CHAPTER 1
INTRODUCTION

Paediatric Occupational Therapists all over the world use standardized assessments to determine a child's eligibility for therapy services, document their status, determine progress in therapy and assist in programme planning\(^{(1)}\). A standardized assessment is a precise measure of performance in a specific area\(^{(1)}\). Results of these assessments are often required by funding agencies and insurance providers since it can assist to decide eligibility for occupational therapy intervention\(^{(1)}\). This study focuses on one of the standardized assessments used to measure performance in visual-motor integration. The term visual-motor integration does not only refer to the integration of spatial input as assessed by the reproduction of geometric forms, but also includes the interaction of visual skills, visual-perceptual skills and motor skills\(^{(2,3)}\). The standardized assessment used as part of this study however uses the form reproduction aspect of visual-motor integration as a means to assess this skill. Although the development of hand skills as well as the development of visual perception will also influence visual-motor integration, these aspects will not be discussed in detail as part of this research report\(^{(3)}\).

Visual-motor integration is the link between visual perception and motor function. According to Beery it is the degree to which visual perception and finger-hand movements are well coordinated\(^{(4)}\). Visual-motor integration is a very important skill and contributes to the academic achievement of the child\(^{(4,6)}\). Many researchers have concluded that improvement in perceptual-motor co-ordination and integration, resulted in children being more equipped to explore and making maximum use of learning situations, emphasizing the link between visual-motor integration and academic achievement\(^{(7,8)}\).

The Beery-Buktenica Developmental Test of visual-motor integration with the supplemental Developmental Tests of Visual Perception and Motor Coordination (4th ed revised)\(^{(4)}\) is a standardized test developed by Keith E. Beery, Norman A. Buktenica, and Natasha A. Beery. Both Psychologists and Occupational Therapists use this standardized test to assess visual-
motor integration in children with learning difficulties or developmental delay. This test was developed and standardized in the United States and is used worldwide to identify children with visual-motor integration deficits. South African therapists can only compare test results of this test, against standardized norms based on the performance of children in the United States. Cross-cultural studies have emphasized the danger of applying a standardized test developed in one culture as a diagnostic instrument for individuals from a different culture\(^{(9-11)}\). Invalid testing could lead to significant consequences for our clients: under-estimation might result in missing out on service provision, while over-estimation might result in inappropriate recommendations that would waste educational and medical resources as well as needlessly raising parents' anxiety.

1.1 STATEMENT OF THE PROBLEM
The question considered in this study is whether the fourth edition (revised) of the Beery-Buktenica Developmental Test of visual-motor integration and the two Supplemental Tests are indeed culture-free assessments, which could be used with individuals of diverse environmental, educational and linguistic backgrounds, as claimed by the authors\(^{(3)}\).

According to findings noted by Beery\(^{(4)}\), statistically significant differences between African-American and Caucasian children have been reported\(^{(12)}\), but the opposite finding has also been obtained\(^{(13)}\). With respect to ethnic and cultural background, Beery (1982) found that at early ages, Chinese children performed better than American children on previous versions of the VMI test, and that Greek and Norwegian children performed slightly less well than American children.

A study done by Mao, Li and Lo on the construct validity of the VMI test for Taiwanese children proposed that the item order of the scoring criteria should be revised for Taiwanese children\(^{(14)}\). The performance of Taiwanese children was different from that of the United States normative samples, not only in the mean score, but also in the sequence of item difficulty. Another study proposed that Taiwanese children practice copying forms much more than U.S. children, which might largely explain their better performance on the VMI test. Other factors such as test taking attitudes, endurance and even genetic predisposition
were also mentioned as factors that might interact to influence test performance\textsuperscript{(15)}. This emphasizes the fact that different cultures might in fact score differently on standardized assessments such as the VMI test and Supplemental Tests, for reasons other than the actual skill being assessed causing this difference.

In previous research completed by Helm on the use of the VMI test (3\textsuperscript{rd} Ed) with urban black South African children, she concluded that the VMI test

"was not proven to be culture independent and that further investigation into the relevance to the Black South African population was warranted"\textsuperscript{(16)} (p. 152)

Schooler and Anderson\textsuperscript{(13)}, also proposed that local norms for key ethnic groups would safeguard against the misinterpretation of results.

The VMI test has become one of the most popular tests to assess visual-motor integration, because of its short administration time, high inter-rater reliability, good concurrent validity and predictive validity\textsuperscript{(17,18)}. Since South Africa consists of a diverse population combining different cultures as one nation, investigation of the appropriateness of using the test results for our multi-cultural society is warranted.

1.2 \textbf{PURPOSE OF THE STUDY}

The purpose of the study is to collect normative data on a group of 80 South African children aged 7 years 0 months to 7 years 3 months, representative of an Eastern Cape population, on the Beery-Buktenica Developmental Test of Visual-motor Integration with Supplemental Developmental Tests of Visual Perception and Motor Coordination (4\textsuperscript{th} Edition, Revised) and to compare the data collected with the normative results obtained by Beery (1997)\textsuperscript{(3)}.

1.3 \textbf{OBJECTIVES}

The objectives of the study are:

- To determine if there is a statistically significant difference between the results obtained by an Eastern Cape sample and an American sample of 7 year 0 month to 7 year 3 month old children on:
The Beery-Buktenica Developmental Test of Visual-motor Integration (4th Edition, Revised),
VMI Supplemental Developmental Test of Visual Perception (STVP)
VMI Supplemental Developmental Test of Motor Coordination (STMC)

- To determine if the test performance of the Eastern Cape sample of 7 year 0 month to 7 year 3 month old children is influenced by gender, socio-economic status or ethnicity.
- To use the results of the study for standardization purposes of this test for 7 year 0 month to 7 year 3 month old South African children in the Eastern Cape

1.4 IMPORTANCE OF THE STUDY
An important trend in occupational therapy today is evidence-based practice. Therapists need to gather information through research to justify the decisions they make. This includes the choice and appropriateness of standardized assessments to identify deficits, as well as the choice of treatment according to these results. Medico-legal work requires evidence of performance and proof that the evidence gathered is valid and appropriate. Due to a lack of locally developed tests, Occupational Therapists are currently using tests developed in other countries, such as the United States of America or the United Kingdom. It is our responsibility, as South African therapists, to determine if these tests are indeed appropriate for our diverse population and if not, to standardize them to ensure the appropriate use in South Africa.

According to findings of the 1995 October household survey compiled by Dr FM Orkin obtained from Central statistics, the Eastern Cape is the third most populous province in South Africa after KwaZulu-Natal and Gauteng. As with all provinces, except for Western and Northern Cape, Africans are in the majority in the Eastern Cape at 87%, Coloureds 7%, Whites 6% and Indians less than 1% of the population. In a study done by Helm she concluded:

"there is little in common between life in a South African urban Black township and life in an American middle class suburb". (p. 143)
We need to investigate if our population, with the majority being African, scores differently to the American population Beery assessed when standardizing the fourth edition of his test. We need to determine if the difference in cultural and educational background will affect the results of the visual-motor integration assessment. A difference in the development of visual abilities and motor abilities of the South African sample could have an important effect on the method of assessment that should be used on this population as well as the treatment of visual-motor integration problems found in South African children.

Occupational therapists cannot continue using tests that are possibly inappropriate for our diverse population. The question that needs to be asked is not - is the test performance better or worse, but - is there a difference? It is not within the scope of this study to speculate why differences might exist but only to establish what differences do exist. Should differences exist the reliability of the test will need to be questioned. It is important to find answers to these questions and this research is one step forward in the right direction.

1.5 **NULL HYPOTHESIS**

The following null hypothesis will be tested:

The results on the Beery-Buktenica Developmental Test of visual-motor integration with Supplemental Developmental Tests of Visual Perception and Motor Coordination (4th Edition, Revised) of a sample of 7 year 0 month to 7 year 3 month old South African children, representative of an Eastern Cape population, will not differ from the American sample of 7 year 0 month to 7 year 3 month old children.

1.6 **OPERATIONAL DEFINITIONS AND ABBREVIATIONS**

**Operational definitions:**

- Visual-motor Integration – Visual-motor integration consists of at least three interrelated processes, namely:
  - A sensory or afferent input process, called perception,
  - A cortical or central process, called integration and
  - An efferent or motor output process, called motor development$^{20, 21}$.
• Visual Perceptual skills – The recognition, discrimination, and processing of sensory information through the eyes and related central nervous system structures. Visual perceptual skills include the identification of shapes, colours, and other qualities, the orientation of objects or shapes in space, and the relationship of objects or shapes to one another and to the environment (22).

• Motor skills – coordinated movements of muscles and limbs (23)

Abbreviations:
• VMI test – Beery-Buktenica Developmental Test of visual-motor integration
• STVP- VMI Supplemental Developmental Test of Visual Perception
• STMC - VMI Supplemental Developmental Test of Motor Coordination