CHAPTER 4

RESULTS

80 participants were initially selected for the study but only 79 were assessed because one of the female participants in the African group was absent on the day the assessments were done. Because of time constraints it was not possible to assess this participant at a later stage or to find another participant to replace this one in the study.

The results are reported in terms of the total sample and the African participants as a separate sample since it is a large enough sample (N=69) to analyse the data separately. The purpose is not however to compare the total sample with the African sample as the small number of White and Coloured participants makes this unrealistic.

4.1 DEMOGRAPHY OF THE SAMPLE

This is reported for the 79 participants selected and assessed for this study, reporting the number of participants selected and assessed from each school, the age and gender distribution, the population group distribution and the actual socio-economic distribution.

4.1.1 Schools

A total of seven schools were selected. The five African schools were selected so as to be divided according to the size of the houses in the area in an attempt to find a fairly equal socio-economic distribution. (Table 4.1)

Of the five African schools, a total of three schools were selected twice – one in each socio-economic category. School 2 was selected twice in the African High category to be approached again after the 3-month period. For the second selection the school cancelled on the day of the test because of a full program due to a concert at the time. It was not possible to do the testing on a different day because of the time factor. For this reason the number of participants is marked 0 in the 2nd selection column next to school 1 in Table 4.1.

School 3 was the only school in the African Middle category and therefore selected again. This is the reason for being marked as having a 1st selection and 2nd selection.
School 5 was selected in the African Low category to be approached again after the 3-month period and is therefore also marked as having a 1st selection and 2nd selection.
High, Middle and Low indicates the boxes the schools were drawn from, determined by the size of the houses in the area and not the actual socio-economic status, since this was only determined after the results were collated by using the composite index derived by Riordan[31].

Table 4.1 Total schools selected

SCHOOLS	Number of Participants in 1st selection	Number of Participants in 2nd selection
1. African High: school 5	3	
2. African High: school 1	5	0
3. African Middle: school 3	17	20
4. African Low: school 2	9	
5. African Low: school 4	10	5
6. White school: school 6	5	
7. Coloured school: school 7	5	

4.1.2 Age and gender

The participants for this study were randomly selected according to the age category 7 years 0 months to 7 years 3 months. The VMI test requires a two-month age distribution when the results are compiled. It is important to note that the two-month age distribution of the total

sample was not absolutely equal with 42 participants (53%) in the 7yr 0mo – 7yr 1mo category and 37 (47%) in the 7yr 2mo – 7yr 3mo category. (Table 4.2)

Table 4.2 Age and gender distribution of total sample

	7yr 0mo	7yr 1mo	**Total**	7yr 2mo	7yr 3mo	**Total**	Male	Female
African	12 17%	26 38%	38 55%	12 17%	19 28%	31 45%	35 51%	34 49%
Total	14 18%	28 35%	42 **53%**	13 17%	24 30%	37 **47%**	41 52%	38 48%

The sample of African participants was considered for analysis as a separate group and the distribution of ages within this group is similar to that of the total sample. (See Table 4.2)

According to the inclusion criteria equal numbers of males and females should have been selected for the sample group. In the African sample the gender of the participants was initially equally distributed, but since one of the females was absent on the day of the test, the distribution ended unequal with 35 males and 34 females.

It was impossible to select an equal number of males and females in the White and Coloured groups since only 5 Coloured and 5 White participants were included. Of the 10 participants in these groups 6 were males and 4 were females. These numbers are included in the total sample, as reflected in Table 4.2.

4.1.3 Distribution by Population Group and Socio-economic Status

The participants were selected according to specific percentages. 87% of the participants had to be African, 6% of the participants had to be White and 7% had to be Coloured. Because of the small number of White and Coloured participants required, equal numbers were used instead of rounding the figures. (Table 4.3)

On the consent form, the parents/guardians had to fill in the breadwinner's occupation and highest level of education. The division of participants according to socio-economic status was then confirmed according to a composite index derived by Riordan[31], where the classification of the breadwinner's occupation and their highest educational level indicate

whether they were of low, middle or high socio-economic status. This was done after all the testing was completed. (Table 4.3)

Since six consent forms from the African sample were returned without any information about the breadwinner's occupation and highest level of education, the total number of participants with a known socio-economic status was 73 and total number of African participants was 63. The Coloured participants selected were all in the high socio-economic group, as they all came from a private school that did not have Coloured children of other socio-economic status groups in the required age group at the time. Due to the time limitations it was not possible to select another school and being such a small group, it was assumed that it would have little effect on the overall outcome of the results.

Table 4.3 Population group distribution and socio-economic status according to a composite index derived by Riordan[31].

Population Group	Number n	Socio-economic status			
		Low	Middle	High	No response
African	69 87.5%	21	25	17	6
Coloured	5 6.25%	0	0	5	0
White	5 6.25%	2	2	1	0
Total	79 100%	23	27	23	6

4.2 VMI TEST, STVP AND STMC RESULTS

4.2.1 Conversion of raw scores to standard scores and comparison to a normal distribution curve

As Beery states in his manual, standard scores can be treated mathematically, since they are equal units of measurement[4]. It is easy to communicate the meaning of standard scores because many people are familiar with IQ scores, which are also expressed as standard scores. For this reason, the initial data analysis compares the standard scores obtained in the sample, to the standard scores expected on a normal distribution curve.

4.2.1.1 VMI test

On the VMI test, the standard scores of the total sample indicates a normal distribution between very low, low and average, but no participants obtained scores in the high or very high categories as illustrated in figure 4.1. The sample of African participants shows a very similar result with two more participants scoring in the low category and two less in the average category.

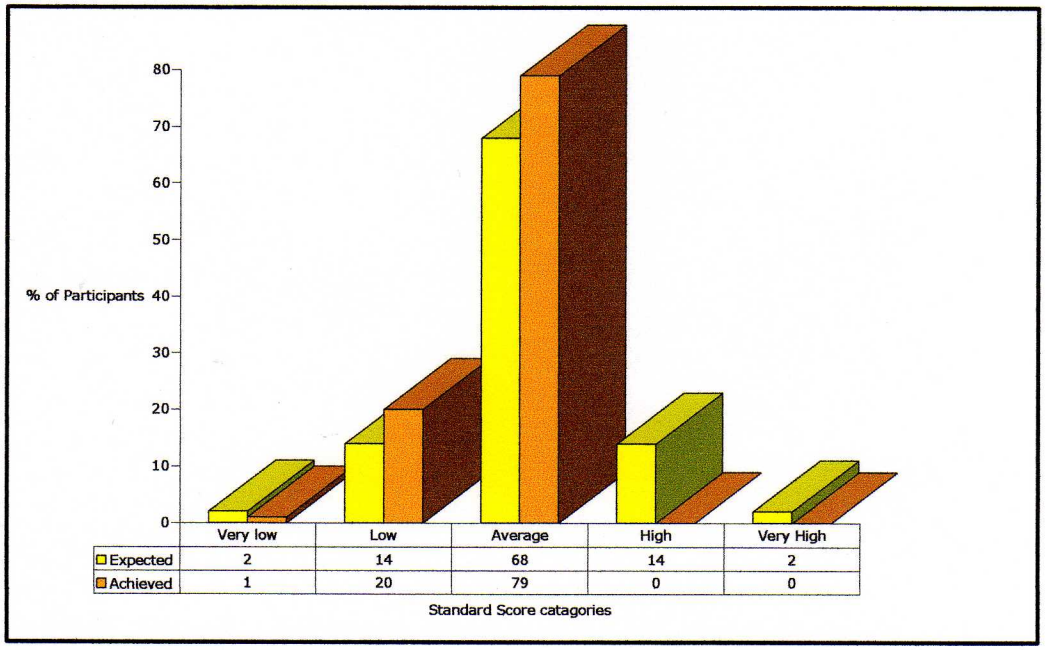

Figure 4.1 VMI test Standard Scores for Total Sample

4.2.1.2 Supplemental test of visual perception (STVP)

On the STVP the total sample and African sample indicates a fairly equal distribution between average, low and very low as indicated in figure 4.2. The sample is skewed, with more children achieving lower scores than would be expected in a normally distributed sample, as illustrated in Figure 4.2.

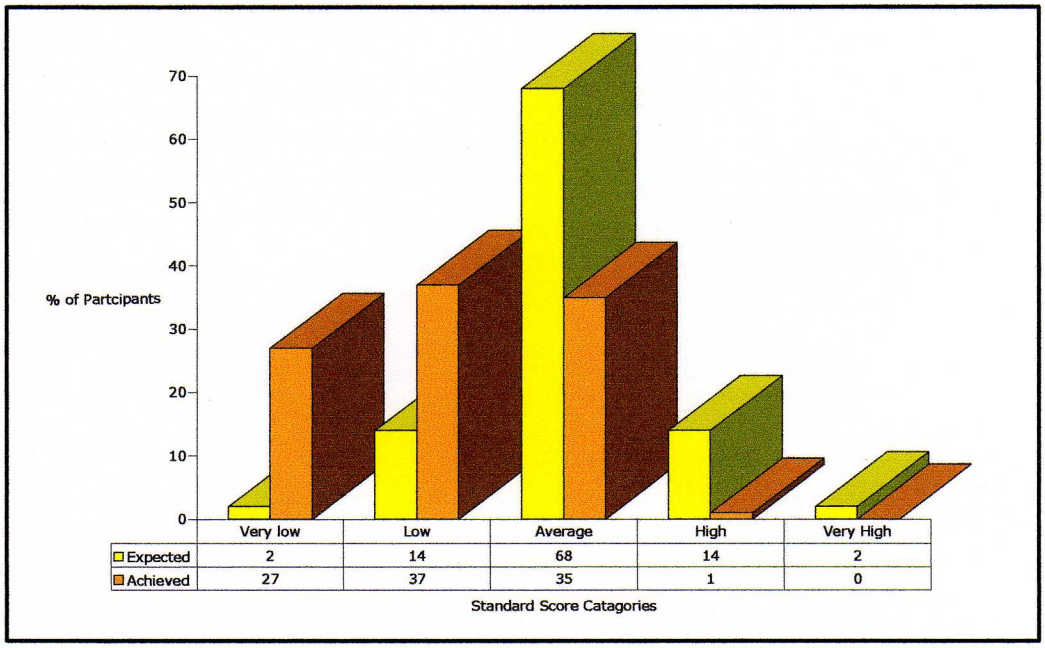

Figure 4.2 STVP - Standard Scores for total sample

4.2.1.3 Supplemental developmental test of Motor coordination (STMC)

The distribution of the STMC results indicates a100% cluster in the average category, as indicated in figure 4.3. Again, the study sample does not correspond with a normal distribution as illustrated in figure 4.3.

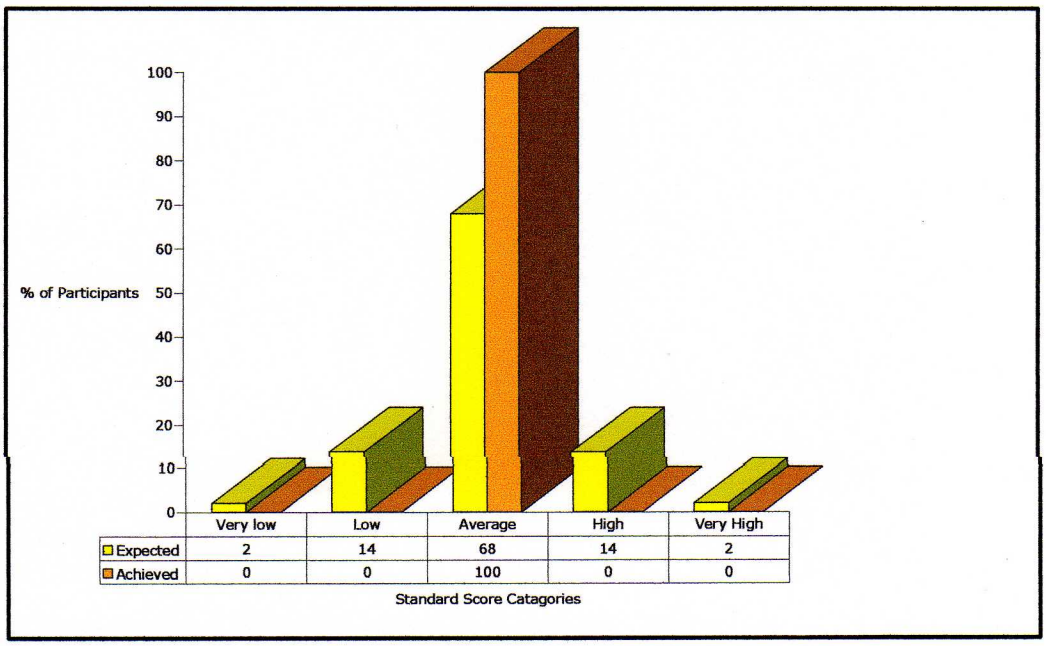

Figure 4.3 STMC - Standard Scores for total sample

4.2.2 Testing the association of the variables

The chi-squared test for association was used to determine if the difference between the observed results and expected results as illustrated in Figures 4.1, 4.2 and 4.3 had any statistical significance.

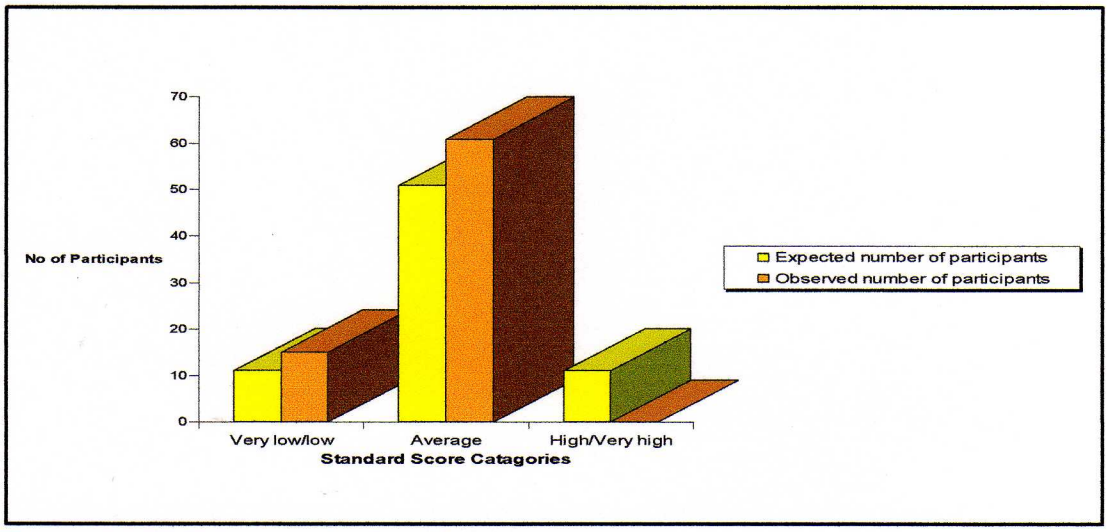

Figure 4.4 VMI test results for chi-square test

When comparing the X^2 (chi squared) value of 15.8 with a tabulated Chi-squared test with 2 degrees of freedom, the p value for the VMI test is 0.001, indicating a statistical significant difference between the results of the total study sample and the American sample on the VMI test as illustrated in Figure 4.4

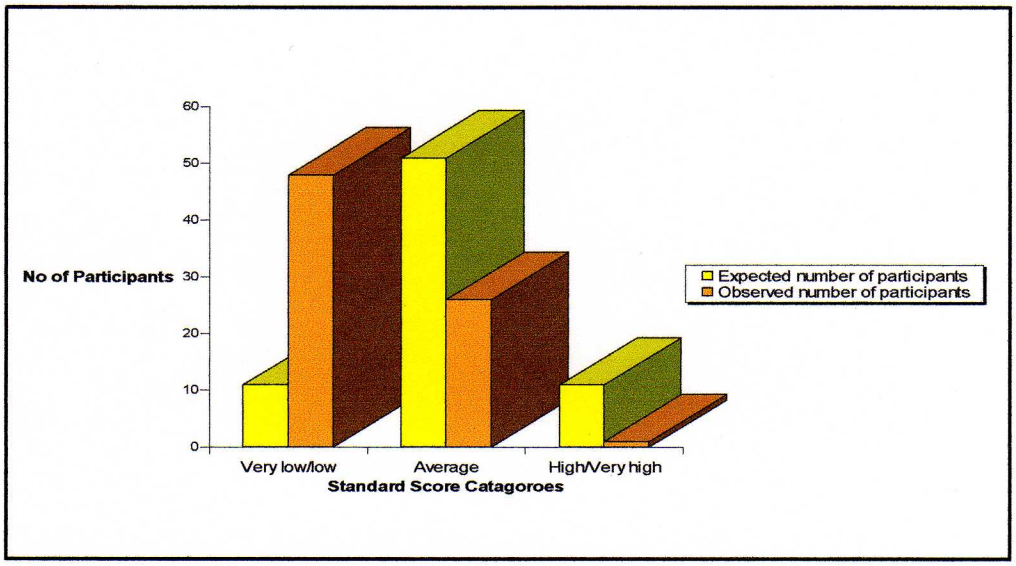

Figure 4.5 STVP results for chi-square test

In comparing the X^2 (chi squared) value of 128 with a tabulated Chi-squared test with 2 degrees of freedom, the p value for the STVP is 0.000, indicating a statistical difference between the results of the total study sample and the American sample on the STVP as illustrated in Figure 4.5.

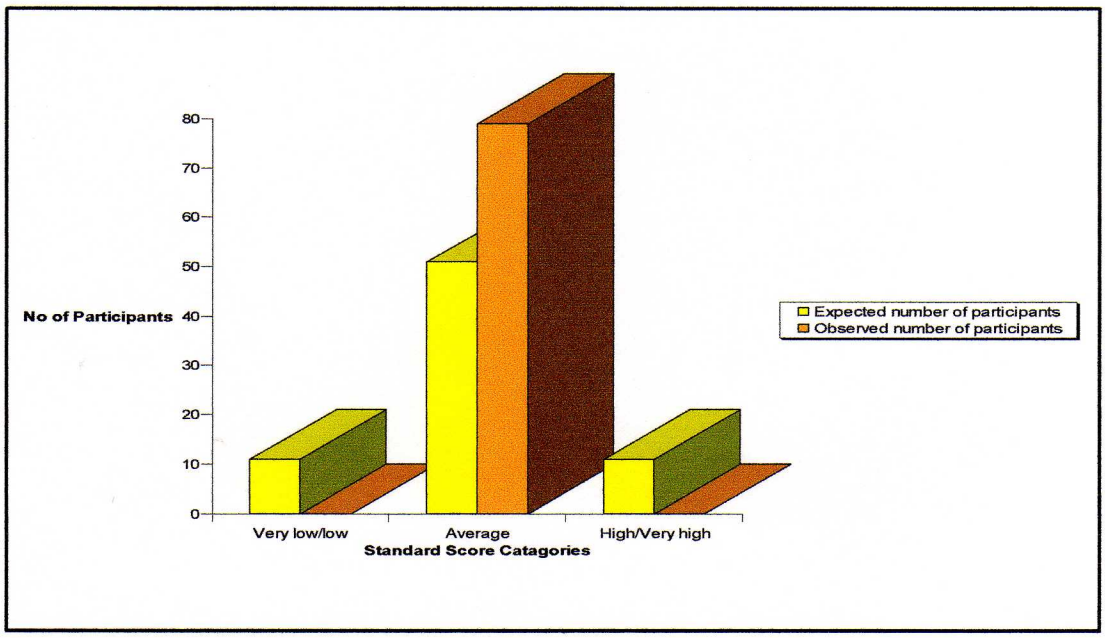

Figure 4.6 STMC results for chi-square test

When comparing the X^2 (chi squared) value of 38.8 with a tabulated Chi-squared test with 2 degrees of freedom, the p value is 0.000, indicating a statistical significant difference between the results of the South African study sample and the American sample on the STMC as illustrated in Figure 4.6.

4.2.3 Comparison according to socio-economic status

4.2.3.1 Socio-economic status comparison - VMI test

Table 4.4 is a summary of the number, mean and standard deviation for visual-motor integration for the total sample and for the African sample according to their socio-economic status. Only 73 of the 79 participants are represented as there was no socio-economic data on 6 of the returned questionnaires. (See Table 4.3)

Table 4.4 VMI test scores according to socio-economic status

Socio-economic status	Total Sample			African Sample		
	n	mean	sd	n	mean	sd
High	23	14.8	1.91	17	15.05	2.13
Middle	27	14.2	1.99	25	14.36	1.93
Low	23	13.8	2.77	21	13.61	2.81
Total	73			63		

The one-way Bonferroni analysis of variance was used to compare the variation between the groups to the variation within the groups[44]. No statistical significant difference between the visual-motor integration scores and socio-economic status was found for either the total sample (p= 0.29) or for African sample (p=0.17) when the significance value was set at p=0.05.

The different socio-economic groups were also paired and compared with each other in a between group analysis and once again the p-values show no statistically significant difference as illustrated in Table 4.5.

Table 4.5 VMI test–Comparison low, middle and high socio-economic status groups

	Total Sample				African Sample			
Socio-economic status	High	p	Low	p	High	p	Low	p
Low	-1.04	0.36			-1.43	0.18		
Middle	-0.57	1.00	0.47	1.00	-0.69	1.00	0.74	0.85

4.2.3.2 Socio-economic status comparison - STVP

Table 4.6 is a summary of the number, mean and standard deviation for the STVP, in preparation of the comparison of socio-economic status for the total sample, and the African sample.

Table 4.6 STVP –according to socio-economic status

Socio-economic status	Total Sample			African Sample		
	n	mean	sd	n	mean	sd
High	23	13.56	2.93	17	13.29	3.13
Middle	27	13.18	3.05	25	12.88	2.72
Low	23	11.39	3.28	21	11	3.13
Total	73			63		

The one-way Bonferroni analysis of variance was used to compare the variation between the groups to the variation within the groups[44].

Table 4.7 STVP – comparison of variation between groups to variation within groups for Total sample and African sample

	Total Sample					African Sample				
Source	SS	df	MS	F	p	SS	df	MS	F	p
Between groups	62.85	2	31.42	3.29	0.04*	60.43	2	30.21	3.41	0.03*
Within groups	669.20	70	9.56			532.16	60	8.86		
Total	732.05	72	10.16			592.60	62	9.55		

SS = Sum of squares F = F-score MS = Mean square
df = Degrees of freedom p = p-value
*** Significant p≤ 0.05**

A statistically significant difference was found for the total sample (p= 0.04) and also for the African sample (p = 0.03) when the significant value was set at p≤0.05, as illustrated in Table 4.7.

The different socio-economic groups were also paired and compared with each other in a between group analysis. When comparing the high and low socio-economic status groups to the middle in the total sample and the African sample, the p-values show no statistically significant difference as illustrated in Table 4.8. When comparing the low socio-economic status group with the high socio-economic status group the p-value is statistically significant for the total sample with p=0.05, but not for the African sample with p=0.06.

Table 4.8 STVP – Sample p-value comparison low, middle and high

	Total Sample				African Sample			
Socio-economic status	**High**	**p**	**Low**	**p**	**High**	**p**	**Low**	**p**
Low	-2.17	0.05*			-2.29	0.06		
Middle	-0.38	1.00	1.79	0.13	-0.41	1.00	1.88	0.11

*** Significant p≤ 0.05**

4.2.3.3 Socio-economic status comparison – STMC

Table 4.9 is a summary of the number, mean and standard deviation for the STMC, in preparation of the comparison of socio-economic status for the total sample, and the African sample.

Table 4.9 STMC –according to socio-economic status

Socio-economic status	Total Sample			African Sample		
	n	**mean**	**sd**	**n**	**mean**	**sd**
High	23	17.52	1.83	17	17.52	1.73
Middle	27	16.92	1.56	25	17	1.60
Low	23	15.69	1.45	21	15.61	1.49
Total	73			63		

The one-way Bonferroni analysis of variance was used to compare the variation between the groups to the variation within the groups[44]. A statistical significant difference was found for the total sample (p=0.001) and for the African sample (p=0.001) when the significance value was set at p≤0.05, as illustrated in Table 4.10.

Table 4.10 STMC – comparison of variation between groups to variation within groups for Total sample and African sample

	Total Sample					African Sample				
Source	**SS**	**df**	**MS**	**F**	**p**	**SS**	**df**	**MS**	**F**	**p**
Between groups	40.06	2	20.03	7.60	0.001*	38.46	2	19.23	7.44	0.001*
Within groups	184.46	70	2.63			155.18	60	2.58		
Total	224.52	72	3.11			193.65	62	3.12		

SS = Sum of squares F = F-score MS = Mean square
df = Degrees of freedom p = p-value
* Significant p≤ 0.05

The different socio-economic groups were also paired and compared with each other in a between group analysis. When comparing the high to the middle socio-economic groups in the total sample and the African sample, no statistically significant difference was found but a statistically significant difference was present when comparing the high to the low socio-economic status group (p=0.001 and p=0.002). A similar result was found in the comparison of the low and the middle socio-economic status groups (p=0.02 and p=0.01). (Table 4.11)

Table 4.11 STMC– Sample p-value comparison low, middle and high

	Total Sample				African Sample			
Socio-economic status	**High**	**p**	**Low**	**p**	**High**	**p**	**Low**	**p**
Low	-1.82	0.001*			-1.91	0.002*		
Middle	-0.59	0.60	1.23	0.02*	-0.52	0.89	1.38	0.01*

* Significant p≤ 0.05

4.2.3.4 Summary of Socio-economic status comparison

No statistical significant difference was found for the VMI test when comparing the performance of the different socio-economic groups.

A statistical significant difference was found for the STVP for both the Total sample and the African sample, when comparing the variation between the groups to the variation within the

groups. In a further paired comparison between the low, middle and high socio-economic groups no statistical significant difference was indicated for the African group. The Total group comparison indicated a statistical significant difference between the high and the low socio-economic groups.

A statistical significant difference was indicated for the STMC for both the Total sample and the African sample when comparing the variation between the groups to the variation within the groups. In a further paired comparison made between the low, middle and high socio-economic groups for both these samples, a statistical significant difference was found on the STMC when comparing the low socio-economic group to the high socio-economic group and the middle socio-economic group. This difference was evident in the analysis of the total sample and when the African sample was singled out.

4.2.4 Comparison according to population group

The performance of the different population groups are compared with each other on all three tests in this analysis and because of the nature of the analysis only the total sample is analyzed.

4.2.4.1 Population group comparison - VMI test

Table 4.12 is a summary of the number, mean and standard deviation for the VMI test, in preparation of the comparison of population groups in the total sample.

Table 4.12 Population group comparison on VMI test

Population Group	Total Sample		
	n	**mean**	**sd**
African	69	14.14	2.35
Coloured	5	14.40	1.14
White	5	14.60	2.19
Total	79		

According to Bartlett's test for equal variances, there was no statistically significant difference of the mean values of the VMI test between the population groups ($p = 0.89$).

When the VMI test results of the three population groups are compared with each other by using Bartlett's test for equal variances, there are also no statistically significant differences indicated with the p-values at 1.000 for all three comparisons.

4.2.4.2 Population group comparison – STVP

Table 4.13 is a summary of the number, mean and standard deviation for the STVP, in preparation of the comparison of population groups in the total sample.

According to Bartlett's test for equal variances, a statistically significant difference of the mean values of the STVP was identified between the population groups, with p=0.03. To ascertain that this is not a false positive, a post test, the Bonferroni test of multiple comparisons, was performed. This test applies corrections to the reported significance levels taking into account that multiple comparisons are conducted.

Table 4.13 Population group comparison on STVP

Population Group	Total Sample		
	n	**mean**	**sd**
African	69	12.30	3.11
Coloured	5	14.80	2.28
White	5	15.40	3.64
Total	79		

When the STVP results of the three population groups are compared with each other by using the Bartlett's test for equal variances, there are no statistically significant differences indicated.

4.2.4.3 Population group comparison – Supplemental developmental test of motor coordination (STMC)

Table 4.14 is a summary of the number, mean and standard deviation for the STMC, in preparation of the comparison of population groups in the total sample.

Table 4.14 Population group comparison on STMC

Population Group	Total Sample		
	n	**mean**	**sd**
African	69	16.5507	1.811209
Coloured	5	17.2	2.387467
White	5	16.8	1.303841
Total	79		

According to Bartlett's test for equal variances, there was no statistical significant difference of the mean values of the STMC between the population groups ($p = 0.72$).
When the STMC results of the three population groups are compared with each other by using Bartlett's test for equal variances, there is also no statistical significant difference indicated with the p-values at 1.000 for all three comparisons.

4.2.4.4 Summary of the population group comparison

In the comparison made between the performance of White, Coloured and African participants on the VMI test, STVP and STMC, no statistical significant difference was found.

4.2.5 Comparison according to gender

The performance of males and females where compared in all three of the tests and this was only done for the total sample as the participants were selected with fairly equal numbers of males and females in each group. The difference of one in the White and Coloured groups is too small to affect the results

4.2.5.1 Gender comparison – VMI test

Table 4.15 is a summary of the number, mean and standard deviation for the VMI test, in preparation of the comparison of gender in the total sample.

Table 4.15 Gender comparison on the VMI test

Gender	Total Sample		
	n	**mean**	**sd**
Female	38	13.94	2.64
Male	41	14.4	1.88
Total	79		

No statistically significant difference of the mean values of the VMI test between the groups was found with p = 0.36.

When the VMI test results of the males and females are compared with each other, there is no statistically significant difference indicated with the p-value 0.36.

4.2.5.2 Gender comparison – Supplemental developmental test of visual perception (STVP)

Table 4.16 is a summary of the number, mean and standard deviation for the STVP, in preparation of the comparison of gender in the total sample where there is no statistically significant difference of the mean values of the STVP between the groups. (p = 0.83)

Table 4.16 Gender comparison on STVP

Gender	Total Sample		
	n	**mean**	**sd**
Female	38	12.57	3.47
Male	41	12.73	2.98
Total	79		

When the STVP results of the males and females are compared with each other, there is no statistically significant difference indicated with the p-value 0.83.

4.2.5.3 Gender comparison – Supplemental developmental test of motor coordination (STMC)

Table 4.17 is a summary of the number, mean and standard deviation for the STMC, in preparation of the comparison of gender in the total sample where there is no statistically significant difference of the mean values of the STMC between the groups. (p = 0.38)

Table 4.17 Gender comparison on STMC – total sample

Gender	Total Sample		
	n	mean	sd
Female	38	16.42	1.95
Male	41	16.78	1.66
Total	79		

When the STMC results of the males and females are compared with each other, there is no statistically significant difference indicated with the p-value 0.38.

4.2.5.4 Summary of the gender comparison

In the comparison made between the performance of males and females on the VMI test, STVP and STMC, no statistical significant difference was found, which supports Beery's findings outlined in the test manual[4].

4.2.6 T-test comparison of sample to determine need for new South African norms

The results were analyzed using the pooled variance-t, an analysis that determines if the mean of the standard scores is statistic significantly different from 100. When analyzing the data for the VMI test, the observed mean of 91.88 are compared to the hypothetical mean of 100 and the p-value of 0.0000 was calculated, which is statistically significant since it is smaller than 0.05. If the hypothetical mean is smaller than 100, the p-value of 0.0000 is also statistically significant, since it is also smaller than 0.05. In Table 4.18 the lower end of the 95% confidence interval, which is 89.43, is a large enough difference from 100 to make the

difference also significant. If the hypothetical mean is larger than 100, the p-value is 1.0000, which is not statistically significant.

Table 4.18 One-sample t-test done on for VMI test – Total sample

Variable	OM	EM	SE	sd	95% conf. interval
Total sample **visual-motor integration** standard score	79	91.88	1.23	10.96	89.43 - 94.34

OM = observed mean
SE = standard error
Degree of freedom: 78
EM = expected mean
sd = standard deviation
conf. interval = confidence interval

mean < 100	**mean = 100**	**mean > 100**
t = -6.5778	t = -6.5778	t = -6.5778
p < t = 0.0000	p > t = 0.0000	p > t = 1.0000

Very similar results with the lower end of the 95% confidence interval at 88.95 and the p-values indicating a significant difference if the hypothetical mean is 100 or smaller than 100 were found for the African sample as illustrated in Table 4.19.

Table 4.19 One-sample t-test done on for VMI test – African sample

Variable	OM	EM	SE	sd	95% conf. interval
African sample visual-motor integration standard score	69	91.68	1.36	11.34	88.95 - 94.40

OM = observed mean
SE = standard error
Degree of freedom: 68
EM = expected mean
sd = standard deviation
conf. interval = confidence interval

mean < 100	mean = 100	mean > 100
t = -6.0913	t = -6.0913	t = -6.0913
p < t = 0.0000	p > t = 0.0000	p > t = 1.0000

By using the same reasoning, Table 4.20 and 4.21 also indicate a statistical significant difference between the observed mean and the hypothetical mean with p-values of 0.0000 for the STVP on the total sample and the African sample.

Table 4.20 One-sample t-test done on total sample for STVP

Variable	OM	EM	SE	sd	95% conf. interval
Total sample Visual standard score	79	78	1.74	15.53	74.51- 81.48

OM = observed mean
SE = standard error
Degree of freedom: 78
EM = expected mean
sd = standard deviation
conf. interval = confidence interval

mean < 100	mean = 100	mean > 100
t = -12.5838	t = -12.5838	t = -12.5838
p < t = 0.0000	p > t = 0.0000	p > t = 1.0000

The observed mean of 78 for the total sample and 76.29 for the African sample is significantly less than the hypothetical mean of 100 for the STVP.

Table 4.21 One-sample t-test done on African sample for STVP

Variable	OM	EM	SE	sd	95% conf. interval
African sample Visual standard score	69	76.29	1.84	15.08	72.67- 79.91

OM = observed mean
SE = standard error
Degree of freedom: 68
EM = expected mean
sd = standard deviation
conf. interval = confidence interval

mean < 100	mean = 100	mean > 100
t = -13.0627	t = -13.0627	t = -13.0627
p < t = 0.0000	p > t = 0.0000	p > t = 1.0000

When interpreting the results for the STMC in Table 4.22 and Table 4.23, it would be scientifically more correct to interpret the 95% confidence interval rather than the p-values, since the observed mean of 97.44 for the total study sample and 97.25 for the African sample is a smaller difference from the hypothetical mean of 100. Although the p-values are less than 0.05 and statistically significant, this difference is probably of little clinical value.

Table 4.22 One-sample t-test done on total sample for STMC

Variable	OM	EM	SE	sd	95% conf. interval
Total sample Motor standard score	79	97.44	0.71	6.30	96.03- 98.86

OM = observed mean
SE = standard error
Degree of freedom: 78
EM = expected mean
sd = standard deviation
conf. interval = confidence interval

mean < 100	mean = 100	mean > 100
t = -3.6053	t = -3.6053	t = -3.6053
p < t = 0.0003	p > t = 0.0005	p > t = 0.9997

Table 4.23 One-sample t-test done on total sample for STMC

Variable	OM	EM	SE	sd	95% conf. interval
Total sample Motor standard score	69	97.25	0.76	6.28	95.74- 98.76

OM = observed mean
SE = standard error
Degree of freedom: 68
EM = expected mean
sd = standard deviation
conf. interval = confidence interval

mean < 100	mean = 100	mean > 100
t = -3.6402	t = -3.6402	t = -3.6402
p < t = 0.0003	p > t = 0.0005	p > t = 0.9997

4.3 SUMMARY OF THE VMI TEST RESULTS

- No statistically significant difference in test performance was found when comparing socio-economic status for the total sample or when comparing socio-economic status for the African sample.
- No statistically significant difference was found when comparing the test performance of the White, Coloured and African children in the sample.
- No statistically significant difference was found when comparing the performance of the males and females.

- Statistically significant differences were found between the mean scores of the study sample and the hypothetical mean score of 100, which indicate that the present norms need to be applied with caution when evaluating children from developing communities in the South African population.

4.4 SUMMARY OF THE STVP RESULTS

- A significant difference was found in the performance on the STVP for both the Total study sample and the African sample, when comparing the variation between the groups to the variation within the groups according to socio-economic status. The analysis of the total study sample found a significant difference between the low and the high socio-economic groups. However a further paired comparison between the low, middle and high socio-economic groups found no significant difference within the African group.
- No statistically significant difference was found when comparing the test performance of the White, Coloured and African children in the sample.
- No statistically significant difference was found when comparing the performance of the males and females.
- Statistically significant differences were found between the mean scores of the total study sample and the hypothetical mean score of 100, which indicates that the standardized norms need to be applied with discretion with children similar to the study sample.

4.5 SUMMARY OF THE STMC RESULTS

- There was a significant difference when comparing the performance of the children on the STMC in the study sample according to socio-economic status. Children in the higher socio-economic status groups scored significantly better than children in the medium and lower groups. This applied to the total and the African sample.
- No statistical significant difference was found when comparing the performance of the White, Coloured and African children in the sample.

- No statistical significant difference was found when comparing the performance of the males and females.
- Although the STMC indicates a significant difference between the mean scores of the sample population and the hypothetical mean score of 100, it was not interpreted to be clinically significant.

4.6 TESTING THE NULL HYPOTHESIS

On the basis of the results obtained in this study the null hypothesis established at the beginning of the study is rejected as test scores 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 normal sample of 7 year 0 month to 7 year 3 month old children, representative of an Eastern Cape population, was significantly different from the American sample of 7 year 0 month to 7 year 3 month old children.