

# A study to assess the level of Intelligence among the children from a low and high economic group by using Goodenough's Draw a Man test

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**Abstract: Background:** Progress of a nation depends on the intelligence of its child population and assessment of a child's intelligence level is helpful in the management of several clinical conditions. **Objectives:** To assess and compare the level of intelligence among the children from low and high economic groups carried out by Goodenough's Draw Man test. **Methodology:** This was a cross-sectional type of study with observational research approach carried out among children with age ranges 4 to 10 years residing in Karad state of Maharashtra India. A total of 1000 school children from purposively selected schools were enrolled and assessed for level of intelligence. The study was conducted in the year 2018 over a period of six months from July to December. Goodenough's Draw Man test was used to collect data and was statistically analyzed and presented in tabular form. **Results:** The proportions of male children were more, 52.7% and 62.2% in both high and low economic groups as compared to females. Mean score of Goodenough's Draw a Man test was significantly higher in every age group of children from high economic class as compared to low,  $p < 0.05$ . There was a linear correlation between the age of the children and the mean score of Goodenough's Draw a Man test,  $r = 0.97$  and  $0.95$  respectively. The mental age less than chronological age was reported significantly higher, 58.6% in children from low economic class. **Conclusion:** There is comparatively higher intelligence in a high socioeconomic group than the low socioeconomic group and environment, emotional/other factors has a significant effect on the development of intelligence.

**Key Words:** Intelligence, socio-economic class, Goodenough's Draw a Man test, correlation.

## 1. INTRODUCTION:

Wechsler defined intelligence as the aggregate or global capacity of the individual to act purposely to think rationally and deal effectively with his environment<sup>1</sup>. The progress of any nation depends on the intelligence of their children. An assessment of intelligence is required in clinical situations as it is helpful in the management of several clinical conditions<sup>2</sup>. So many clinical tests are available for assessing the intelligence of children but their validations are of questionable and their importance is also very immense<sup>3</sup>.

Psychologists have stated that intelligence is a vital factor in children's drawings up to 10 years of age. The factors involved in the development of intelligence viz. visual, auditory, imagination, memory, casual reasoning are important in determining the capacity to draw. The relation between the development of intelligence and the development of drawing ability are supposed to be very strong. Children love drawing and drawing catches the person's thoughts and ideas. Drawing is unique since it adds the dimension of imagination and fantasy. So art in a way is a language of pictures<sup>4</sup>.

Environment influences the intelligence which is determined by genetic factors. Therefore ethnic, social, racial, economic and cultural factors are bound to affect the intellectual abilities of a growing child. So far, the studies conducted have shown that socioeconomic status and intelligence are related as reported by higher Intelligent Quotient of children and parents is seen with families of higher socioeconomic status which is calculated by occupation, income, and type of housing<sup>5</sup>. Professional individuals have a higher IQ than those who are untrained<sup>6</sup>.

Goodenough-Harris 'Draw-a-Man' Test has been traditionally used as a simple tool to measure mental development in a child. There have very few studies looking at the utility of 'Draw a man' test in the Indian subcontinent. In this study, a trial has been made to compare and determine the results of Draw Man's test in two groups- high socioeconomic group and low socioeconomic group.

## 2. MATERIAL AND METHODS:

The present study was carried out in Karad taluka of western Maharashtra, India. The cross-sectional as an analytical approach of observational study was used to collect the data from school children. The children enrolled in nursery and primary sections were considered as the study subjects. The study units include private convent school from

Karad city where most of the students enrolled from high socio-economic status, other semi-private schools were mixed economic class children enrollment and Zilla Parishad (ZP) School located in a rural area of Karad block where most of the children enrolled from poor families. The sampling frame includes purposively selection of one convent, one semi-private, and one ZP schools and all the children totaled 500 as sample size and they were distributed as 320, 350 and 330 respectively. The modified BG Prasad socio-economic classification which is based on per capita family income was used in the study to obtain correct information from each student and classified into high and low socioeconomic groups. As per scheduled interview and assessment, each child was provided a drawing sheet, pencil, and eraser. The students were supposed to fill their names, age, standard and division. A quiet room was chosen and photographs with human images were removed from it to avoid distractions. The children were told not to copy from anywhere and use an eraser to the least. They were also asked to draw a full image of a man on the sheet. The crayons and color pencils were not to be used. They were given thirty minutes to finish the drawing. The goodies were distributed amongst these children. The whole data were collected by investigators in the months of July to December 2018 during schooling time after prior permission from school authorities and as per suitable time table.

All the drawings were scored by Goodenough Harris Revised Scale which has 28 items as follows;

1. Head present
2. Legs present
3. Arms present
4. Trunk present
5. Length of trunk > breadth
6. Shoulder indicated
7. Both arms and legs attached to the trunk
8. Legs attached to trunk in correct position and Arms attached to trunk in the correct position
9. Neck present
10. Outline of neck continuous with that of head and trunk or both
11. Eye present
12. Nose present
13. Mouth present
14. Both mouth and nose in two dimensions and two lips shown
15. Nostrils indicated
16. Hair is shown
17. The hair on more than the circumference of the head
18. Clothing present
19. Two articles of clothing present, non-transparent
20. Entire clothing with sleeves and trousers shown free from transparency
21. Four or more articles of clothing definitely indicated
22. Costume complete without incongruities
23. Fingers showed
24. Correct number of fingers shown
25. Fingers in two dimensions, length greater than breadth. The angle subtended not greater 180°
26. Opposition of thumb
27. Hand showed, distinct from arms and fingers
28. Arms joints shown either elbows, shoulders or both.

In this study, the basal age of 3 years was chosen and for every 4 points in the drawing, one year was added to basal age.

IQ was calculated by the following formula;

$$= \frac{\text{Mental age}}{\text{Chronological age}} \times 100$$

The data so collected were coded and decoded, analyzed and presented in tabular forms with frequency percentage distribution. The chi-square test was applied to determine the statistically significant difference between study variables and the difference was considered if the p-value is less than 0.05 at 95% confidence interval.

### 3. OBSERVATION AND RESULTS:

A total of 1000 drawings were collected out of which 550 belonged to the high socioeconomic group and 450 belonged to the low socio-economic group. The proportions of boys were higher 52.7% and 53.3% than girl students

with respect to the high and low socio-economic group however; the difference was not statistically significant ( $p > 0.05$ ). There were 530 boys and 470 girls participated in the present study (Table 1).

**Table 1: Distribution of Children according to Gender and Socio-Economic groups**

Socio-economic group	Boys	Girls	Total
High socio-Economic group	290 (52.7%)	250(45.45%)	550(55%)
Low Socio-Economic group	240(53.33%)	220(48.89%)	450(45%)
<b>Total</b>	530(53%)	470(47%)	1000
$\chi^2 = 0.23, p = 0.62$			

Among the high and low economic group, higher proportions of children were seen in the age group 5-6 and 4-5 years respectively. The proportions of male children from high and low-income groups were maximum in the age group 7-8 years whereas, 8-9 and 5-6 years among females (Table 2).

**Table 2: Age and Sex wise distribution of school children**

Age groups (yrs.)	High Economic Group Frequency (%)			Low Economic Group Frequency (%)		
	Male	Female	Total	Male	Female	Total
4-5	22(55.0%)	18(45.0%)	40(40.0%)	36(60.0%)	24(40.0%)	60(60.0%)
5-6	34(56.6%)	26(43.3%)	60(60.0%)	22(55.0%)	18(45.0%)	40(40.0%)
6-7	57(42.2%)	70(51.8%)	135(51.9%)	80(64.0%)	45(36.0%)	125(49.1%)
7-8	48(64.0%)	27(36.0%)	75(57.7%)	37(67.2%)	18(32.7%)	55(42.3%)
8-9	60(46.1%)	70(53.8%)	130(59.1%)	60(66.6%)	30(33.3%)	90(40.9%)
9-10	69(62.7%)	48(43.6%)	110(57.8%)	45(56.2%)	35(43.7%)	80(42.1%)
<b>Total</b>	290 (52.7%)	260(47.2%)	550(55.0%)	280(62.2%)	170(37.7%)	450(45.0%)

**Table 3: Distribution of children according to Goodenough Harris revised scale score**

Age groups (yrs.)	Goodenough Harris scale score				Z test
	High Economic Group		Low Economic Group		
	Range	Mean	Range	Mean	
4-5	5-15	10	4-11	7.5	0.001
5-6	5-18	11.5	4-15	9.5	0.004
6-7	6-22	14	6-17	11.5	0.001
7-8	7-24	15.5	5-19	12	0.001
8-9	11-26	18.5	7-25	16	0.001
9-10	19-29	24	12-29	20.5	0.001
r =0.97,			r = 0.95		

The mean score of Goodenough-Harris revised scale in different age groups are significantly higher in children coming from the high economic group as compared to low as indicated by Z test and  $p < 0.05$  at 95% CI respectively. The positive correlations were also seen among the age of children and mean score of Goodenough- Harris scale in both the study groups,  $r = 0.97$  and  $0.95$  respectively (Table 3).

**Table 4: Distribution of children according to scores by Goodenough – Harris revised scale**

Age groups (yrs.)	Mental age < Chronological age		Mental age = Chronological age		Mental age > Chronological age	
	High S-E	Low S-E	High S-E	Low S-E	High S-E	Low S-E
4-5	25(62.5%)	17(28.3%)	5(12.5%)	14(23.3%)	10(25.0%)	29(48.3%)
5-6	20(33.3%)	24(60.0%)	14(23.3%)	9(22.5%)	26(43.3%)	7(17.5%)
6-7	41(30.7%)	77(61.6%)	27(20.0%)	22(17.6%)	67(49.2%)	26(20.8%)
7-8	18(24.0%)	36(65.4%)	11(14.6%)	10(18.1%)	46(61.3%)	9(16.3%)
8-9	55(42.3%)	61(67.7%)	22(16.9%)	8(8.8%)	53(40.7%)	21(23.3%)
9-10	42(38.1%)	49(61.2%)	18(16.3%)	10(12.5%)	50(45.4%)	21(26.2%)
Total	201(36.5%)	264(58.6%)	97(17.6%)	73(16.2%)	252(45.8%)	113(25.1%)
	$\chi^2 = 11.39; p = 0.04$		$\chi^2 = 6.23; p = 0.01$		$\chi^2 = 10.41; p = 0.001$	

According to table 4, maximum proportions of children with mental age < chronological age, were significantly higher, 58.6% from low S-E class. The children with mental age equal chronological age were significantly higher, 17.6 % from high S-E class. Similarly, proportions of children had mental age more than chronological ages were also significantly higher, 45.8% from high S-E class.

#### 4. DISCUSSION:

The drawing is an innate ability and its spontaneous quality is given up by children after 10 years of ages but the present study revealed assessment of IQ and its association among children aged 4-10 years coming from high and low S-E background. A total of 1000 drawings were collected of which max, 55% belonged to the high socioeconomic group.

The percentages of boys in both groups were higher, 52.7% and 53.33% respectively than girls and this dissimilarity may be due to social causes viz. poverty, female child discrimination, family dispute, adverse sex ration, etc. In most of the rural, peri-urban, slum and tribal families, the female children are uncared for and their education is not encouraged. Similar findings have been also reported by Phatak P<sup>7</sup> among school children from the state of Maharashtra. The range of scores achieved by Goodenough- Harris Draw a Man test was much higher in children from high S-E class as compared to low S-E class. A study conducted by Phatak P<sup>7</sup> among school children from the state of Maharashtra also showed similar results.

A study conducted by Raja S in Nepal <sup>8</sup> observed a significant association of deviation of drawing age from chronological age with respect to gender, however; there was a low positive correlation between drawing age and chronological age and this could be due to the low sample size of the study population. The present study found that the family's socioeconomic status affects the IQ of children. A study conducted at the National Institute of Nutrition Hyderabad<sup>9</sup> also reported that socioeconomic status influences the intelligence of children. Children of higher and lower socioeconomic status have different attitudes towards learning and problem solving which in a way influences their performance in IQ tests.

Therefore it is safe for us to conclude that Goodenough – Harris Draw a Man test can be used as an easy and convenient screening test for assessing general intelligence and recognize and variation from normal activity in routine clinical practice by Pediatricians.

#### 5. CONCLUSIONS:

The IQ attained from Goodenough- Harris test showed much higher IQ in high socioeconomic groups and lower IQ in the low socioeconomic group. This study is evidence that the environment affects the development of intelligence. Children from high socioeconomic groups have access to better environmental, social, psychological stimulation. Thus, they are quite ahead in terms of the development of intelligence.

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