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A STUDY OF THE USE OF THE McCARTHY SCALES OF CHILDREN'S ABILITIES WITH IRISH CHILDREN

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The McCarthy Scales of Children's Abilities and the Stanford-Binet Intelligence Scale were administered to a sample of 200 children, chosen to be representative of Irish children aged between five and six years. When compared with the findings of previous studies, the Irish mean ability scores were similar to American mean scores but below those of English and Scottish samples. Sex and social class differences in McCarthy scale scores were somewhat greater in Ireland than in other countries. Some doubt surrounds the suitability of the McCarthy Motor and Quantitative scales for children on this side of the Atlantic, though in general the test seems broadly suitable for use here.

The McCarthy Scales are a set of 18 norm-referenced tests of cognitive and physical development suitable for use with children from two-and-a-half to eight-and-a-half years of age. The tests were standardized in the United States between 1969 and 1970. Six composite scale scores are derived from the 18 subtests. The Scales are Verbal, Perceptual Performance, Quantitative, Motor, and Memory, with a sixth, the General Cognitive Index being made up of the Verbal, Perceptual and Quantitative scores (16).

Research on the McCarthy Scales largely consists of comparative studies with other tests of ability such as the Stanford-Binet Intelligence Scale and the Wechsler tests. These studies are mainly American. Reported correlations with the Stanford-Binet range between .45 and .91 on samples ranging in size from 33 to 111 children (4, 5, 6, 7, 10, 11, 13, 14). Correlations between the McCarthy Scales General Cognitive Index and the WISC and the WPPSI Full Scale, Verbal and Performance IQs, have usually been in the range 0.6 to 0.75 (1, 7, 8, 12, 17). Thus, the McCarthy scales have a favourable degree of concordance with other well-established ability tests.

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Studies in various countries have reported sex differences in performance on the McCarthy Scales In a study of the standardization sample, consistent, though slight, differences which favoured girls were found at the seven age levels used (13) In a further American study (20), the overall pattern of differences was found to favour females to a small extent Statistically significant differences were found in the Motor Scale where the girls scored higher than boys Sex differences on the Perceptual Performance Scale and the General Cognitive Index were marginally significant in favour of the girls In a study of 89 English four-year olds, marginally significant differences in favour of girls were found in the Perceptual Performance Scale and the CGI and highly significant differences in the Motor Scale (15) A study of 128 Scottish five-year olds also reported a significant difference in the Motor Scale in favour of females (19)

The present study considers whether the McCarthy Scales and norms are applicable to Irish children and compares the relative standing of Irish children with English, American, and Scottish children on the cognitive areas assessed by the Scales Sex differences and cognitive developmental differences between children from different social back grounds are also examined

METHOD

Sample

A quota sample based on father's occupation, child's age, sex, and area of residence was constructed The sample consisted of 100 males and 100 females attending national schools in the counties of Clare and Cork Twenty schools from a representative set of locations were identified and their principal teachers' cooperation was sought All the teachers agreed to assist in the data collection To construct the sample, quotas were set for father's occupation based on the 1981 Irish Census (The eleven occupational categories in the Census were collapsed into seven groups, see Table 1) The sample was equally divided by sex Two age groups were chosen to allow comparison with the US normative figures The first group had a mean age of five and a-half years and a range of three months on either side and the second, a mean age of six and-a half years and the same range Finally a 60%-40% urban rural partition was sought To make up the actual sample, children's names were taken from each school's roll until all the required sex, age, residential, and occupational quotas were filled Parents were approached and asked to give permission

TABLE 1

SOCIAL-CLASS BACKGROUND OF SAMPLE AND POPULATION

Father's occupational category	Number in sample	(population)
Professional, Employer, Manager	42	(35)
Salaried Employee, Intermediate non-manual	36	(31)
Other Non-manual	26	(23)
Skilled Manual Worker	45	(39)
Semi-skilled Manual Worker	12	(11)
Unskilled Manual Worker	17	(17)
Farmer, Farm Manager, other Agricultural	22	(44)
Total	200	

for their child to be tested. There were ten refusals; in these cases, the children were replaced by other comparable children.

The achieved sample is fairly representative of the Irish population except that the farming occupational group is slightly under-represented and the middle classes are slightly over-represented.

The sample consists of 112 urban and 88 rural residents. The five-and-a-half year old group of 50 boys and 50 girls are aged between 63 and 69 months (inclusive), with a mean age at testing of 66.3 months; the six-and-a-half year old group (also 50 boys and 50 girls) is aged between 75 and 81 months (inclusive) with a mean age 77.7 months.

The number of cases in each occupational category in the sample and the equivalent number in the population as a whole (2, 3) are shown in Table 1.

Procedure

All children were tested in a private room in their school by the second author, a post-graduate student with supervised experience in test administration. The order of Test administration was alternated with each successive subject.

RESULTS

Means and standard deviations for the Stanford-Binet test and the McCarthy Scales for the Irish children are presented in Table 2 A correlation of 74 was found between scores on the two tests This is consistent with other research, and suggests that the concurrent validity of the McCarthy Scales in an Irish context, when the Stanford-Binet is used as the criterion, is reasonable though not high However, as will be apparent later, the McCarthy Scales sample cognitive skill areas in a broader and more specific way than the Stanford-Binet and the tests are not exactly comparable

TABLE 2

MEANS (AND SDs) OF IRISH CHILDREN S SCORES ON McCARTHY AND STANFORD BINET SCALES BY GENDER

	Male		Female		
	M	SD	M	SD	p
Stanford Binet	101	12 0	102	13 3	
McCarthy CGI	98	14 9	105	16 1	**
Verbal	50	10 7	54	11 0	*
Perceptual	50	9 1	58	10 2	**
Quantitative	47	9 0	50	8 3	*
Memory	46	9 0	49	9 9	**
Motor	46	9 0	49	9 8	

* $p < 05$ ** $p < 01$

A number of significant differences were found between the male and female means on the McCarthy Scales, in all cases, girls scored higher than boys Differences occurred on the McCarthy General Cognitive Index and on the Verbal, Perceptual Performance, Quantitative, and Memory Scales A significant sex difference was not evident on the Stanford-Binet Scale

In overall IQ as measured by the General Cognitive Index, the Irish statistics are very similar to the US normative figures, and so the McCarthy scales and norms would seem to be appropriate for use in Irish settings as a general indicator of cognitive development Minor deviations from the norms do exist, however, in the case of specific McCarthy scales and subtests and these would need to be taken into account in using the test

TABLE 3

MEAN SCORES (AND SDs) OF IRISH AND AMERICAN CHILDREN ON McCARTHY SCALES, BY AGE GROUP

	5½ year olds				6½ year olds			
	Irish		USA		Irish		USA	
	M	SD	M	SD	M	SD	M	SD
McCarthy CGI	103	15.2	100	16.2	100	16.2	100	15.7
Verbal	52	11.1	50	9.8	52	11.0	50	9.9
Perceptual	51	9.7	50	9.7	51	9.8	50	9.7
Quantitative	50	7.7	49	9.9	46	9.4	50	9.6
Memory	49	9.5	50	9.9	48	10.5	50	9.9
Motor	49	8.4	50	10.0	46	10.3	50	9.8

The index scores of the two Irish age groups and the corresponding scores of the standardization sample are presented in Table 3. There are no significant differences between the Irish and American samples for the five-and-a-half year old age group. However, the American six-and-a-half year olds achieve significantly higher Quantitative and Motor Scale scores than does the Irish sample ($p<.01$).

Relatively speaking, the Irish five-and-a-half year olds appear to perform significantly better in the Quantitative and Motor areas than the six-and-a-half year olds. The Irish and American mean raw scores in the separate tests making up the Quantitative scale at the two age levels are set out in Table 4. In all the Quantitative subtests, the Irish group make less relative progress between the ages of five-and-a-half and six-and-a-half than their American counterparts. At the earlier age, they are slightly in advance of the American children but this advantage has gone by age six-and-a-half.

A comparison between the scores of the occupational groups reveals a number of significant differences, particularly in some of the specific index areas such as Memory, where the difference between the unskilled manual group and the professional group is large, exceeding one standard deviation (Table 5). The children from the professional/employer class obtain the highest scores in all areas. Farmers', salaried employees', and skilled manual workers' children score close to the American norm. The remaining three occupational groups return mean scores below the normative group

TABLE 4

MEANS (AND SDs) OF IRISH AND AMERICAN CHILDREN ON THE QUANTITATIVE SUBTESTS OF THE McCARTHY SCALES BY AGE

		Irish		USA	
	Age	M	SD	M	SD
Number Questions	5	45	11	45	14
	6	54	13	62	16**
Numerical Memory I	5	65	16	56	18**
	6	68	20	71	17
Numerical Memory II	5	18	16	15	16
	6	28	18	28	18
Counting & Sorting	5	73	13	72	16
	6	79	20	86	08**

** $p < 01$

in every comparison except one No significant differences were noted between the mean scores of urban and rural children

The mean McCarthy Scale scores for English four-and a quarter year olds (15) and Scottish five year olds (19) are presented in Table 6 along with the Irish results It should be noted that while the Scottish and English samples were fairly representative of the social background of the populations concerned, they were not structured according to any formal guidelines

The English children scored significantly higher than the Irish five-and-a-half year olds in the General Cognitive Index and in the Verbal and Perceptual scales In the Memory, Quantitative, and Motor Scales, the differences were not statistically significant The Scottish sample obtained significantly higher mean scores in the General Cognitive Index, the Verbal Scale, the Perceptual Scale and the Memory Scale

TABLE 5

MEANS (AND SDs) OF IRISH CHILDREN ON THE McCARTHY SCALES, BY OCCUPATIONAL GROUPS

		GCI	Verbal	Percept.	Quant.	Memory	Motor
Professional	M:	108.3	55.7	53.5	52.5	52.9	49.6
	SD:	12.6	8.9	9.0	8.6	8.2	8.9
Salaried	M:	101.5	51.9	51.4	47.0	47.1	48.8
	SD:	14.8	10.0	10.9	7.7	8.6	9.4
Non-manual	M:	96.1	48.3	48.7	47.0	48.8	44.8
	SD	14.7	12.6	8.2	7.8	8.1	8.5
Skilled	M:	100.8	51.1	51.0	47.1	48.1	49.1
	SD:	16.3	10.2	9.9	8.8	10.2	8.0
Semi-skilled	M:	97.0	50.0	49.0	47.0	50.6	42.7
	SD:	17.3	12.7	9.5	7.4	11.6	11.2
Unskilled	M:	95.4	49.5	47.0	44.7	43.4	46.7
	SD:	16.1	11.0	7.6	10.6	12.8	11.3
Farming	M:	102.4	52.7	50.9	49.3	49.1	45.1
	SD:	18.7	13.9	11.1	8.6	10.9	11.0

TABLE 6

SCOTTISH, ENGLISH AND IRISH McCARTHY SCALE MEAN SCORES

	Scottish		English		Irish			
Age	5		4		5		6	
	M	SD	M	SD	M	SD	M	SD
MSGCI	110.2	14.1	107.8	12.6	103.1	15.2	99.6	16.2
Verbal	58.2	10.0	54.4	8.8	51.5	11.0	52.1	10.9
Perceptual	55.2	8.2	55.6	8.4	50.9	9.6	50.7	9.8
Quantitative	51.4	9.3	52.1	8.5	50.0	7.6	46.4	9.3
Memory	52.0	9.9	49.9	8.4	49.1	9.4	47.6	10.4
Motor	47.7	9.9	47.6	8.5	49.2	9.9	45.9	10.2

DISCUSSION

The results of this study suggest that the McCarthy Scales are generally appropriate for use with Irish children However, the Motor Scale appears to be inappropriate in some respects for Irish and British populations and children's scores here should be treated with caution The same applies, but to a lesser extent, in the case of the Quantitative scale where there may be problems with respect to the difficulty level of the subtest items after the age of four (7, 9) According to the test manual, the Quantitative scale is aimed at assessing number aptitude rather than at exploring the upper limit of computational skills A detailed study of the Quantitative subtests and item statistics would be required in order to determine how appropriate they will be in Ireland

The poor motor scores of the Irish children are consistent with previous findings (15, 18, 19) and suggest quite specific and marked differences in motor development between American and European children

Sex differences which have been noted in other samples were also found in the Irish sample Since the McCarthy items do not contain any obvious sex bias, except for Skipping on the Motor Scale, the differences may be reflective of a general superiority in development of girls over boys which, for some reason, is accentuated in Ireland

The occupational-class differences in the McCarthy Scale scores found in the Irish sample may reflect the greater environmental and material advantages of the higher socio-economic groups The differences suggest that children from lower socio-economic backgrounds are educationally handicapped from the beginning of their school careers

The differences between the Irish and the Scottish and English results are not readily interpretable because the samples involved were not formally matched and the age ranges differ However, the findings may be indicative of cultural differences in child rearing practices A clearer finding of the comparative aspect of our study is the relative decline in development on the Quantitative scale in the Irish children, a phenomenon which should be investigated more fully

REFERENCES

1 ARINOLDO, C G Concurrent validity of McCarthy s Scales *Perceptual and Motor Skills*, 1982 *54* 1343 1346

2. IRELAND: CENTRAL STATISTICS OFFICE. *Household budget survey.* Dublin: Stationery Office, 1980.

3. IRELAND: CENTRAL STATISTICS OFFICE. *Census of population of Ireland 1981.* Dublin: Stationery Office, 1983.

4. DAVIS, E.E. Concurrent validity of the McCarthy Scales of Children's Abilities. *Measurement and Evaluation in Guidance,* 1975, *8,* 101-104.

5. DAVIS, E.E., & ROWLAND, T. A replacement for the venerable Binet. *Journal of Clinical Psychology,* 1974, *30,* 517-521.

6. DAVIS, E.E., & SLETTEDAHL, R.W. Stability of the McCarthy Scales over a one-year period. *Journal of Clinical Psychology,* 1976, *32,* 798-800.

7. DAVIS, E.E., & WALKER, C. Validity of the McCarthy Scales for south-western rural children. *Perceptual & Motor Skills,* 1976, *42,* 563-567.

8. DAVIS, E.E., & WALKER, C. McCarthy Scales and WISC-R. *Perceptual & Motor Skills,* 1977, *44,* 496.

9. EISER, C. An evaluation of the McCarthy Scales of Children's Abilities. *British Journal of Educational Psychology,* 1978, *48,* 351-353.

10. GERKEN, K.C., HANCOCK, K.A., & WADE, T.H. A comparison of the Stanford-Binet Intelligence Scale and the McCarthy Scales of Children's Abilities with pre-school children. *Psychology in the Schools,* 1978, *15,* 468-472.

11. HARRISON, K.A., & WIEBE, M.J. Correlational study of McCarthy, WISC and Binet Scales. *Perceptual & Motor Skills,* 1977, *44,* 63-68.

12. KAUFMAN, A.S. Comparison of the WPPSI, Stanford-Binet, and McCarthy Scales as predictors of first grade achievement. *Perceptual and Motor Skills,* 1973, *36,* 67-73.

13. KAUFMAN, A.S., & KAUFMAN, N.L. Sex differences on the McCarthy Scales of Children's Abilities. *Journal of Clinical Psychology,* 1973, *29,* 362-365.

14. KROHN, E.J., & TRAXLER, A.J. Relationship of the McCarthy Scales of Children's Abilities to other measures of preschool cognitive, motor and perceptual development. *Perceptual and Motor Skills,* 1979, *49,* 783-790.

15. LYNCH, A., MITCHELL, L.B., VINCENT, E.M., TRUEMAN, M., & McDONALD, L. Th McCarthy Scales of Children's Abilities: A normative study on English 4-year-olds. *British Journal of Educational Psychology,* 1982, *52,* 133-143.

16. McCARTHY, D. *The McCarthy Scales of Children's Abilities.* New York: Psychological Corporation, 1972.

17. PHILLIPS, B.L., PASEWARK, R.A., & TINDALL, R.C. Relationship among McCarthy Scales of Children's Abilities, WPPSI and Columbia Mental Maturity Scale. *Psychology in the Schools,* 1978, *15,* 352-356.

18. TEW, B. Differences between Welsh and Canadian children on parts of the Test of Motor Impairment. *Child Care, Health and Development,* 1979, *5,* 135-141.

19. TIERNEY, I., SMITH, L., AXWORTHY, D., & RATCLIFF, S.G. The McCarthy Scales of Children's Abilities – Sex and handedness effects in 128 Scottish five-year-olds. *British Journal of Educational Psychology,* 1984, *54,* 101-105.

20. TIVNAN, T., & PILLEMER, D.B. Differences on standardized tests: The case of sex differences on the McCarthy Scales of Children's Abilities. *Journal of Clinical Psychology,* 1978, *34,* 443-445.