. The first (lowest) stratum has over 70 narrow abilities, the second stratum possesses nine broad abilities, and the highest stratum has an overall *g*. Typically, only the first seven factors from the second stratum are represented in conventional intelligence test batteries. The nine broad factors of intelligence listed in the second stratum of the CHC theory are: *knowledge intelligence*, which involves language and our ability to understand the world through it; *fluid intelligence*, which involves solving novel problems; *short-term*

memory, which is the ability to remember bits of information (e.g., a phone number) and use it later; *long-term storage and retrieval*, which is the ability to remember information and use it much later; *processing speed*, which refers to the ability to perform regular cognitive tasks quickly, particularly when you have to be focused; *visual processing*, which refers to the ability an individual possesses to interpret and understand visual information; *auditory processing*, which refers to the ability to understand and perceive audio stimuli; *reading and writing*, which are skills acquired during formal education; and *quantitative intelligence*, which refers to the interpretation and understanding of numerical knowledge (McGrew, 2005).

CHC theory is supported by years of comprehensive psychometric data. Additional support for the model is based on neurocognitive, genetic, developmental, occupational, and educational research (Horn, 1998). In the late 1990s, the Cross-Battery Assessment (Flanagan & McGrew, 1997) was developed to help clinicians interpret test scores accurately using CHC theory.

The theories of intelligence described above, although not representing an exhaustive list of such models of general intellectual functioning, emphasize strongly various constellations of the structure of the intellect. Every one of the theories discussed above (and many others not reviewed here) has added valuable insight and knowledge to our understanding of intelligence and intelligence tests. It must be understood, however, that there continues to be no shortage of controversy and debate when it comes to the concept and measurement of intelligence within psychological assessment; the controversies range from the definition of intelligence to factors such as the influence of culture on intelligence test performance (Cohen & Swerdlik, 2005).

Wechsler Intelligence Scales

As discussed above, there are numerous viable theories of intelligence, all presenting different understandings and interpretations of the concept of intelligence, and most associated with a variety of different intelligence tests. For the purpose of the research presented here, however, David Wechsler's definition is foundational.

Wechsler's definition of intelligence has been validated by over 60 years of research, and continues to be influential in modern psychological testing. He defined intelligence as:

... the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment. It is aggregate or global because it is composed of elements or abilities, which, though not entirely

independent, are quantitatively differentiable. By measurement of these abilities, we ultimately evaluate intelligence.... Although intelligence is not merely the sum of these abilities, the only way we can evaluate it quantitatively is by measurement of the various aspects of these abilities (Wechsler, 1944, p.3).

Based on this conceptualization, Wechsler and his followers have designed multiple individually administered intelligence tests to evaluate intellectual abilities of people from preschool to older adulthood. By and large, the Wechsler scales have been accepted and evaluated favourably from a psychometric viewpoint. With regard to reliability (internal consistency, test-retest reliability, and inter-scorer reliability), all Wechsler tests are strong. Furthermore, correlations and factor-analytic studies in the Wechsler test manuals show the scales possess good content and construct validity (Cohen, 1959; Cohen & Swerdlik, 2005; Watkins et al, 2007).

Currently, there are four major Wechsler tests in use: the Wechsler Adult Intelligence Scale - Fourth Edition (WAIS-IV) for ages 16 through 89 years; the Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV) for ages 6 through 16 years and 11 months; the Wechsler Pre-School and Primary Scale of Intelligence - Third Edition (WPPSI-III) for ages 3 years to 7 years 3 months; and the Wechsler Abbreviated Scale of Intelligence (WASI) for ages 6 through 89 years. My research focuses on the latter, and so I discuss it in greater detail in the next section.

WASI: Description and Utility

The WASI (Psychological Corporation, 1999) was created in response to requests from clinicians and researchers for a brief and reliable measure of general intellectual functioning, suitable for use across the lifespan. The WASI test manual notes that it can be used as a screening instrument, as an estimate of general intellectual functioning for research purposes, or for reassessment of an individual who has undergone a more comprehensive evaluation previously (Axelrod, 2002). The WASI saves clinicians and researchers the time it would take if they reviewed literature to decide which tests are suitable and appropriate for them to use, as it is a standardized method of obtaining summary scores that are highly correlated with those from the WISC-IV and WAIS-IV.

The WASI consists of four subtests: Vocabulary, Block Design, Similarities, and Matrix Reasoning. None the items used in the WASI subtests are included in the corresponding subtests of the WISC-IV or WAIS-IV, or on any of the earlier editions of those instruments. Scores on the Vocabulary and Similarities subtests are combined to yield a

Verbal IQ (VIQ) score; similarly, scores on the Block Design and Matrix Reasoning subtests are combined to yield a Performance IQ (PIQ) score. Scores from the four subtests can be combined to derive a Full Scale IQ (FSIQ) score. Raw scores on each of the subtests are converted into age-adjusted standardized scores, and from there the index scores (VIQ, PIQ, and FSIQ) are derived.

The *Vocabulary* subtest has the highest correlation with Full Scale IQ. It assesses the individual's word knowledge by asking him/her to produce the definitions of given words. The examiner presents the words visually and orally, and the examinee is required to define the word. The answer is given a score of 0, 1, or 2 points; the examiner is provided a scoring rubric to help decision-making in this regard. This subtest proceeds on the assumption that the individual has normal social and adequate educational background, and it is fairly resistant to the effects of brain damage (except for neurodegenerative disorders such as dementia). Thus, it is often considered a useful estimate of pre-morbid intelligence.

The *Similarities* subtest measures an individual's ability to form comparisons between verbal concepts. For the first four items of the test, the individual is presented with two rows of pictures. He/she is then required to choose one picture from the bottom row that is most similar to the pictures in the top row. For the rest of the items, the examiner reads two words and the examinee has to describe how those items are similar. As with *Vocabulary*, the examinee's responses are scored 0, 1, or 2, based on the manual's scoring rubric. Optimal performance on this test requires concentration, long-term memory, and abstract reasoning ability. Low scores are associated with lower education levels, concrete thinking, and a tendency toward impulsivity.

The *Block Design* subtest measures non-verbal reasoning and visuospatial organizational abilities. This task requires the participant to copy a geometric design presented on a stimulus card using two-dimensional blocks. It assesses lower-level cognitive abilities (e.g., basic visual perception) as well as higher-level perceptual planning elements, and therefore integrated functioning of a variety of brain systems is required for optimal performance on this subtest. Hence, it is sensitive to lesions in a variety of cortical and sub-cortical locations.

The *Matrix Reasoning* subtest measures the ability to manipulate, abstract, and perceive the relationships between shapes; therefore, it measures non-verbal perceptual and visuospatial organizational abilities, as well as visual analogical reasoning (Braze et. al, 2007). In this task, two sets of geometric patterns are presented to the participant. The first pattern has one piece missing; the examinee is required to select the missing piece from the

second set of patterns. A correct response to the problem is awarded 1 point; an incorrect response scores 0. The final score is the sum of all correct responses, and ranges between 0 and 35 (Mansfield, 2008).

The WASI, although not designed as a substitute for a comprehensive examination of general intellectual functioning, is nevertheless particularly attractive to clinical, research, educational, and occupational psychologists for several reasons. First, the entire battery can be administered in roughly 35 minutes; second, it is standardized for use in individuals aged 6-89 years; third, one can derive reasonably rich information about general intellectual functioning, verbal functioning, and non-verbal functioning; fourth, it appears sensitive to a variety of clinical conditions (e.g., mental retardation and moderate/severe traumatic brain injury) (Axelrod, 2002; Strauss, Sherman, & Spreen, 2006).

Furthermore, the WASI, like its counterparts in the Wechsler stable, has excellent psychometric properties. The test manual (Psychological Corporation, 1999) reports that, for children and adolescents in the standardization samples, test-retest reliability coefficients of the subtests range from 0.87 to 0.92; coefficients are 0.93, 0.94, and 0.86 for VIQ, PIQ, and FSIQ, respectively. For adults, the reliability coefficients of the subtests range from 0.92 to 0.94; coefficients are 0.96, 0.96, and 0.98 for VIQ, PIQ, and FSIQ respectively. With regard to inter-scorer agreement, the test manual reports it to be high (> 0.90) for all subtests.

With regard to validity studies, Canivez, Konold, Collins, and Wilson (2009) administered the WASI and the Wide Range Intelligence Test (WRIT; Glutting, Adams, & Sheslow, 2000) to a sample of 152 children, adolescents, and adults. They reported meaningful convergent validity coefficients, and noted that both tests were consistent with the theoretical models of intelligence upon which they were based.

With regard to the characteristics of the standardization sample, the WASI was normed on English-speaking American individuals aged 6 to 89 years. Although geographic location and educational attainment of these individuals was well documented, their socioeconomic status was not (Psychological Corporation, 1999). Furthermore, as with many other commonly-used neuropsychological tests, the original normative sample consisted mostly of white English-speaking individuals. Furthermore, the normative data are not stratified by ethnicity, and culturally-relevant information (e.g., quality of education) is not provided in the test manual. Given these omissions, it is unclear whether, and to what degree, cultural, socioeconomic, and linguistic factors might play a role in test score variability (Strauss et al., 2006).

Intelligence Testing in South Africa

To make sense of and understand the current status of psychometric testing in South African psychology, one needs to take both history and context into account (Kendall, Verster, & Mollendorf, 1988). The history of psychology in this country is deeply scarred by apartheid beliefs and practices. For example, at the height of the apartheid era White universities refused to accept Black students to study psychology, and Black academics were not allowed to publish journal articles. In addition, psychometric assessments were used to demonstrate that Blacks were intellectually inferior to Whites. These tests were, of course, constructed by, and normed on, White individuals and thus were completely unfair to Black examinees. Nonetheless, their results were used to further perpetuate the ideology of Black inferiority (Foxcroft, 1997; Owen, 1992).

At the Psychology and Transformation Conference in 1994, the then-president of the Psychological Association of South Africa acknowledged the complicity of psychology during apartheid, and stated that psychology had to transform in order for it to be significant to all South Africans. Subsequently, psychology in South Africa has transformed, and has come to be characterized as a liberatory psychology. This term refers to a 'progressive' psychology that aims to break away from Euro-American hegemonic dominance. More specifically, it focuses on development of relevant social and psychological practices and the needs of the nation's people. Transformation of South African psychology has, however, been gradual. Indeed, with regard to the practice of psychological testing, it has been dawdling and incomplete (Stead, 2002).

One key to the transformation process with regard to psychological testing has been debates about how 'culture fair' currently-used psychometric tests are, and whether, in fact, such tests are at all desirable in a culturally diverse nation such as South Africa. Psychologists and researchers have been working fervently toward transformation in this area, trying to dismantle the practices within psychometric testing that were firmly embedded in Western cultures and that played a crucial role in the success of apartheid. Integral to this endeavour of providing appropriate psychological testing (which is a cornerstone of providing appropriate mental healthcare services) is the development of locally appropriate normative data (Foxcroft, 2004; Skuy et al., 2001).

Importance of Normative Data

Normative data are created by testing a large group of individuals, either considered to be homogenous or stratified by relevant demographic variables, to determine a range of

'normal' functioning within a particular domain for the population from which the sample is drawn. Such data are extremely useful in clinical practice, where individual scores can be compared to normative data so that one might ascertain the presence of any deviations from the norm. Subsequently, the clinician can then make diagnostic inferences based on these data. Clearly, then, the veracity of these inferences are dependent upon the quality and availability of normative data (Mitrushina et al., 2005; Nell, 1999b; Strauss et al., 2006).

Normative data in South Africa. As noted earlier, there is a distinct lack of South African normative data for psychological tests. One possible reason for this lack of data is that large-scale normative studies are time-consuming, expensive, and require extensive resources and expertise; for this reason they are logistically difficult. Nell (2000) pointed out that the development of normative data in South Africa is more likely to be the result of small locally-driven initiatives rather than being market-driven; as a result, the process can be expected to be slow. Additionally, many studies that have collected normative data have not published their datasets, making it difficult to obtain these resources (Ferrett, 2011). Furthermore, due to cohort effects, normative data have to be updated because of improved performance over time (Flynn, 1985). Hence, many clinicians or researchers may discover and use data sets that are outdated and, thus, useless (Mitrushina et al., 2005).

In South Africa, psychologists mainly use tests that have been developed, standardized, and normed in Western countries. This trend is due in large part to the fact that many available South African tests either do not meet international psychometric standards, are outdated, or feature norms created during the apartheid era (Foxcroft & Roodt, 2005; Nell, 2000; Viljoen, 1994). As noted earlier, much controversy and debate exists about whether norms developed for overseas-created tests are suitable for use in non-Western, developing-world countries such as South Africa. When using these norms as the standard, several researchers have found that South Africans perform at a lower level than their American counterparts (Gaylard, 2005; Knoetze, Bass, & Steele, 2005). This level of performance arises because many of the collected normative data do not take into account various cultural factors, such as ethnicity, acculturation, bilingualism, and geographical location; thus, the interpretations based on foreign norms are meaningless, and the danger of misdiagnosis (and under-diagnosis, when clinicians accept that it is normal for South African individuals to perform at a lower level than American individuals) is a reality.

These potentially damaging consequences are particularly evident in neuropsychological assessment, whether in private, clinical, or research settings. To demonstrate the difficulties that can occur when foreign neuropsychological test norms are

applied to a South African sample for which they were not developed, Anderson (2001) conducted a study with a small neurologically intact English first-language South African sample ($N = 20$). His results indicated a higher incidence of neuropsychological impairment than would have been expected for a group of neurologically intact individuals.

Cross-Cultural Aspects of Intelligence Testing

Variations in culture and language have been identified as factors that could contribute to lower the validity of cognitive assessments across different geographic settings (Parker, Philp, Sarai, & Rauf, 2007). I will discuss each of these two factors briefly in order to clarify the impact each might have on intelligence test performance.

Cultural bias in intelligence testing. Culture may be defined as “that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society” (Tylor, 1924, p. 1). The relationship between culture and psychological assessment has much to do with the role of culture in measured intelligence. Culture prescribes many of our behaviours and ways of thinking, and culture also allows people to master the skills necessary for survival. Furthermore, values differ across cultures, and so the emphasis one culture places on intelligence, and what it regards as intelligent behaviour, may be quite different from those of another culture (Super, 1983).

An exceptionally large literature supports the argument that, because different cultures promote and require different skills and abilities, examinees, depending on the culture to which they belong, will show differential levels of abilities across different tasks in a test situation. For instance, Serpell (1979) tested Zambian and British school children on a task requiring them to reconstruct models using paper-and-pencil, wire, or clay. The British children performed much better than their Zambian counterparts when using paper-and-pencil. In contrast, the Zambian children outperformed their British counterparts when using the wire. The groups performed equally well when using the clay. Serpell explained that these between-group differences existed because the children performed best using instruments that were culturally familiar to them.

The ways in which intelligence tests are constructed, and the ways in which items are selected for tests, reflect the culture in which the tests are developed. Thus, a score on an intelligence test could merely reflect the degree to which an individual has been integrated into, or is familiar with, a particular culture. Given this situation, and the fact that almost all existing intelligence tests were developed by, and standardized on, White Europeans or North Americans, it is not surprising that Black people generally score lower on intelligence tests

than Whites (Agranovich & Puente, 2007; Ardila, 1995; Foxcroft, 1997; Shuttleworth-Edwards et al., 2004). Although some (e.g., Rushton & Jensen, 2005) ascribe these IQ-score differences to genetic factors, the consensus in the field seems to be that genetic and environmental factors are almost impossible to separate when discussing IQ, and that any attempt to separate them must first take into account whether the test used to measure IQ is fair to all test-takers (Cohen & Swerdlik, 2005; Kamin, 2006).

An assumption made here, then, is that if one develops tests that eliminate or minimize cultural bias, then the magnitude of cross-race performance differences will be decreased. One way to control the influence of culture is to exclude verbal items from a test and to thus only use non-verbal items. Unfortunately, however, non-verbal tests of intelligence have not lived up to their promise. The belief, formerly widely-held, that non-verbal tests are free from cultural and racial bias has been debunked (see, e.g., Rosselli & Ardila, 2003). For instance, Knoetze et al. (2005) showed that Xhosa-speaking individuals performed significantly more poorly than their English-speaking counterparts on the Ravens Coloured Progressive Matrices (RCPM; Raven, Court, & Raven, 1990), a widely-used non-verbal assessment of reasoning ability that is often used as a model of culture-free intelligence testing. Knoetze and colleagues speculated that the relatively poor RCPM performance they saw by Xhosa-speaking individuals might be due to those children's relatively poor ability to think analogically, given that this kind of thinking is required to interpret non-verbal stimuli.

In addition, non-verbal tests of intelligence tend to be relatively poor predictors of academic success; verbal tests are much better, largely because academic institutions require good verbal skills from their students (Roselli & Ardila, 2003). What this means, of course, is that non-verbal intelligence tests often cannot serve a primary function of intelligence tests: sorting the academically gifted from the academically challenged.

Is it possible, then, to have a culture-free intelligence test? Cole (1999) argues that the idea of a culture-free test is nothing more than illusion. He states that no matter how much tests are revised to be 'culturally fair' or to remove cultural bias, the construction itself is developed from a particular cultural perspective. In other words, tests of intelligence will always reflect the culture in which they have been developed. Thus, intelligence tests will always differ in the extent to which they are 'culturally loaded', where *culture loading* refers to the extent to which a test has adapted the vocabulary, feelings, traditions, and knowledge linked with a particular culture (Cohen & Swerdlik, 2005).

Currently, major tests of intelligence undergo rigorous scrutiny in order to reduce cultural loading and cultural bias before being published. Procedures include analysis of individual items, consultations with expert panels, and pilot studies. Only when a test is believed to be free of cultural loading and cultural bias is it made available for use by the profession (Cohen & Swerdlik, 2005).

Language bias in intelligence testing. Language is one of the parameters along which cultures vary, and it may be the most important mediator of intelligence test performance, particularly when the language of test administration is not the home language of the examinee (Nell, 1999b). For example, instructions during intelligence tests are transferred and negotiated through language. The success of this transfer and negotiation is determined by the effectiveness of the communication between examinee and examiner. Hence, it would be fair to say that if the communication is inappropriate, the instructions will not be transferred effectively. Furthermore, it seems logical that before any other intelligence test considerations are made, language of test administration must be considered (Shuttleworth-Jordan, 1995).

As an illustration of the importance of language of test administration in interpreting test performance, Carstairs, Myers, Shores, and Fogarty (2006) compared neuropsychological test performance of three groups of Australian participants ($N = 116$): those from a non-English-speaking cultural background who first spoke a language other than English as a child, those from a non-English-speaking cultural background who first spoke English as a child, and those from an English-speaking background. All participants were tested in English. The researchers found that individuals from a non-English-speaking background performed more poorly than those from an English-speaking background on verbal subtests; they ascribed this relatively poor performance to the individuals' lack of proficiency in the English language. They therefore concluded that proficiency in the language of test administration impacts on assessments of general verbal ability on verbal subtests. These findings raise questions about any clinical practice that involves assessing individuals from non-English speaking backgrounds in English.

The disadvantage experienced by the individuals from non-English-speaking background might be decreased if the individual's language of educational instruction is English, however. To illustrate this point, Shuttleworth-Edwards et al. (2004) compared test performance on an English administration of the WAIS-III (Wechsler, 1997) of a sample of South African White English first-language and Black African first-language speakers ($N = 68$, age range 19-30 years). Crucially, all participants had English as a medium of educational

instruction. The results suggested that White and Black African participants with educational backgrounds of similar quality performed at a level comparable to the US standardization sample. Similarly, Bethlehem, de Picciotto, and Watt (2006) demonstrated, using a small South African bilingual English-Zulu speaking sample ($N = 35$), that individuals who were tested in English and who had English as a medium of instruction performed slightly better on verbal fluency tests than those who were tested in Zulu and had English as a medium of instruction. These data suggest that even if home language and medium of instruction are not the same, the best language for the individual to be tested in is that in which he/she has received formal education.

Furthermore, Foxcroft and Aston (2006) critically examined the process undertaken by the Human Sciences Research Council (HSRC) in their standardization of the WAIS-III in South Africa. The test was administered to a multicultural sample of Black African ($n = 165$), Coloured ($n = 230$), Indian ($n = 191$), and White ($n = 203$) adults. Both first- and second-language English speakers were included in this sample. Although the measure was standardized for English-speaking South Africans, the test adaptation team needed to be aware of the fact that the sample recruited for the study included individuals with varying levels of English proficiency. This fact might be expected to have an important influence on test performance, and Foxcroft and Ashton asserted subsequently that the South African adaptation of the WAIS-III is biased against second-language English speakers. For instance, the results of their study showed that Black African first-language speakers who were tested in English performed significantly more poorly than other individuals.

In hindsight, Foxcroft and Aston (2006) recommend that the best way to address and understand the impact of language is to create separate norms for different language groups. Hence, there is, for instance, an urgent need to establish separate normative data for English- and Afrikaans-first-language speakers in South Africa.

Understanding the Impact of Quality of Education on Intelligence Test Performance

The political history of South Africa, even 17 years after the advent of democratic rule, has left contemporary society in this country to contend with many inequalities. One of the most serious of these inequalities is deeply rooted in the education policies enacted by the apartheid government. Prior to democratization, education and language policies were used as measures to ensure the subjection of Black people. Even though these policies have been abandoned, the consequences appear to be much more difficult to eradicate.

In 1953, the National Party government passed the Bantu Education Act. This Act set in place policy stating that schools were to be segregated along racial lines, and that different education curricula were to be taught to the different race groups. This policy was based on the premise that particular jobs were to be filled by individuals from particular race groups. For instance, White people were expected to dominate the field of science by becoming doctors, engineers, and so forth. In contrast, Black people were encouraged to become domestic workers, miners, and so forth (Lowenberg & Kaempfer, 1998).

In addition to ensuring that the ruling party had a major avenue of social control in the country, the Act also meant that, from a practical point of view, schools designated for Black African, Coloured, and Indian students were given fewer resources and less educational material. They were also provided with less qualified teachers, and their schools tended to be located in impoverished or even dangerous areas. Although these students made up 75% of the South African student population, only 5-25% of government funding was spent on their education (Gaylard, 2005).

Since 1994, the new democratically-elected South African government has worked hard to overturn the injustices wrought by apartheid-era educational policies. For example, all racialised education policies have been abolished; more scholarships and bursaries have been made available to Black students; and, because of Black economic empowerment policies, Black students have a better chance at pursuing tertiary education. However, despite these efforts, the matric pass rate amongst Black students still pales in comparison to that of White students. The most recent statistics show that Black students are still exhibiting poorer academic performance in comparison to White students (Gaylard, 2005; October, 2000; Statistics South Africa, 2001; WCED, 2010).

In short, then, even in contemporary South Africa White students still have a better chance of attending the best schools, going on to attend the best universities, and proceeding to become the *crème* of South Africa's graduates (Kajee, Naidoo, & Wyk, 2003). Most Black students are still lagging behind in all of these respects. Therefore, for the purposes of this study, as with most other South African studies in this field (e.g., Ferrett, 2011; Gaylard, 2005; Shuttleworth-Edwards et al, 2004a), quality of education is defined in the following way: Private or Model C schools, which pre-democratization were reserved for White students, will be considered as delivering an advantaged quality of education. Schools that were reserved solely for Black learners pre-democratization will be considered as delivering disadvantaged quality of education).

A growing body of literature suggests that differences in intelligence test performance are affected directly by differences in quality of education. For instance, Walker, Batchelor, and Shores (2009) reviewed 19 peer-reviewed articles from the period 1980-2008 in a meta-analysis focusing on the effects of education on WAIS-III, WMS-III, and WAIS-R performance. Their analysis revealed that there was indeed a noteworthy relationship between quality and level of education and intelligence test performance. This proved to be the case regardless of whether participants in these studies were neurologically healthy individuals or drawn from clinical populations.

In a South African study, Shuttleworth-Jordan (1996) compared the SA-WAIS (1969) performance of a group of Black African South African university students attending a primarily White university to White students from the same university. The Black African students performed at a consistently lower level than the White students. Shuttleworth-Jordan explained that even though the difference in scores was relatively small, these slight differences can be explained by the poor quality of education the Black African students had received during primary and high school. Similarly, Shuttleworth-Edwards and colleagues (2004) examined the WAIS-III performance of Black African first-language pupils from private schools and Black African graduates who had received disadvantaged quality of education. Those with advantaged quality of education performed at a level comparable to the American standardization sample and better than those students with disadvantaged quality of education.

Furthermore, Grieve and van Eeden (2010) investigated the validity of an Afrikaans version of the WAIS-III for South African use. They compared the performance of individuals from Stellenbosch with disadvantaged quality of education ($n = 30$) to individuals from Pretoria with advantaged quality of education ($n = 52$). The latter outperformed the former, with quality of education explaining 65% of the variance in performance across the sample.

In a somewhat unique study, Avenant (1988) compared the WAIS-R performance of Black South African prison warders to that of Black African university students from a disadvantaged university. All of the participants were older than 18 years, and all had at least a Grade 7 education. Although the university students scored better (mean Full Scale IQ = 77) than the prison warders (mean Full Scale IQ = 73), the average scores for both groups of participants were well below those of American standardization samples, and, indeed, fell into the range conventionally classified as Borderline.

In addition, Skuy and colleagues (2002) compared the performance of White university students ($n = 28$) to Black African university students ($n = 70$) on the Ravens Standard Progressive Matrices (Raven et al, 1990). The group of White students obtained an average IQ score of 105, whereas the group Black African students' mean score was 85. These results once again reflect the effects of years of disadvantaged quality of education and other socio-political deprivation experienced by Black African students.

Clearly, then, the influence of quality of education on intelligence test performance is of great significance. Clinicians and researchers have to consider it as a vital variable that may affect the outcome of an individual's psychological assessment. Equally clear is the fact that this variable is particularly relevant in South Africa, not only because of the political-educational history of this country but also because vast economic disparities continue to mark our society.

The Impact of Socioeconomic Status on General Intellectual Functioning

Just as differences in quality of education are related directly to differences in performance on intelligence tests, so differences in socioeconomic status (SES) are related to differences in performance on those tests. Although only a few South African studies have demonstrated this point, the vast SES differences within the South African population mean that this statement is as true in South Africa as in the countries from which most of the research emanates.

SES is a multi-factorial concept with several definitions in the literature, making it very difficult to define precisely and concisely. Nevertheless, here I define SES as many other researchers have done, by focusing on the educational, social, and financial resources available to the individuals in question (Magnuson & Duncan, 2006; Walker, Petrill, & Plomin, 2005).

According to Richardson (2002), financial, social, and educational resources influence an individual's preparedness for tests of general intellectual functioning. High-SES families socialize their children in a way that equips them to perform better on IQ tests. For instance, children learn verbal, reasoning, and categorization skills at home. Middle- and upper-class parents, in comparison to those from lower SES backgrounds, are more likely to provide a much more stimulating environment for these skills to flourish (Bradley & Corwyn, 2002).

Aside from the overall general positive relationship between SES and intelligence test performance, there are specific indicators of SES that contribute in particular to a child's IQ test scores. Numerous studies have shown that a child's cognitive development (and

subsequent academic success) is determined by three broad factors: parental education, parental expectations and parental income (Currie & Thomas, 1998; Gottfredson, 1997; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987; Strenze, 2007; van der Berg, Wood, & Le Roux, 2002).

Parental education is a strong predictor of a child's intellectual development. In one demonstration of this point, Sellers, Burns, and Guyrke (2002) examined the correlation between various demographic variables and IQ using the WPPSI-R (Wechsler, 1989). Their results revealed that parental education had the largest relation to IQ scores, making a larger contribution than age, gender, ethnicity, and geographic region. Similarly, Rowe and colleagues (1999) showed that children with parents who had higher educational levels achieved higher VIQ scores on the Add Health Picture Vocabulary Test (an abbreviated version of the Peabody Picture Vocabulary Test – Revised; Dunn & Dunn, 1981) than did children of parents with lower levels of education. Also, Kareken, Gur and Saykin (1995) conducted a study in which they examined the relationship between performance on the Wide Range Achievement Test-Revised (WRAT-R; Jastak & Wilkinson, 1984) reading subtest (READ) and overall IQ. In addition the study also investigated the relationship between READ subtest, IQ, and its relationship with various demographic variables. The results revealed that scores on the READ subtest were positively correlated with VIQ, PIQ, and FSIQ. More importantly, parental educational level accounted for a great deal of the variance in IQ, even more so than the READ

More specifically, maternal levels of education have been positively correlated with children's intellectual attainment and development. Brooks-Gunn, Klebanov, and Duncan (1996) conducted a study to evaluate the contribution of the maternal IQ of Black and White American families to a child's IQ on the WPPSI-R (Wechsler, 1989). The White mothers had an IQ of 98.04 with an average of 13 years of education, whereas Black mothers had an IQ of 78.10 and an average of 11 years of education. The results revealed that the White children (average IQ: 105.13) outperformed the Black children (average IQ: 85.04).

With regard to parental expectations and their relationship to intelligence test performance, studies have shown that greater parental expectations result in greater parental involvement, which in turn results in enhanced intelligence test performance of children. For instance, Englund and colleagues (2004) showed that when the expectations of mothers were high their children excelled on intelligence tests, and that this relationship held regardless of the low-SES status of these families. They attributed this outcome to the fact that these mothers were more responsive to their children because of their higher expectations.

With regard to the influence of parental income on children's intelligence test performance, again studies have shown that there is a positive correlation (see, e.g., Burchinal, Campbell, Brayant, Wasik & Ramey, 2006; Campbell & Ramey, 2008; Ceci & Williams, 1997; Lawlor et al., 2006; Brooks-Gunn, & Kohen, 2002). There are numerous mechanisms that explain this association: High-SES parents tend to have more conversations with their children, to spend more time reading to their children, and to provide more learning opportunities at home. In contrast, low-SES parents are, because of financial limitations, less likely to (a) attend recreational and cultural events with their children, (b) spend money on reading and other learning materials, and (c) monitor what their children watch on television (Bradley & Corwyn, 2002; Sewell & Shah, 1967).

Language and literacy development are particularly vulnerable to the influence of SES; several studies have shown that low-SES children are more likely to have difficulties reading and are less verbally expressive (Feagans, 1982). Their difficulties can extend to their non-verbal cognitive abilities, such as drawing and constructing shapes, however. These skills are particularly relevant for optimal intellectual development and thus successful performance on intelligence tests (Beery, 1982; Ferrett, 2011; Hemp, 1989).

It is clear, then, that an individual's financial, educational, and social resources can have a significant influence on his/her intelligence test scores. Therefore, it is necessary for clinicians and researchers to recognize the impact of these social forces on a child's general cognitive functioning and to have the appropriate norms to interpret these scores correctly.

Specific Aims and Hypotheses

This study was part of a larger 3-year longitudinal research programme that aimed to establish a valid, reliable, and comprehensive multi-purpose neuropsychological test battery for use in South African clinical and research settings. The current study had two primary objectives. First, I set out to describe the development of a culturally and linguistically adapted version of the WASI suitable for use in English and Afrikaans first-language speakers. Second, I set out to establish, for that adapted instrument and for English and Afrikaans first-language speakers aged 12 to 15 years and resident in the Western Cape, a preliminary set of locally appropriate norms, stratified by age, language, and quality of education.

There is a lack of normative data for Afrikaans speakers and for Coloured adolescents on intelligence tests administered to them in their first language (Grieve & van Eeden, 2010). The current sample was specifically selected for study because Coloured individuals, and Afrikaans-speaking individuals, constitute a large portion of the population within the greater Cape Town metropolitan area. According to the 2001 government census (Statistics South Africa, 2001), 55.3% of the Western Cape population had Afrikaans as a home language; according to a recent social profile survey of South Africa, 57.5% of individuals in the province self-identified as Coloured (Statistics South Africa, 2010).

With regard to the age range chosen for study, the government social profile compiled for the period 2002-2009 (Statistics South Africa, 2010) reported that a high proportion of South African adolescents drop out of school at the age of 16. More specifically, 30.9% of children aged 17 in the year 2009 had not completed grade 9. The decision to test individuals who had not yet reached the age of 16 ensured that we would sample from a population more representative of all adolescents in the Western Cape, rather than one representing those with the motivation or the familial, social, and financial circumstances to remain in school.

Furthermore, the original WASI standardization process in the United States stratified the normative sample by five educational levels, with the lowest of those levels being 8 years of education. Therefore, in order to facilitate cross-cultural comparisons of the current sample to an age-matched American sample, it was necessary for the South African sample to also have at least 8 years of education.

Additionally with regard to the age range chosen for the study, the adolescent brain differs from the child and adult brain (Yurgelun-Todd, 2007; Weinberger, Elvevåg & Giedd, 2005). The development of most cognitive domains has stabilized by adolescence; the notable exception is executive function, which continues to develop during and after this

period (Gogtay et al., 2004; Luna, 2009). Paediatric cognitive assessments rely on developmentally appropriate information for accurate assessments of adolescents (Baughman & Cooper, 2007; Sattler & Dumont, 2004). Hence, this sort of assessment can be very challenging when there is a shortage of contextually appropriate normative data. The age group focused on in this study provides South African child clinical psychologists, educational psychologists, and pediatric neuropsychologists with useful guidelines to better assess their clients.

In summary, then, the profound need to collect locally appropriate normative data in South Africa is clear. Therefore, the normative data presented here, for this specific sample, are a valuable contribution to the literature. Additionally, even though South Africa has a multicultural population, clinicians and researchers often do not fully meet the linguistic, educational, and socio-cultural needs of the individuals they assess. A lack of relevant and readily-available information can account partly for that situation. Therefore, the cross-cultural issues explored in the study will provide pertinent information that might assist in enabling more meaningful assessments (Anderson, 2001; Ferrett, 2011).

With regard to the specific aims of the study, I sought to:

1. Conduct a cross-lingual comparison of WASI performance by examining the scores of English-speaking Coloured adolescents relative to their Afrikaans-speaking counterparts.
2. Conduct a cross-cultural comparison of WASI performance by examining the scores of this sample of South African adolescents relative to the published norms for age-matched American adolescents.
3. Explore the effects of socioeconomic status, language, sex, quality of education, level of education, and age on the WASI performance of the current sample.
4. Present normative data, appropriately stratified by relevant demographic variables, for the population from which the current sample was drawn.

METHODS

Research Design and Setting

Data were collected from learners residing in the greater Cape Town metropolitan area. The methodological approach adopted here was that of a cross-sectional descriptive study in which the main findings constitute a set of preliminary normative data for a specific local population.

Participants

A sample of 200 participants (age range: 12-15 years) was recruited by grade from several schools in the Western Cape. Recruitment aimed to ensure a balanced sample of participants, with equal numbers of boys and girls, roughly equal numbers within age groups, and an approximately equal number of first-language English- and Afrikaans-speakers. Recruitment also attempted to ensure that the sample was representative of a broad range of socioeconomic and quality of education strata. In addition, an important inclusion criterion was that all participants should have been educated in South Africa for at least 5 years prior to testing; this criterion ensured that all participants were educated in similar school systems.

Exclusion criteria. Individuals who were not attending school and those with less than 1 year of completed education were excluded from participation. Also excluded were those individuals who were under the age of 12 years and older than 15 years; whose first language was neither English nor Afrikaans; who did not identify themselves as being a member of the Coloured race; with a history of medical, psychiatric, or substance use disorders that may have affected performance on the intelligence test; with any history of head injuries or birth complications; with any pervasive neurological, developmental, or learning disabilities; or who were using psychotropic medication.

Most of the information bearing on these criteria was extracted from parent- and self-reports. The final selection of learners was, however, based on a screening interview for psychiatric disorders. The screening interview used was the Schedule for Affective Disorders and Schizophrenia for School-Aged Children (6-18 years) Lifetime Version (K-SADS-PL; Kaufman et al., 1997). Furthermore, the researchers also asked a variety of screening questions to establish that the potential participants had not suffered from any medical condition affecting their mental or motor abilities.

Materials

The larger study within which this research was nested used a large set of paper-and-pencil personality inventories and neuropsychological tests, as well as electrophysiological measures. Only those instruments relevant to this research are described below, however. All of the instruments were administered in the participant's first language. Rigorous translation and back-translation procedures ensured that English and Afrikaans versions of the instruments were of equivalent complexity (Ferrett, 2011).

Demographic and socioeconomic questionnaire. Participants and their parents were

required to complete a demographic questionnaire (see Appendix A), which called for them to provide information about their age, sex, health status, home language, highest level of education, years of successfully completed education, medical history, and race. The latter was self-defined according to classification categories used in the 2002- 2009 social profile of South Africa (Statistics South African, 2010).

An asset index was included in this questionnaire to help determine the participant's socioeconomic status. On this form, information such as geographical region, relationship between caregivers, gross family income, and caregiver's employment were recorded. Furthermore, information pertaining to domestic living conditions (i.e., dwelling type, number of people co-habiting, and the kind of assets the caregivers possessed) was documented.

Marin Acculturation Scale (MAS). This 12-item scale (see Appendix B) was used to measure the language preference of each participant objectively. The instrument was developed for, and has mainly been used in research with, Latino individuals in the United States (G. Marin, Sabogal, B. Marin, Otero-Sabogal, & Perez-Stable, 1987). The original version of the scale has a test-retest reliability of 0.92 (Domino, 2006). The scale has been used in numerous studies involving college students and community adults (Cortese & Smythe, 1979; Krauna, Green, & Valencia-Weber, 1982; Olmeda & Padilla, 1987; Padilla, Olmeda, & Loya, 1982). Because specific acculturation measures were unavailable for each of the language groups used in this study, the MAS was adapted for the current sample. Specifically, the original English version was translated into Afrikaans and then back-translated to ensure fidelity.

The MAS features three sub-scales: Language Use (items 1-5), Media Use (items 6-8), and Ethnic Social Relations (items 9-12). Each item is scored on a 1-5 rating scale. In the version adapted for the current study, higher scores indicated English dominance and lower scores indicated Afrikaans dominance. The final MAS score represented an average score across all items; that is, it was calculated by summing all of the individual item scores and then dividing by the total number of items on the scale. Hence, higher final MAS average scores suggested that the individual was more proficient in English, while a lower average score indicated that the individual was more proficient in Afrikaans. The perfect average an individual could obtain on the scale is 3. For the purposes of deciding on the language of test administration, such a score would indicate that the participant in question could be tested in either English or Afrikaans. However, a final score below this perfect average indicated that the individual was more proficient in Afrikaans, and should be tested

in that language; a final score above this average meant that the individual was more proficient in English, and should be tested in that language.

Wechsler Abbreviated Scale of Intelligence (WASI). This is, of course, the instrument of interest in this study. As noted earlier, this test of general intellectual functioning has been normed and standardized in the United States for use in persons aged 6-89 years (Psychological Corporation, 1999). To briefly review some of the information presented earlier: The WASI is based on the original Wechsler model of intelligence, which conceptualizes intelligence as being captured by the traditional verbal and performance index split (Strauss et al., 2006). The *Vocabulary* and *Similarities* subtests comprise the WASI Verbal IQ index. The first of these subtests requires participants to describe the meaning of a word; the second requires participants to identify how two concepts are similar. The *Block Design* and *Matrix Reasoning* subtests comprise the WASI Performance IQ index. The first of these subtests requires participants to copy modeled geometric patterns using coloured blocks; the second requires participants to select the correct piece of a missing picture from a series of options. Scores from the Verbal IQ index and the Performance IQ index are combined to derive a Full Scale IQ (FSIQ) score.

WASI-SA adaptation procedure. A team of psychological, psychometric, educational, and linguistic experts were consulted to revise and adapt the WASI Vocabulary and Similarities subtests so as to make the test items culturally and linguistically suitable for the local population. For each item (i.e., each word on the Vocabulary subtest and each word of each word pair on the Similarities subtest), the experts scrutinized word class, degree of abstraction, syllable count, and frequency of occurrence in English and Afrikaans. This process sought to evaluate whether the original English and the directly-translated Afrikaans items were equally difficult. If any inequalities existed, the offending item was replaced with a suitable alternative. Finally, the original English scoring rubrics were also translated into Afrikaans, and were altered to suit the revisions made (see Appendix C).

Procedure

Individuals identified by the study's recruiters as being potentially suitable participants were given assent and demographic forms to complete; their parents were given consent forms (see Appendix D). These forms were completed and returned to study representatives prior to commitment to participate in the study. Appointment times were arranged telephonically or via email with participants and their parents/guardians. Depending on what was more convenient for the participant and his/her parent/guardian, testing was

conducted at the school that he/she attended or at the research offices of the larger study at Tygerberg Hospital.

After potential participants had been recruited, and consent, assent, and demographic forms had been read, signed, and completed, study representatives analyzed the documents to ensure that the individuals met the eligibility criteria. If they did, a licensed psychiatrist then conducted the clinical screening interview.

On the day of intelligence testing, the examiners once again ensured that participants understood the purpose of the study and their role in it. They were also reminded of the confidentiality of their responses, and of the fact that they could withdraw from the study at any time without penalty. Examiners then allowed for any questions the participants and parents/guardians had. After these questions were answered, administration of the MAS and WASI commenced.

As noted above, the WASI was administered in the participant's home language (as determined by self-report and by MAS score). Test administration followed conventional standards, as outlined in the manual (see Appendix C).

A licensed clinical psychologist managed the administration and scoring of the WASI by four trained examiners. The latter received test manuals in Afrikaans and English, and were trained to follow closely the instructions for administration given in the manuals. For the Vocabulary and Similarities subtests, the examiners used tape recorders to capture responses; these were later transcribed.

When the testing session was completed, each participant was fully debriefed and thanked for his/her cooperation and participation. Each participant was given the opportunity to discuss any concerns or express opinions regarding the participation experience. Finally, each participant received a Clicks gift voucher worth R50.

Ethical Considerations

The principal investigators of the larger study within which this one was nested received permission from the Western Cape Education Department to collect data at identified schools within the province. Additionally, the Research Ethics Committees of the University of Stellenbosch's Faculty of Health Sciences and of the University of Cape Town's Department of Psychology granted approval for all of the larger study's procedures. The current study followed the ethical guidelines for research with human subjects as outlined by the Health Professions Council of South Africa (HPCSA) and the University of Cape Town Codes for Research.

All potential participants were given detailed information about the study procedures and about their role in the research. As noted above, assent and consent was obtained from the participants and their parents/guardians, respectively. Confidentiality was maintained at all times, and written consent was required when feedback was necessary. Each participant was allocated a code number and all his/her relevant documents were stored according to it. The key linking participant name and code number was only available to the external supervisor. This made it impossible for the examiners to identify participants, which further ensured anonymity and confidentiality. If any significant personal, psychological, or learning problem was detected at any point during the testing and screening sessions, parents/guardians were informed and referred to appropriate therapists/agencies.

All testing procedures were explained to participants in their home language. There were no anticipated risks for physical, psychological, or social harm because of participating in this study. Some of the participants felt slightly anxious or frustrated during the administration of tests (e.g., at times when they did not know the answers to questions). Examiners tried at all times to have a friendly demeanour and to place participants at ease, however. Regular breaks were offered to participants. Participants received gift vouchers as an incentive and appreciation for participation.

Data Management and Statistical Analyses

Data for two demographic variables (SES and quality of education) needed some transformation before being used in the final analyses. With regard to SES, we measured it as a composite of the following six variables: family income, parental education level, dwelling type, parental employment, household assets, and bedroom cohabitation. The demographic questionnaire (Appendix A) shows that three of those variables were captured in categorical fashion: *family income* ranged from 1 to 6, with higher categories indicating greater levels of income; *parental education level* ranged from 1 to 6, with higher categories indicating higher education levels; *dwelling type* ranged from 1 to 6, with higher categories indicating better living conditions. *Parental employment* was captured in open-ended form on the demographic questionnaire, and later categorized according to Hollingshead's (1975) employment ranks. Within that system, categories range from 1 to 9, with lower categories being indicative of higher ranks. For the purposes of our analyses, the Hollingshead scores were reversed so that higher scores indicated higher occupational status. *Household asset* score was captured as a continuous variable that ranged from 0 to 7, with a higher score indicating more assets in the household; similarly, *bedroom cohabitation* was initially

captured as a continuous variable that ranged from 1 to 7, with higher scores indicating that more people shared a bedroom with the participant. However, originally a score of 7 indicated that the child had his/her own bedroom. Later, the scores were placed in ascending order so that the lowest score reflected that the individual was not sharing a bedroom and the highest score indicated that an individual was sharing with more than five people.

Summing these scores allowed us to create a final composite score for SES; this distribution of scores was transformed into a categorical variable (Low SES or High SES) by median split. In the current sample, the range of SES scores was 15-40, with a mean of 29.62, median of 30.00, and standard deviation of 6.15.

With regard to quality of education, pre-democratization classification was used to categorize the schools from which participants were drawn. Schools classified as delivering an *advantaged quality of education* included those that had, pre-1994, been reserved solely for White learners but that had been open to learners from other race groups since democratization; these schools are commonly referred to as Model C schools. Schools classified as delivering a *disadvantaged quality of education* included those that had previously been intended for Black, Coloured, or Indian learners (i.e., schools that had been administered by the Department of Education Training (DET), House of Representatives (HOR), or House of Delegates (HOD) systems). Hence, quality of education was captured as a dichotomous variable (advantaged or disadvantaged).

The WASI subtests were scored by the examiners. Each test was checked, audited, and entered into an MSEXcel spreadsheet by the external supervisor. Tests were scored according to procedures outlined in the WASI manual (Psychological Corporation, 1999) and in the manual created specifically for the adaptation used in this study (Appendix C). As stipulated in the WASI manual, the raw scores obtained on the tests were converted into age-corrected *T*-scores, using data from the original United States normative sample.

Analyses of the collected data were conducted using the SSPS software package, and commenced with detailed analyses of descriptive statistics characterizing the performance of individuals on the WASI subtests. Descriptive statistics were also used to examine the sample's characteristics in terms of home language, quality of education, level of education, sex, SES, and age. The assumptions of parametric statistical tests (e.g., normal distribution of data, homogeneity of variance) were checked for all variables of interest. Effect sizes were interpreted as being small (0.20), medium (0.50), or large (0.80), according to convention (Cohen, 1988).

Inferential data analysis then proceeded according to the specific aims of the study. First, to make cross-lingual comparisons, a series of independent-samples *t*-tests were conducted comparing the WASI performance (Vocabulary; Similarities; Matrix Reasoning; Block Design; Verbal IQ; Performance IQ; and Full Scale IQ) of English-speaking individuals to that of Afrikaans-speaking individuals.

Second, to make cross-cultural comparisons, a series of one-sample *t*-tests was conducted to compare the performance on the various WASI subtests and indices of this study's English- and Afrikaans-speaking groups to those of the age-matched US standardization sample.

Third, a series of hierarchical multiple regressions was conducted to investigate the predictive power of various demographic variables with regard to WASI VIQ, PIQ, and FSIQ outcome variables. The final predictor variables identified by these analyses were those with statistically significant *F*-values and those that explained most strongly the variance in the model (as shown by their high R^2 values). These predictors formed the final regression models; diagnostic tests were run on those models.

Fourth, I constructed a set of preliminary WASI normative tables, stratified by language and by other demographic variables established by the previous analyses as being of significant value.

RESULTS

Sample Characteristics

Table 1 presents a summary of the sample characteristics. As can be seen, there were no statistically significant differences between the two language groups in terms of age at testing, male-female distribution, and number of years of successfully completed education at testing. There were, however, statistically significant between-group differences with regard to quality of education and SES. The uneven distribution of the participants' quality of education and SES may be a consequence of the fact that recruitment was from 19 schools delivering advantaged quality of education but from 28 schools delivering disadvantaged quality of education. Considering the likely relationship between quality of education and SES, it is therefore not surprising that the SES distribution is also unbalanced, with more Afrikaans-speaking than English-speaking learners from lower SES (van der Berg & Wood & le Roux, 2002). The impact on test performance of these inequalities in distribution across language groups can be interpreted following the multiple regression analyses (described below) investigating whether quality of education and/or SES had a significant effect on WASI test performance.

The remainder of the Results section is organized around the primary aims of the thesis, which were to:

1. Conduct a cross-lingual comparison of WASI performance by examining the scores of English-speaking Coloured adolescents relative to their Afrikaans-speaking counterparts.
2. Conduct a cross-cultural comparison of WASI performance by examining the scores of this sample of South African adolescents relative to the published norms for age-matched American adolescents.
3. Explore the effects of socioeconomic status, language, sex, quality of education, level of education, and age on the WASI performance of the current sample.
4. Present normative data, appropriately stratified by relevant demographic variables, for the population from which the current sample was drawn.

Table 1
Demographic Characteristics of the Current Sample (N = 200)

Variable	Language group		<i>df</i>	<i>t/χ²</i>	<i>p</i>	ESE
	English (<i>n</i> = 94)	Afrikaans (<i>n</i> = 106)				
Sex						
Male:Female	43:51	51:55	1	0.11	.73	0.24
Age (years)						
12:13:14:15	29:22:25:18	33:17:25:31	3	5.32	.15	.13
Level of education (years)						
<i>M (SD)</i>	6.89 (1.28)	7.05 (1.26)	(1, 198)	0.85	.39	0.12
Quality of education						
Advantaged:Disadvantaged	30:64	16:90	1	7.95	< .001***	.19
Socioeconomic status						
High:Low	59:35	41:65	1	11.56	< .001***	.24

Note. ESE = effect size estimate. Effect size was estimated by Cramer's *V* for chi-square analyses and by Cohen's *d* for *t*-tests.

p* < .05. *p* < .01. ****p* < .001.

Aim 1: Cross-lingual comparisons

The first aim of the study was to compare the WASI performance of participants whose first language was English against those whose first language was Afrikaans. With regard to the assumptions underlying the relevant parametric statistical tests here, (a) data were normally distributed for all of the dependent variables (scores on Vocabulary, Similarities, Block Design, Matrix Reasoning, VIQ, PIQ, and FSIQ), but (b) Levene's test for equality of variance was significant for the Vocabulary, Block Design, and VIQ outcome variables. Hence, independent-samples *t*-tests were used for all of the between-group comparisons, but in analyses involving Vocabulary, Block Design, and VIQ the *t* statistic was estimated by an equation not assuming equal variances across groups.

Table 2 shows the results of this series of *t*-tests. As is clear, there was an overall trend for Afrikaans first-language speakers to perform significantly more poorly than their English-speaking peers. Even at a Bonferroni-corrected *p*-value of $(.05/7) = .007$, there were statistically significant between-group differences on all outcome variables. Of note is that, on average, the means of all three index scores for the Afrikaans-speaking adolescents were in the Borderline range, whereas English-speaking adolescents scored within the Average range for FSIQ and VIQ. The effect sizes associated with each of the between-group comparisons were relatively large, suggesting that the relationship between home language and WASI performance was quite substantial.

Table 2
Cross-Lingual Comparisons of WASI Performance (N = 200)

Outcome variable	Language group		<i>t</i>	<i>df</i>	Mean difference	<i>p</i>	ESE
	English (<i>n</i> = 94)	Afrikaans (<i>n</i> = 106)					
Verbal IQ	92.93 (15.29)	76.27 (11.34)	8.65	(1, 170)	16.65	< .001***	1.32
Vocabulary	45.99 (10.92)	32.44 (9.09)	9.45	(1, 181)	13.54	< .001***	1.40
Similarities	44.86 (10.37)	34.81 (9.54)	7.13	(1, 198)	10.05	< .001***	1.01
Performance IQ	87.35 (13.58)	79.93 (11.55)	4.15	(1, 196)	7.42	< .001***	0.59
Block Design	44.30 (9.81)	40.13 (8.00)	3.26	(1, 179)	4.16	< .001***	0.48
Matrix Reasoning	38.80 (10.42)	33.13 (9.81)	3.95	(1, 198)	5.66	< .001***	0.56
Full Scale IQ	90.23 (14.62)	77.77 (19.98)	4.97	(1, 198)	12.46	< .001***	0.70

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance. The *Mean difference* variable was calculated by subtracting the mean value for the Afrikaans group from that of the English group. ESE = effect size estimate; in this case, Cohen's *d*.

p* < .05. *p* < .01. ****p* < .001.

Aim 2: Cross-cultural comparisons

The second aim of the study was to compare the WASI performance of the current South African adolescent sample to their age-matched American counterparts, using the manual's normative statistics (Psychological Corporation, 1999) as the data source for the latter. The assumptions underlying the relevant parametric statistical tests were met in this case: the data were normally distributed for all of the dependent variables, and Levene's test was not significant for any of those variables. Hence, one-sample *t*-tests were used for all of these between-group comparisons.

The series of cross-cultural comparisons began by evaluating the performance of the entire South African sample, collapsed across language and all other demographic variables, against the normative dataset. Table 3 shows the results of this comparison. As can be seen, local adolescents scored significantly more poorly than their age-matched American counterparts on all WASI outcome variables. The South African sample's average FSIQ, VIQ, and PIQ scores were in the Low Average range relative to the US normative data. Most of the subtest performances were also in the Low Average range, although Block Design performance tended to be slightly better than that. The effect sizes associated with each comparison were very large, suggesting that there is an important real-world relationship between WASI performance and being a South African Coloured adolescent.

To explore these results further, I stratified the sample by language and then by quality of education so as to see whether, for instance, English-speaking South African Coloured children with advantaged quality of education would perform similar to the US normative sample. This strategy follows previous research along the same lines (see, e.g., Ferrett, 2011; Gaylard, 2005; Shuttleworth- Edwards et al., 2004a; Van Tonder, 2008).

Table 3
Cross-Cultural Comparison I: Entire South African sample (N = 200) versus US normative sample

Outcome variable	<i>M (SD)</i>	<i>t</i>	Mean difference	<i>p</i>	ESE
Verbal IQ	84.10 (15.70)	14.31	15.90	< .001***	2.02
Vocabulary	38.81 (12.05)	13.12	11.19	< .001***	1.86
Similarities	35.53 (11.11)	13.13	10.46	< .001***	1.86
Performance IQ	83.41 (13.05)	17.86	16.58	< .001***	2.54
Block Design	42.09 (9.11)	12.26	7.91	< .001***	1.73
Matrix Reasoning	35.79 (10.46)	19.19	14.20	< .001***	2.72
Full Scale IQ	83.63 (18.69)	12.38	16.37	< .001***	1.75

Note. Degrees of freedom in each case was (1, 199). The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance. The *Mean difference* variable was calculated by subtracting the mean value for the South African group from that of the US normative sample. ESE = effect size estimate; in this case, Cohen's *d*.

* $p < .05$. ** $p < .01$. *** $p < .001$.

The second cross-cultural comparison, then, involved evaluation of the performance by those in the current sample with English as a first language and advantaged quality of education against the normative database. Table 4 shows that this group of local adolescents scored significantly more poorly than the normative sample on the Similarities and Matrix Reasoning subtests. The relatively poor performance on Matrix Reasoning is what underlies the statistically significant differences on the Performance IQ and Full Scale IQ outcome variables. Nonetheless, even on the FSIQ measure, the average performance by this group of South African adolescents was in the Average range relative to the US normative sample.

With regard to the effect sizes shown in the table, those for Similarities, Matrix Reasoning, PIQ, and FSIQ were very large, indicating that language and quality of education likely played a significant role in performance by these adolescents on those WASI indices and subtests.

Table 4

Cross-Cultural Comparison II: First-language English Coloured South African adolescents with advantaged quality of education (N = 30) versus US normative sample

Outcome variable	<i>M (SD)</i>	<i>t</i>	Mean difference	<i>p</i>	ESE
Verbal IQ	97.66 (13.96)	0.91	2.34	0.37	0.33
Vocabulary	50.80 (9.90)	0.44	0.80	0.66	0.16
Similarities	45.86 (9.48)	2.38	4.14	0.02*	0.88
Performance IQ	92.10 (14.42)	3.00	7.90	.005**	1.11
Block Design	47.90 (10.79)	1.06	2.10	0.29	0.39
Matrix Reasoning	41.73 (10.14)	4.46	8.77	< .001***	1.65
Full Scale IQ	94.23 (13.16)	2.39	5.77	.023*	0.88

Note. Degrees of freedom in each case was (1, 29). The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance. The *Mean difference* variable was calculated by subtracting the mean value for the South African group from that of the US normative sample. ESE = effect size estimate; in this case, Cohen's *d*.

* $p < .05$. ** $p < .01$. *** $p < .001$.

The third cross-cultural comparison involved evaluation of the performance by those in the current sample with English as a first language and disadvantaged quality of education against the normative database. Table 5 shows that this group of local adolescents scored significantly more poorly than the normative sample on all subtests and on all indices. Of interest here, however, is that scores on the Verbal subtests were slightly better than those on the Performance subtests; indeed, relative to the US normative sample, the mean VIQ was in the Average range, while the mean PIQ was in the Low Average range. All effect sizes were large, except for Verbal IQ which was in the medium range. The magnitude of the effect sizes in this case once again demonstrates that WASI test performance was likely influenced by the participants' language and their quality of education.

Table 5

Cross-Cultural Comparison III: First-language English Coloured South African adolescents with disadvantaged quality of education (N = 64) versus US normative sample

Outcome variable	<i>M (SD)</i>	<i>t</i>	Mean difference	<i>p</i>	ESE
Verbal IQ	90.70 (15.48)	4.80	9.30	< .001***	0.33
Vocabulary	43.73 (10.72)	4.67	6.27	< .001***	1.17
Similarities	44.39 (10.80)	4.15	5.61	< .001***	1.04
Performance IQ	85.09 (12.67)	3.00	14.91	.005**	1.11
Block Design	42.60 (8.91)	6.63	7.40	< .001***	1.67
Matrix Reasoning	37.42 (10.34)	9.73	12.58	< .001***	2.45
Full Scale IQ	88.35 (14.98)	2.39	11.35	.023*	0.88

Note. Degrees of freedom in each case was (1, 63). The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance. The *Mean difference* variable was calculated by subtracting the mean value for the South African group from that of the US normative sample. ESE = effect size estimate; in this case, Cohen's *d*.

* $p < .05$. ** $p < .01$. *** $p < .001$.

The fourth cross-cultural comparison involved evaluation of the performance by those in the current sample with Afrikaans as a first language and advantaged quality of education against the normative database. Table 6 shows that this group of local adolescents scored significantly more poorly than the normative sample on all subtests, and therefore on all index scores. In this case, relative to the US normative sample, the mean VIQ and mean PIQ were both in the Low Average range. All the effect sizes were large here, suggesting that there is a substantial real-world relationship between WASI performance and being Afrikaans-speaking with advantaged quality of education. Furthermore, it is of note that, relative to the US normative sample, this group of adolescents performed significantly more poorly than their English-speaking counterparts with advantaged quality of education.

Table 6
Cross-Cultural Comparison IV: First-language Afrikaans Coloured South African adolescents with advantaged quality of education (N = 16) versus US normative sample

Outcome variable	<i>M (SD)</i>	<i>t</i>	Mean difference	<i>p</i>	ESE
Verbal IQ	83.12 (14.61)	4.61	16.88	<.001***	2.38
Vocabulary	37.50 (2.64)	4.72	12.50	.002**	2.43
Similarities	39.31 (2.86)	3.72	10.69	<.001***	1.92
Performance IQ	81.37 (16.86)	4.41	18.63	<.001***	2.27
Block Design	41.62 (2.97)	2.81	8.38	.013*	1.45
Matrix Reasoning	33.56 (2.92)	5.62	16.44	<.001***	2.90
Full Scale IQ	80.94 (14.30)	5.32	19.06	<.001***	2.74

Note. Degrees of freedom in each case was (1, 15). The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance. The *Mean difference* variable was calculated by subtracting the mean value for the South African group from that of the US normative sample. ESE = effect size estimate; in this case, Cohen's *d*.

p* < .05. *p* < .01. ****p* < .001.

The fifth and final cross-cultural comparison involved evaluation of the performance by those in the current sample with Afrikaans as a first language and disadvantaged quality of education against the normative database. Table 7 shows that this group of local adolescents scored significantly more poorly than the normative sample on all subtests, and therefore on all index scores. Of note here is that scores on the Verbal and Performance subtests were similar, although participants performed best on the Block Design subtest. In this case, the mean VIQ and mean PIQ were both in the Borderline range relative to US normative standards. The effect sizes were also very large, suggesting that there is a marked real-world relationship between WASI performance and being Afrikaans-speaking with disadvantaged education. Additionally, this group of adolescents performed significantly more poorly relative to the US normative database than did their English-speaking counterparts with disadvantaged quality of education. Notably, they also performed more poorly than their Afrikaans-speaking counterparts with advantaged quality of education.

Table 7

Cross-Cultural Comparison V: First-language Afrikaans Coloured South African adolescents with disadvantaged quality of education (N = 90) versus US normative sample

Outcome variable	<i>M (SD)</i>	<i>t</i>	Mean difference	<i>p</i>	ESE
Verbal IQ	75.05 (10.29)	22.99	24.95	< .001***	4.87
Vocabulary	31.54 (8.56)	20.43	18.54	< .001***	4.33
Similarities	34.01 (8.99)	16.85	15.99	< .001***	3.57
Performance IQ	79.67 (10.43)	18.37	20.33	< .001***	3.89
Block Design	39.86 (7.16)	13.42	10.14	< .001***	2.84
Matrix Reasoning	33.05 (9.51)	16.90	16.95	< .001***	3.58
Full Scale IQ	77.21 (20.84)	10.37	22.79	< .001***	2.19

Note. Degrees of freedom in each case was (1, 89). The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance. The *Mean difference* variable was calculated by subtracting the mean value for the South African group from that of the US normative sample. ESE = effect size estimate; in this case, Cohen's *d*.

* $p < .05$. ** $p < .01$. *** $p < .001$

In summary, the statistical analyses in this section revealed that South African Coloured adolescents with English as a first language tended to fare better than those with Afrikaans as a first language on cross-cultural comparison with the WASI's US normative sample. Similarly, those with advantaged quality of education tended to fare better than those with disadvantaged quality of education, regardless of home language. Ultimately, then, it was not surprising that Afrikaans-speaking adolescents with disadvantaged quality of education showed, relative to standards set by the US normative sample, the weakest WASI performance of the four groups. Even though English-speaking adolescents with advantaged quality of education performed best relative to their peers in the other three groups, they still performed significantly worse than the American normative sample. Hence, these results confirm that the normative data published in the WASI manual are, in fact, unsuitable for the evaluation and assessment of South African Coloured adolescents, regardless of quality of education or home language. This finding reinforces the need for the establishment of local South African norms that consider linguistic, social, and cultural nuances.

Aim 3: Demographic influences on WASI test performance

For a more refined and powerful analysis of the relationship between demographic variables and WASI test performance, I performed a set of three multiple hierarchical regression analyses. Conducting these analyses helped establish how much of WASI test performance in the current sample was accounted for by a particular set of demographic variables (sex, age, quality of education, level of education, socioeconomic status, and home language). Following convention for this method, known predictors (established from previous research investigating the influence of demographic variables on intelligence test performance; see, e.g., Axelrod (2002); Bethlehem, Picciotto, & Watt (2003); Gaylard (2005)) were entered into the model in order of their importance in predicting the outcome variable. Thus, the order of entry for each model was: age, sex, level of education, language, quality of education, and SES. The criterion variables were VIQ, PIQ, and FSIQ.

The correlation matrix for predictor variables revealed that age and level of education had a strong positive association, $r = .88, p < .001$. Hence, I excluded level of education from the final model. The correlation matrix also revealed that SES and quality of education had a definite positive association ($r = .38, p < .001$), and so I entered them into the final model as a block.

Hierarchical Regression Model: VIQ. Table 8 shows results from the final regression model, which included language and SES/quality of education as the predictors. These predictor variables were retained for this model as they demonstrated statistically significant F values and accounted for the most variance at various stages of the hierarchical model (as shown by their high R^2 values). The final model was a statistically significantly good fit for the observed data, $F(2, 194) = 20.58, p < .001, R^2 = .35$.

A full set of diagnostic tests was run on that final model. Table E1 and Figure E1 in Appendix E illustrate aspects of these diagnostic tests. Briefly, analysis of the partial correlations suggested that the predictors contributed a substantial amount of unique variance. However, the tolerance levels were high, suggesting no problems with multicollinearity in the data, and the change in R^2 values were low, suggesting that there was a relatively small amount of shared variance between the variables. Analysis of the residuals showed that the data were normally distributed and that there did not seem to be any serious outliers that required attention.

Table 8
*Hierarchical Regression Model I: Predictors of WASI VIQ
 test performance in the current sample (N = 200)*

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Step 1					
(Constant)	86.71	2.56		33.75	< .001***
Age	-1.07	0.95	-.08	-1.12	.26
Step 2					
(Constant)	88.11	2.68		32.76	< .001***
Age	-0.93	0.95	-.06	-0.97	.33
Sex	-3.74	2.22	-.11	-1.68	.09
Step 3					
(Constant)	95.51	2.43		39.17	< .001***
Age	-0.42	0.81	-.03	-0.52	.59
Sex	-3.46	1.89	-.11	-1.83	.06
Language	-16.49	1.88	-.52	-8.74	< .001***
Step 4					
(Constant)	81.42	4.31		18.85	< .001***
Age	-0.43	0.78	-.03	-0.54	.58
Sex	-3.47	1.83	-.11	-1.89	.06
Language	-14.56	1.89	-.46	-7.68	< .001***
Quality of education	5.71	2.35	.16	2.45	.02*
SES	3.96	2.00	.13	1.98	.05

Note. SES = socioeconomic status; $R^2 = .006$ for Step 1; $\Delta R^2 = -.01$ for Step 2; $\Delta R^2 = .28$ for Step 3; $\Delta R^2 = .05$ for Step 4.
 * $p < .05$. ** $p < .01$. *** $p < .001$

In summary, the final regression model was, from a statistical significance perspective, a good fit for the observed data, suggesting that the model as a whole was a good predictor of WASI VIQ test performance. The three predictors (language, SES, and quality of education) produced a good model of overall WASI VIQ performance as they accounted for a great deal of the variance in the data.

Hierarchical Regression Model: PIQ. Table 9 shows results from the final regression model, which included language as the only predictor. This predictor variable was retained for this model as it demonstrated a statistically significant F value and accounted for the most variance at the various stages of the hierarchical model (as shown by high R^2 values). The final model was a statistically significantly good fit for the observed data, $F(2, 192) = 4.91, p < .001, R^2 = .11$.

Table 9
*Hierarchical Regression Model II: Predictors of WASI PIQ
 test performance in the current sample (N = 200)*

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Step 1					
(Constant)	85.38	2.14		39.82	< .001***
Age	-0.81	0.08	-.07	-1.01	.31
Step 2					
(Constant)	85.41	2.26		37.78	< .001***
Age	-0.81	0.08	-.07	-1.00	.32
Sex	-0.09	1.87	-.003	-0.05	.96
Step 3					
(Constant)	88.66	2.31		38.26	< .001***
Age	-0.58	0.77	-.05	-0.75	.45
Sex	0.11	1.80	-.004	0.06	.95
Language	-7.32	1.80	-.28	-4.07	< .001***
Step 4					
(Constant)	79.81	4.19		19.04	< .001***
Age	-0.06	0.77	-.05	-0.78	.44
Sex	0.08	1.78	-.003	0.04	.96
Language	-6.09	1.84	-.23	-3.29	< .001***
Quality of education	3.91	2.28	.13	1.78	.08
SES	2.28	1.95	.09	1.16	.24

Note. SES = socioeconomic status; $R^2 = .005$ for Step 1; $\Delta R^2 < .001$ for Step 2; $\Delta R^2 = .078$ for Step 3; $\Delta R^2 = .03$ for Step 4.
 $*p < .05$. $**p < .01$. $***p < .001$

Once again, a full set of diagnostic tests were run on that final model. Table F1 and Figure F1 in Appendix F illustrate aspects of these diagnostic tests. Briefly, analysis of the partial correlations suggested that the predictors contributed a reasonable amount of unique variance. However, the tolerance levels were high, suggesting no problems with multicollinearity in the data, and the R^2 values were low, suggesting that there was a relatively small amount of shared variance between the variables. Analysis of the residuals showed that the data were normally distributed and that there did not seem to be any serious outliers.

In summary, the final regression model was, from a statistical significance perspective, a good fit for the observed data, suggesting that the model as a whole was a reasonably good predictor of WASI PIQ test performance. Nonetheless, it appears that there is still a great deal of unexplained variance in the current data from the WASI Performance subtests.

Hierarchical Regression Model: FSIQ. Table 10 shows the final regression model, which shows language as the only predictor variable. This predictor variable was retained for this model as it demonstrated a statistically significant F value and accounted for the most variance at various stages of the hierarchical model (as shown by its high R^2 values). The final model was a statistically significantly good fit for the observed data, $F(1, 195) = 7.61, p < .001, R^2 = .14$.

A full set of diagnostic tests were run on that final model. Table G1 and Figure G1 in Appendix G illustrate aspects of these diagnostic tests. Briefly, analysis of the partial correlations suggested that language contributed a substantial amount of unique variance. However, the tolerance levels were high, suggesting no problems with multicollinearity in the data, and the R^2 values were low, suggesting that there was a relatively small amount of shared variance between the variables. Analysis of the residuals showed that the data were normally distributed and that there did not seem to be any serious outliers.

In summary, the final regression model was, from a statistical significance perspective, a good fit for the observed data, suggesting that the model as a whole was a good predictor of WASI FSIQ test performance. Nonetheless, it appears that there is still a great deal of unexplained variance in the current WASI FSIQ data.

Table 10
*Hierarchical Regression Model II: Predictors of WASI FSIQ
 test performance in the current sample (N = 200)*

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Step 1					
(Constant)	81.95	3.06		26.74	< .001***
Age	0.68	1.13	.04	0.60	.54
Step 2					
(Constant)	83.13	3.22		25.81	< .001***
Age	0.81	1.14	.05	0.71	.48
Sex	-3.14	2.66	-.08	-1.18	.24
Step 3					
(Constant)	88.77	3.24		24.40	< .001***
Age	1.19	1.07	.07	1.10	.27
Sex	-2.93	2.51	.07	-1.16	.25
Language	12.59	2.50	-.33	-5.02	< .001***
Step 4					
(Constant)	81.77	5.92		13.82	< .001***
Age	1.26	1.08	.80	1.17	.24
Sex	-3.00	2.51	-.08	-1.20	.23
Language	-11.72	2.60	-.31	-4.51	< .001***
Quality of education	5.18	3.23	.12	1.60	.11
SES	0.03	2.74	.001	.01	.99

Note. SES = socioeconomic status; $R^2 = .002$ for Step 1; $\Delta R^2 = .007$ for Step 2; $\Delta R^2 = 0.11$ for Step 3; $\Delta R^2 = 0.01$ for Step 4.
 $*p < .05$. $**p < .01$. $***p < .001$

Aim 4: Normative data, appropriately stratified

The fourth aim of the study was to present a set of preliminary normative data for the WASI, stratified by demographic variables shown by previous literature to have important influences on test performance (Gaylard, 2005; Shuttleworth-Edwards et al, 2004; Van Tonder, 2007; Van der Merwe, 2008). These variables were language, quality of education, and age. The normative data are presented in Tables 11-18.

Table 11
WASI Normative Data for 12-year-old First-language English Coloured South African Adolescents with Advantaged and Disadvantaged Quality of Education

Outcome variable	Quality of education	
	Advantaged (<i>n</i> = 11)	Disadvantaged (<i>n</i> = 18)
Verbal IQ	102.18 (15.96)	86.88 (15.41)
Vocabulary	54.27 (10.20)	38.77 (9.24)
Similarities	48.18 (10.67)	43.27 (14.75)
Performance IQ	91.81 (18.81)	86.44 (13.20)
Block Design	48.81 (11.84)	44.22 (39.16)
Matrix Reasoning	40.27 (13.02)	39.16 (11.51)
Full Scale IQ	96.81 (16.13)	85.15 (9.92)

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance.

Table 12
WASI Normative Data for 12-year-old First-language Afrikaans Coloured South African Adolescents with Advantaged and Disadvantaged Quality of Education

Outcome variable	Quality of education	
	Advantaged (<i>n</i> = 3)	Disadvantaged (<i>n</i> = 30)
Verbal IQ	91.33 (17.24)	76.16 (7.95)
Vocabulary	41.33 (15.30)	31.13 (6.76)
Similarities	46.66 (11.15)	35.56 (7.39)
Performance IQ	82.66 (14.57)	79.23 (11.09)
Block Design	43.00 (7.00)	38.33 (6.89)
Matrix Reasoning	34.00 (14.17)	34.20 (10.49)
Full Scale IQ	86.00 (17.69)	75.53 (8.26)

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance

Table 13
WASI Normative Data for 13-year-old First-language English Coloured South African Adolescents with Advantaged and Disadvantaged Quality of Education

Outcome variable	Quality of education	
	Advantaged (<i>n</i> = 9)	Disadvantaged (<i>n</i> = 13)
Verbal IQ	95.25 (13.37)	87.23 (11.63)
Vocabulary	48.11 (8.13)	39.61 (9.18)
Similarities	44.00 (7.71)	42.76 (8.40)
Performance IQ	94.50 (21.42)	86.00 (12.74)
Block Design	47.88 (10.82)	43.69 (8.94)
Matrix Reasoning	40.55 (9.00)	37.92 (10.16)
Full Scale IQ	94.25 (12.99)	85.15 (9.92)

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance.

Table 14
WASI Normative Data for 13-year-old First-language Afrikaans Coloured South African Adolescents with Advantaged and Disadvantaged Quality of Education

Outcome variable	Quality of education	
	Advantaged	Disadvantaged
	(<i>n</i> = 4) <i>M</i> (<i>SD</i>)	(<i>n</i> = 13) <i>M</i> (<i>SD</i>)
Verbal IQ	95.25 (13.37)	76.53 (8.92)
Vocabulary	44.50 (10.01)	30.92 (7.46)
Similarities	49.75 (9.74)	36.00 (9.70)
Performance IQ	94.50 (21.42)	79.30 (10.31)
Block Design	50.50 (16.62)	40.38 (7.54)
Matrix Reasoning	41.50 (12.39)	32.15 (10.31)
Full Scale IQ	94.25 (12.9)	75.76 (7.92)

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance.

Table 15
WASI Normative Data for 14-year-old First-language English Coloured South African Adolescents with Advantaged and Disadvantaged Quality of Education

Outcome variable	Quality of education	
	Advantaged (<i>n</i> = 4)	Disadvantaged (<i>n</i> = 21)
Verbal IQ	88.00 (16.59)	94.85 (14.26)
Vocabulary	44.25 (14.10)	47.38 (10.61)
Similarities	38.75 (9.91)	45.47 (9.83)
Performance IQ	89.50 (12.39)	83.38 (11.53)
Block Design	43.50 (10.66)	42.33 (8.74)
Matrix Reasoning	43.00 (7.02)	35.99 (9.56)
Full Scale IQ	87.25(14.97)	88.33 (12.80)

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance.

Table 16
WASI Normative Data for 14-year-old First-language Afrikaans Coloured South African Adolescents with Advantaged and Disadvantaged Quality of Education

Outcome variable	Quality of education	
	Advantaged (<i>n</i> = 5)	Disadvantaged (<i>n</i> = 20)
Verbal IQ	76.00 (10.29)	76.00 (10.94)
Vocabulary	33.80 (8.67)	33.55 (9.11)
Similarities	33.00 (7.77)	32.55 (8.61)
Performance IQ	78.20 (14.02)	82.15 (11.16)
Block Design	41.00 (8.68)	42.60 (8.02)
Matrix Reasoning	30.00 (11.57)	33.90 (8.76)
Full Scale IQ	75.40 (11.58)	76.85 (8.65)

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance.

Table 17
WASI Normative Data for 15-year-old First-language English Coloured South African Adolescents with Advantaged and Disadvantaged Quality of Education

Outcome variable	Quality of education	
	Advantaged (<i>n</i> = 6)	Disadvantaged (<i>n</i> = 12)
Verbal IQ	101.16 (10.81)	92.91 (20.29)
Vocabulary	52.83 (7.49)	49.25 (10.49)
Similarities	49.16 (8.23)	45.91 (8.33)
Performance IQ	95.83 (14.41)	85.09 (15.08)
Block Design	49.16 (10.96)	41.00 (10.64)
Matrix Reasoning	45.33 (8.61)	36.83 (10.90)
Full Scale IQ	98.16 (9.10)	96.58 (24.38)

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance.

Table 18
WASI Normative Data for 15-year-old First-language Afrikaans Coloured South African Adolescents with Advantaged and Disadvantaged Quality of Education

Outcome variable	Quality of education	
	Advantaged (<i>n</i> = 4)	Disadvantaged (<i>n</i> = 27)
Verbal IQ	73.75 (9.21)	92.91 (20.29)
Vocabulary	32.25 (9.93)	49.25 (10.49)
Similarities	31.25 (6.84)	45.91 (8.33)
Performance IQ	71.25 (13.20)	85.09 (15.08)
Block Design	32.50 (8.81)	41.00 (10.64)
Matrix Reasoning	29.75 (9.63)	36.83 (10.90)
Full Scale IQ	70.75 (3.94)	96.58 (24.38)

Note. The index score data (Full Scale IQ, Verbal IQ, and Performance IQ) were age-adjusted standard scores, with a mean of 100 and standard deviation of 15; higher scores indicate better performance. The subtest score data (Vocabulary, Similarities, Block Design, Matrix Reasoning) were age-adjusted *T*-scores, with a mean of 50 and a standard deviation of 10; higher scores indicate better performance.

Normative Data: Case illustrations

I selected, pseudo-randomly, two cases from the sample to illustrate some of the principles and trends observed in the normative tables presented above. The purpose of these brief case studies, then, is to provide a practical demonstration of the differences in interpretation that might arise when using international versus appropriately-stratified local normative data.

The procedure used to interpret the data from each case was identical: Using the WASI test manual (Psychological Corporation, 1999), I converted raw scores on each of the subtests into age-adjusted standardized scores (*T*-scores), and from there derived the index scores (VIQ, PIQ, and FSIQ) in conventional fashion. Then, I used tables from the WASI manual, as well as score-conversion and category-label tables from Mitrushina et al. (2005, p. 21) and Strauss et al. (2006, p. 5; see Table 19), to give a qualitative label to each of the *T*-scores and index scores. Hence, these *T*-scores and index scores, and their associated labels, represent performance of the individual judged against the US normative sample.

To contrast this interpretation of performance against interpretation of performance based on local norms, I derived *z*-scores by using the following formula: test score (*T*-score

or index score, as calculated conventionally) minus the mean of the performance by the appropriate sub-sample from Tables 11-18, divided by the standard deviation of performance by that sub-sample. To complete the procedure, I labelled each of the z -scores following the guidelines presented in Table 19.

Table 19
Score Conversions and Qualitative Classifications

Percentile	T -score range	z -score range	Suggested clinical interpretation
≥ 98	≥ 70	> 1.96	Very superior
91 - 97	64 - 69	1.27 - 1.95	Superior
75 - 90	57 - 63	0.66 - 1.26	High average
25 - 74	44 - 56	-0.69 - 0.65	Average
9 - 24	37 - 43	-1.37 - (-0.70)	Low average
2 - 8	28 - 36	-1.96 - (-1.38)	Borderline
< 2	≤ 27	< -1.96	Impaired

Case A was a 14-year-old Afrikaans-speaking Coloured male who had completed 8 years of disadvantaged quality of education at the time of testing. Table 20 shows his WASI performance, and differences in interpretation of that performance when using US versus local norms. The z -scores based on local normative data suggest that this individual scored at least in the average range on all subtests and IQ scales, and that he performed particularly well on the Vocabulary and Matrix Reasoning subtests. Had his performance been judged against the US normative sample, however, it would have been classified as low average, at best, and borderline, at worst. This case study illustrates the potential for misdiagnosis of a (mild) cognitive deficit when using US normative data to judge performance of South African adolescents.

Table 20

Case A: Interpretation of WASI test performance using local and non-local norms

Outcome variable	<i>T</i> -score / Index score	Interpretation: US norms	<i>z</i> -score	Interpretation: SA norms
Verbal IQ	77	Borderline	0.09	Average
Vocabulary	40	Low average	0.70	High average
Similarities	29	Borderline	-0.41	Average
Performance IQ	85	Low average	0.26	Average
Block Design	38	Low average	-0.49	Average
Matrix Reasoning	42	Low average	0.92	High average
Full Scale IQ	79	Borderline	0.25	Average

Note. Interpretation of performance using SA norms presented in Table 16.

Case B was a 15-year-old English-speaking Coloured female who had completed 9 years of advantaged quality of education at the time of testing. Table 21 shows her WASI performance and differences in interpretation of that performance when using US versus local norms. The *z*-scores based on local normative data suggest that this individual scored in the superior range, at best, and in the average range, at worst, on all subtests and IQ scales. Had her performance been judged against the US normative sample, it would have been classified as high average, at best, and average, at worst.

This case study illustrates that, for individuals who are English-speaking and who have been afforded an advantaged quality of education, there is not much difference between the interpretations provided by the non-local and local norms. Although the US norms still tend to underestimate the performance of such individuals, there is little here to suggest the possibility of a misdiagnosed cognitive deficit. Hence, either the non-local or local norms could be suitable when interpreting the performance of individuals matching the sociodemographic profile of case B.

Table 21

Case B: Interpretation of WASI test performance using local and non-local norms

Outcome variable	T-score / Index score	Interpretation: US norms	z-score	Interpretation: SA norms
Verbal IQ	115	High Average	1.28	Superior
Vocabulary	59	High Average	0.82	High Average
Similarities	60	High Average	1.32	Superior
Performance IQ	106	Average	0.71	High Average
Block Design	61	High Average	1.08	High Average
Matrix Reasoning	47	Average	0.19	Average
Full Scale IQ	112	High Average	1.52	Superior

Note. Interpretation of performance using SA norms presented in Table 17.

In summary, Case A demonstrates the severity of cultural bias against Afrikaans - speaking, Coloured adolescents with disadvantaged quality of education. Even though the interpretation of Case B's performance is similar when using local and non-local norms, it is still apparent that the local norms would be more appropriate. Because these latter norms are derived from a sample that resembles the participants' sociodemographic profile, it provides a more accurate reflection of the adolescents' cognitive performance. Taken together, these two cases demonstrate that the local norms present a more meaningful characterization of performance by South African Coloured adolescents on the WASI than the non-local norms. Hence, the preliminary norms presented here are clearly more suitable for use in South African clinical and research settings.

Discussion

The current study had two primary objectives. First, I set out to describe the development of a culturally and linguistically adapted version of the WASI suitable for use in English and Afrikaans first-language speakers. Second, I set out to establish, for that adapted instrument and for English and Afrikaans first-language speakers aged 12 to 15 years and resident in the Western Cape, a preliminary set of locally appropriate norms, stratified by age, language, and quality of education.

South Africa is burdened by a tremendous lack of normative data for commonly-used psychological tests (Claassen, 1998; Nell, 2000). The paucity of appropriately stratified adolescent norms for such tests in this country is even more pronounced. Hence, this study attempted to serve as an initial step toward creating (a) normative data useful for child clinical psychologists, educational psychologists, paediatric neuropsychologists, and others in the profession who might assess adolescent intellectual performance, and (b) a template for one way in which normative studies might be conducted in South Africa.

I pursued the two broad main objectives of the study by investigating four more specific aims. These were to:

5. Conduct a cross-lingual comparison of WASI performance by examining the scores of English-speaking Coloured adolescents relative to their Afrikaans-speaking counterparts.
6. Conduct a cross-cultural comparison of WASI performance by examining the scores of this sample of South African adolescents relative to the published norms for age-matched American adolescents.
7. Explore the effects of socioeconomic status, language, sex, quality of education, level of education, and age on the WASI performance of the current sample.
8. Present normative data, appropriately stratified by relevant demographic variables, for the population from which the current sample was drawn.

This section of the thesis will be organized as follows: First, I will review the results of the data gathered via the first three aims outlined above, and I will place the current data into the context established by previous studies in the field. Second, I will discuss the fourth aim under the heading *Real world significance and practical implications of these preliminary normative data*. To conclude, I will examine the limitations of the current study and present recommendations for future research.

Aim 1: Cross-lingual comparisons

Afrikaans-speaking adolescents performed significantly more poorly than their English-speaking peers on all WASI subtests and index scores. The greatest mean difference between the two language groups was on the Verbal IQ scale. On average, English-speaking adolescents scored in the average range and Afrikaans-speaking adolescents in the borderline range in comparison to their age-matched American counterparts in the original WASI normative sample.

The differences in scores amongst the language groups may be a result of the confounded fact that there was an imbalance in the final sample's distribution of SES. Most Afrikaans-speaking adolescents were from lower-SES backgrounds, whereas most English-speaking participants were from higher-SES backgrounds. The current results, then, are consistent with a growing body of literature suggesting that individual differences on intelligence tests are related to impoverished circumstances experienced during childhood (Bradley & Corwyn, 2002; Duncan, Brooks-Gunn, & Klebanov, 1994); that is, children from high-SES backgrounds tend to outperform their low-SES counterparts. Recent literature has reported a strong association between neurocognitive development and SES. For example, Farah and colleagues (2006) administered several neuropsychological tests to girls 11 years of age from either low-SES ($n = 17$) or middle-SES ($n = 17$) backgrounds. The latter outperformed the former, particularly on tests of language, memory, and executive function. Similarly, Mezzacappa (2004) showed that low-SES children ($n = 17$; ages 10-13) demonstrated impaired speed and accuracy on the Attentional Network Test (ANT; Rueda et al., 2005) relative to their age-matched high-SES counterparts ($n = 17$). With specific regard to tests of intelligence, Kishiyama and colleagues (2008) found that low-SES children ($n = 13$; ages 8-11) performed more poorly on the Wechsler Intelligence Scale for Children – Third Edition (WISC-III; Wechsler, 1994) than their age-matched high-SES counterparts ($n = 13$; ages 7-12).

Previous research has shown that high scores on the Wechsler Verbal IQ index are connected to language proficiency, which stems from reading ability (Manly et al, 2002; Patel, 2009). As noted earlier, good reading ability is generally associated with higher SES: Parents from such backgrounds have the finances to provide the necessary resources for their children to excel at home and at school (Bradley & Corwyn, 2002). Bowey (1995) showed that differences in phonological sensitivity and reading level were associated with SES (low-SES children performed more poorly than high-SES children). She suggested that the differences in scores could have resulted from the fact that low-SES children were not exposed to proper sound patterns and phonological structures of spoken language in their homes. Burks and Bruce (1955) suggested that individuals with poor reading skills approach verbal subtests such as Similarities in a concrete way, and therefore perform poorly on such abstract analogical reasoning tasks. Similarly, Tsethlikai (2011), who investigated the cognitive skills and WASI VIQ scores of Tohono O'odham children ($N = 99$), found that those from higher SES backgrounds performed significantly better than their peers from lower SES backgrounds.

In summary, the current results are consistent with those presented in these previous studies and reiterate that, in the South African context, where economic disparities are vast, SES has to be controlled for in research studies and considered in the clinical interpretation of intelligence test performance.

With specific regard to the Afrikaans-speaking participants in this study, there are a few important points to note concerning administration quirks and the lessons test administrators learned during the study. As noted earlier, more than half the population in the Western Cape has Afrikaans as a home language. This does not mean, however, that the form of language all of those individuals speak is identical. In South Africa, migration and urbanization have fuelled the melding of language and cultures; Afrikaans, and Afrikaans-speakers, have not been immune to that process.

Afrikaans has experienced many lexical changes since it gained status as a separate official language in 1925. In the Western Cape, in particular, language mixing and code switching amongst Coloured people has led to the development of a variant that combines English and Afrikaans in a unique way. This dialect, variously referred to as 'Kombuis' Afrikaans or 'Kaapse' Afrikaans, is very different from what is considered 'standard' Afrikaans, which is spoken primarily by White Afrikaans individuals in the northern provinces and in certain regions of other provinces (Southwood & Van Dulm, 2009; Van Dulm & Southwood, 2008). One example of the difference between Kombuis Afrikaans and

standard Afrikaans is the use of the word ‘vermaak’, which was included in the Vocabulary subtest word list. The standard definition is ‘to entertain’, but amongst Coloured people in the Western Cape it is used to describe withholding an emotion or object in order to belittle someone else or to demonstrate one’s superiority; it also describes someone being boastful. This is precisely the definition that was presented by most of the Afrikaans-speaking participants in the study. Therefore, it cannot be ruled out that some (or even most) of the Afrikaans-speaking participants in this study may speak ‘Kombuis Afrikaans’ and not standard Afrikaans.

Hybrid languages like ‘Kombuis Afrikaans’ are developing rapidly all over the world (Gutierrez et al., 2009; Munro et al., 2004). For example, “Spanglish” is a combination of English and Spanish used frequently in parts of the United States, and “Hmonglish” is a combination of English and Hmong (a language used in the mountainous regions of Thailand, China, and Vietnam). People who speak hybrid languages may not develop an equal proficiency in both original languages (Schuler, 2010; Strutt, 2010). For instance, Robert (1939) describes problems associated with speaking hybrid languages: Individuals who speak such languages might abandon general linguistic rules applied during conversation (e.g., they might intermingle vocabularies, misinterpret idioms, and use lexical constructions inappropriately). These assertions about the negative impact of speaking a hybrid language on primary language performance may have been confirmed in the present study: Afrikaans participants performed the worst on the Vocabulary subtests, regardless of quality of education (Ayeomoni, 2006; Price, 2010).

Furthermore, the differences in WASI performance between the English- and Afrikaans-speaking participants may be attributed to the language of test administration. In the current study, all participants were tested in the language with which they were most comfortable, which was confirmed by the MAS as their home language. However, previous studies demonstrate that perhaps the best language of test administration, next to home language, may be the medium of educational instruction (Bethlehem, Picciotto, & Watt, 2003; Carstairs et al., 2006; Shuttleworth-Edwards et al., 2004). One way to improve proficiency in any language, of course, is to have it as the medium of academic instruction. Thus, one other lesson learnt in the current study is that in intelligence tests, matching the language of test administration to the language of academic instruction, regardless of home language, may be particularly important: Children may learn and use various terms at school that are not directly translatable into their home language, or that are required in the academic context but not at home. In other words, language use is context-dependent for bilingual or

multilingual individuals, and it is likely that the formal language learned and used in academic contexts will be much more beneficial to intelligence test performance than the relatively informal language used in social contexts and at home.

In a slightly different vein, a reasonably large body of literature suggests that congruency of home language and medium of instruction enhances students' academic performance (see, e.g., Brock-Utne, 2007; Howie, Scherman, & Venter, 2008; Mchazime, 2001; Snayers & Du Plessis, 2006; Webb, 2006). To illustrate this point, Esterhuysen, Beukes, and Louwrens (2007) conducted a study with a South African sample of Grade 2 learners ($N = 138$), aged 7-8 years. They found that learners instructed in a mother tongue that was the same as their medium of instruction significantly outperformed those instructed in their second language on a measure of intelligence and academic performance. Based on these data, the authors suggested that medium of instruction is crucial in the development of general mental ability because language and intelligence are interdependent cognitive domains. Therefore, it seems logical that if adolescents are to perform at their best on intelligence tests then they should be tested in the language in which they are receiving their formal education.

Aim 2: Cross-cultural comparisons

I conducted a series of one-sample *t*-tests to compare the performance of the entire South African sample, and various sub-samples, to the American standardization sample. Taken as a whole, the South African sample performed significantly more poorly than their American counterparts. There were significant differences in favour of the latter on all WASI subtests and indices, and, on average, the South African adolescents' scores were in the low average range relative to the American norms.

On average, participants in the current sample scored the worst on the Similarities and Matrix Reasoning subtests, and best on the Block Design subtest. These results are consistent with previous cross-cultural literature (Anderson, 2001; Foxcroft & Aston, 2006; Skuy et al., 2001) showing that South Africans generally perform worse on intelligence tests in comparison to American populations.

Of interest here is that all of the South African adolescents in the study could be characterized as at least bilingual as they attended dual medium (English and Afrikaans) schools, which are governed by the language in education policy in terms of section 3(4)(m) of the National Education Policy Act, 1996 (Act 27 of 1996) (WCED, 2012). In contrast, 82% of Americans speak English as their home language and are monolingual; only 12% of

the American population can speak Spanish, which is the second most common language spoken in the United States (Shin & Kominski, 2010). If these statistics are anything to go by, one can safely assume that many of the participants in the American standardization sample were monolingual English first-language speakers.

Numerous studies have now established that multilingualism and bilingualism can complicate the development of reading and writing skills. Children who are bilingual or multilingual may experience difficulties with spelling, reading accuracy, phonological processing, and word decoding in both languages (Joshi, 2010; Kaani, 2010; Zainab, Joshi, Carreker, & Smith, 2010). With specific regard to tests of vocabulary, monolinguals tend to outperform bilinguals (Gollan et al, 2007; Portocarrero, Burright, & Donovanick, 2007). For example, Bialystok and Feng (2009) found that bilinguals ($n = 55$) achieved lower scores on the Peabody Picture Vocabulary Test – Third Edition (PPVT-III; Dunn & Dunn, 1997) than their monolingual counterparts ($n = 54$). This vocabulary test requires participants to recall words when presented with a picture, which is a very similar format to the first four items of the WASI Vocabulary subtest.

The vocabulary storage and recall processes of bilinguals involves slightly different cognitive processes to that of monolinguals. Bialystok and Feng (2009) explain that if bilinguals hope to perform at the same level on vocabulary tests as monolinguals they have to exercise greater executive control. Even though bilingual individuals store the vocabulary of both languages in memory, their aim during ordinary conversation and communication is to access and speak only one language at a time. However, this process is complicated as the individual has to select words from the target language and ignore words from the non-target language. A small body of research indicates that in the bilingual brain words from the different languages ‘compete’ with each other (Rodriguez-Fornells et al., 2002; von Studnitz & Greene, 2002). Such interference between languages is referred to as *language conflict*. Heuven and colleagues (2008) presented behavioural and functional magnetic resonance imaging data showing that when bilinguals select words from the target language, language conflict occurs. These findings suggest that the bilingual brain cannot actually avoid the conflict, perhaps because all words are stored in a common lexicon and therefore blocking of the non-target language is not possible (Dijkstra et al., 1998; van Heuven et al, 1998; von Studnitz & Green, 2002).

In addition, given that bilinguals know two languages, one might reasonably expect that they will know two definitions for many concepts and that they will have a larger vocabulary size than monolinguals. However, if one regards each language separately,

bilinguals have a smaller vocabulary size relative to monolinguals in the language common to the two groups (Portocarrero, Burright, & Donovan, 2007). Furthermore, bilinguals tend to recognise fewer difficult vocabulary words than monolinguals, and they are reported to experience more retrieval failures (i.e., tip-of-the-tongue experiences) than monolinguals (Gollan & Brown, 2006). Bilinguals also take a longer time to name pictures compared to monolinguals (Gollan et al., 2008). Taken together, these data demonstrate a direct relationship between degree of bilingualism and cognitive disadvantage experienced on intelligence and other neuropsychological tests (Gollan et al., 2007). The data presented in this study (specifically, in the analyses associated with Aim 2) are consistent with previous findings regarding the negative effects that bilingual and multilingualism have on cognitive and linguistic abilities, as illustrated by performance on intelligence and other neuropsychological tests.

To better understand the initial set of results presented in the analyses associated with Aim 2, I stratified the current sample by home language and by quality of education, and then compared the performance of each sub-sample to the American standardization sample. Adolescents with disadvantaged quality of education tended to perform more poorly than those with advantaged quality of education across all WASI subtests and index scores. This trend held regardless of home language. Furthermore, a major point to emerge from the current data is that English-speaking adolescents with advantaged quality of education did not perform significantly differently from the US standardization sample on the Vocabulary subtest (and on Verbal IQ scale) and on the Block Design subtest. The Afrikaans-speaking adolescents, even those with advantaged quality of education, performed more poorly on all indices than their English-speaking counterparts, and the analyses here showed that their performance was significantly worse than that of the US standardization sample.

The results presented in the analyses associated with Aim 2 demonstrate that the general trend of association between quality of education and performance on the WASI was consistent with a priori expectations based on previous research: Learners who had experienced an advantaged quality of education would perform better than those learners who had experienced a disadvantaged quality of education (Nell, 1999b; Shuttleworth-Edwards, Kemp et al., 2004; van der berg, 2009).

Regarding performance on the non-verbal subtests, disadvantaged quality of education was associated with lower scores, particularly on the Matrix Reasoning subtest. Interestingly, Matrix Reasoning-type tests like the Raven's Matrices test are frequently held as being free from cultural bias (Cockcroft & Israel, 2011; Colom & Garcia-Lopez, 2002;

Shuttleworth-Edwards et al., 2004; Viljoen et al., 1992). In the current study, however, all language- and quality of education-based groups performed significantly more poorly than the US standardization sample on the Matrix Reasoning subtest. These data suggest that this subtest is not as culture fair as some previous researchers have claimed.

Our data are, however, consistent with findings from researchers who state that even though Matrix Reasoning is a non-verbal test, good performance still depends on language proficiency and on skills taught at school. Dugbartey and colleagues (1999) compared the performance of English-speaking American participants ($n = 41$) to non-English speaking participants ($n = 14$) on the WAIS-III Matrix Reasoning subtest and other cognitive tests. Their results revealed a significant relationship between, on the one hand, performance on tests of verbal fluency and of verbal abstract reasoning and, on the other hand, performance on the Matrix Reasoning subtest. Based on these data, they suggested that even though Matrix Reasoning is a non-verbal test, there is a strong element of verbal mediation in performance on it.

In a similar study, Baldo and colleagues (2010) tested a group of left-hemisphere stroke patients ($N = 107$) on the Ravens Coloured Progressive Matrices (RCPM; Raven, Court, & Raven, 1990) test. The RCPM consists of 36 items, 17 of which the researchers identified as requiring visual pattern matching and 10 which required relational reasoning. Relational reasoning refers to the ability to draw analogies or similarities between concepts or objects (Hummel & Holyoak, 2005). As the researchers predicted, the aphasic patients were particularly impaired on items that required such reasoning. Furthermore, the authors used voxel-based lesion system mapping (VLSM) to determine which of the damaged areas in the brain was most closely related to RCPM performance. They showed that problems on the relational reasoning items were associated with damage to brain regions essential for core language processing. Baldo and colleagues (2010) concluded, on that basis, that language plays an important role in higher-level reasoning required on some RCPM items.

The current results are also consistent with those presented by Knoetze et al. (2005), who observed that Matrix Reasoning-type tests, which require analogical reasoning, may be unfamiliar to African children. Similarly, Jinabhai et al. (2004) showed that Zulu-speaking children performed poorly in comparison to their American counterparts on the RCPM. These latter authors concluded their paper by stating that the RCPM is not a culture-fair test, and recommending that more appropriate tests, or at least appropriately stratified normative data, need to be developed.

Relatedly, the currently-observed differences in scores on the non-verbal tests between advantaged and disadvantaged quality of education groups are consistent with prior research findings (Grieve & Viljoen, 2000; Jinabhai et al., 2004; Knoetze et al., 2005). Researchers have offered various explanations to account for the effects quality of education might have on non-verbal tests. For instance, Grieve and Viljoen (2010) suggested that education systems that emphasize rote learning as opposed to encouraging the development of critical and reasoning abilities may damage learners' performance on non-verbal tests. Therefore, the reasoning abilities and concepts used in non-verbal tests may in fact be more culturally loaded than those required by verbal tests (Jinabhai et al., 2004). Grieve and Viljoen (2010) also found that there was a significant relationship between disadvantaged quality of education and non-verbal problem solving skills, such as those required to complete the Austin Maze test (Walsh, 1985). The results in the current study confirm that disadvantaged quality of education may not equip individuals to develop perceptual organizational skills, and may not teach them to balance these skills with speed and accuracy.

Taken together, this set of results illustrates that for English- and Afrikaans-speaking Coloured adolescents in the Western Cape, WASI Performance IQ is as vulnerable as Verbal IQ to the effects of language proficiency and quality of education (Shuttleworth-Edward et al., 2004).

Regarding performance on the Vocabulary subtest, two trends were prominent: First, Afrikaans-speaking adolescents tended to score particularly poorly on this subtest, regardless of quality of education. Second, when Afrikaans and poor quality of education were paired, there was a significant drop in scores on this subtest. As noted earlier, these results are consistent with those presented in previous studies showing that language development and reading skills are vulnerable to the effects of disadvantaged quality of education and low SES (Duncan & Magnuson, 2003; Feagans, 1982). Furthermore, in individuals with disadvantaged quality of education, Verbal IQ scores were consistently low, regardless of home language. The two subtests that comprise the WASI Verbal IQ index (Similarities and Vocabulary) assess crystallized intelligence, long-term memory, and verbal concept formation. Performance on these two subtests is therefore strongly linked to skills taught at school. The Vocabulary subtest relies on factual information and how well learners remember what they have been taught and what they have read. On the other hand, the Similarities subtest requires application of problem-solving skills. Hence, these results confirm that disadvantaged quality of education may be associated with relatively poor performance on tests of crystallized

intelligence, long-term memory, verbal concept formation, and problem-solving skills (Gaylard, 2005; Kaufman, 1994).

Finally, another factor that may have had an influence on WASI test performance by the current sample is ‘test-wiseness’ (Shuttleworth-Edwards et al., 2004). This term refers to the kind of skill that develops when an individual is tested repeatedly (e.g., writes exams often, or goes to a number of interviews), and thereby becomes familiar with the demands of the testing situation. That individual learns to perform with both precision and speed in that situation, and also becomes comfortable in the role of being an examinee. Individuals from disadvantaged quality of education backgrounds may not have as many testing opportunities as their advantaged counterparts, and therefore may not acquire the familiarity and knowledge that is necessary to perform optimally in such situations. Hence, these individuals can be considered less ‘test-wise’ (Nell, 1999b). Clearly, then, the current results emphasize the profound influence of quality of education on intelligence test performance, and the importance of controlling for these effects when analysing and interpreting test performance.

Aim 3: Demographic influences on WASI test performance

Using regression analyses, I investigated the predictive value of a set of demographic variables (sex, language, SES, quality of education, level of education, and age) on WASI test performance (i.e., on the VIQ, PIQ, and FSIQ measures). I chose that particular set of demographic variables because previous research has demonstrated that each individually affects performance on intelligence tests (see, e.g.; Knoetze, Bass, & Steele, 2005; Rosselli et al., 2001; Shuttleworth-Edwards et al., 2004). The set of hierarchical regressions indicated that, for VIQ, home language and SES/quality of education were significant predictors of test performance. However, for PIQ and FSIQ, only home language was a significant predictor. Overall, then, home language explained more of the variance in WASI performance than any other demographic variable; the combination of SES and quality of education was a poor second in this regard.

More specifically, and consistent with results presented earlier, the pattern of data showed that Afrikaans-speaking learners performed the worst on all indices compared to their English-speaking peers. As also mentioned previously, most of the Afrikaans-speaking adolescents were from low-SES backgrounds, previous research has established the major effects that SES has on intelligence test performance. (Duncan & Magnuson, 2003; Ferrett, 2011; Gaylard, 2005; Nell, 1999b).

The collective impact of educational and economic disadvantage has been shown in previously published studies to impact negatively on cognitive development in general (Bergan, 2008; Lee et al., 2003). Taking into consideration the financial challenges that parents of children from lower SES backgrounds might face, it is possible that providing children with the necessary resources for their education may not always be their first priority; ensuring that those children have food and shelter might require more immediate attention. Molteno (1985) showed, in a South African study, that children experiencing economic and social disadvantages demonstrated developmental lags at pre-primary school level. Consequently, the results of the current study and other similar studies bring awareness to the pressing issue of economic deprivation and its consequences.

Clearly, children from low-SES communities require extensive assistance; they not only need to have their basic needs provided for, but they might also require interventions to help remedy the neurocognitive deficits associated with SES deprivation that they might experience. However, attempting to assist children from low-SES communities is a challenging and daunting task as it requires generous funding and many resources. Fundamentally, it seems unlikely that the goal of eradicating poverty will be reached soon. Thus, a more direct and pragmatic intervention might be to improve children's quality of education. van der Berg (2009) reported on the results of South African learners who had participated in internationally benchmarked tests, measuring their performance in mathematics (TIMM; Reddy, 2005) and their reading ability (PIRPLS; Mullis et al., 2007), and examining their quality of education. Results indicated that learners from impoverished communities performed more poorly than those from wealthier communities. These data suggest that the quality of education the learners received corresponded to the SES of the communities in which they resided. Thus, if improved quality of education can be offered to children from impoverished communities, their academic and cognitive performance may be at a level similar to their peers from high-SES communities.

Intervention has to start early and must be able to identify learners who experience cognitive impairment or deficits to help them develop various coping skills and to provide them with resources they may be lacking due to their relative economic deprivation. An intervention that has previously had success focused on executive function; it consisted of teaching low-SES learners to think out loud, to play pretend planning games, and to engage in tasks that involved executive control. Those who participated in the intervention showed significant improvement on tasks of executive function (Diamond, Barnett, Thomas, & Munro, 2007). Unfortunately, such an intervention has not yet been evaluated properly in

South Africa, and so there are no data on whether it might work, and which factors might impact on the likelihood of its success, in this country.

Aim 4: Real-world significance and practical implications of the preliminary normative data

The final objective of the study was to present preliminary normative data, stratified by age, language, and quality of education, for English- and Afrikaans-speaking 12-15-year-old Coloured adolescents in the Western Cape. As noted earlier, these normative data may be relevant and useful to a large array of clinicians and other professionals. For instance, it is common practice for children to be referred to educational psychologists for developmental and educational concerns. Hence, those psychologists may use these norms to help adolescents make decisions regarding subject and career choices, or to inform decisions about which tertiary institutions to target. In addition, clinical or counselling psychologists may find these norms useful when contextualizing and characterizing their clients' cognitive functioning meaningfully, thus helping them make diagnostic inferences accurately (Knoetze, Bass, & Steel, 2005).

Cognitive tests are used in a variety of different settings and for all age groups. Cognitive assessments are particularly useful in adolescence because it is, physiologically and psychologically, a developmentally tumultuous period filled with emotional and biological changes. Therefore, such locally-appropriate norms could also help clinicians identify adolescents with learning and other educational or emotional problems. Adolescence can also be characterized as a high-risk behavioural period because many teenagers use this time to explore their personal freedom by breaking social rules and norms. Others go so far as to experiment with drugs and alcohol (Ernst & Fudge, 2009; Ferrett, 2011; Wahlstrom, White, & Luciana, 2010). Several studies have demonstrated that chronic use of illicit drugs may be associated with (at least temporary) neuropsychological impairment (e.g., Ferrett et al., 2010; Bramley-Harker et al., 2000; Parry, 2004). For instance, a number of studies have shown that marijuana, which is which is a very popular drug among young people in the Western Cape (Flisher et al., 2003; Pluddemann et al., 2008), interferes with short-term memory, learning, and psychomotor skills (Brook et al., 2006; Flisher et al., 2003; Palen et al., 2006). Furthermore, the rate of methamphetamine use has increased radically among young people in Cape Town over the past decade. Abuse of this drug is particularly high among young Coloured people (Flisher et al., 2006; Simbayi et al., 2006; Wechsberg et al., 2010). Research examining the consequences of methamphetamine abuse has suggested that

it is associated with deficits on tests of visuomotor ability, planning, spatial working memory, attention, and verbal memory (Rogers & Robbins, 2001; Wechsberg et al., 2010).

Young people who abuse substances are at risk for psychosocial difficulties, including academic problems, strained relationships with family members, and mental or physical health-related problems (Dube et al., 2003; Wechsberg et al., 2008, 2010). In particular, psychiatric problems such as depression and anxiety, as well as developmental delays, can be related directly to substance abuse during adolescence (Altman et al., 1996). In addition, teenagers who abuse alcohol and drugs are at higher risk of attempting suicide and of getting involved in criminal activities, and are at risk for teenage pregnancies and contracting sexually transmitted diseases (Lucas et al., 2002; Thorpe et al., 2004).

Furthermore, teenagers who participate in contact sports such as rugby may also be at risk for head injuries. These injuries may result in impaired concentration, information processing speed, learning, and memory deficits (Shuttleworth-Edwards, Smith, & Radloff, 2008; Shuttleworth-Edwards & Whitefield, 2007).

Considering these issues adolescents may experience, clinicians may be required to make decisions regarding emotional and cognitive state. However, making such decisions accurately can become a problem if the clinician has to do so without adequate information regarding normal cognitive functioning for a particular population group. To diagnose the extent of the abovementioned cognitive problems effectively, clinicians need to be equipped with the appropriate tools, which include locally-appropriate and properly stratified normative data. Appropriately-stratified norms will help practitioners compare adolescents' individual test scores to those of their peers with similar demographic and educational backgrounds. Perhaps more importantly, the availability of such norms will ensure that practitioners are not obliged to use anecdotal knowledge and to follow misguided assumptions about how an individual's performance might compare to that of his/her peers.

The association between race, language, and quality of education. The normative data in the current study have been stratified language, and quality of education because previous studies have shown that stratification of norms according to age alone, level of education alone, or race alone is problematic. It is important for clinicians to understand and control for the relationship between race, language, and quality of education (Nell, 1999b). Several studies have demonstrated that between-race differences in scores on intelligence tests are influenced by quality of education (Cosentino, Manly, & Mungas, 2008; Manly, Byrd, Touradji, & Stern, 2004). Education provides us with essential knowledge, strategies, and skills to do well on cognitive tests (Grieve, 2005). In a country like South Africa, where

quality of education was for many years defined along race-based lines, we can anticipate that, even almost 20 years after the new dispensation, Black people will still demonstrate poorer performance on cognitive tests due to the lingering effects of apartheid-era disadvantaged quality of education. Although the new government has made many strides toward integration and equality, schools in underprivileged communities are still delivering a relatively poor quality of education to their pupils (Hoogeveen & Ozler, 2005)

Many South African studies have been conducted to examine the link between race, language, and quality of education (Cave & Grieve, 2010; Claasen et al., 2001; Jinabhai et al., 2004; Grieve & van Eeden, 2010). Generally, the works of Shuttleworth-Edwards and colleagues have found trends of lower scores on intelligence tests by individuals with disadvantaged education within different racial and language groups (Shuttleworth-Edwards, Donnelly, Reid, & Radloff, 2004; Shuttleworth-Edwards, Kemp et al., 2004; Shuttleworth-Jordan, 1996). More specifically, their data have demonstrated that White English-speaking individuals, as well as Black English-speaking individuals with advantaged quality of education, perform similarly to their American counterparts on the WAIS-III. However, Black African language-speakers with disadvantaged quality of education perform poorly in comparison to both groups mentioned above, as well as in comparison to the American standardization sample. Skuy and colleagues (2001) state that the group differences on tests shown by Black and White South Africans is at least partially a reflection of the socioeconomic deprivation and lack of educational opportunities experienced by Black people.

Therefore, in this context, to interpret race as a proxy for the many sociocultural and political experiences of Black and White South Africans is legitimate, as not race per se but the factors that it represents may account for the between-group differences seen on intelligence tests. Researchers who argue against race-based norms believe that it reinforces the idea that Black people are intellectually inferior to White people (Gasquoine, 2009). The historical racial and cultural context of South Africa, however, makes it important to acknowledge and understand race differences on intelligence tests.

A final note here is that the normative data presented in this study should never be interpreted in isolation (Anderson, 2001). A qualitative interpretation of the client's performance is essential when evaluating and interpreting test scores. Meaningful assessments are made with information collected from a variety of sources. This information may include the clients' medical, psychosocial, and educational history, and knowledge

regarding their emotional and personality characteristics (Brooke & Iverson, 2010; Brooks et al., 2009; Mitrushina et al., 2005).

Limitations and Recommendations for Future Research

There were a number of limitations of the current study. Below, I discuss the most important of those, and I also provide some brief discussion as to how they can be addressed by future research in this field.

One limitation concerns the restricted sample, which consisted only of Coloured adolescents who speak English and Afrikaans and who reside in the Western Cape. The sample was also restricted to adolescents attending school. Hence, the sample did not include the 36% of Coloured children not currently enrolled at schools (Statistics South Africa, 2010). Nevertheless, the procedures and methods reported in this study serve as a preliminary template upon which to build and expand research in this area. It would be advantageous for future research to extend the study and expand on the age bracket and geographic location, and to include languages such as isiXhosa, which is the second most commonly spoken language (behind Afrikaans) in the Western Cape. It would also be interesting to investigate how adolescents who have dropped out of school perform on the WASI in comparison to those still in school. This will allow researchers to examine to what extent general school exposure contributes to the differences in WASI scores.

The second limitation concerns the relatively small sample size. The data presented in the study are often stratified by various demographic variables, and because of this the sample sizes within each cell ended up being quite small. For this reason, the data should be interpreted with caution. It would be useful for future research to expand on the sample size, in an attempt to (at least) have equal and large numbers within each cell for more effective comparisons.

The third limitation pertains to the test adaptation procedures. This study is different from most normative studies conducted in South Africa in that the test material was rigorously evaluated and scrutinized by various professionals to ensure that it was suitable for use with the current sample. However, in spite of the efforts to ensure cultural and linguistic fairness and equivalence across language groups, it cannot be ruled out that there may have been some language bias (specifically, against the Afrikaans-speaking individuals). It is important that future studies assess the items on the Similarities and Vocabulary subtests for potential bias in order to understand whether, and to what degree, test bias may have contributed to the differences in scores between the language groups. It would also be useful

for future research to investigate the influence of factors like code switching or code mixing, language proficiency, reading ability, and bi- and multi-lingualism.

A fourth limitation pertains to language proficiency. Because this study showed that home language had a significant impact on intelligence test performance, it is important for future studies to have a stricter way of evaluating each individual's language proficiency before commencing assessment. The MAS scale was limited to asking participants about their language preference in different contexts; it did not, however, assess language or reading ability. Hence, participants who were, for example, classified as Afrikaans-speaking were not necessarily much more proficient in Afrikaans than in English. Future research should consider using the learners' school results to obtain estimates of language proficiency or of reading ability, and should use those results to decide on the language of test administration.

Lastly, because quality of education and SES were not the main focus areas of this study, the ways in which they were operationalized could have influenced the results of the study negatively. Because SES and quality of education had such a profound influence on the test results it is important to investigate precisely what factors determine the impact of these variables. Thus, with regard to SES it would be useful for future studies to consider conducting brief interviews with parents to try and understand their social circumstances and how it could possibly affect performance on cognitive tests. With regard to quality of education, instead of measuring it as a dichotomous variable it may be more useful as a continuous variable, or as a categorical variable with more than two sub-groups. Defining it this way may allow for more specific questions researchers may have about the influence of quality of education on cognitive test performance. For example, this approach may answer questions such as (a) what are the effects of moving from disadvantaged quality of education to advantaged education systems?, or (b) does improved quality of education affect overall cognitive functioning or is its influence restricted to certain cognitive domains?

Summary and Conclusion

The WASI is a well-known standardized intelligence test used in both research and clinical settings. In South Africa, researchers and clinicians are hampered by a shortage of locally available normative data and of culturally sensitive tests. This study provides templates and guidelines on cross-cultural test adaptation and appropriately stratified normative data. More specifically, this study has demonstrated that certain socio-demographic variables (i.e., language, socioeconomic status, and quality of education) have a significant effect on intelligence test performance. These results should make teachers,

psychologists, and paediatricians more aware of the cross-cultural issues that exist when working with adolescents, and should offer some insight into intervention and treatment programmes. Hence, the study makes a valuable contribution to solving the problem of the shortage of normative data and culturally sensitive tests by describing a culturally and linguistically adapted version of the WASI, and providing preliminary normative data for that instrument.

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APPENDIX A

**PAR – Parent Self-Report
Demographic Questionnaire and Asset Index**

PARENT INFORMATION:

Full name:			
Relationship to child:	1. Mother 2. Father 3. Grandmother 4. Grandfather 5. Guardian 6. Other (specify):		
Contact numbers:	Home:	Work:	Cel:
Marital status:	1. married 2. co-habiting 3. widowed 4. divorced & living apart 5. divorced & living together 6. separated 7. remarried 8. other (specify):		
Combined household income (before tax deductions) PER YEAR	1. Less than R10 000 2. R10 000 – 20 000 3. R20 000 – 40 000 4. R40 000 – 60 000 5. R60 000 – R100 000 6. More than R100 000		

PARENTAL EMPLOYMENT:

What do you do for a living? (e.g. teacher, professor, unemployed, student)	
What does your child's other parent / caregiver do for a living?	

DEVELOPMENTAL MILESTONES (CHILD)

How old was your child when they did the following tasks for the first time?		
sitting	5 – 8 months	older than 9 months
crawling	7 – 9 months	older than 10 months
walking	11 – 15 months	older than 16 months
first words spoken	10 – 15 months	older than 16 months
speaking in short sentences	18 – 24 months	older than 2 years
speaking in full sentences	3 – 4 years	older than 4 years

PARENTAL EDUCATION:

Highest level of education reached?	Mother	Father	Guardian
Mark one response for each person as follows:			
1. 0 years (No Grades / Standards) = No formal education (never went to school)	1.	1.	1.
2. 1-6 years (Grades 1-6 / Sub A-Std 4) = Less than primary education (didn't complete primary school)	2.	2.	2.
3. 7 years (Grade 7 / Std 5) = Primary education (completed primary school)	3.	3.	3.

4. 8-11 years (Grades 8-11 / Stds 6-9) = Some secondary education (didn't complete high school)	4.	4.	4.
5. 12 years (Grade 12 / Std 10) = Secondary education (completed senior school)	5.	5.	5.
6. 13+ years = Tertiary education (completed university / technikon / college)	6.	6.	6.
7. Don't know	7.	7.	7.

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DEM – Child English Demographic Questionnaire
Participant self-report (younger participants assisted by clinician and/or parent)

GENERAL INFORMATION

Full name:				
How would you describe your race?	1. Black	2. Coloured	3. White	
	4. Asian answer	5. Other(specify):		6. Refuse to
Contact numbers:	Person	Home	Work	Cel
	Self			
	Mother			
	Father			
	(Guardian)			
Residential Address:				

EDUCATION

Name and area of Current School:	School: Suburb / area:
If you are attending Secondary school, what is the name and area of the Primary School you attended in Grade 7?	School: Suburb / area:

RESIDENTIAL INFORMATION

How long have you lived at your current address?				
How would you describe your dwelling?	1. Shack dwelling	2. Wendy house or backyard		
	3. Tent or traditional dwelling	4. Flat / apartment		
Which of these items do you have in your home? (mark as many as necessary)	5. Town house / semi-detached house			
	6. Freestanding brick house 7. Other (specify):			
How many people sleep in the same room with you at night when you are at home?	A. Tap water	B. Flush toilet inside home	C. Electricity	
	D. Telephone (landline)	E. Television	F. Computer	G. Car
	1. one	2. two	3. three	4. four
	5. five	6. more than five	7.	
	none			

FAMILIAL INFORMATION

Who is your primary care-giver? (Describe the relationship, e.g. mother, father, uncle etc.)		
What is your relationship with your BIOLOGICAL MOTHER?	1. Unknown 2. Known, but irregular contact 3. Known and regular contact 4. Living with child 5. Deceased	
How old is she? (If deceased, specify age and reason of death)		
What is your relationship with your BIOLOGICAL FATHER?	1. Unknown 2. Known, but irregular contact 3. Known and regular contact 4. Living with child 5. Deceased	
How old is he? (If deceased, specify age and reason of death)		
What is your parents' marital status?	1. married 2. co-habiting 3. widowed 4. divorced & living apart 5. divorced & living together 6. separated 7. remarried 8. other (specify):	

MEDICAL HISTORY

Do you have any problems with your sight, hearing or with co-ordination?	1. No 2. Yes
If YES, please provide some details:	

Have you ever been admitted to hospital?	1. No 2. Yes If YES, please answer the following:
Why were you hospitalized?	
How old were you?	
How long did you stay in hospital?	

Have you ever had a head injury?	1. No 2. Yes If YES, please answer the following:
How did the injury occur?	
Did you lose consciousness?	
How long were you unconscious?	
How old were you?	

Have you ever had a fit / seizure?	1. No 2. Yes If YES, please answer the following:
How old were you?	
What caused it?	
Has it happened more than once?	
Do you take medication for it?	

Have you ever had a serious illness?	1. No 2. Yes If YES, please answer the following:
Name of illness/es	age

Have you ever had to take medication for over two weeks? (do not include medication for common conditions such as colds, flu, gastro enteritis)	1. No 2. Yes If YES, please answer the following:
What was the reason for the medication?	
What was the name and dosage of the medication?	
Are you currently taking any medication?	
What is the reason for the medication?	
What is the name and dosage of the medication?	

PSYCHIATRIC HISTORY

Have you ever sought counselling (at school, church or elsewhere) for emotional or other difficulties?	1. No 2. Yes If YES, please answer the following:
How old were you?	
Who did you receive help from?	
For how long did you consult the person / agency?	
Did the treatment help your condition?	

PSYCHOMETRIC HISTORY

Have you had a psychometric evaluation (for example, aptitude of "IQ" test) in the last 12 months?	1. No 2. Yes If YES, please answer the following:
What was the purpose of the test?	
Who tested you?	

SCHOLASTIC HISTORY

In comparison with your peer group,	1. No 2. Yes If YES, please answer the
--	---

have you ever experienced severe difficulties in coping with your school work?	following:
If YES, please provide some details?	

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APPENDIX B

Marin Acculturation Scale

English Version

For items 1-8, please indicate which language you prefer in each of the situations described. For items 9-12, please indicate which social grouping you prefer in each of the situations described.

Do you think you are:

English-speaking

Bilingual

Multilingual

A = Afrikaans, X = Xhosa, E = English	Only A/X	More A/X than E	Both equally	More E than A/X	Only E
1. In general, what language(s) do you read and speak?	1	2	3	4	5
2. What was the language (s) you used as a child?	1	2	3	4	5
3. What language(s) do you usually speak at home?	1	2	3	4	5
4. In which language(s) do you usually think?	1	2	3	4	5
5. What language(s) do you usually speak with your friends?	1	2	3	4	5
6. In what language(s) are the TV programs you usually watch?	1	2	3	4	5
7. In what language(s) are the radio programs you usually listen to?	1	2	3	4	5
8. In general language(s) are the movies, TV and radio programs you	1	2	3	4	5

prefer to watch and listen to?					
A = Afrikaans, X = Xhosa, E = English	All A/X	More A/X than E	About half and half	More E than A/X	All E
9. Your close friends are?	1	2	3	4	5
10. You prefer going to social gatherings/parties at which people are?	1	2	3	4	5
11. The persons you visit or who visit you are?	1	2	3	4	5
12. If you could choose your children's friends to would prefer them to be?	1	2	3	4	5

Afrikaans version

Vir items 1-8, verwys asseblief watter taal jy verkies. Vir items 9-12, verwys asseblief watter sosiale groep jy verkies in die omstandighede wat beskryf is.

Dink jy dat jy is:

Afrikaans

Tweetalig

Veeltalig

A = Afrikaans, X = Xhosa, E = English	Slegs A/X	Meer A/X as E	Albei ewe	Meer E as A/X	Slegs E
1. In die algemeen watter taal/e gebruik jy om te lees en skryf?	1	2	3	4	5
2. Watter taal/e het jy gebruik as kind?	1	2	3	4	5
3. Normaalweg watter taal/e praat jy by die huis?	1	2	3	4	5
4. In watter taal/e dink jy gewoonlik?	1	2	3	4	5
5. Watter taal/e praat jy gewoonlik met jou vriende?	1	2	3	4	5
6. In watter taal/e is die T.V programme wat jy gewoonlik na kyk?	1	2	3	4	5
7. In watter taal/e is die radio programme wat jy gewoonlik na luister?	1	2	3	4	5
8. In die algemeen in watter taal/e verkies jy om flieke, T.V en radio programme te kyk en luister?	1	2	3	4	5
A = Afrikaans, X = Xhosa, E = English	Almal A/X	Meer A/X as E	Omtrent half en half	Meer E as A/X	Almal E
9. Die vriende na aan jou is?	1	2	3	4	5
10. Jy verkies om sosiale funksies/partyjies bywoon waar mense?	1	2	3	4	5

11. Die persone wat vir jou besoek is?	1	2	3	4	5
12. As jy jou kinders se maatjies kon kies, jy so verkies dat hulle?	1	2	3	4	5

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APPENDIX C

English version

<p>Project Number N08/08/227: Comparing the Utility of South African Adaptations of the <i>Wechsler Abbreviated Scale of Intelligence</i>, the <i>Controlled Oral Word Association Tests</i> and the <i>Boston Naming Test</i> for English, Afrikaans and Xhosa-speaking 8-25 year olds in the Western Cape Province NEUROPSYCHOLOGICAL BATTERY English Scoring & Response Booklet Compiled by H. Ferrett (2009) University of Stellenbosch Psychiatry Department</p>
--

Participant Identification Number:

Examiner:

Supervisor:

Home Language: Afrikaans English Mixed Bilingual Xhosa

School Language: Afrikaans English Mixed Bilingual Xhosa

Test Language: Afrikaans English Mixed Bilingual Xhosa

Gender: Male Female **Colour Blindness:** Yes No

Hand Dominance (EHI): Left Right Ambidextrous

Education: Current Year / Grade Highest Grade / Year Passed Number of Grades / Years Repeated

Test Date: y m d

Birth Date: y m d

Test Age: y m d

Test Behaviour:	Unsatisfactory	Below Average	Average	Highly Satisfactory
Rapport				
Motivation				
Cooperation				
Mental Stamina				

Comments:

WASI Vocabulary

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 30; Age 9-11: stop after item 34
Age 12-16: stop after item 38; Age 17 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

Items 1 & 2: Instructions

Say: **Now I am going to show you some pictures
and ask you to tell me what they are.
Are you ready?**

Expose the picture and say:

For an incorrect or uncertain response, say:
I was trying to show you a *fish* / *spade*.

#	WORD	verbatim response and response samples	SCORE
[1]	Fish	<i>fish</i> <i>goldfish</i> or variant	1
		not as above	0
[2]	Shovel	<i>spade</i> <i>shovel</i> or variant	1
		not as above	0

Items 3 & 4: Instructions

Expose the picture and say:
**Look at the picture on this page.
Tell me what this picture shows.**

[3]	Map	<i>map</i> <i>chart</i> <i>world map</i> <i>world chart</i> or variant	1
		not as above	0
[4]	Shell	<i>shell</i> <i>seashell</i> <i>sand dollar</i> <i>scallop</i> <i>mollusc</i> <i>crustacean</i> <i>oyster</i> <i>clam</i> or variant	1
		not as above	0

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 30; Age 9-11: stop after item 34
Age 12-16: stop after item 38; Age 17 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

Items 5 – 42: Instructions

Say: **Now, I am going to ask you to tell me the meanings of some words. Listen carefully
and tell me what each word means.
Are you ready?**

Point to the word and say:
What is a *shirt* etc.

(5) Shirt:				
Something you wear (on the top part of your body) Something you put on to cover your chest clothing	Garment	You wear it	Clothes Blouse Piece of	2
Put it on Q	Material Q	Keeps you warm		1
You button it up Q	Has sleeves (buttons, seams) Q	[Examinee points at shirt] Q		0
(6) Shoe:				
Footwear Something you wear (put) on your feet (for protection)	An outer covering for the foot that has a sole and heel			2
Boots Clothing Q	Loafers You wear it Q	Tackies Sneakers Pumps	Something you walk in Something you put on Q	1
[Examinee points at shoes] Q		Shoe rack		0
(7) Torch:				
Something that helps you see when it is dark It provides light so that things are visible Portable instrument with a bulb that provides light				2
It helps you if it is dark Q It helps you find things Q	It allows you to see better Q It makes (has) light			1
You carry it Q	A small cylindrical-shaped object Q	Police use them Q		0
(8) Car:				
Automobile Something with four wheels and a motor that takes you places	Vehicle	Form of transportation	Method of travel	2
Jalopy Something you drive Has four wheels (a steering wheel, an engine, brakes)	Sedan You ride in it	Station wagon Truck	Ford Toyota etc. You go places in it	1
It can go fast	It has seats (doors)	Runs on petrol Q		0
Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).				
9. Bird:				
A feathered creature that flies A winged animal that has feathers on its body	An animal (that can fly) Fowl			2
It flies It sings (in the spring)	Mammal that flies (sings, has wings) It makes nests	Chicken Hawk Parakeet Cardinal etc.	It has wings (feathers, a beak) Q	1
It could be a pet Q	It lives in a tree Q	It's pretty		0

10. Calendar:		
It tells you what day and month it is An orderly list of the days of the week and months of the year	Something that tells you the date	2
Schedule It shows which days are holidays	Appointment book It helps you plan (your time or schedule) It has the days (months, years) Q	1
Can carry one with you Made of paper	Wall calendar It tells you what time it is Q	0
11. Number:		
Digit Calculate Numeric value (sign) Tells the quantity (how much, how many) of something	Figure Count Enumerate A counting device A symbol Q	Amount Tally A number is used to count with A mathematical unit (symbol) Something you count
Something to help you learn math Used to addition (multiplication, subtraction, division) Signifies placement (order, sequence) Q	You write it in your math answer Something that has value Measurement Q 1, 2, 3 [or any other no.] Q	1
You tell your age with it Q Something for writing down your phone number (address) Q		0
12. Bell:		
A device to sound an alarm (demand attention, signal for something) An (musical) instrument Ring it Q – like a call for dinner	Instrument that rings Something that makes music	2
Something you can ring Q It rings (jingles, makes a ding sound, goes ding-dong) Q	A dome shape with a little thing inside Q Ringer	1
Something that makes a noise Q	For church (school) Q	0

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 30; Age 9-11: stop after item 34
Age 12-16: stop after item 38; Age 17 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

13. Breakfast:		
The first meal of the day Food eaten at the first meal of the day	Early (first, morning) meal Eating in the morning	2
A meal Eggs (bacon, coffee) Q	To eat Food Q	What we eat The most important meal of the day Q
To break the fast Q		0
14. Police:		
People who maintain public order and safety of citizens Someone who serves the public and arrests criminals	Cop Peace officer	To enforce the laws 2

Law enforcement agents (agency) To prevent or detect violations of rules and regulations	Law enforcer	
A group of people who control (regulate, maintain order) Keep people protected (safe) Somebody who helps you (arrest people, takes you to jail) Search for evidence when there is a crime (robbery, murder)	You report crime to them Q A group of armed people A peace keeper Security Q A law person Q	1
Give out speeding tickets People who wear a blue uniform (suit) and have a badge Q People who drive a car that has red and blue lights Q	People who provide justice Q Authority figure Q Catch bad people Q	0
15. Vacation:		
A respite Break from work (school, normal routine) when you can rest (do whatever you want) A period of resting (relaxation) Holidays (break, time off) from work (school)	A period of time planned for enjoyment (recreation) Leisure time Trip taken for fun (to relax)	2
A place where you go to relax An activity different from your normal day-to-day routine Time spent with family away from home When you go out of town to visit family (friends) You go away (from home for a while, on a trip)	When you go to Disneyland [or other vacation spot] To get away When it's time to take off Q Trip; Getaway; Day off Q	1
Escape Q [give names of holiday months] Q	Somewhere you go Q Something you go on	0
16. Repair:		
To fix or correct something that has been damaged To rebuild To restore (to original condition)	To fix Fixing To mend Make better if broken To re-establish operational condition	2
Something that was damaged and fixed To fix a chair (car) Q	To finish or remodel something Something is broken, you have to repair it Q	1
Work on shoes or home	Repair a chair When something is broken Q	0
Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).		
17. Balloon:		
Rubber (plastic, elastic, latex) that you can blow up (fill with air, gas, helium) Toy consisting of an inflatable rubber bag A toy you blow up that can fly	A ball you put helium in that floats Blimp Airship A type of aircraft	2
Used for decorations Something that flies in the sky and is all kinds of colors You blow it up (fill it with air, play with it) Q	A party favor that holds air Expand A toy Q Has air in it and flies	1
It floats Q Something that pops Q	It can be made into different things Q For special occasions (birthdays) Q	0
18. Transform:		
Change To change in composition (structure, appearance, shape)	Convert Metamorphose Mutate Modify	2

To change (turn) into something else (from one thing to another) To turn into a different shape (form) To undergo metamorphosis (mutation)	
Something that turns into something else To become different Q The process of changing from one form to another Remake Q Turn into something Q Like a caterpillar turns into a butterfly Q	1
Fix something Like you go into something Q	0
19. Crocodile:	
A reptile Alligator An amphibian An animal Q – that lives in swamps and has rough skin (swims in the water; lays eggs)	2
A cold-blooded (mean, man-eating, green, scaled) animal Q An animal Q It has sharp teeth (four legs, a long snout) Q A big lizard Q An animal that can live on water or land (in a swamp) Q Mammal that lives in water (has scaly skin, bites) Carnivore	1
Lives in water Q Something that is dangerous Q	0
20. Cart:	
Small-wheeled vehicle used to store or carry things Wagon Something that has wheels and carries things Buggy Wheeled vehicle drawn by a horse (pony, dog) Wheelbarrow	2
Something you drive around in when you play golf Carry A box with wheels Something you put (carry) things in (when shopping) Grocery basket You load things in it and use it to carry things around Way of transporting goods Something you push that holds things Haul A container that holds stuff Q	1
A horse pulls it Q For transportation Q You push (pull) it Q	0
Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).	
21. Blame:	
Accusation Reprehension Accuse Fault Charge To put guilt on others To find fault with To point the finger at Transfer responsibility to someone else To use someone as a scapegoat for something bad that happened To lay fault on To hold someone responsible (for something that's gone wrong) To pass the buck	2
Attribute Q To say someone else did it (when you really did it) I blame you for something I did Q Responsibility	1
To tell on somebody Q She did it Q To put upon someone else Q If you get into trouble but didn't do it Q	0
22. Dance:	
A form of body movement for recreation (artistic purposes, to express yourself) To move to music (a rhythm, a song) Caper Frolic Boogie Rhythmic movement Moves put together to form a routine (typically performed to music) Art form A ritual performed by one or more people to represent their heritage	2

Something you do for pleasure (exercise) Q Jitterbug Polka Rumba Tango Form of expression Q Something you do to music To jump around; to wiggle your body Q Move fast Move your feet	Shindig Hop Ball Prom The Twist Ballet etc.	1
To perform Q	A party you have with friends Q	0
23. Purpose:		
Reason Intention Function Objective Goal Aim Mission What something is used for Why something exists Why you're doing something		2
Cause; Plan; Proposal Q Desire to accomplish something Q Not an accident Q The meaning of (for) something Q Deliberately I did it on purpose Q The purpose of scissors is to cut paper When you want to do something Q		1
A statement	The end result of something	0

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).		
24. Entertain:		
Amuse Contemplate Consider To provide diversion To show a good time To keep occupied (hold the attention of) To think about (consider) something To perform (sing, dance) for others' enjoyment To host a party (social event) To make others laugh with your actions To extend hospitality toward		2
To perform To keep someone (you) busy Q Putting on a show A comedian, TV, or radio can entertain you Activity to provide amusement Enjoyment A person who amuses others To make people laugh (happy) Q Play a musical instrument (Sing, Dance, Tell jokes) Q		1
To have fun Q	Take care of	0
25. Famous:		
Well-known Widely known Renowned Celebrated Recognized Celebrity Notorious People who are extraordinary (set apart) Someone (something) that a lot of people know about Person that has done something outstanding or heroic		2
Known Q Notable Important Popular People want your autograph A person like a great singer such as Elvis or Sinatra Someone who's loved by a lot of people (in the media, in the limelight)		1
Someone who has fame Q You're a star Q Everyone watches you on TV Great Q Someone who lives in Hollywood and has a big house		0

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).		
26. Reveal:		

To be motivated and excited (eager, energetic, pumped up)	Exuberant	Gung-ho	
Interested	Attracted	Ecstatic	Joyful
To be energetic (full of spirit)	Excited about something	Excited	Eager
You can be enthusiastic about your job (hobby) Q			Excitement
To be into the mood Q	Very active Q	Looking forward to it Q	
To be really happy Q		Outgoing	0

STOP POINT for 8 year olds

<p align="center">Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).</p>			
31. Complicated :			
Something that is made up of intricate parts or aspects that are difficult to understand or analyse Not easily comprehended or understood Not simple (Very) involved Not as easy as it seems Not easily worked out/resolved Difficult to analyse or explain Not easy to find an answer Not easy to explain Hard to explain (Very) difficult Intricate			2
Not straight-forward Hard / not easy Complex Tricky Not clear Confusing / made up of different parts Mixed-up / not well defined			1
Can't get it right / solve it Not understandable Can't explain it Problematic Don't understand it Struggle to do			0
32. Impulse:			
Impetus An urge for sudden action Sudden urge An inner drive that makes you do something on the spur of the moment (without thinking) A feeling which compels you to do something Stimulus transmitted in a muscle or nerve fiber			2
Spontaneity Q Urge; Drive; Momentum Q Spur of the moment Q To act (do something) on a whim (on the spur of the moment, without thinking) Q A quick moment of decision making Q Impetuous; Spontaneous Q An instinctive (involuntary, immediate) response or reaction Reaction Response			1
Wanting to do something Q You did it automatically Q Sudden Q I did it on impulse Q			0
<p align="center">Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).</p>			
33. Haste:			

Tenderness Q – sort of like a maternal feeling	Forgiveness	To console	
Thoughtfulness Q	Care for someone Q	A feeling Q	Kindness Q
Emotion / heartfelt, great emotion Q	Love	Deep feeling of wanting to love	0
Tolerance		Passionate	

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 30; Age 9-11: stop after item 34
Age 12-16: stop after item 38; Age 17 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

37. **Impertinent:**

Irrelevant Disrespectful Something that is not appropriate	Impudent Flippant	Brazen Lack of etiquette	Saucy Lack of etiquette	Sassy Out of line and disrespectful	Pert Out of line and disrespectful	Insolent Out of line and disrespectful	Rude Out of line and disrespectful	2
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Obnoxious; Disobedient Q	Unessential; Insignificant; Unimportant Q	1
Intrusive; Meddlesome Q	Not necessary Q	Not pertaining to the current subject
Someone that gets on people's nerves	Annoying Q	Not a very nice person Q
Sarcastic and smart-alecky	Not to the point Q	Fresh

Foolish	Pretentious Q	Cocky	Smart	0
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38. **Colony:**

A country belonging to another country Settlement of people in a new world or place Group of people banded together for a common goal or purpose Settlement for a group of animals or humans who have the same social structure	Territory subject to another government	2
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A group of almost anything – ants, bees Q – that live together A group of people who have the same interest Q A (territory, settlement, community) where people live	A territory settled	1
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A small town A group of (people, animals, ants or bees) Q	Village Neighbourhood	A commune Q The property of another country Q	0
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STOP POINT for 12-16 year olds

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 30; Age 9-11: stop after item 34
Age 12-16: stop after item 38; Age 17 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

39. **Presumptuous:**

Impertinent Overstepping bounds or boundaries	Insolent Taking liberties	Impudent Taking liberties	Excessively forward or confident Too bold or forward	2
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Assuming; To assume Q	Uppity; Pompous; Know-it-all Q	Haughty Arrogant	1
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Having preconceived ideas about something Taking something for granted Someone who is trying to be something he/she is not Q	Jumping to conclusions To presume; Making quick guesses Q	
Anxious Q	Demanding Q	Daring Q A snob Q
40. Formidable:		
Daunting Awesome Awful Appalling Dreadful Horrible Horrifying Terrible Intimidating Threatening Ominous Difficult to defeat or overcome Presents a difficult , challenging or overwhelming obstacle Imposing Gives the impression of having great strength and authority		2
Difficult; Hard; Tough; Scary Q Overwhelming; Challenging Q Competitive; Strong Q	Strenuous; Laborious; Toilsome Q Powerful Q An opponent with superior abilities to yourself Q	1
Worthy opponent Q	Worthy; Great Q	A formidable intellect 0

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 30; Age 9-11: stop after item 34
Age 12-16: stop after item 38; Age 17 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).




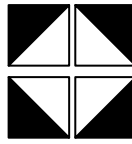
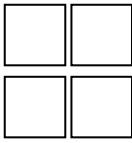
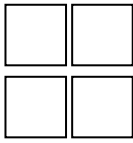
41. Ruminare:		
Reflect Ponder Cogitate Muse Contemplate To chew (the cud) To thoroughly consider To go over in the mind repeatedly Mull (think) over		2
Something to do with thinking Q To lament about past events To think about Q To worry excessively (about things that aren't there) Q To dwell on something Q An animal that eats grass (that has more than one stomach) Digest Q		1
To talk about something Q To remember something I ruminate about my taxes Q		0
42. Tirade:		
A long emotional speech marked by anger or censure Laying into somebody verbally Verbal tantrum Ranting and raving Volume of rapid language, generally some quality, such as punishment, about it An angry speech A harangue Verbal browbeating Cussing somebody out, having a go at them Hostile flow of words		2
Verbal fuss Yelling To yell A scolding Argument Flood of words A speech A long speech		1
A tantrum A temper tantrum A fit of anger Lose one's temper Outburst Q A fit of inner feeling Rampage A commotion Associated with violence and anger, letting go of human or natural control Upheaval Raising Cain To be forceful and angry Bossy person Q		0

Total Score

/80

Number of Correct Items Beyond Discontinuance Point	/37
Number of Correct Points Beyond Discontinuance Point	/74
Total Score for Age 8 (Items 1 to 30)	/56
Number of Correct Items Beyond Age 8 Cutoff Point	/12
Number of Points Beyond Age 8 Cutoff Point	/24
Total Score for Ages 9 to 11 (Items 1 to 34)	/64
Number of Correct Items Beyond Age 9 to 11 Cutoff Point	/8
Number of Points Beyond Age 9 to 11 Cutoff Point	/16
Total Score for Ages 12 to 16 (Items 1 to 38)	/72
Number of Correct Items Beyond Age 12 to 16 Cutoff Point	/4
Number of Points Beyond Age 12 to 16 Cutoff Point	/8
Total Score for Ages 17 and above (Items 1 to 42)	/80

WASI Block Design

Start: #3 (8yrs:#1)		Reverse: If 0 or 1 on #3 or #4, do #2 (then #1)		Discontinue: after 3 consecutive 0's	
Design	Incorrect Design		Time seconds	Score	
(1)	Trial 1: <ul style="list-style-type: none"> demo using examiner's blocks leave model intact 		(Trial 2): <ul style="list-style-type: none"> Leave examiner's model intact Demo using examinee's blocks Scramble demo 		
		Trial 1 	(Trial 2) 	/ 30"	Trial 1 ✓ in 30" = 2 Trial 2 ✓ in 30" = 1 X = 0
(2)	Trial 1: <ul style="list-style-type: none"> demo using examiner's blocks leave model intact 		(Trial 2): <ul style="list-style-type: none"> Leave examiner's model intact Demo using examinee's blocks Scramble demo 		
		Trial 1 	(Trial 2) 	/ 60"	Trial 1 ✓ in 60" = 2 Trial 2 ✓ in 60" = 1 X = 0
BEGIN	Trial 1: <ul style="list-style-type: none"> demo using examiner's blocks leave model intact 		(Trial 2): <ul style="list-style-type: none"> Leave examiner's model intact Demo using examinee's blocks Scramble demo 		

3		Trial 1	(Trial 2)	/ 60"	Trial 1 ✓ in 60" = 2
					Trial 2 ✓ in 60" = 1
4	Trial 1: <ul style="list-style-type: none"> Expose design card Demo using examinee's blocks Scramble demo 		(Trial 2): <ul style="list-style-type: none"> Expose design card Demo using examinee's blocks Scramble demo 		X = 0
		Trial 1	(Trial 2)	/ 60"	Trial 1 ✓ in 60" = 2
					Trial 2 ✓ in 60" = 1
					X = 0

Discontinue: after 3 consecutive 0's				
Designs 5-13: no demonstrations; use stimulus card only				
	Design	Incorrect Design	Time seconds	Score
5			/ 60"	X = 0 21 - 60" = 4 16 - 20" = 5 11 - 15" = 6 1 - 10" = 7
6			/ 60"	X = 0 21 - 60" = 4 16 - 20" = 5 11 - 15" = 6 1 - 10" = 7
7			/ 60"	X = 0 21 - 60" = 4 16 - 20" = 5 11 - 15" = 6 1 - 10" = 7
8			/ 60"	X = 0 21 - 60" = 4 16 - 20" = 5 11 - 15" = 6 1 - 10" = 7
9			/ 60"	X = 0 21 - 60" = 4 16 - 20" = 5 11 - 15" = 6 1 - 10" = 7

Discontinue: after 3 consecutive 0's				
	Design	Incorrect Design	Time seconds	Score
10			/ 120"	$X = 0$ $66 - 120'' = 4$ $46 - 65'' = 5$ $31 - 45'' = 6$ $1 - 30'' = 7$
11			/ 120"	$X = 0$ $76 - 120'' = 4$ $56 - 75'' = 5$ $41 - 55'' = 6$ $1 - 40'' = 7$

12			/ 120"	$X = 0$ $76 - 120'' = 4$ $56 - 75'' = 5$ $41 - 55'' = 6$ $1 - 40'' = 7$
13			/ 120"	$X = 0$ $76 - 120'' = 4$ $56 - 75'' = 5$ $41 - 55'' = 6$ $1 - 40'' = 7$

TOTAL RAW SCORE	/ 71
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TOTAL ITEMS CORRECT BUT OVER TIME LIMIT	/ 13
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WASI Similarities

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 20; Age 9-11: stop after item 24
Age 12 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).

Item 1: Instructions
 Say: **I'm going to show you some groups of pictures.**
For each group, I want you to tell me which picture in the bottom row is most like the pictures in the top row.
 Expose Item 1 and say:
Look at these pictures.
Which one here (point to the pictures in the bottom row)
is like these (point to pictures in the top row).
Show me.
 If correct, say:
Yes, these are all four-wheeled vehicles (point to pictures in top row)
And this is also a four-wheeled vehicle (point to picture of bus).
 If incorrect, say:
Look up here (point to pictures in top row).
These are all four-wheeled vehicles
that people drive on a road or highway.
This one (point to picture of bus) **is like them,**
because it is also a four-wheeled vehicle
that people drive on a road or highway.

#	WORD	VERBATIM SUBJECT RESPONSE	SCORE
1	Four-wheeled	Ship BUS Bike Train	0 1

Item 2 -4: Instructions
Now look at these pictures. Which one here (point) is like these ?

2	Dining Items	SPOON Pan Bowl Can Opener	0 1
3	Clothing	Jump Rope Ball SHOES Crayons	0 1
4	Fruits	BANANA Bean Pumpkin Potato	0 1

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 20; Age 9-11: stop after item 24
Age 12 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).

Items 5-26: Instructions
 Say: **In the following section,**

<p>I am going to read two words to you. I would like you to tell me how they are the same. For example, if I ask "How are biscuits and sweets the same", you would say "They are both snacks or food".</p>			
5. Red – Blue:			
[A response indicating that both are colors]	Colors	Primary (Basic) colors	2
Both are colors of the rainbow	Light (dark, bright) colors	Part of the spectrum	
They are very colorful Q	Both can be used to make purple (other colors) Q		1
Both are on the (American) flag Q	Both symbols of Independence Day		
Both are crayons	Both are in the rainbow	People use them in paint Q	
Both are pretty Q		Bright (Dark) Q	0
6. Circle – Square:			
[A response classifying both as shapes or figures]	Shapes	Figures	2
Geometric symbols (designs)	Geometric objects	Perimeters around something	
Used in math (geometry) Q	Symbols; Designs Q	Have dimensions	1
You write them	They have holes in the middle	Forms Q	0
7. Grapes – Strawberries:			
[A response indicating that both are fruit]	Fruits	Berries	2
Food Q	Both are juicy (sweet)	You eat them	1
Both are nutritious	Both give energy	Pick both of them	
Both have seeds	You can make juice or jam out of them	Both have calories	
Same color	Both are red	Taste alike (or different) Q	0
<p>Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).</p>			
8. Cow – Bear:			
[A response indicating that they are both animals, mammals, or creatures]			2
Animals	Four-legged animals (quadrupeds)	Mammals	
Living things		Both are alive	
Both in nature		Both have (walk on) four legs	1
Both are furry (hairy)	Both have hides	Both breathe oxygen (have babies)	
They are dangerous (big)		Both have ears (backbones, feet)	0

Both walk (eat) Q	Both have same colors	
9. Plane – Bus:		
[A response classifying both as a means of transportation] Mass (Community) transportation	Means of transportation Vehicles Conveyances Methods of travel	2
Both carry passengers You can drive both Can travel on them Q	Transport the public Get people from place to place Can ride (take a trip) in both Go places Take you places	1
Both move Q	Both have an engine (wheels, motor) Made of metal	0
10. Shirt – Jacket:		
[A response indicating that both are articles of clothing] Wearing apparel	Clothes Articles of clothing Both garments Part of your dress (attire)	2
Both keep you warm Something to wear (put on) Q Both made of cloth	Both cover your body Protect the body (from cold or heat) Worn on top part of your body Q	1
They have sleeves (buttons, collars)	Jacket goes over the shirt	0
11. Pen – Pencil:		
[A response indicating that both are writing instruments] Writing utensils (materials)	Writing objects (tools)	2
Office (School, Art) supplies Q	Both write (draw, mark) Writing Drawing	1
Both have a sharp end (eraser) Q	Both long and thin	0
Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).		
12. Plate – Bowl:		
[A response indicating that both are eating or kitchen utensils] Dishes Eating utensils (articles, vessels)	Both china Dining ware Parts of a dining set Utensils Kitchen utensils	2
Both items you eat out of To serve (hold) food Q	Used for storing Containers for food Use them for meals (food) Q Can put things on them	1
Silverware Q Eat Q	Used the same way They can be washed	0
13. Love – Hate:		

[A response classifying both as feelings, emotions, or emotional reactions]			2
Both emotions	Both feelings	Relationships	Ways you can feel (about someone)
Forms of expression	Attitudes	You can feel them	1
Things you can do to somebody		Can be passionate	Q
Actions	Ways you cope with others	They both have to do with two people	0
14. TV – Newspaper:			
[A response classifying both as a means of communication]			2
Sources of information	(Forms of) media	Entertainment (Forms of) communication	
Educational devices		Information	
Forms of socialization	You can read (look at) both	News; Resources	1
Both have pictures and words	You can learn from both	Are educational	
Both tell you news (the weather, stories, what happened)			
Have advertisements		Both are visual	
Can buy both		You use them a lot	0
15. Smooth – Rough:			
[A response indicating that both have to do with texture]			2
Surfaces (of something)	Features (Conditions) of a surface	Both textures	
Describe a surface (finish)	Feelings of certain materials	Ways things feel	
Sense of touch	Touch feelings	Sensations	
Both have to do with feeling (touch)		Feeling; Touching	1
You can feel (touch) both	The way a road can be	Conditions of skin	
Both are descriptive words		On sandpaper	0
<p>Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items</p> <p>Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).</p>			
16. Shoulder – Ankle:			
[A response indicating that they are both joints]			2
Anatomy	Parts of the body	Bone connections	Junctions in bone structure
Connect limbs	Both have sockets	Both are bones	1
Both bend (move, rotate, pivot)	You have two of each one	Can be broken	0
Both are hard (strong)	Things on your body	Both support your body	Q
17. Sit – Run:			

[A response classifying both as actions or movements] Actions you (people) do Activities Movements Motions Verbs of motion	Ways you move your body	2
Postures Positions a body can take Your body moves Moving Something you can do with your body Things people (you) do Both verbs Q Burn calories in both Ways of using up energy Require effort		1
Both are exercise Body language Q Commands Use your legs for both		0
18. Child – Adult:		
[A response indicating that they are stages of human development] Stages of the life cycle (human development) Phases of life (human development) Age groups Time spans in the human life		2
Generations Human beings People Homo sapiens Human race Forms of life Both are alive Both grow (learn things) Age Q		1
Both have arms and legs (same makeup) Child grows into adult Q Mammals Family		0

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).		
19. Steam – Cloud:		
[A response classifying both as water or vapor] Water Forms of water (in gaseous state) Vapors Evaporation Forms of condensation (humidity) Forms of moisture (precipitation)		2
Both made of gas; Gases Q (Both are filled with) moisture Both are wet (humid) Both float in air (rise up, go up) Both are part of the atmosphere Mist		1
Both foggy (smoky, hazy, cloudy) You can't see through them Both white (gray, same color)		0
20. Bird – Flower:		
[A response indicating that both are living things] Biological organisms Both alive Have life Living things Both live (outside)		2
(Part of) nature Wild species Can reproduce Both can die (grow) Require air / water for survival Both come out in spring		1
Found outdoors (on earth) Part of the pollination process Are pretty (colorful, delicate, free) Part of the food chain		0

STOP POINT for 8 year olds

<p>Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).</p>		
21. Less – More:		
[A response indicating that both have to do with quantity] Proportions of something Descriptions (expressions) of quantity (how many, how much)	Relational operators Measurements Units of measure	2
Both a degree of something Amounts; Quantities Q Used to compare (show, describe) amounts (values, sums) Measure volume (mass)	Methods of counting Both tell how much Q Both (words of) comparison Q Both measure Q	1
Both are something you have	Tell you something	0
22. Photo – Song:		
[A response indicating that both are forms of expression or art] (Forms of) expression	Artistic expression Art (Forms of) entertainment	2
Means of communication Ways of showing feeling Evoke emotions (memories) Representations of something	Memorabilia Capture a moment (feeling, thought) Tell a story Have meaning Made by people	1
Recreation	Both are beautiful You can see both	0
<p>Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).</p>		
23. Peace – War:		
[A response classifying both as conditions of a nation or social climate] Conditions (States, Cycles, Stages) of a nation (country, world) States of political interaction (social climate, arms) Interactions between one group and another Descriptions of relationships between nations or people		2
Conditions (States) of violence Have to do with politics (countries) How people (countries) get along Emotions (Moods) of people (mind)	Internal conditions (relationships) Ways you can settle something Ways to unite people Part of history (life) Happen to a country (world, society)	1

Situations; States Q	Created by people	Affect people's lives	
Military events	Related to survival	One usually follows the other	0
24. Capitalism – Socialism:			
[A response classifying both as having to do with economic or political ideology] Forms of economic status (systems, theories)			2
Ideologies (Beliefs) for running a country			(Political) ideologies Political systems
Forms of government (rule, leadership)			
Politics: Political Q	Political parties Q	Part of government Q	Monetary system Q
Both have to do with economy (government, society, politics, people)			Beliefs Q
Government programs			Hierarchies
			0

STOP POINT for 9-11 year olds

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).			
25. Tradition – Habit:			
[A response indicating that both are routines or behavior patterns] Patterns to follow			2
Something you do ordinarily (on a regular basis, again and again over time) Q			1
Both are repeated (rooted in the past, can be broken)			Things people follow
Something you are used to doing			Things you form over the years
Parts of culture (custom, everyday life) Q			Way of life Q Automatic ways of doing things
Ways of doing something Q			Parts of human nature
Something done continuously			Things you adhere to Q Something that is inherited
26. Freedom – Law:			
[A response indicating that both are rules or boundaries by which one lives] Rules (Boundaries) by which one lives			2
Levels of restriction placed on people			Guidance Standards of living Limitations (put on our conduct)
Legal concepts			Concepts created for society Part of democracy
Required for civilization to work			Principles that govern a society
Have rules (regulations, limitations)			Granted by the constitution
Things by which you abide (have to live with)			Allow you to do something

Related to order (rights of people, control, justice system)		
Exercised by people	Government Q	
Corrections	One restricts the other	0

Total Raw Score	/48
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University of Cape Town

WASI Matrix Reasoning

Administer items **A** and **B**. Proceed with item **1** (8 yrs) / **5 & 6** (9-11yrs) / **7** and **8** (12 yrs+).
If either item **5** or **6** (9-11yrs) / **7** or **8** (12+yrs) is **incorrect**, administer items **6-1**(reverse)
until the examinee obtains perfect scores on **2 consecutive items**.

Credit items 1 -6 if not administered.

Discontinue after **4 consecutive scores of 0** or **4 scores of 0 on 5 consecutive items**.

[0 0 0 0] // [0 1 0 0 0] // [0 0 0 1 0] // [0 0 0 1 1 0 1 0 0 0] //

Item	Response Options	Score	Item	Response Options	Score
A	1 2 3 4 5 ?		18	1 2 3 4 5 ?	0 1
B	1 2 3 4 5 ?		19	1 2 3 4 5 ?	0 1
1	1 2 3 4 5 ?	0 1	20	1 2 3 4 5 ?	0 1
2	1 2 3 4 5 ?	0 1	21	1 2 3 4 5 ?	0 1
3	1 2 3 4 5 ?	0 1	22	1 2 3 4 5 ?	0 1
4	1 2 3 4 5 ?	0 1	23	1 2 3 4 5 ?	0 1
5	1 2 3 4 5 ?	0 1	24	1 2 3 4 5 ?	0 1
6	1 2 3 4 5 ?	0 1	25	1 2 3 4 5 ?	0 1
7*	1 2 3 4 5 ?	0 1	26	1 2 3 4 5 ?	0 1
8	1 2 3 4 5 ?	0 1	27	1 2 3 4 5 ?	0 1
9	1 2 3 4 5 ?	0 1	28	1 2 3 4 5 ?	0 1
10	1 2 3 4 5 ?	0 1	29	1 2 3 4 5 ?	0 1
11	1 2 3 4 5 ?	0 1	30	1 2 3 4 5 ?	0 1
12	1 2 3 4 5 ?	0 1	31	1 2 3 4 5 ?	0 1
13	1 2 3 4 5 ?	0 1	32	1 2 3 4 5 ?	0 1
14	1 2 3 4 5 ?	0 1	33	1 2 3 4 5 ?	0 1
15	1 2 3 4 5 ?	0 1	34	1 2 3 4 5 ?	0 1
16	1 2 3 4 5 ?	0 1	35	1 2 3 4 5 ?	0 1
17	1 2 3 4 5 ?	0 1	Total Raw Score		/35

Afrikaans version

Project Number N08/08/227:
Comparing the Utility of South African Adaptations of the *Wechsler Abbreviated Scale of Intelligence*, the *Controlled Oral Word Association Tests* and the *Boston Naming Test* for English, Afrikaans and Xhosa-speaking 8-25 year olds in the Western Cape Province
NEUROPSYCHOLOGICAL BATTERY
Afrikaans Scoring & Response Booklet
Compiled by H. Ferrett (2009)
University of Stellenbosch Psychiatry Department

Participant Identification Number: Examiner: Supervisor: Home Language: Afrikaans English Mixed Bilingual Xhosa School Language: Afrikaans English Mixed Bilingual Xhosa Test Language: Afrikaans English Mixed Bilingual Xhosa Gender: Male Female Colour Blindness: Yes No Hand Dominance (EHI): Left Right Ambidextrous Education: Current Year / Grade Highest Grade / Year Passed Number of Grades / Years Repeated Test Date: y m dBirth Date: y m dTest Age: y m d

Test Behaviour:	Unsatisfactory	Below Average	Average	Highly Satisfactory
Rapport				
Motivation				
Cooperation				
Mental Stamina				

Comments:

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WASI Vocabulary

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 30; Age 9-11: stop after item 34
Age 12-16: stop after item 38; Age 17 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

Items 1 & 2: Instructions

Say: **Nou gaan ek vir jou 'n paar prente wys en vir jou vra om vir my te vertel wat hulle is.**
Is jy gereed?

Expose the picture and say:
Kyk na die prent op hierdie blad.
Vertel vir my wat die prent wys.

For an incorrect or uncertain response, say:
Ek het probeer om 'n *vis / graaf* vir jou te wys.

#	WORD	verbatim response and response samples	SCORE
[1]	Vis		
		<i>vis goudvissie</i> or variant	1
		not as above	0
[2]	Graaf		
		<i>graaf skoffel</i> or variant	1
		not as above	0

Items 3 & 4: Instructions

Expose the picture and say:
Look at the picture on this page.
Tell me what this picture shows.

[3]	Kaart		
		<i>kaart wêreldkaart</i> or variant	1
		not as above	0
[4]	Skulp		
		<i>skulp seeskulp kammossel weekdier skaaldier gapermossel oester seekastaiing</i> or variant	1
		not as above	0

Start at Item 1 and administer all items up to age-appropriate cutoff points.
--

Age 8: stop after item 30; Age 9-11: stop after item 34
Age 12-16: stop after item 38; Age 17 and above: administer all items
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

Items 5 – 42: Instructions

Say: **Nou gaan ek vir jou vra wat die betekenis is van sommige woorde. Luister aandagtig en vertel vir my wat elke word beteken. Is jy gereed?**

Point to the word and say:

Wat is 'n hemp etc.

(5) Hemp:

Iets wat jy aantrek (aan die boonste deel van jou lyf)	Jy dra dit	Klere	2
Iets wat jy aantrek om jou bors te bedek			
Kledingstuk	Kleredrag	Bloes	
Trek dit aan Q	Materiaal Q	Hou jou warm	1
Jy knoop dit toe Q	Het moue (knope, some) Q	[Kind wys na hemp] Q	0

(6) Skoen:

'n Buitenste bedekking vir die voet wat 'n sool en 'n hak het	Skoeisel vir die voet	2		
Iets wat jy aan jou voete dra / aantrek (vir beskerming)				
Stewels	Tekkies	Hofskoene	Iets waarin jy loop	1
Klere Q	Jy dra dit Q		Iets wat jy aantrek Q	
[Kind wys na skoene] Q			Skoenrak	0

(7) Flits:

Iets wat jou help sien as dit donker is	Dit gee lig sodat dinge sigbaar is	2	
Draagbare instrument met gloeilamp wat lig gee			
Dit help jou as dit donker is Q	Dit laat jou mooier sien Q	1	
Dit help jou om dinge te vind Q	Dit maak (het) lig		
Jy dra dit Q	'n Klein silindervormige voorwerp Q	Die polisie gebruik dit Q	0

(8) Kar:

Rytuig	Voertuig	Vervoermiddel	Manier om te reis	2			
Iets met vier wiele en 'n motor wat jou na plekke bring							
Tjor	Ford	Chevrolet	Toyota	Sedan	Stasiewa	Trok etc.	1
Het vier wiele ('n stuurwiel, 'n enjin, remme)					Iets wat jy bestuur		
Jy ry daarin					Jy gaan daarin na plekke		
Dit kan vinnig ry		Dit het sitplekke (deure)			Ry met petrol Q		0

Start at Item 1 and administer all items up to age-appropriate cutoff points.

Age 8: stop after item 30; Age 9-11: stop after item 34

Age 12-16: stop after item 38; Age 17 and above: administer all items

Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

9. Voël:

'n Geveerde dierasia wat vlieg 'n Dier met vlerke wat vere op sy lyf het	'n Dier (wat kan vlieg) Pluimvee	2
Dit vlieg Soogdier wat vlieg (sing, vlerke het) Dit sing (in die lente) Dit bou neste Hoender	Dit het vlerke (vere, 'n snawel) Q Valk Parkiet Kardinaalvoël	1
Dit kan 'n troeteldier wees Q	Dit bly in 'n boom Q	Dis mooi 0
10. Kalender:		
Dit sê jou watter dag en maand dit is 'n Ordelike lys van die dae van die week en maande van die jaar		Iets wat jou die datum vertel 2
Rooster Afspraakboek Dit wys watter dae vakansiedae is	Dit help jou (jou tyd of rooster) beplan Dit het die dae (maande, jare) Q	1
Kan een saam jou dra Van papier gemaak	Muurkalender Dit sê jou hoe laat dit is Q	0
11. Nommer:		
Syfer Figuur Getalteken Bedrag Aantal Som Heeltal Bereken Tel Optel Laat klop 'n Nommer word gebruik om mee te tel 'n Wiskundige eenheid (simbool) 'n Telmiddel Numeriese waarde (teken) Sê wat die hoeveelheid (hoeveel, hoe baie) van iets is Iets wat jy tel		2
Gebruik vir optelling (vermenigvuldiging, aftrekking, deling) Iets om jou wiskunde te help leer Dui plasing aan (orde, volgorde) Q Meting Q 1, 2, 3 [of enige ander syfer] Q	Iets wat waarde het 'n Simbool Q Jy skryf dit in jou wiskunde-antwoord	1
Jy sê daarmee hoe oud jy is Q Iets waarmee jy jou telefoonnommer (adres) neerskryf Q		0
12. Klokkie:		
'n Toestel om alarm mee te maak (aandag eis; vir iets sein) Instrument wat lui 'n Musiekinstrument Lui dit Q – soos om iemand vir ete te roep	Iets wat musiek maak	2
Iets wat mens kan lui Q Dit lui (klingel, maak 'n donggeluid, maak ding-dong) Q	'n Koepelvorm met 'n klein dingetjie binne Q Luier	1
Iets wat 'n geraas maak Q	Vir kerk (skool) Q	0

Start at Item 1 and administer all items up to age-appropriate cutoff points.

Age 8: stop after item 30; Age 9-11: stop after item 34

Age 12-16: stop after item 38; Age 17 and above: administer all items

Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).

13. Ontbyt:

Die eerste maaltyd van die dag Kos wat tydens die eerste maaltyd van die dag geëet word	Vroeë (eerste, oggend-) maaltyd Om in die oggend te eet	2
'n Maaltyd Om te eet	Wat ons eet	1

Eiers (spek, koffie) Q	Kos Q	Die belangrikste maaltyd van die dag Q	
Om op te hou vas			0
14. Polisie:			
Mense wat die openbare orde en veiligheid van burgers handhaaf			2
Vredesbeampte Wetstoepasser Om wette toe te pas Wetstoepassingsagente			
Iemand wat die publiek dien en misdadigers in hegtenis neem			
Om die verbreking van wette en regulasies te voorkom of te bespeur			
'n Groep mense wat beheer uitoefen (reguleer, orde handhaaf)			1
Soek vir bewyse wanneer 'n misdaad gepleeg is (roof, moord)			
Iemand wat jou help (mense in hegtenis neem, jou tronk toe vat)			
'n Groep gewapende mense			
Jy meld misdaad by hulle aan Q			
Skryf spoedboetes uit			0
Mense wat geregtigheid toepas Q			
Mense wat 'n blou uniform (pak) dra en 'n kenteken het Q			
Mense wat in 'n kar met blou en rooi ligte ry Q			
Vang slegte mense Q			
Gesagsfiguur Q			
15. Vakansie:			
'n Blaaskans 'n Rustydperk (ontspanning)			2
'n Beplande genotydperk (ontspanning)			
Breek van werk (skool, gewone roetine) wanneer jy kan rus (doen wat jy wil)			
'n Uitstappie doen vir die pret (om te ontspan)			
Breek (vryetyd) van werk (skool)			
'n Plek waar jy kan ontspan			1
Tyd wat jy weg van die huis saam jou gesin deurbring			
Wanneer jy die dorp verlaat om by familie (vriende) te gaan kuier			
Jy gaan weg (van die huis af vir 'n rukkie, op reis)			
Wanneer dit tyd is om af te vat Q			
Wanneer jy Disneyland toe gaan (of enige vakansieplek)			
Reis (wegbreek, afdag) Q			
Ontsnap Q			0
Iewers waarheen jy gaan Q			
[give names of holiday months] Q			
Iets waarop jy gaan			
16. Herstel:			
Om iets wat beskadig is, heel te maak of reg te maak			2
Om weer bruikbaar te maak			
Om reg te maak (regmaak, heelmaak)			
Om iets wat stukkend is, te herstel			
Om te herstel (tot die oorspronklike toestand)			
Om te herbou			
Om tot 'n werkende toestand te herstel			
Iets wat beskadig was, maar herstel is			1
Om iets af te werk of oor te doen			
Om 'n stoel (motor) reg te maak Q			
Iets is stukkend, en jy moet dit heelmaak Q			
Werk aan skoene of jou huis			0
Maak 'n stoel heel			
Wanneer iets stukkend is Q			
Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).			
17. Ballon:			
Rubber (plastiek, rekker, lateks) wat jy kan opblaas (met lug, gas, helium vul)			2
'n Bal waarin jy helium blaas en dit sweef			
Ballonskip			
Speelding wat uit 'n opblaasbare rubbersak bestaan			
Lugskip			
'n Speelding wat jy opblaas wat kan vlieg			
Soort vliegtuig			
'n Speelding Q			1
Jy blaas dit op (vul dit met lug, speel daarmee) Q			
Het lug en vlieg			
'n Partytjieplesier wat lug hou			
Vir versierings gebruik			
'n Vervoermiddel			

Iets wat in die lug vlieg en allerhande kleure is	Uitsit	Wat swel of uitpof	
Dit sweef Q	Dit kan in verskillende goed verander word Q		0
Iets wat bars Q	Vir spesiale geleenthede (verjaardae) Q		
18. Omskep:			
Verander	Bekeer	Metamorfose	Muteer
Om in iets anders te verander (van een ding na iets anders)			Wysig
Om van samestelling te verander (struktuur, voorkoms, vorm)			
Om na 'n ander vorm te verander		Om 'n metamorfose te ondergaan	
Soos wat 'n ruspe in 'n skoenlapper verander Q	Iets wat in iets anders verander		1
Die proses om van een vorm in 'n ander te verander		Oormak Q	
Om anders te word Q		In iets verander Q	
Jy gaan in iets Q		Maak iets reg	0
19. Krokodil:			
'n Reptiel	Alligator		'n Amfibië
'n Dier Q – wat in moerasse leef en 'n growwe vel het (swem in die water, lê eiers)			2
'n Dier Q	Dit het skerp tande (vier pote; 'n lang snoet) Q		1
'n Dier wat in die water of op grond ('n moeras) kan leef Q		'n Groot akkedis Q	
'n Koudbloedige (gemene, mensvretende, groen, geskubbe) dier Q			
Soogdier wat in die water bly (geskubbe vel, byt)		Karnivoor	
Lewe in water Q		Iets wat gevaarlik is Q	0
20. Waentjie:			
Wa	Bakkie	Kruiwa	Iets met wiele wat goed vervoer
Voertuig met wiele wat deur 'n perd (ponie, hond) getrek word			2
Voertuig met klein wiele wat gebruik word om goed te bêre of te dra			
Iets waarin jy rondry as jy gholf speel	'n Kartondoos met wiele	Inkopiemandjie	1
Jy laai goed daarin en gebruik dit om goed in rond te dra			
Iets wat jy stoot waarin goed is	Dra	Trek	'n Houer wat goed hou Q
Iets waarin jy goed sit (dra) (wanneer jy inkopies doen)	Manier om goed te vervoer		
Dit word deur 'n perd getrek Q	Jy stoot (trek) dit Q	Vir vervoer Q	0
<p align="center">Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).</p>			
21. Blaam:			
Beskuldiging	Berisping	Beskuldig	Berispe
Om iemand die sondebok te maak vir iets sleg wat gebeur het		Om ander die skuld te gee	
Om vinger te wys na		Om fout te vind met	
Om iemand verantwoordelik te hou vir iets (vir iets wat skeef geloop het)		Skuif die verantwoordelikheid op iemand anders af	
Toereken aan Q	Ek blameer jou vir iets wat ek gedoen het Q	Verantwoordelikheid	1
Om te sê iemand anders het dit gedoen (as jy dit eintlik gedoen het)			
Sy het dit gedoen Q	Om iemand te verklik Q	Om op iemand anders te plaas Q	0
As jy in die moeilikheid kom, maar jy het dit nie gedoen nie Q			
22. Dans:			

Liggaamsbewegings vir ontspanning (kunsdoeleindes, om jouself uit te druk)	Boogie	2
Om op die maat van musiek te beweeg ('n ritme, 'n liedjie)	Kunsvorm Rondspring	
'n Ritueel wat deur mense uitgevoer word om hul herkoms te verteenwoordig		
Bewegings wat saamgestel is om 'n roetine te vorm (word gewoonlik op die maat van musiek gedoen)	Ritmiese beweging Pret maak	
Iets wat jy vir die pret (oefening) doen Q	Om rond te spring; om jou lyf te wikkel Q	1
Fuif Bokjol Bal Matriekafskeid Ritteldans Polka Rumba Tango Sokkie Ballet etc.		
Beweeg vinnig	Liggaamsbeweging Beweeg jou voete	
Vorm van uitdrukking Q	Iets wat jy op die maat van musiek doen	
Om op te tree Q	'n Partytjie wat jy saam met vriende hou Q	0
23. Doelwit:		
Rede	Intensie	2
Waarom jy iets doen	Funksie	
	Doeleinde	
	Mikpunt	
	Missie	
	Waarom iets bestaan	
Saak; plan; voorstel Q	Die doel van 'n skêr is om papier te sny	1
Begeerte om iets te volvoer Q	Nie 'n ongeluk nie Q	
Die betekenis van (vir) iets Q	Wanneer jy iets wil doen Q	
	Ek het dit met opset gedoen Q	
'n Stelling	Die eindresultaat van iets	0

Start at Item 1 and administer all items up to age-appropriate cutoff points.		
Age 8: stop after item 30; Age 9-11: stop after item 34		
Age 12-16: stop after item 38; Age 17 and above: administer all items		
Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).		
24. Vermaak:		
Amuseer	Oorweeg	2
Om ander te laat lag met jou optrede	Oordink	
Om besig te bly (die aandag hou van)	Beskou	
Om 'n partytjie (sosiale geleentheid) te hou	Om mense hulleself te laat geniet	
	Om op te tree (sing, dans) vir ander se plesier	
	Om afleiding te verskaf	
	Om gasvry te wees	
Aktiwiteit om plesier te verskaf	Om iemand (jouself) besig te hou Q	1
Genot	Iemand wat ander vermaak	
Bespeel 'n musiekinstrument (sing, dans, vertel grappies) Q	Om mense te laat lag (gelukkig te maak) Q	
'n Komediante, TV of die radio kan jou vermaak	Om op te tree	
'n Vertoning te doen		
Om pret te hê Q	Om voor te sorg	0
25. Beroemd:		

Welbekend wat bo ander uitstaan Welbekende persoon	Baie bekend	Vermaard	Gevierd	Erkend	Berug	Mense	2
Iemand (iets) van wie baie mense weet Iemand wat iets besonder of dapper gedoen het							
Bekend Q Iemand soos 'n sanger soos Elvis of Sinatra Iemand oor wie baie mense gek is (in die media; in die kalklig)	Vernaam		Belangrik		Gewild		1
Mense wat jou handtekening wil hê							
Iemand wat roem het Q Iemand wat in Hollywood bly en 'n groot huis het		Wonderlik Q		Jy is 'n ster Q			0
Almal kyk vir jou op TV							

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).							
26. Onthul:							
Openbaar Blootlê Bekend maak Ten toon stel Om iets wat weggesteek is te toon Om iets aan die lig te bring Openbaar maak Rugbaar maak Om te wys (iets, jouself) Om iets te verklap wat geheim gehou is Oopvlek Ontbloot Ontmasker							2
Ontdek; oopmaak Q Om iets (die waarheid) uit te vind Om iets te vertel Q Om iemand anders van iets te vertel Q Soos verklap 'n geheim, jy vertel die waarheid							1
Om iets na te gaan Om iets te sien wat in die verlede gebeur het							0
27. Eeu:							
Beskryf 100 jaar wat verby is 'n Tydperk van 100 jaar							2
Honderd Q Sekere aantal jare Q Groep jare Q Hoeveelheid tyd Q							1
Ouderdom Q Dekades gelede Q 'n Ander eeu 'n Geslag 25 [enige toename behalwe 100] jaar							0
28. Tradisie:							
Gebruik 'n Manier van dinge doen wat van geslag tot geslag oorgedra word 'n Oorgeërfde (gevestigde, gebruiklike) denkpatoon (dade, optrede, oortuiging) 'n Eeue oue ritueel 'n Waardestelsel wat in die verlede gewortel is 'n Sekere tema of viering wat gereeld plaasvind Iets wat jy vir baie geslagte doen Soos 'n kulturele ritueel, iets wat jy doen omdat jou familie dit gedoen het of die nasie dit doen							2
Gewoonte Ritueel 'n Ou ('n bekende) manier van dinge doen Q Waardes Q Doen jaar na jaar dieselfde ding Iets wat jy een keer 'n jaar doen Q Iets wat oor geslagte heen oorgedra is Q Iets wat jy keer op keer doen Q Dis voorheen gedoen Iets wat nog altyd gedoen word							1
Iets wat jy vier Q Kersfees; Nuwejaarsdag etc. Soos 'n vakansie Q Legende Iets vasgestel Iets wat jy saam met jou familie doen Q Familietradisie							0

<p align="center">Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).</p>	
29. Jubel:	
Bly maak Verheug Om blydskap te ervaar oor 'n gelukkige gebeurtenis of geleentheid Om (baie) gelukkig te wees; om hoogs ingenome te wees Om uiters gelukkig te lyk	2
Geniet Vier Blydskap Genot Viering Geluk Bly; vrolik; opgewonde Q Jy verheug jou in jou sukses Q	1
Uitbasuin Q Om 'n partytjie te hou	0
30. Entoesiasies:	
Geesdriftig Ywerig Gretig Uitbundig Om heelhartig by 'n projek betrokke te raak Opgewonde en gretig oor iets wat ju doen Met afwagting en opgewondenheid Om gemotiveer en opgewonde te wees (gretig, energiek, vurig)	2
Belangstellend Aangetrek Ekstaties Vrolik Om energiek te wees (vol gees) Jy kan entoesiasies oor jou werk (stokperdjie) wees Q Opgewondenheid Opgewonde Opgewonde oor iets	1
Uitgaande Om in die luim te wees Q Baie aktief Q Om baie gelukkig te wees Q Sien daarna uit Q	0

STOP POINT for 8 year olds

<p align="center">Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).</p>	
31. Gekompliseerd:	
Iets wat bestaan uit ingewikkelde dele of aspekte wat moeilik is om te verstaan of te ontleed Nie maklik begrypbaar of verstaanbaar Nie eenvoudig (Baie) ingewikkeld Nie so maklik soos dit lyk nie Ingewikkeld Nie maklik om uit te werk/op te los nie Nie maklik om te verduidelik nie Moeilik om te ontleed of te verduidelik Nie maklik om 'n antwoord te kry nie	2

Moeilik om te verduidelik	(Baie) moeilik	
Nie eenvoudig nie duidelik nie Deurmekaar / nie duidelik gedefinieer nie	Moeilik / nie maklik Verwarrend / bestaande uit verskillende dele	Gekompliseerd Bedrieglik Nie
Kan dit nie regkry / oplos nie Nie verstaanbaar nie	Problematies	Kan dit nie verduidelik nie Sukkel om te doen
32. Impuls:		
Dryfkrag 'n Innerlike krag wat jou iets Skielike drang laat doen (sonder om te dink) 'n Prikkel wat deur 'n spier of senuvesel gelei word	'n Drang vir skielike optrede op die ingewing van die oomblik	'n Gevoel wat jou dwing om iets te doen
'n Skielike gier kry (om iets te doen) (op die ingewing van die oomblik, sonder om te dink) (Instinktiewe; onwillekeurige; onmiddellike) optrede of reaksie Spontaneïteit Q Ingewing van die oomblik Q	'n Vinnige besluit neem Q Drang; stukrag; momentum Q Voortvarend; spontaan Q	Q
Wil iets doen Q	Skielik Q	Jy het dit outomaties (impulsief) gedoen Q

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).		
33. Haastigheid:		
Onbesonnenheid Gou gedoen	In 'n war Snelheid van beweging	Vlugheid Beweeg gou (haastig)
Agterlosigheid Tyd mors	Gou Doen iets sonder sorg (om te dink)	Vinnigheid Spoed Doen iets vinnig
Hoe meer haas hoe minder spoed		
34. Tendens:		
Verloop Hedendaagse beweging 'n Patroon wat herhaal word 'n Beweging na 'n nuwe (of ander) manier van dinge doen	Neiging Iets wat ál gewilder word	Geneigdheid Iets wat 'n algemene patron volg 'n Algemene rigting of patroon
Patroon; fase Q Gier Styl wat almal volg Q	Neiging beteken soos die huidige mode (die jongste "inding") Mode Gewoonte Iets wat almal doen	Gewilde styl Iets wat tydelik en gewild op daardie tydstip is
Wat aan die gebeur is Q	Modeneiging	Om 'n skare te volg Q

'n Tydperk	Gewild Q	Wat gewoonlik vir 'n ruk gedoen word Q	
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STOP POINT for 9-11 year olds

<p>Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).</p>					
35. Onderbroke:					
Periodiek	Dan en wan	Gebeur nie gereeld nie	Spasmodies	Sporadies	2
Sonder sinkronisiteit		Iets wat begin en dan eindig		Elke nou en dan	
Wisselvallig	Onbestendig	Ongereeld	Dan in, dan uit, nie bestendig		
Kom en gaan met tussenposes		Nie deurlopend nie		Met onderbrekings	
Sit tyd tussen-in Q		Soos jou ruitveërs wat op verskillende tye beweeg			1
Onvoorspelbare voorkoms van 'n sekere aksie Q					
Dit gebeur gereeld		Iets kom tussen ander dinge Q		Verspreid Q	0
Tussen-in; in die middel Q		'n Pouse; 'n breuk Q		Wisselvallige reënval	
36. Deernis:					
Jammerte	Empatie	Simpatie, verbind jou gevoelens met 'n ander			2
Genade / medelye hê		Droefheid voel saam met / vir 'n persoon			
Droefheid of jammerte aangewakker deur die nood van 'n ander					
Liefdevolle besorgdheid Q – welwillendheid in die wydste sin van die woord					
Voel iets/voel vir ('n ander persoon, iemand) [sonder aanduiding van besorgdheid]					1
Jammer	Verdriet	Omgee	Gevoel van omgee	Besorgdheid	
Teerheid Q – soort van soos 'n moederlike gevoel		Vergifnis		Om te troos	
Bedagsaamheid Q	Omgee vir iemand Q	'n Gevoel Q	Gaafheid Q		0
Emosie / opregte, sterk emosie Q		Diep smagting daarna om lief te hê			
Verdraagsaamheid	Liefde	Hartstogtelik			

Start at Item 1 and administer all items up to age-appropriate cutoff points.
Age 8: stop after item 30; Age 9-11: stop after item 34

Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).				
37. Parmantig:				
Onvanpas Voorbarig Onbeskof	Gebrek aan etiket Astrant Minagtend	Onbeskaamd Vrypostig Ongeskik	Onvanpas en oneerbiedig Iets wat nie gepas is nie Oneerbiedig	2
Aanstootlik; ongehoorsaam Q Lastig Q Iemand wat op ander se senuwees werk Bysaak; onbeduidend; onbelangrik Q Opdringerig; bemoeisiek Q Nie reguit nie Q Nie 'n baie oulike mens nie Q Onnodig Q Sarkasties en snedig Vars Hou nie met die huidige onderwerp verband nie				1
Dwaas	Aanmatigend Q	Verwaand	Slimjan	0
38. Kolonie:				
'n Land wat aan 'n ander land behoort 'n Grondgebied wat aan 'n ander regering ondergeskik is 'n Nedersetting van mense wat hulle in 'n nuwe stuk wêreld of op 'n nuwe plek vestig 'n Groep mense wat vir 'n gemeenskaplike oogmerk of doelwit saamstaan 'n Kolonie vir 'n groep diere of mense wat dieselfde sosiale struktuur het				2
'n Groep van byna enige soort organisme – miere, bye Q – wat in gemeenskap leef 'n Groep mense wat dieselfde belange het Q 'n Gekoloniseerde gebied 'n Gebied, nedersetting of gemeenskap waarbinne mense leef				1
'n Dorp, dorpie of buurt Die eiendom van 'n ander land Q		'n Groep mense, diere, miere of bye Q 'n Kommune Q		0




STOP POINT for 12-16 year olds

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).					
39. Voorbarig:					
Parmantig	Astrant	Vermetel	Steek grense oor	Veroorloof vryhede	2
Uitermatig reguit of vol selfvertroue				Te vrypostig of voorbarig	
Aanmatigend; aanmatig Q	Maak eie afleidings		Hoogmoedig	Arrogant	1
Aanstellerig; verwaand; beterweterig Q	Neem iets as vanselfsprekend aan		Iemand wat iets probeer wees wat hy/sy nie is nie Q		
Het vooropgestelde idees oor iets		Om aan te neem; vat	vinnige raaiskote Q		0
Angstig Q	Gewaagd Q	Veeleisend Q	'n Snob Q		
40. Formidabel:					
Skrikwekkend	Ontslagwekkend	Intimiderend	Dreigend	Onheilspellend	2
Is 'n moeilike, uitdagende of oorweldigende struikelblok		Verskriklik	Vreeslik		
Afskuwelik	Yslik	Aaklig	Skrikaanjaend	Moeilik om te oorwin of te oorkom	1
Indrukwekkend		Laat die indruk dat dit baie krag en mag het			
Moeilik; swaar; sterk;	vreesaanjaend Q	Kragtig Q	Iets om te respekteer		0
Veeleisend; moeisaam; vermoeiend Q		Mededingend; sterk Q		'n Teenstander met meerdere vaardighede as jouself Q	
Oorweldigend;uitdagend Q		Oorweldigend;uitdagend Q		Waardige teenstander Q	0
'n Formidabele intellek		Waardig; wonderlik Q			
Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 30; Age 9-11: stop after item 34 Age 12-16: stop after item 38; Age 17 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 5 consecutive scores of 0).					
41. Peins:					
Besin	Herkou	Oordink	(Om deeglik) te oorweeg	Oor iets nadink	2
Om (herhaaldelik) daaroor te dink		Oor iets maal		Mymer	
Verwerk Q	Om erg bekommerd te wees (oor goed wat nie bestaan nie) Q			1	
Om by iets stil te staan Q	Om daaroor te dink Q	Iets met dink te doen Q			
'n Dier wat gras eet (wat meer as een maag het)					
Om te kerm oor goed wat in die verlede gebeur het					
Om oor iets te praat Q		Om iets te onthou	Ek herkou my belasting Q		0
42. Tirade:					

'n Lang, emosionele toespraak wat deur woede of afkeuring gekenmerk word Om iemand verbaal aan te val 'n Geraas en geskel 'n Woord-woedebui 'n Vinnige stortvloed woorde, gewoonlik die een of ander eienskap (soos straf) daarvan Met woorde striem 'n Driftige toespraak 'n Opruiende toespraak 'n Vyandige woordevloed Om iemand uit te vloek, in te klim	2
'n Verbale herrie 'n Geskel Om te verskree 'n Uitbrander (raas) raas kry 'n Stortvloed woorde 'n (Lang) preek Twis	1
'n Drifbui 'n Woedeaanval Om jou humeur te verloor 'n Emosionele bevlieging Amok 'n Gedoente Opskudding Om 'n kabaal op te skop Om siedend van woede te wees 'n Uitbarsting Q 'n Baasspelerige persoon Q Wat met geweld en woede vereenselwig word, om menslike en natuurlike beheersing oorboord te gooi	0

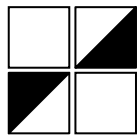
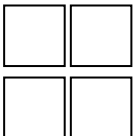
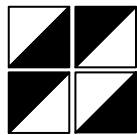
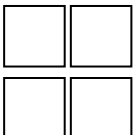
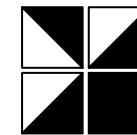
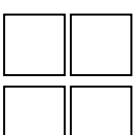
Total Score	/80
Number of Correct Items Beyond Discontinuance Point	/37
Number of Correct Points Beyond Discontinuance Point	/74
Total Score for Age 8 (Items 1 to 30)	/56
Number of Correct Items Beyond Age 8 Cutoff Point	/12
Number of Points Beyond Age 8 Cutoff Point	/24
Total Score for Ages 9 to 11 (Items 1 to 34)	/64
Number of Correct Items Beyond Age 9 to 11 Cutoff Point	/8
Number of Points Beyond Age 9 to 11 Cutoff Point	/16
Total Score for Ages 12 to 16 (Items 1 to 38)	/72
Number of Correct Items Beyond Age 12 to 16 Cutoff Point	/4
Number of Points Beyond Age 12 to 16 Cutoff Point	/8
Total Score for Ages 17 and above (Items 1 to 42)	/80

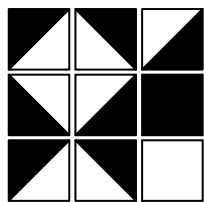
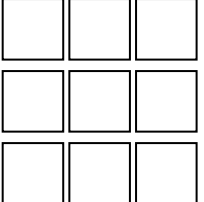
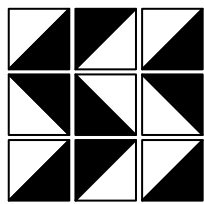
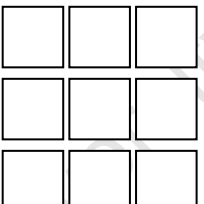
WASI Block Design

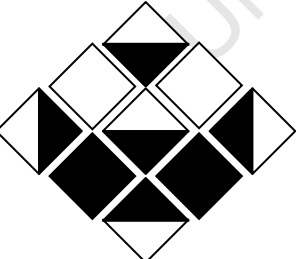
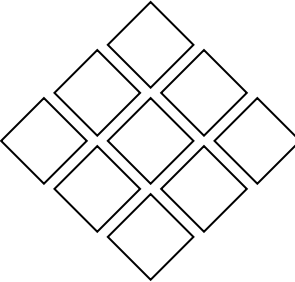
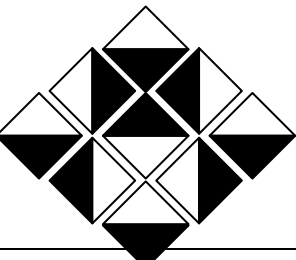
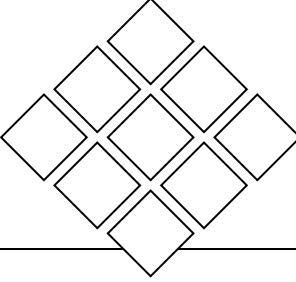
Start: #3 (8yrs: #1)	Reverse: If 0 or 1 on #3 or #4, do #2 (then #1)		Discontinue: after 3 consecutive 0's
Design	Incorrect Design	Time seconds	Score
(1)	Trial 1: <ul style="list-style-type: none"> demo using examiner's blocks leave model intact 		(Trial 2): <ul style="list-style-type: none"> Leave examiner's model intact Demo using examinee's blocks Scramble demo
		Trial 1 	(Trial 2) 
	Trial 1: <ul style="list-style-type: none"> demo using examiner's blocks leave model intact 		(Trial 2): <ul style="list-style-type: none"> Leave examiner's model intact Demo using examinee's blocks

(2)		Trial 1	(Trial 2)	/ 60"	<ul style="list-style-type: none"> Scramble demo Trial 1 ✓ in 60" = 2 Trial 2 ✓ in 60" = 1 X = 0
BEGIN	Trial 1: <ul style="list-style-type: none"> demo using examiner's blocks leave model intact 			(Trial 2): <ul style="list-style-type: none"> Leave examiner's model intact Demo using examinee's blocks Scramble demo 	
	3		Trial 1	(Trial 2)	/ 60"
4	Trial 1: <ul style="list-style-type: none"> Expose design card Demo using examinee's blocks Scramble demo 			(Trial 2): <ul style="list-style-type: none"> Expose design card Demo using examinee's blocks Scramble demo 	
		Trial 1	(Trial 2)	/ 60"	Trial 1 ✓ in 60" = 2 Trial 2 ✓ in 60" = 1 X = 0

Discontinue: after 3 consecutive 0's				
Designs 5-13: no demonstrations; use stimulus card only				
	Design	Incorrect Design	Time seconds	Score
5			/ 60"	X = 0 21 - 60" = 4 16 - 20" = 5 11 - 15" = 6 1 - 10" = 7
6			/ 60"	X = 0 21 - 60" = 4 16 - 20" = 5 11 - 15" = 6 1 - 10" = 7

7			/ 60"	$X = 0$ $21 - 60'' = 4$ $16 - 20'' = 5$ $11 - 15'' = 6$ $1 - 10'' = 7$
8			/ 60"	$X = 0$ $21 - 60'' = 4$ $16 - 20'' = 5$ $11 - 15'' = 6$ $1 - 10'' = 7$
9			/ 60"	$X = 0$ $21 - 60'' = 4$ $16 - 20'' = 5$ $11 - 15'' = 6$ $1 - 10'' = 7$

Discontinue: after 3 consecutive 0's				
	Design	Incorrect Design	Time seconds	Score
10			/ 120"	$X = 0$ $66 - 120'' = 4$ $46 - 65'' = 5$ $31 - 45'' = 6$ $1 - 30'' = 7$
11			/ 120"	$X = 0$ $76 - 120'' = 4$ $56 - 75'' = 5$ $41 - 55'' = 6$ $1 - 40'' = 7$

12			/ 120"	$X = 0$ $76 - 120'' = 4$ $56 - 75'' = 5$ $41 - 55'' = 6$ $1 - 40'' = 7$
13			/ 120"	$X = 0$ $76 - 120'' = 4$ $56 - 75'' = 5$ $41 - 55'' = 6$

				1 - 40" = 7
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TOTAL RAW SCORE	/ 71
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TOTAL ITEMS CORRECT BUT OVER TIME LIMIT	/ 13
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WASI Similarities

<p>Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).</p>
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<p>Item 1: Instructions Say: Ek gaan vir jou sekere groepe prente wys. Vir elke groep, ek wil hê jy moet vir my sê watter prent in die onderste ry is die meeste soos die prente in die boonste ry. Expose Item 1 and say: Kyk na hierdie prente. Watter een hier (point to pictures in bottom row) is soos hierdie (point to pictures in top row). Wys my. If correct, say: Ja, hierdie is almal vierwiel motors (point to pictures in top row) en hierdie is ook 'n vierwiel motor (point to picture of bus). If incorrect, say: Kyk hier bo (point to pictures in top row of bus). Hierdie is almal vierwiel motors wat mense bestuur op 'n pad of hoofweg. Hierdie een (point to the bus picture) is soos hulle, want dit is ook 'n vierwiel motor wat mense bestuur op 'n pad of hoofweg.</p>
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1	Vierwiel motors	Skip	BUS	Fiets	Trein	0 1
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<p>Items 2 -4: Instructions: Say: Kyk nou na hierdie prente. Watter een hier (point) is soos hierdie (point) ?</p>						
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2	Eetgereedskap	LEPEL	Pan	Bakkie	Blikoepmaker	0 1
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						0
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3	Klere	Springtou	Bal	SKOENE	Kruite	1
4	Vrugte	PIESANG	Boontjie	Pampoen	Aartappel	0 1

<p align="center">Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).</p>						
<p align="center">Items 5-26: Instructions</p> <p>Say: In die volgende afdeling, ek gaan twee woorde vir jou lees. Ek wil hê jy moet vir my vertel hoe hulle dieselfde is. Byvoorbeeld, as ek vra "Hoe is koekies en lekkers dieselfde", jy sal sê, "hulle is albei peuselhappies of kos".</p>						
5. Rooi – Blou:						
[’n Antwoord dat albei kleure is]					Kleur	2
Lig (donker, helder) kleure		Primêre (basiese) kleure	Deel van die kleurspektrum			
Hulle is albei baie kleurvol Q		Hulle is albei simbole van Onafhanklikheidsdag		Albei is vetkryte		1
Albei kan gebruik word om pers (ander kleure) te maak Q		Albei is in die reënboog		Hulle is albei op die (Amerikaanse) vlag Q		
Albei is in die reënboog		Mense gebruik dit in verf Q		Albei is mooi Q		0
Helder (donker) Q						
6. Sirkel – Vierkant:						
[’n Antwoord dat albei vorms of figure is]					Meetkundige simbole (ontwerpe)	2
Buitevande om iets		Vorms	Figure	Diagramme	Meetkundige voorwerpe	
Word in wiskunde (meetkunde) gebruik Q		Simbole; ontwerpe Q		Het dimensies		1
Jy skryf hulle		Formasies Q		Hulle het gate in die middel		0
7. Druie – Aarbeie:						
[’n Antwoord dat albei vrugte is]					Vrugte	2
Kos Q		Albei is gesond	Albei gee energie	Albei is sappig (soet)	Jy eet dit	1
Albei het kalorieë		Het pitte	Mens pluk dit	Kan sap of konfyt daarvan maak		
Dieselfde kleur		Albei is rooi		Proe dieselfde (of verskillend) Q		0

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).			
8. Koei – Beer:			
[’n Antwoord dat albei diere soogdiere of dierasies is]		Viervoetige diere	2
Soogdiere	Diere	Lewende goed	Albei lewe
Albei in die natuur	Albei het ’n pels (is harig)	Albei het velle	1
Albei het (loop op) vier pote	Albei asem suurstof in (het babas)		
Hulle is gevaarlik (groot)	Albei het ore (ruggrate, pote)		0
Albei loop (eet) Q	Albei se kleure is dieselfde		
9. Vliegtuig – Bus:			
[’n Antwoord wat albei as vervoermiddels klassifiseer]		Maniere om te reis	2
Massa-(gemeenskaps-) vervoer	Voertuie	Ryding	Vervoermiddels
Albei vervoer passasiers	Jy kan albei bestuur	Vervoer die publiek	1
Kan in albei ry (reis)	Neem mense van plek tot plek	Kan daarop ry Q	
Plekke gaan		Jou na plekke bring	
Albei beweeg Q	Van metaal gemaak	Albei het ’n enjin (wiele, motor)	0
10. Hemp – Baadjie:			
[’n Antwoord dat albei kledingstukke is]		Kleredrag	Klere
Albei kledingstukke		Deel van jou uitrusting	2
Albei hou jou warm	Iets om aan te trek (te dra) Q	Albei bedek jou liggaam	1
Word aan die bokant van jou lyf gedra Q		Albei van lap gemaak	
Beskerm jou liggaam (teen koue en hitte)			
Hulle het moue (knope, krae)	Baadjie word oor die hemp aangetrek		0
11. Pen – Potlood:			
[’n Antwoord dat albei skryfgoed is]		Skryfgereedskap	Skryfvoorwerpe
Kantoorvoorraad (skool, kuns) Q	Skryf	Albei skryf (teken, merk)	Teken
Albei het skerp punte (uitveër) Q		Albei is lank en dun	0

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).			
12. Bord – Bakkie:			
[’n Antwoord dat albei eetgerei of kombuisware is]	Eetgerei (items; houers)		2
Albei van porselein	Skottelgoed	Eetstel	
Toebehore	Kombuistoebehore	Deel van ’n eetservies	
Mens kan uit albei eet	Om kos in te bedien (te bêre) Q	Gebruik as bêregoed	1
Gebruik hulle vir etes (kos) Q	Houers vir kos	Kan goed in hulle sit	
Silwergoed Q	Word eenders gebruik	Eet Q	0
13. Liefde - Haat:			
[’n Antwoord dat albei gevoelens, emosies of emosionele reaksies is]			2
Verhoudings	Maniere hoe jy kan voel (oor iemand)	Albei emosies	
Uitdrukkingsvorme	Dinge wat jy aan iemand kan doen	Houdings	1
Kan passievol wees Q		Mens kan dit voel Q	
Dade	Hulle het albei met twee mense te doen		0
Maniere hoe jy ander mense hanteer Q			
14. TV – Koerant:			
[’n Antwoord dat albei kommunikasiemiddele is]	(Vorm deel) van die media		2
(Vorme van) kommunikasie	Vermaak	Opvoedkundige middele	
Inligtingsbronne		Inligting	
Maniere van sosialisering	Nuus; hulpbronne Q	Mens kan albei lees (kyk na)	1
Mens kan van albei leer; is albei opvoedkundig		Albei het prentjies en woorde	
Albei bring jou die nuus (die weer, stories, wat gebeur het)			
Het advertensies		Albei is visueel	
Kan albei koop		Mens gebruik dit baie	0
15. Glad – Grof:			
[’n Antwoord dat albei met tekstuur te doen het]	Beskryf ’n oppervlak (afwerking)		2
Hoe sekere materiaal voel	Albei teksture	Hoe dinge voel	
Tassintuig; hoe iets voel as mens daaraan raak		Sensasie	
Kenmerke (toestand) van ’n oppervlak		Oppervlakke (van iets)	
Albei het met voel (aanraking)	Mens kan albei voel (aanraak) te doen		1
Hoe ’n padoppervlak kan wees	Voel; aanraak Q	Veltoestand	
Albei is beskrywende woorde Q		Op skuurpapier Q	0
Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items			

Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).			
16. Skouer – Enkel:			
[’n Antwoord dat albei gewrigte is]	Albei is gewrigte	Koeëlgewrigte	2
Anatomie	Verbind ledemate Q	Liggaamsdele	Beenverbindings
Albei het sokke Q	Albei is bene Q	Verbindings in beenstruktuur	
Albei buig (beweeg, roteer, draai)	Dinge op jou liggaam Q	Jy het twee van elk	0
Albei ondersteun jou liggaam Q	Kan gebreek word Q	Albei is hard (sterk) Q	
17. Sit – Hardloop:			
[’n Antwoord dat albei aksies of bewegings is]	Bewegings	Werkwoorde	2
Aksies wat jy (mense) doen; aktiwiteite	Maniere waarop jy jou liggaam beweeg		
Liggaamshouding; posisies waarin die liggaam kan wees	Albei werkwoorde Q		1
Jy liggaam beweeg; beweging	Verbrand met albei kalorieë		
Iets wat jy met jou liggaam kan doen; goed wat mense (jy) doen			
Maniere om energie te gebruik; verg inspanning			
Albei is oefening	Opdragte	Liggaamstaal Q	Gebruik jou bene vir albei
18. Kind – Volwassene:			
[’n Antwoord dat albei fases van menselike ontwikkeling is]			2
Fases van die lewe (menslike ontwikkeling)	Fases van die lewensiklus		
Ouderdomsgroepe	Tydvak in die mens se lewe		
Geslagte	Vorms van lewe	Albei leef	Mense
Albei groei (leer dinge)			Die mensdom
			Ouderdom Q
Albei het arms en bene (dieselfde gebou)			Soogdiere
Familie			Kind word volwassene Q

Start at Item 1 and administer all items up to age-appropriate cutoff points.

Age 8: stop after item 20; Age 9-11: stop after item 24

Age 12 and above: administer all items

Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).

19. Stoom – Wolk:

[’n Antwoord dat albei waterof damp is] Vorms van kondensasie (klamheid) Water, vorms van water (in gasfase)			Vorms van vog (neerslag) Dampe Verdamping	2
Albei van gas gemaak; gasse (Albei is vol) vog	Q Albei is deel van die atmosfeer	Albei sweef in die lug (styg op) Albei is nat (klam) Mis		1
Albei mistig (rokerig, wasig, dynserig) Albei is wit (grys, dieselfde kleur)		Jy kan nie deur hulle sien nie		0
20. Voël – Blom:				
[’n Antwoord dat albei lewende dinge is] Albei lewend; het lewe	Lewende dinge	Biologiese organismes Albei lewe (buite)		2
(Deel van) die natuur Het lug/water nodig om te oorleef	Albei kan doodgaan (groei) Kan voortplant	Wildspesies Albei kom uit in die lente		1
Word buite gekry Deel van die bestuivingsproses		Is mooi (kleurvol, delikaat, vry) Deel van die voedselketting		0

STOP POINT for 8 year olds

<p>Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).</p>				
21. Minder – Meer:				
[’n Antwoord dat albei met hoeveelheid te doen het] Beskrywings (uitdrukkings) van hoeveelheid (hoeveel, hoe baie) Relasiestelsel	Mates Maateenhede	Maateenhede Gedeeltes van iets		2
Albei ’n graad an iets Gebruik om te vergelyk (dui aan, beskryf) hoeveelhede (waardes, somme) In wiskunde gebruik	Albei vergelykende woorde Q Meet volume (massa)	Albei sê hoeveel Q Telwyse Hoeveelhede; aantalle Q Albei meet Q		1

Albei is iets wat jy het	Vertel jou iets	0
22. Foto – Lied:		
[’n Antwoord dat albei kunsvorms is] (Vorms van) uitdrukking	Kunsuitdrukking (Vorms van) vermaak	2
Kommunikasiemiddel Vertel ’n storie; het betekenis; beskryf iets Manier om gevoel te wys	Lok emosies (herinneringe) uit Maniere om dinge te onthou Voorstellings van iets	1
Vang ’n oomblik (gevoel, gedagte) vas	Deur mense gemaak; jy geniet albei	
Ontspanning	Jy kan albei sien	0

<p>Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).</p>		
23. Vrede – Oorlog:		
[’n Antwoord wat albei as die toestand van ’n nasie of sosiale stemming klassifiseer] Interaksie tussen twee groepe Stand van politieke interaksie (sosiale stemming, wapens) Beskrywings van verhoudings tussen nasies of mense Toestande (stand, siklusse, fases) van ’n nasie (land, wêreld)		2
Toestande (stand) van geweld Interne toestande (verhoudings) Het met politiek te doen (lande) Maniere om iets te skik Hoe mense (lande) oor die weg kom; manier om mense te verenig Raak mense se lewens	Emosies (buie) van mense Gebeur met ’n land (wêreld, samelewing) Situasies, stand van sake Deel van geskiedenis (lewe)	1
Militêre gebeure	Die een volg gewoonlik op die ander	0
24. Kapitalisme – Sosialisme:		
[’n Antwoord wat albei klassifiseer as iets wat met ekonomiese of politieke ideologieë te doen het] Ideologieë (oortuigings) om ’n land te regeer Vorms van ekonomiese status (stelsels, teorieë) Regeringsvorme (bewind, leierskap)	Politieke stelsels (Politieke) ideologieë	2
Politiek; polities Albei het met die ekonomie te doen (regering, sameleing, politiek, mense) Deel van regering	Geldstelsel Oortuigings Politieke partye	1
Regeringsprogramme	Hiërargieë	0

STOP POINT for 9-11 year olds

Start at Item 1 and administer all items up to age-appropriate cutoff points. Age 8: stop after item 20; Age 9-11: stop after item 24 Age 12 and above: administer all items Scoring: Score items up to discontinuance point (i.e. 4 consecutive scores of 0).		
25. Tradisie – Gewoonte:		
[‘n Antwoord dat albei roetine of gedragspatrone is] Gedragspatrone	Patrone om te volg Roetine	2
Iets wat jy gewoonlik doen (gereeld, keer op keer oor ‘n tydperk) Q Dinge wat jy oor jare vorm Albei word herhaal (gewortel in die verlede, kan verbreek word) Outomatiese manier van dinge doen Iets wat jy gewoon is om te doen	Dele van kultuur (gebruike, alledaagse lewe) Q Lewenswyse Q Goed wat mense volg	1
Manier om iets te doen Q Dele van die menslike natuur	Dinge wat jy aanhang Q Iets wat oorgeërf is Iets wat deurlopend gedoen word	0
26. Vryheid – Wet:		
[‘n Antwoord dat albei reëls of grense is waarvolgens ‘n mens lewe] Beperkings (wat op ons optrede geplaas word) Reëls (grense) waarvolgens mens leef Beginsels wat ‘n samelewing regeer Vereis vir die beskawing om te werk	Leiding Lewenstandaarde Konsepte wat vir die samelewing geskep is Beperkings wat mense opgelê word Deel van demokrasie; regs-konsepte	2
Het reëls (regulasies, beperkings) Hou met orde verband (regte van mense, beheer, regstelsel) Deur die grondwet verleen	Jou toelaat om iets te doen Regering Q Beoefen deur mense Dinge waarby mens hou (mee moet saamleef)	1
Regstellings	Die een beperk die ander	0

Total Raw Score	/48
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WASI Matrix Reasoning

Administer items **A** and **B**. Proceed with item **1** (8 yrs) / **5 & 6** (9-11yrs) / **7** and **8** (12 yrs+).
If either item **5** or **6** (9-11yrs) / **7** or **8** (12+yrs) is **incorrect**, administer items **6–1**(reverse)
until the examinee obtains perfect scores on **2 consecutive items**.

Credit items 1 -6 if not administered.

Discontinue after **4 consecutive scores of 0** or **4 scores of 0 on 5 consecutive items**.

[0 0 0 0] // [0 1 0 0 0] // [0 0 0 1 0] // [0 0 0 1 1 0 1 0 0 0] //

Item	Response Options	Score	Item	Response Options	Score
A	1 2 3 4 5 ?		18	1 2 3 4 5 ?	0 1
B	1 2 3 4 5 ?		19	1 2 3 4 5 ?	0 1
1	1 2 3 4 5 ?	0 1	20	1 2 3 4 5 ?	0 1
2	1 2 3 4 5 ?	0 1	21	1 2 3 4 5 ?	0 1
3	1 2 3 4 5 ?	0 1	22	1 2 3 4 5 ?	0 1
4	1 2 3 4 5 ?	0 1	23	1 2 3 4 5 ?	0 1
5	1 2 3 4 5 ?	0 1	24	1 2 3 4 5 ?	0 1
6	1 2 3 4 5 ?	0 1	25	1 2 3 4 5 ?	0 1
7*	1 2 3 4 5 ?	0 1	26	1 2 3 4 5 ?	0 1
8	1 2 3 4 5 ?	0 1	27	1 2 3 4 5 ?	0 1
9	1 2 3 4 5 ?	0 1	28	1 2 3 4 5 ?	0 1
10	1 2 3 4 5 ?	0 1	29	1 2 3 4 5 ?	0 1
11	1 2 3 4 5 ?	0 1	30	1 2 3 4 5 ?	0 1
12	1 2 3 4 5 ?	0 1	31	1 2 3 4 5 ?	0 1
13	1 2 3 4 5 ?	0 1	32	1 2 3 4 5 ?	0 1
14	1 2 3 4 5 ?	0 1	33	1 2 3 4 5 ?	0 1
15	1 2 3 4 5 ?	0 1	34	1 2 3 4 5 ?	0 1
16	1 2 3 4 5 ?	0 1	35	1 2 3 4 5 ?	0 1
17	1 2 3 4 5 ?	0 1	Total Raw Score		/35

APPENDIX D

ENGLISH CHILD CONSENT, PARENT CONSENT AND INFORMATION LEAFLET

RESEARCH PROJECT NUMBER: NO8/08/227

RESEARCH PROJECT TITLE: *Comparing the utility of South African adaptations of the Wechsler Abbreviated Scale of Intelligence, the Controlled Oral Word Association Test and the Boston Naming Test for English, Afrikaans and Xhosa-speaking 8-25 year olds in the Western Cape Province.*

INVESTIGATORS: Mrs H. Ferrett (PI), Dr P. Carey, Dr K. Thomas

Dear Volunteer

Why is this study being done?

A research study is a way to learn more about something. A team of researchers from the Universities of Stellenbosch and Cape Town are trying to learn more about the ways in which children's brains develop. Many of the tests (called neuropsychological tests) that we use come from other countries. We want to be able to use these tests in South Africa, for children who speak English, Afrikaans or Xhosa.

Who can take part in the study?

Learners who are at school, older than 8 years and have passed Grade 1 may take part in this study. If you speak English, Afrikaans or Xhosa as your home language, you may take part. We will ask your parent/guardian to fill in a form for us which will tell us if you have ever had any serious medical problems. If you have had serious problems with your health or schooling, you will not be able to take part in this study, but you may be able to take part in some of our other studies.

What will happen to you if you agree to take part in this study?

If you agree to take part in the study, a researcher will visit you twice at your school during school hours. At the first visit, the researcher will explain everything to you and answer any questions or concerns you may have. You will be asked to fill in a form to give us some information about yourself. The researcher will help you to complete the form if you need help. You will be given a form to take home for your parent/guardian to read and to sign if they agree to let you take part. If they agree, they will also be asked to fill in a short questionnaire giving us some information about your medical history and where you live. Once you have returned the forms to the school, the researcher will arrange a time and date for you to be tested. At the second visit, you will be tested by yourself in a quiet room in your school. You will be asked to answer some questions and do some activities like naming things or describing things to us. You do not have to study for the "test" and you are not expected to get everything correct. All you will be asked to do is to try your best. The test will take about one hour. The tests will not hurt you in any way. You may feel a bit tired during the tests, so the researcher will allow you to take short breaks. If you feel too tired to complete the tests on the second visit, the researcher will arrange to finish the test with you on another day.

What will happen to the information you give us?

If you agree to take part, the researcher will use a code for the information about you. This means that the information that you give us will be kept private and your name will not be used.

Do you have to pay to take part?

You don't have to pay anything to take part in this study. If you fill in all the forms and complete the tests, we will give you a gift voucher for R50. This is our way of thanking you for taking part in the study.

Do you have to take part in the study?

You do not have to take part in the study. It is up to you and your parent/guardian to decide whether you want to take part or not. If you want to take part, we would like you and your parent/ guardian to write your names and signatures on this form. If you sign the papers now and then decide to change your mind later, all you have to do is to tell us that you don't want to take part anymore. No-one will get cross with you if you decide not to take part, or if you agree to take part and then change your mind later.

What if you have any questions?

If you have any questions about this study, you may ask the researcher about them during one of the visits, or later on. You can phone Mrs Alexander on 021 938 9771 or 073 548 3928 between 08h30 and 16h30 on weekdays if you have any more questions.

If you (the learner) agree to take part in this study and you understand what the researcher has explained to you, please write and sign your name below:

Child's name: _____

Child's signature: _____

Date: _____ **Place:** _____

If your parent or guardian has read this form and allows you to take part in the study, please ask him/her to sign his/her name below:

Parent (or guardian's) name: _____

Parent (or guardian's) signature _____

Date: _____ **Place:** _____

The researcher must sign his/her name below to confirm that he/she has explained the study to you in your home language and answered the questions you have about it:

Researcher's name: _____

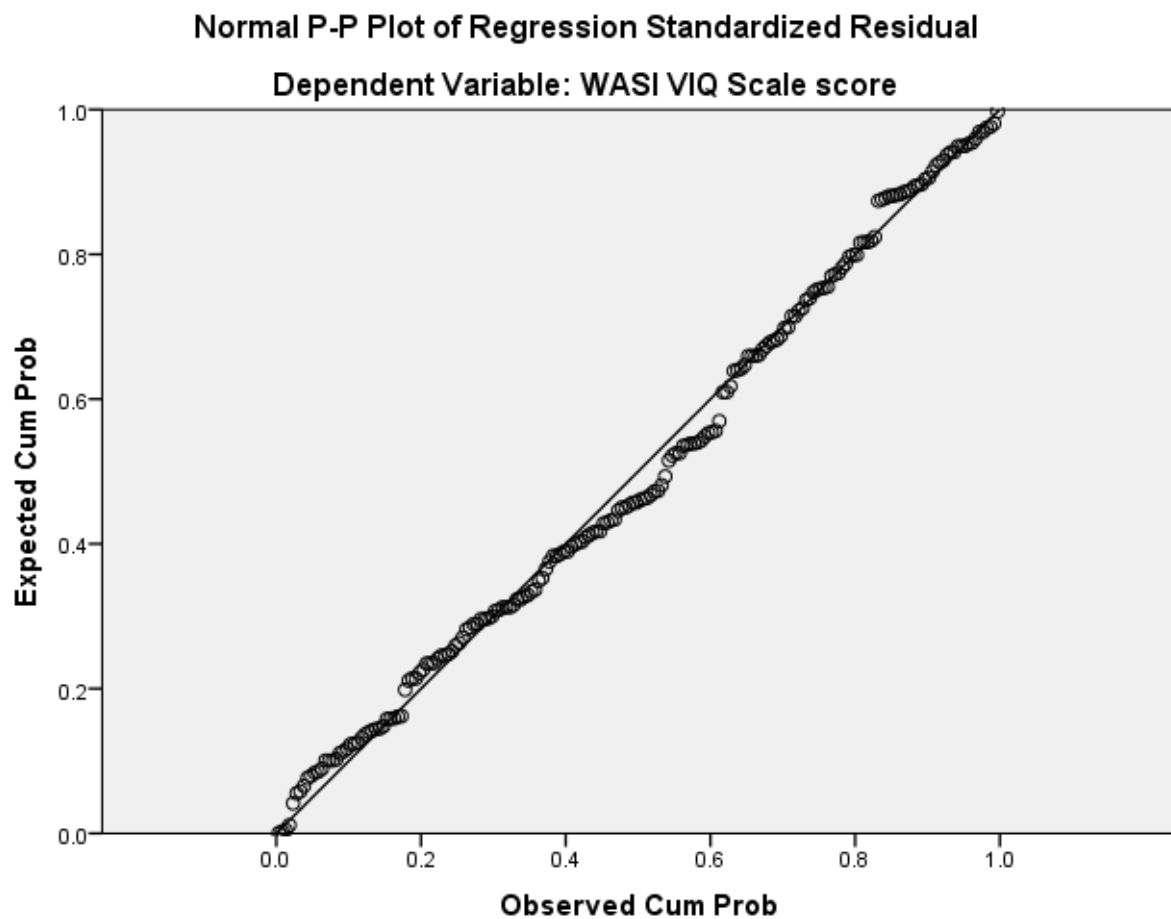
Researcher's signature: _____

Date: _____ **Place:** _____

APPENDIX E

Table E1*Hierarchical Regression Model I: Diagnostic data – redundancy coefficients*

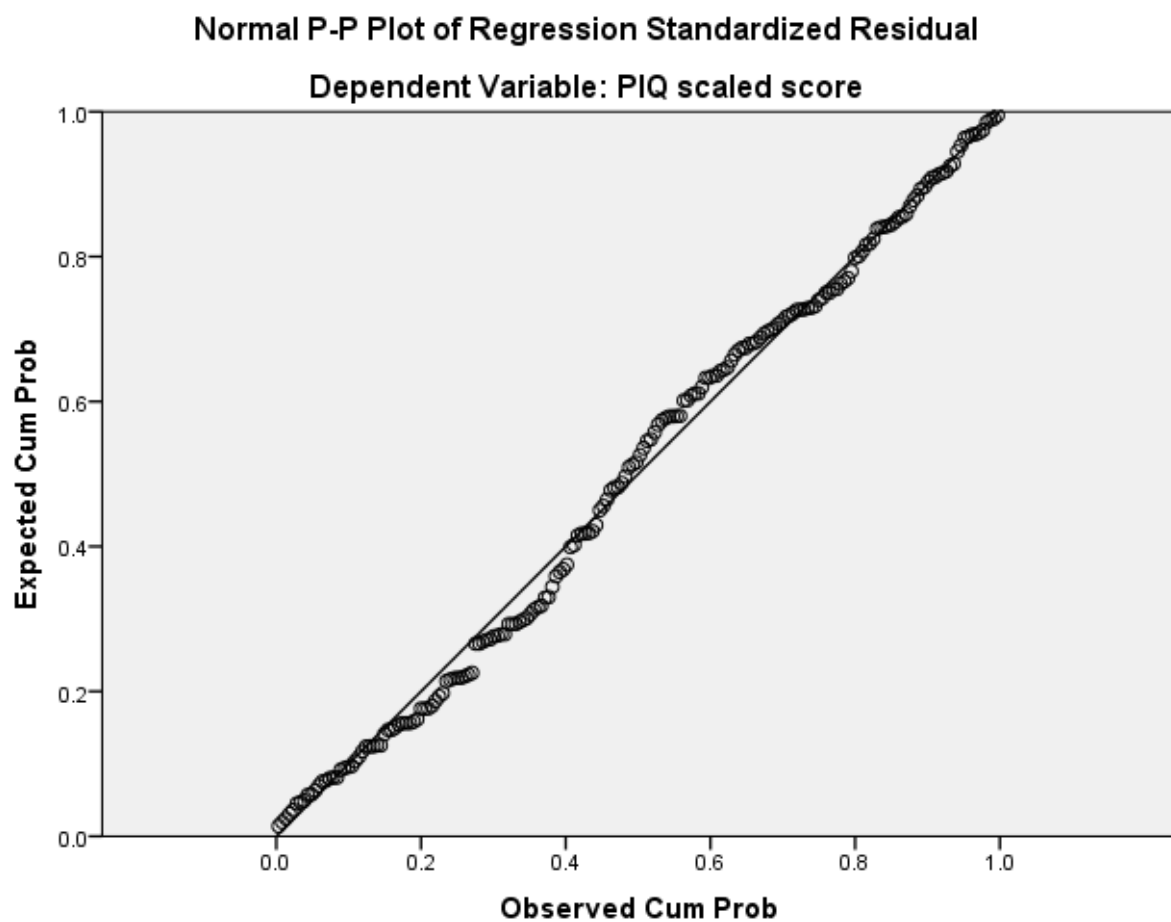
Predictor	Beta in	Partial correlation	Part correlation	Tolerance
Language	0.53	-0.48	0.44	0.92
SES	0.29	0.17	0.11	0.82
Quality of education	0.29	0.14	0.14	0.84

*Figure E1.* Normal probability plot of residuals for final regression model

APPENDIX F

Table F1*Hierarchical Regression Model II: Diagnostic data – redundancy coefficients*

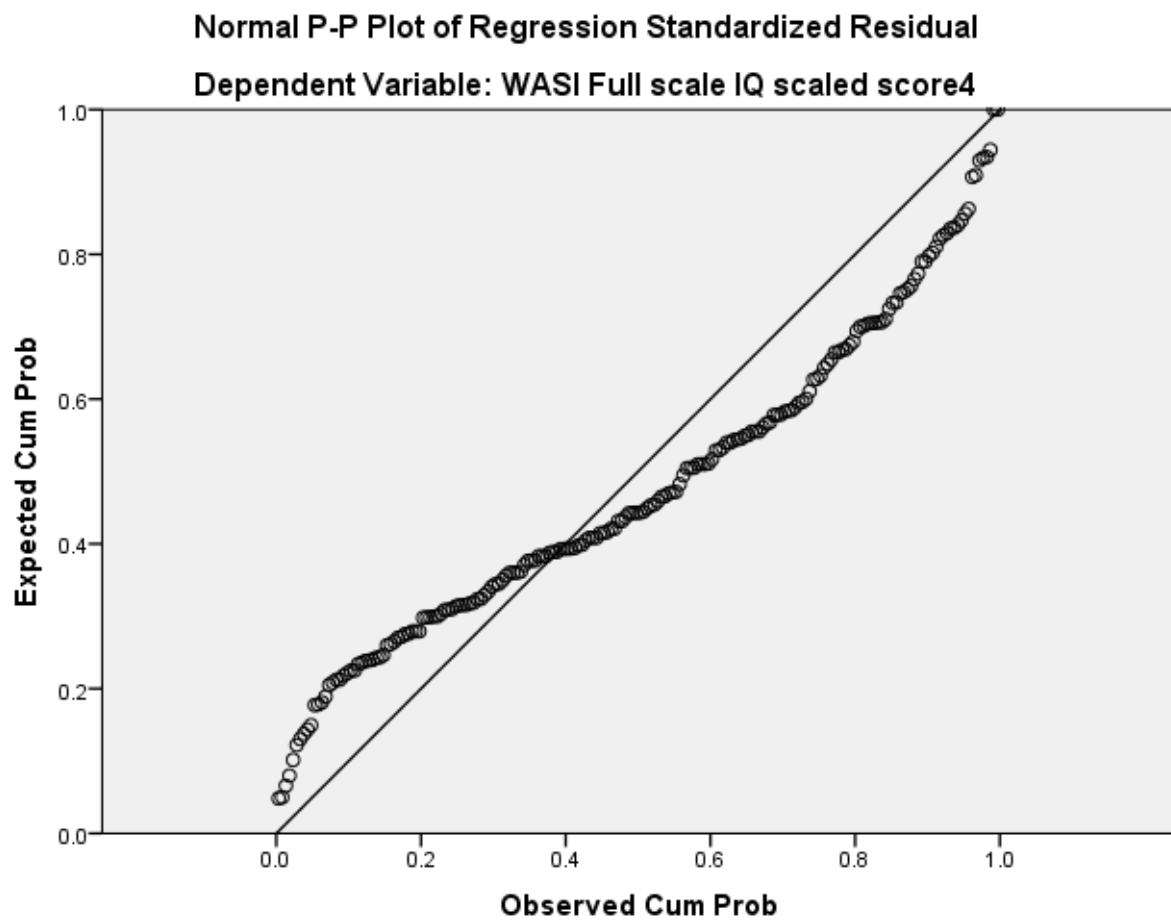
Predictor	Beta in	Partial correlation.	Part correlation	Tolerance
Language	-0.28	-0.23	-0.22	0.92

*Figure F1.* Normal probability plot of residuals for final regression model

APPENDIX G

Table G1*Hierarchical Regression Model III: Diagnostic data – redundancy coefficients*

Predictor	Beta in	Partial correlation	Part correlation	Tolerance
Language	-0.33	-0.30	-0.30	0.92

*Figure G1.* Normal probability plot of residuals for final regression model