



**Original Article:**

**Relationship between Visual Motor Integration and Academic Performance in Elementary School Children.**

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**Abstract: Objective:** To assess the relationship between visual motor integration and academic performance in elementary school children. **Method:** A cross sectional study was undertaken on 208 children who were in second standard from government, government aided and private schools. The screening tools for excluding children with visual and auditory deficit, Attention Deficit Hyperactivity Disorder, Childhood psychiatric symptoms, learning disabilities, below average intelligence were administered. The primary measure of visual motor integration was obtained using Beery-Buktenica Developmental Test of Visual-Motor Integration (VMI). The academic performance was calculated from the mean of all the subject marks scored in two consecutive exams and on teacher's perception on academic performance using a 100-point rating scale. **Results & Conclusion:** Pearson product-moment correlation coefficient test was used to analyze the correlation. It has shown that there is weak positive correlation found between visual motor integration and academic performance which would recommend the need for longitudinal study.

**Key Words:** Visual motor integration, academic performance, elementary school children

**Introduction:**

Education is considered as one among the most vital facets of human resource development. Every child should be provided with an opportunity to accomplish their academic potential. Report on poor school performance in India, mentioned that at least 20% of children get poor marks in a classroom.(1) Poor academic performance in the early phases of schooling may put children at risk, naming them as delayed learners and reducing the likelihood of positive social exchange and peer group support, and emphasizing low expectations of parents as well as teachers for children's academic performance.(2)

A notable number of school going children fail to perform sufficiently in academic performance without any obvious limitations.(3) Researchers and health care providers working with children have long been interested in understanding what causes children with average intelligence to suffer from academic underachievement, particularly when these academic difficulties are not the result of physical, environmental, or behavioral problems.(4) One of the paramount justifications offered for poor academic performance were disordered in one or more of the basic psychological process.(3)

A large number of investigations support that good visual motor skill development is a forerunner for performing well in early primary school grades.(5) Visual Motor Integration (VMI) is the skill of eyes and hand to work together in a smooth and efficient way.(6) Since the focus of early primary school education is highly dependent on paper and pencil activities, visual-motor skills may facilitate success on pre-academics and academics.(5)

The literature review was done in Scopus, Cochrane and PubMed database with key words visual motor integration, academic performance, and elementary school children.

A study conducted in the year 2011, among 77 children analyzed the correlation between VMI and academic performance using Beery VMI and academic performance test. The results depicted that visual motor integration influences the performance of students in school activities.(7) A study was conducted in the year 2005 to assess the relationship between visual motor integration and spatial organization of written language & math among 18 children with normal VMI and 19 children with low VMI. The results revealed that the children with low visual motor integration made more errors and suggested that visual motor integration may contribute to poor spatial organization of written work.(8)

A study carried out in 1999 to find out the relationship between visual motor integration and academic performance among 191 children in kindergarten through third grade. Beery VMI and teacher's ratings of academic achievement was used as a primary measure for assessing school performance with regard to reading, math and writing ability. The teachers' rating was validated by using Stanford Diagnostic Reading Test & Otis-Lennon School Ability Test. The results revealed that performance on a visual analysis and VMI task is significantly related to academic performance in 7 through 9-year-old children.(9)

Another study in 1989 examined the role of visual-motor factors in 34 non-promoted and 34 promoted kindergarten children and found that these factors showed weak correlation between visual motor skills and non-promoted children.(10) A citation in the study conducted in the year 2003 revealed that VMI to predict the academic performance in 80 elementary school children have little predictive utility to find academic success.(5)

Literature review showed mixed results in terms of relationship between VMI and writing readiness, handwriting skills, reading, mathematical abilities and academic performance in children. So, this study attempted to assess the relationship between VMI and academic performance in elementary school children.

#### Methods

**Ethics:** Obtained ethical clearance from Institutional Ethical committee, Manipal.

**Study Design:** Cross sectional study.

**Target population:** All elementary school children who were studying in second standard.

**Sampling:** Convenience sampling comprising of 540 children from 15 schools was included for the study. Out of which, 208 were included for the study based on the selection criteria.

**Selection Criteria:** Indian boys and girls from second standard were included and children who were having any Physical or sensory defects, childhood psychiatric symptoms, ADHD, learning disabilities and below average in intelligence were excluded from the study.

#### Tools used:

- The Screening tool such as Childhood Behavior Checklist, Vanderbilt teacher rating Questionnaire, Grade Level Assessment Tool, and Raven's Progressive Matrices tools were used to select children based on the criteria.
- The outcome measures such as Beery-Buktenica Developmental Test of VMI with supplemental developmental tests of visual perception and motor coordination was administered.
- Academic performance index was calculated through marks obtained in each subject for 2 consecutive exams in the respective academic year from school record. The teacher's perception about the academic performance of the children was obtained through the Teacher rating scale ranging from 0 to 100 points.

#### Procedure:

After obtaining the ethical clearance, the Head of the schools were approached for permission to conduct the study as well as to collect the basic information about the schools. Informed consent from parents was obtained. Initially, screening tool was administered to 540 children and 208 children were recruited based on the selection criteria. The Beery VMI along with visual perception and motor coordination supplemental tests was administered to those 208 children and marks were collected from the school record for the two consecutive exams. The teachers were asked to give their perception on academic performance in the rating scale ranging from 0 to

100 at the end of the academic year. The data was compiled and analyzed.

#### Results:

The data was analyzed using statistical package for social sciences (SPSS version 16). Descriptive statistics was used for sample characteristics. Pearson product-moment correlation coefficient test was applied to study the relationship between visual motor integration and academic performance.

As per the results shown in Table 1, out of 208 children selected as part of sample group, 49.5 % were boys and 50.5 % were girls. 26 % of them were from Government and Government Aided school and 74 % from Private schools. 38.9 % of the children belonged to upper and upper middle class, 32.7% were lower middle class, 28.4% upper lower and lower class families. 76 % of them were from nuclear family and the remaining 24% were from joint family.

Demographics of Participants n=208	n (%)
<b>Gender</b>	
Boys	103 (49.5)
Girls	105 (50.5)
<b>Type of School</b>	
Government & Government Aided	54 (26)
Private	154 (74)
<b>Socioeconomic Status</b>	
Upper & Upper middle	81 (38.9)
Lower Middle	68 (32.7)
Upper Lower & Lower	59 (28.4)
<b>Type of Family</b>	
Nuclear	158 (76)
Joint	50 (24)

The mean age of the study population was 91 months with Standard Deviation (SD)  $\pm 3.1$ . The mean VMI standard score was 111 with SD  $\pm 19.3$ . The marks of all the subjects were clubbed together to form the index of children's academic performance. The mean value stood at 80 with SD  $\pm 15.6$ . The teacher rating on 100-point rating scale showed the mean of 76 with SD  $\pm 17.6$  (Table 2). The mean visual perception supplemental test standard score was 91.37 with SD  $\pm 16.72$  and mean motor coordination supplemental test standard score was 110.57  $\pm 17.43$ .

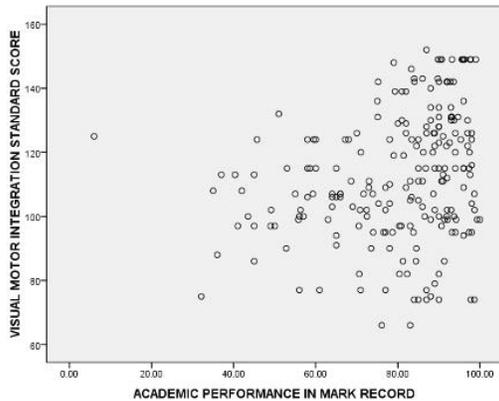
Descriptive Statistics	Mean(SD)	Minimum	Maximum
Visual Motor Integration Standard Score	111 (19.3)	56	147
Academic Performance in Mark Record (out of 100)	80 (15.6)	32	100
Academic Performance in Teacher's Rating Scale (out of 100)	76 (17.6)	20	100

As shown in the Table 3 and graph 1 & 2, the visual motor integration has weak positive correlation with the academic performance in mark record ( $r=0.22$ ) as well as in teacher's report ( $r= 0.23$ ). The correlation between the visual perception supplemental test and academic performance showed a significant positive correlation with teacher's report on academic performance ( $r=0.41$ ) and weak positive correlation with mark record ( $r=0.35$ ). There is a no significant correlation found between motor coordination supplemental test and

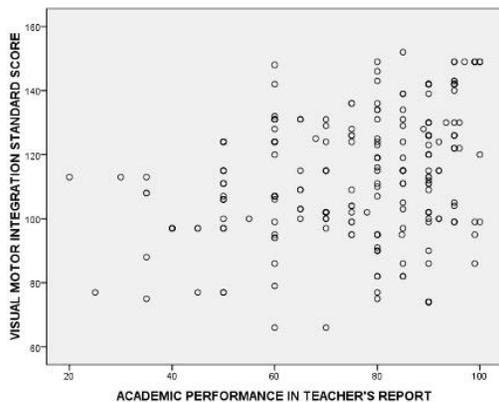
academic performance in teacher's report ( $r=0.14$ ) as well as in mark record ( $r=0.09$ ).

<b>Table.3: Relationship of Visual Motor Integration, Visual Perception Supplemental test, Motor Coordination Supplemental Test Standard Score with Academic Performance</b>			
Variables	n	Academic Performance in Mark Record	Academic Performance in Teacher's Rating Scale
		r	r
Visual Motor Integration Standard Score	208	0.22*	0.23*
Visual Perception Supplemental Test Standard Score	208	0.35*	0.41*
Motor Coordination Supplemental Test Standard Score	208	0.09	0.14

\* Significant at  $p<0.05$  level



**Graph 1: Scatter Plot: VMI with Academic Performance in Mark Record**



**Graph 2: Scatter Plot: VMI with Academic Performance in Teacher's Rating Scale**

**Discussion:**

This cross-sectional study is a part of three-years longitudinal study to find out the relationship between visual motor integration and academic performance. The study attempted to minimize all the possible confounding variables through the screening process. Pearson product-moment correlation coefficient test was used and a weak positive correlation was found between visual motor integration and academic performance. Though the results are statistically significant, the strength of the correlation is very weak with good sample

size. The results of this study are supported by few studies that the visual motor integration contributes to academic performance.(5,7,10)

The significant positive correlation between visual perception supplemental test and academic performance in the current study is found to be similar to the studies done in 2010, 2003, and 2002. (3,11-13) The motor coordination supplemental test has no significant correlation with academic performance which is controversial to the study done in the year 2011 which emphasized the influence of motor coordination on writing activities.(7)

The visual motor integration is considered as having negligible positive correlation with academic performance. It could be due the fact that the current study attempted to evaluate the overall academic performance instead of specific factors such as writing, reading and math, which would have given better interpretation. The other factors such as non-use of standardized tests to measure academic performance, group administration and stipulated time may contribute to this study results.

The results of this study broaden the knowledge about the relationship of visual motor integration with academic performance in Indian children. It also provides information that may be useful to school teachers to identify the children with poor visual motor integration skill. The study results would support the need for longitudinal study to determine the relationship of the visual motor integration with academic achievement in elementary school children. Identifying the relationship of visual motor skills with each components of academic performance like reading, writing, mathematics using standardized tests is recommended.

**Conclusion:**

There was no strong positive correlation observed between visual motor integration and academic performance in elementary school children.

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