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Sex Differences in scholastic attainment from year 3 to form IV: A study of trends

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INTRODUCTION

The role of pupil sex as one of the major determinants of scholastic performance is amply demonstrated in the international literature.

Studies of primary school children carried out in the UK and the USA generally indicate that whatever sex differences exist in scholastic performance these tend to emerge clearly and consistently after age 11 (cf. Badger, 1985; Fairweather, 1976; Shackleton & Fletcher, 1984; Shuard, 1982). Studies by Ross & Simpson (1971), Thompson (1975) and Wilson (1972), for instance, show that in verbal abilities like reading and spelling no clear cut boy-girl differences appear before this age.

Studies by Kellmer Pringle, Butler & Davie (1966) and Pidgeon (1960) similarly suggest that this is also the case for arithmetic skills and mathematical ability. In a comprehensive review of the literature on sex differences, Maccoby & Jacklin (1974) conclude that up to age 11 boys and girls are very similar in verbal and mathematical abilities. At age 11, however, their abilities begin to diverge with girls becoming superior in verbal abilities and boys in mathematical abilities.

Borg & Falzon (1995) propose a plausible explanation for the little or no consistency in the occurrence and direction of sex differences. They argue that this may lie in the nature of the items making up the assessment instrument. Indeed, in a report on mathematical performance at age 11, the Assessment of Performance Unit (1980) found that when the examination paper is analysed in its component parts rather than as a whole paper girls perform significantly better than boys in certain areas such as computation while boys perform better in other areas like the spatial (e.g. length , area, volume and capacity). Borg & Falzon (1995) postulate that this may also well be the case in language subjects so that it is quite possible, for instance, to find girls performing better in one specific language area and boys in another. Hence, differences and directions may well be the product of the weighting of the various abilities assessed by the instrument.

Although these UK and USA findings on sex differences may be important and interesting and may have serious implications for educational policies and practices it is here argued that they are not, or should be, directly transferable to the local situation. Cultural differences as well as differences in parental practices, educational philosophies and classroom practices warrant that sex differences in performance in school subjects should be studied in the local context. A small number of Maltese studies have begun to address this need.

Falzon & Sammut (1976), for instance, found that amongst Maltese Form I and II pupils in comprehensive schools[1] girls consistently score higher in Maltese, English and Maths, with the greatest differences occurring in the two languages. Moreover, Ventura (1992) reports that whereas in Forms I and II girls outperform boys in Integrated Science, in Forms III and IV there are no sex differences in performance in Biology and Chemistry; in Physics, however, the boys perform better.

METHOD

Aim of study

The aim of this study is to draw together the most recent findings on sex differences among Maltese children (cf. Borg & Falzon, 1991, 1995; Borg, Falzon & Sammut, 1995; and Borg, 1995). It will seek to present a complete and comprehensive picture of sex differences in performance in Maltese, English and Maths from Year 3 of the state primary school to Form IV of the state junior lyceum. The trends in girl-boy

differences across these eight years of state-provided schooling in what are generally considered to be the core/tool school subjects will be investigated.

Settings

The study was restricted to the primary sector and secondary junior lyceum sector of the state school system. This offered ideal conditions for the purpose of the study as it has national end-of-year examinations, as well as a highly centralised system of education with a clearly defined common curriculum.

Schooling is compulsory from age 5 to 16. Primary schooling is co-educational and spans the 6 years up to age 11. In Year 3 children were streamed on the basis of their performance in school-based annual exams in Maltese, English and Maths held at the end of Year 2. (Since 1989 streaming has been postponed and is now restricted to Years 5 and 6.) Streaming in the subsequent primary years was based on end-of-year national exams in these three curriculum subjects as well as performance in Social Studies and Religion. English is taught alongside Maltese from the first year of compulsory schooling. Towards the end of Year 6, most pupils take their 11-plus Junior Lyceum Entrance Examination which will determine their placement in one of two types of state secondary school: the grammar type 'junior lyceum' or the 'area secondary school'. Junior lyceums and area secondary schools are single-sex schools.

Subjects

The sample consisted of:

- 4123 pupils in Years 3, 4 and 5, making up 33.2 percent of the combined pupil population in these three grades (31.7 percent, 34.6 per cent and 33.3 percent of the population in Years 3, 4 and 5 respectively);
- 3460 Year 6 pupils from state and private schools who sat for the Junior Lyceum Entrance Examination; this figure represents 78.2 percent of the 4425 candidates;
- 816 pupils in each of Forms I, II and III of the junior lyceum, making up approximately 63 percent of the population figures in each grade;
- 770 pupils in Form IV of the junior lyceum, making up 60 per- cent of the population figures.

Results in the three core subjects in Form IV are not entirely derived from the same sample. Due to strike action by teachers none of the junior lyceums had a complete data set in the three subjects; in each school, at least one of the exam papers had not been administered. Hence it was decided to select the largest possible sample, but a different one, for each of the three subjects. It should also be noted that in these three samples there are predominantly more girls than boys, as is the case in the Junior Lyceum population.

A breakdown of the sample by grade and sex is set out in Table I.

TABLE I
The sample by grade and sex

Grade	Boys	Girls	Total
Year 3	688 (51.2%)	656 (48.8%)	1344 (100%)
Year 4	776 (53.9%)	663 (46.1%)	1439 (100%)
Year 5	719 (53.7%)	621 (46.3%)	1340 (100%)
Year 6	1659 (47.9%)	1801 (52.1%)	3460 (100%)
Form I	408 (50.0%)	408 (50.0%)	816 (100%)
Form II	408 (50.0%)	408 (50.0%)	816 (100%)
Form III	408 (50.0%)	408 (50.0%)	816 (100%)
Form IV:			
Maltese	276 (35.8%)	494 (64.2%)	770 (100%)
English	325 (42.2%)	445 (57.8%)	770 (100%)
Maths	234 (30.4%)	536 (69.6%)	770 (100%)

Measures

The present data set consists of the raw scores in Maltese, English and Maths. Exam papers were scored out of 100; the English and Maths papers were in English. The exams are, like typical school exams, of the omnibus type, that is, essentially heterogeneous in content. The raw scores making up the data set represent therefore a composite assessment of performance in various skills in each of the curriculum subjects tested. None of the three exams was piloted or standardised before administration. The exam papers were as follows:

- Years 3, 4 and 5: national end-of-year exams (Borg & Falzon, 1991 & 1995)[2];
- Year 6: the Junior Lyceum Entrance Examination (Borg, Falzon & Sammut, 1995)[3];
- Forms I, II, III and IV: national end-of-year exams (Borg, 1995)[4].

The end-of-year exams and Junior Lyceum Entrance Examination are organised and administered by the Test Construction Unit of the Department of Education under strict examination conditions.

Procedure

The data pertaining to Years 3, 4 and 5 and Forms I, II, III and IV were collated from the record sheets of classes in all the 8 junior lyceums and 12 primary schools selected at random from schools in Malta and Gozo. The Junior Lyceum Entrance Examination scores were drawn from the data base of the Test Construction Unit.

RESULTS

Before considering the major results, some caution must be exercised when interpreting the results. The results in Years 3, 4 and 5 are based on data obtained from boys and girls in state primary schools. About two-thirds of primary aged children attend the state school sector and it is not clear in what ways these children are different from those who attend the private/church school sector. Hence, the trends reported hereunder for children in the state sector may not necessarily be repeated in the population of children in the private/church primary sector.

With regard to results in Forms I to IV of the junior lyceum two important points need to be made. First, the junior lyceum population is a 'survivor' population; a population of children who was successful at the Junior Lyceum Entrance Examination. Hence, they are also a relatively homogeneous group in scholastic attainment. Second, in the junior lyceum population there are proportionally fewer boys than girls. For instance, in the present scholastic year, out of the combined pupil populations in private/church and state secondary schools 48.3% were boys. However, in the junior lyceum population only 39.7% were boys. Although, a proportion of boys as well of girls would opt to attend one of the private/church schools it is clear that far more boys than girls attend these schools (54.2% and 45.8% respectively). Although there is no evidence that the boys and the girls who enter private/church schools are the high achievers one can safely assume that at least they must be among the best achievers to have been able to pass the exams for entry in these schools. In which case the remaining boys' sample in the junior lyceum may lack much more of the best elements in that sex group than the girls' sample. Hence, the boys' sample may be somewhat biased. In any case, as indicated above, the trends reported hereunder for pupils in the junior

TABLE II

Sex differences in scholastic attainment: summary of MANOVAs at Year 3 to 6 and Form I to III; summary of t-tests in Form IV.

==Year 3

Univariate F-tests with (1.1336) df:

Variable	*F-value*	*p <*
Maltese	28.613	0.001
English	28.512	0.001
Maths	6.638	0.010

== Year 4

Univariate F-tests with (1,1431) df:

Variable	*F-value*	*p <*
Maltese	54.512	0.001
English	45.438	0.001
Maths	11.995	0.001

== Year 5

Univariate F-tests with (1,1332) df:

Variable	*F-value*	*p <*
Maltese	72.263	0.001
English	44.948	0.001
Maths	16.167	0.001

==Year 6 (Junior Lyceum Entrance Exam)

Univariate F-tests with (1,3452) df:

Variable	*F-value*	*p <*
Maltese	126.538	0.001
English	95.797	0.001
Maths	0.224	0.640

== Form I

Univariate F-tests with (1.808) df:

Variable	*F-value*	*p <*
Maltese	5.321	0.025
English	1.180	0.280
Maths	4.880	0.030

== Form II

Univariate F-tests with (1,808) df:

Variable	*F-value*	*p <*
Maltese	14.803	0.001
English	0.777	0.380
Maths	40.582	0.001

== Form III

Univariate F-tests with (1,808) df:

Variable	*F-value*	*p <*
Maltese	16.677	0.001
English	3.345	0.070
Maths	6.430	0.015

== Form IV

Independent t-test with df=768:

Variable	*t-value*	*p <*
Maltese	5.10	0.001
English	7.73	0.001
Maths	5.33	0.001

lyceum sector may not necessarily be repeated in the population of pupils in the state area secondary school sector or the private/church secondary sector.

Table II, which sets out a summary of the analysis, shows the following results:

- in Years 3, 4, 5 and Form IV there are statistically significant sex differences in Maltese, English and Maths;
- in Year 6, there are statistically significant sex differences in Maltese and English only;
- in Forms I, II and III there are statistically significant differences in Maltese and Maths only.

Figures 1, 2 and 3, illustrating the mean scores for girls and boys in the three core subjects in Years 3, 4 and 5, respectively, show that girls perform significantly better than boys in Maltese, English and Maths.

At the end of Year 6, in the Junior Lyceum Entrance Examination, girls outperform boys in Maltese and English (figure 4). There are no significant differences in the sexes' performance in Maths.

In Forms I, II and III, the performance of junior lyceum girls in Maltese and Maths is significantly better than that of junior lyceum boys (figures 5,6 and 7). There are no significant sex differences in English.

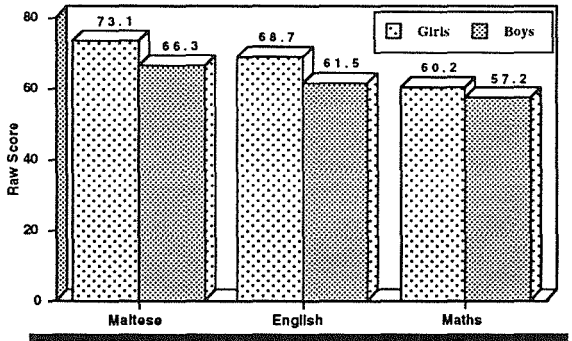

Fig 1. Sex Differences in scholastic attainment at the end of Year 3

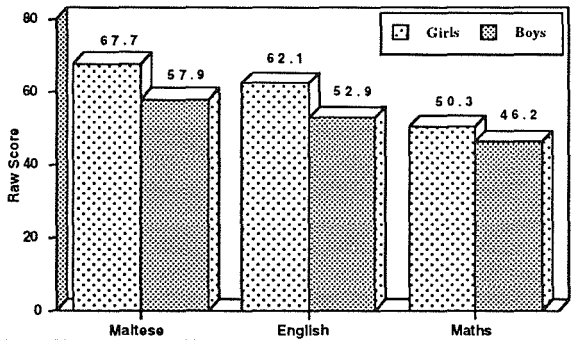

Fig 2. Sex Differences in scholastic attainment at the end of Year 4.

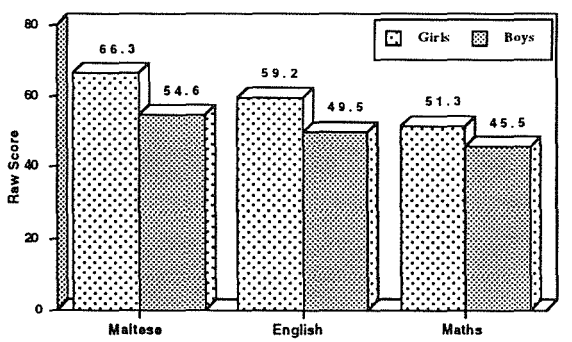

Fig 3. Sex differences in scholastic attainment at the end of Year 5.

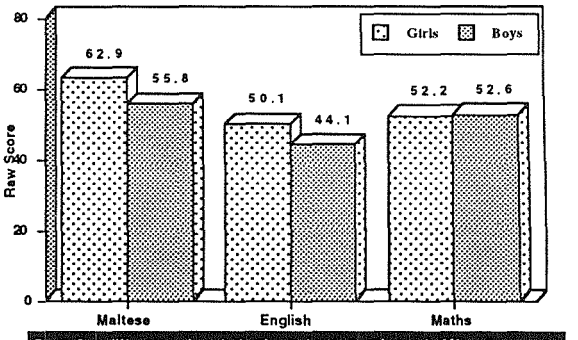

Fig 4. Sex differences in scholastic attainment at the end of Year 6 (Junior Lyceum Entrance Examination).

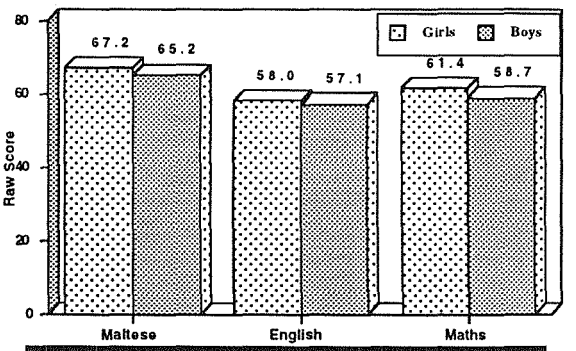

Fig 5. Sex differences in scholastic attainment at the end of Form 1 of the Junior Lyceum

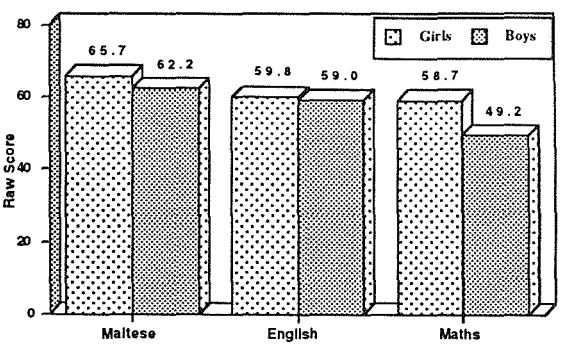

Fig 6. Sex differences in scholastic attainment at the end of Form II of the Junior Lyceum

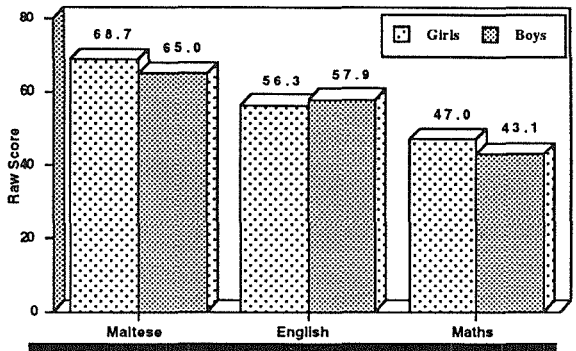

Fig 7. Sex differences in scholastic attainment at the end of Form III of the Junior Lyceum

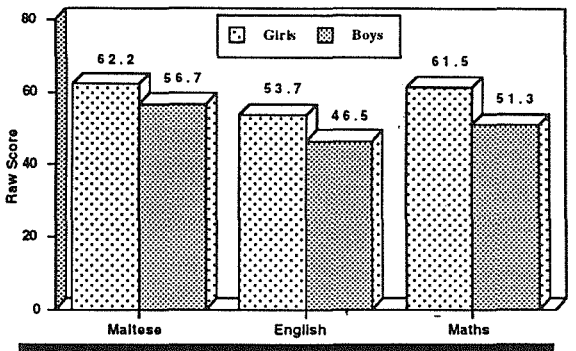

Fig 8. Sex differences in scholastic attainment at the end of Form IV of the Junior Lyceum

Figure 8 shows that at the end of Form IV of the junior lyceum, girls outperform boys in Maltese, English and Maths.

To investigate the presence of any trends in the magnitude of the sex differences the mean boy-girl difference in each curriculum subject in Year 3 to Form IV was expressed in terms of the pooled standard deviation (i.e. the standard deviation in each respective sample as a whole). This was done irrespective of whether the sex difference was statistically significant or not. Table III shows that out of a possible 24 girl-boy comparisons in only two instances did boys perform better than girls. It is also clear from these results that differences are most marked in the two languages; they are generally most accentuated in Maltese and least accentuated in Maths.

Figure 9, illustrating these girl-boy differences in Maltese, shows that the general trend is for differences to increase in magnitude from Year 3 to Year 6, and from Form I to Form IV.

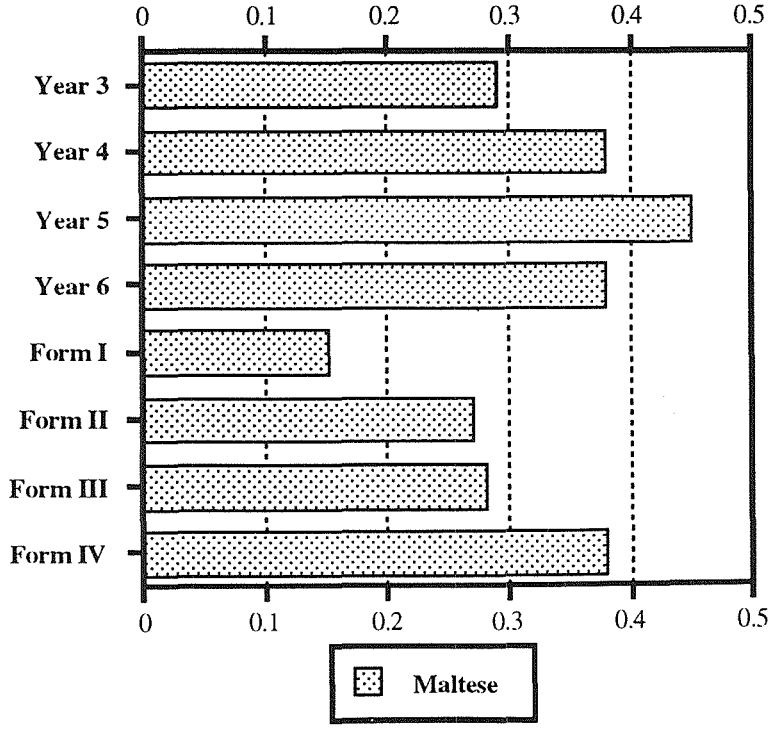

Fig 9. Sex differences in Maltese: trends from Year 3 to Form IV

Although, as is evident from Figure 10, this trend may also be said to be repeated in English from Year 3 to Year 6 the trend over the secondary years is not clear. Indeed, whereas girls perform better in English in Form I, II and IV, the converse occurs in Form III with boys outperforming girls.

In Maths, results show that from Year 3 to Year 5 there is an increase in the magnitude of the sex difference (see Figure 11). Generally speaking this is also the case over the secondary years. In the Junior Lyceum Entrance Examination at the end of Year 6, however, boys outperform girls.

DISCUSSION

This paper highlights some important sex differences in scholastic performance: generally speaking, girls tend to outperform boys in English, Maltese and Maths. Most notable is one unequivocal trend throughout: girls consistently perform better than boys in Maltese in each of the eight grades investigated. Except for the results in

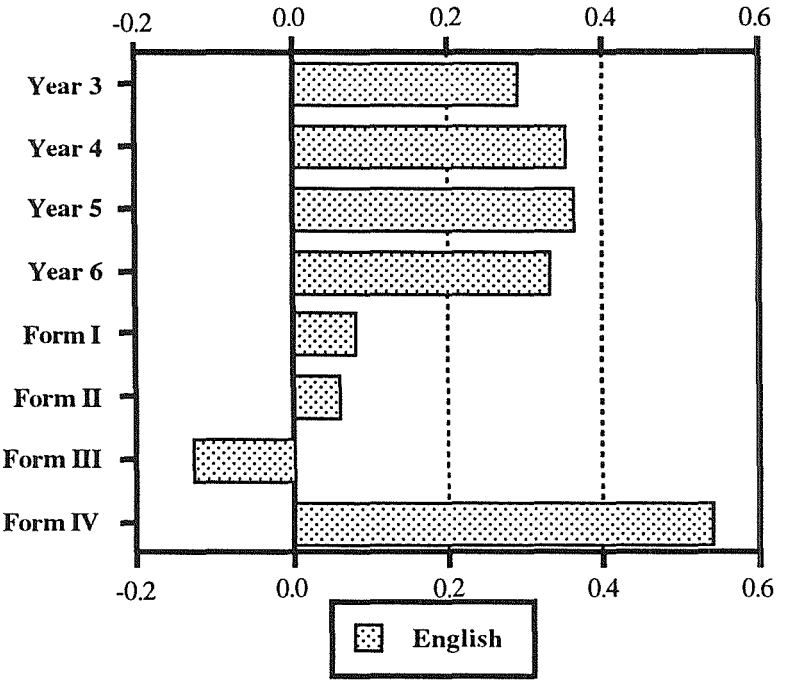

Fig 10. Sex differences in English: trends from Year 3 to Form IV

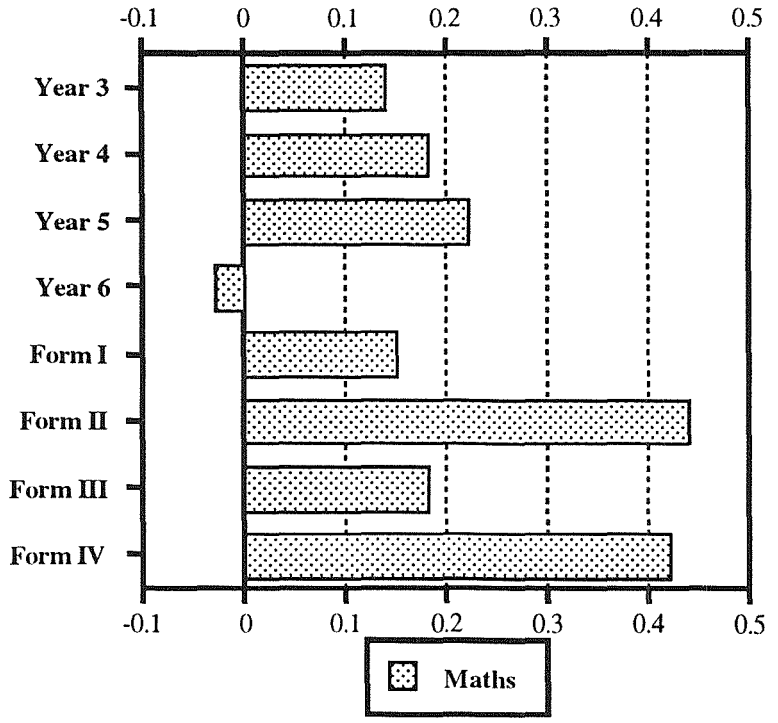

Fig 11. Sex differences in Maths: trends from Year 3 to Form IV.

Maths of the Junior Lyceum Entrance Examination, girls also outperform boys (in Maths) at all grades investigated. In English, the trend favours girls in the primary years, whereas in the secondary years there are no consistent sex differences.

The present finding that generally speaking girls outperform boys in school subjects is in agreement with those reported in other researches carried out in the UK and USA (cf. Maccoby & Jacklin 1974). There is, however, one important departure from the general trend in these studies: Maltese girls tend to manifest their superiority in the languages earlier on in age - as early as age 8. Their superiority in Maltese is consistent and becomes amplified over grade level within the respective primary and secondary sector. With regard to the latter sector, sex differences in Maltese are in concordance with those reported by Falzon & Sammut (1976) for Form I and Form II comprehensive schoolchildren.

The girls' superiority in English is not so pervasive: they only manage to re-establish and consolidate their superiority as late as Form IV. This is in contra position to the findings in the subject as reported by Falzon & Sammut (1976).

With regard to performance in Maths, findings are in contra position to those reported in UK and USA studies (cf. Maccoby & Jacklin, 1974). There are two important points of departure here: first, sex differences emerge clearly and consistently from as early as age 8; second, in the junior lyceum, it is the girls rather than the boys who are superior in Maths. The results also show that the girls' superiority in Maths generally becomes more pronounced from Year 3 to Form IV.

CONCLUSIONS

This paper has provided empirical evidence which unequivocally shows that the formal examination system in the state primary school sector and the

junior lyceum sector of secondary education clearly 'favour' the girls. It is the girls who from as early as age 8 outperform the boys in all or some of the core/tool subjects. This trend is, of course, in sharp contrast with the general findings reported by UK and USA studies, as pointed out earlier in this paper.

Borg & Falzon (1995) argue that the marked and consistent sex differences in Years 3, 4 and 5 may be the indirect outcome of classroom practices in our state primary schools. It is argued that since here it is often the case that compliance with adult demands is generally encouraged and valued, girls, who tend to be more compliant (cf. Maccoby and Jacklin 1974), are likely to find school a more congenial place than boys. Hence, this situation may be reflected in an improved scholastic performance on the part of the girls. This may also very well be the case in the junior lyceum, although one must bear in mind that the boys' sample may lack some of its best elements such that the present findings at this level may be an artifact of this practice.

FUTURE RESEARCH

One problem with the findings reported above is that the magnitude and direction of sex differences are possibly influenced by those aspects of the curriculum subject that are actually being assessed. As pointed out above, the raw scores on which the present findings are based are in reality a composite score rather than scores in specific, clearly defined, abilities. This, of course, leads to the possibility that certain sex differences in a specific skill, as for instance computation, may be subsumed or canceled out because of the heterogeneous nature of the items making up the Maths paper. It is here acknowledged that it is difficult to interpret results when these are based on an analysis of a composite assessment. There is the need for research which investigates sex differences on specific, narrow abilities separately, rather than using global measures. This writer is currently engaged in such a project.

Notes

1. In the 1970s all state secondary schools in Malta went comprehensive. In the early 1980s the grammar school was re- introduced.
2. This data set was collected by Marie Therese Attard-Montalto, Alfred Debattista, Jonathan Mifsud, Renzo Mule-Stagno, Joseph Saliba and Margaret Vassallo for their B.Ed.(Hons.) dissertation.
3. This data set was drawn from the data base of the Test Construction Unit.
4. This data set was collected by Natalie Muscat and Sharon Sammut for their B.Ed.(Hons.) dissertation.

References

Assessment of Performance Unit (1980) *Mathematical Development. Primary Survey Report No.* 1 (London, HMSO).

Badger, E. (1985) Why aren't girls better at maths?, in: N. Entwistle (Ed.) *New Directions in Educational Psychology - Learning and Teaching* (London, Falmer Press).

Borg, M.G. (1995) Age and sex differences in scholastic performance among secondary school students: a longitudinal study. *Education Review*, in press.

Borg, M.G. and Falzon, J.M. (1991) Streaming in Maltese primary schools. *Research in Education*, 45, pp. 1-12.

Borg, M.G. and Falzon, J.M. (1995) Birthdate and sex effects on the scholastic attainment of primary schoolchildren: a cross-sectional study. *British Educational Research Journal*, 21, pp. 61-74.

Borg, M.G., Falzon, J.M. and Sammut, A. (1995) Age and sex differences in performance in an 11-plus selective examination. *Educational Psychology*, 16, in press.

Central Office of Statistics (1993) *Education Statistics 1992-93* (Malta, Central Office of Statistics).

Fairweather, H. (1976) Sex differences in cognition. *Cognition*, 4, pp. 231-280.

Falzon, J.M. and Sammut, A. (1976) A Report on the National Examinations held in Government Schools (Forms I to V) in June-July, 1975 (mimeo) (Malta, Education Department, Test Construction Unit).

Kellmer Pringle, M.L., Butler, N.R. and Davie, R. (1966) *11,000 Seven-Year-Olds* (London, Longmans).

Maccoby, E.E. and Jacklin, C.N. (1974) *The Psychology of Sex Differences* (California, Stanford University Press).

Pidgeon, D.A. (1960) A national survey of the ability and attainment of children at three age levels. *British Journal of Educational Psychology*, 30, pp. 124-133.

Ross, J.M. and Simpson, H.R. (1971) The national survey of health and development: 1, Educational attainment. *British Journal of Educational Psychology*, 41, pp. 49-61.

Shackleton, V. and Fletcher, C. (1984) *Individual Differences, Theories and Applications* (London, Methuen).

Shuard, H.B. (1982) Differences in mathematical performance between girls and boys, in: W.H. Cockcroft (Ed.) *Mathematics Counts* (London, Her Majesty's Stationery Office).

Thompson, G.B. (1975) Sex differences in reading attainment. *Educational Research*, 18, pp. 16-23.

Ventura, F. (1972) Gender, science choice and achievement: a Maltese perspective. *International Journal of Science Education*, 14, pp. 445-461.

Wilson, J.A. (1972) Personality and attainment in the primary schools: II. Personality structure and attainment of ten- year-olds. *Research in Education*, 7, pp. 12-23.

TABLE III

Sex differences in Maltese, English and Maths: trends from Year 3 to Form IV.

	Means Girls	Boys	Difference between means	Pooled SD	Difference in terms of pooled SD
Maltese					
Year 3	73.11	66.32	6.79	23.67	.29
Year 4	67.66	57.89	9.77	25.77	.38
Year 5	66.33	54.64	11.69	25.56	.46
Year 6	62.93	55.83	7.10	18.93	.38
Form I	67.17	65.21	1.96	12.22	.16
Form II	65.71	62.17	3.54	13.29	.27
Form III	68.70	64.99	3.71	13.15	.28
Form IV	62.17	56.72	5.45	14.45	.38
English					
Year 3	68.67	61.52	7.15	24.92	.29
Year 4	62.13	52.95	9.18	26.44	.35
Year 5	59.17	49.49	9.68	26.54	.36
Year 6	40.13	34.06	6.07	18.55	.33
Form I	58.02	57.05	0.97	12.82	.08
Form II	59.79	58.98	0.81	13.23	.06
Form III	56.30	57.88	-1.58	12.51	-.13
Form IV	53.72	46.46	7.26	13.35	.54
Maths					
Year 3	60.21	57.20	3.01	21.97	.14
Year 4	50.26	46.22	4.04	22.90	.18
Year 5	51.26	45.50	5.73	25.96	.22
Year 6	52.17	52.60	-0.43	25.50	-.02
Form I	61.40	58.69	2.71	17.58	.15
Form II	58.71	49.24	9.47	21.73	.44
Form III	46.96	43.06	3.90	22.02	.18
Form IV	61.47	51.31	10.16	24.76	.41