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Gender Differences in Educational Achievement in a New Zealand Birth Cohort

David M Fergusson Ph.D. Executive Director

L John Horwood, B.A., M.Sc. Research Fellow

Christchurch Health and Development Study

Department of Psychological Medicine

Christchurch School of Medicine

PO Box 4345

Christchurch

New Zealand

ABSTRACT

Gender differences in educational outcomes were examined in a birth cohort of over 1,000 Christchurch born children studied from the point of school entry to the age of 18. This analysis suggested three major conclusions:

i) Throughout the school career of this cohort males achieved less well than females. Gender differences were evident in the results of standardised testing, teacher ratings of school performance and in the school leaving outcomes of the cohort. At no point of the school career of this cohort was there evidence to suggest that females performed less well than males.

ii) Gender differences in educational achievement could not be explained by gender differences in intelligence since boys and girls had very similar IQ test scores.

iii) However, the higher rate of educational under-achievement in males was adequately explained by gender related differences in classroom behaviours with males being more prone to disruptive and inattentive classroom behaviours that appeared to impede male learning and lead to a male educational disadvantage.

It is concluded that the traditional educational disadvantage shown by females has largely disappeared and has been replaced by an emerging male disadvantage. The implications of these findings for contemporary educational policies are discussed.

INTRODUCTION

Over the last two decades there has been an increasing emphasis placed on issues of gender equity in the classroom. This interest has been motivated by observations suggesting that girls were at a disadvantage within the New Zealand education system. Two lines of evidence supported this conclusion. First, historical evidence suggested that girls had lower success rates in school leaving examinations and were less likely to enter tertiary education with these differences being particularly marked in the areas of science and mathematics (Forbes, 1987; NZCER, 1988). Second, studies of classroom interaction patterns suggested that males are more prominent and dominant in both teacher/pupil and pupil/pupil interactions (Middleton, 1988; NZCER, 1988). This evidence has been interpreted as suggesting that male classroom behaviour may act to discourage female educational achievement. The most comprehensive review of these issues, as they apply to the New Zealand educational system, was reported in the analysis given in the report of the 1988 Royal Commission on Social Policy. The report concluded that:

"The major findings of the research are limitations on the aspirations and life chances of most young women at their completion of secondary school and their limited participation in tertiary education .... The research shows clearly that the New Zealand education system does not offer the majority of girls a fair chance to develop their abilities." (NZCER, 1988, p181).

There were, however, two potential limitations of this review. First the review failed to quantify the extent to which there were gender differences in educational achievement or to examine the extent to which these differences had been reducing. Second, much of the report was based on research findings reported by the early 1980s. Both features suggest that the report may have been somewhat out of date as an account of gender differences in the New Zealand education system in the late 1980s. This view is supported by recent evidence that

suggests the traditional female educational disadvantage has disappeared and has been replaced by an emerging male educational disadvantage. For example, the 1995 Minister of Education's report on the New Zealand school system (Minister of Education, 1995) showed that females tended to: have higher rates of participation and success in School Certificate and University Bursary examinations; have higher rates of school retention to the sixth and seventh forms and that fewer girls than boys left school without educational qualifications. It was also clear that in School Certificate examinations the traditional disadvantage of females in mathematics and science subjects had all but disappeared: males tended to do slightly better in mathematics than females whereas females did slightly better than males in science subjects. Examination of participation and success rates at Bursary level however, suggests the presence of gender preferences with females more often participating in non-science subjects and males more often participating in science subjects. The trends in this report clearly suggest that the traditional educational disadvantage of females has largely disappeared and may have been replaced by an emerging male disadvantage that is particularly evident in School Certificate participation and success rates, retention in school and in the proportion of young people leaving school without educational qualifications.

In this paper we examine these issues by reporting on the educational achievement of a birth cohort of Christchurch born children who were studied from the point of school entry to the age of 18 years. This cohort is of particular interest since its members received their schooling over an historical period (1982 - 1995) during which there was a growing emphasis on female educational disadvantage and gender equity in the classroom. The aims of the analysis are twofold. First, the analysis aims to examine the extent and nature of gender differences in educational achievement over the school career of this cohort. As we will show later, there was consistent evidence of male educational disadvantage from middle childhood to the point of school leaving. Second, the paper presents an analysis of the origins of male

educational disadvantage. Specifically, it is proposed that gender differences in educational achievement largely reflect gender differences in classroom behaviour with males being more prone to disruptive, distractable and inattentive behaviours that impair learning opportunities and act to impede educational achievement.

METHOD

The data described in this study were gathered over the course of the Christchurch Health and Development Study. The Christchurch Health and Development Study is a longitudinal study of a birth cohort of 1,265 Christchurch born children that has been studied from birth to the age of 18 years using a combination of data collection methods including parental interviews, teacher assessments, standardised testing and interviews with the children. The data were gathered in the following ways.

Standardised Testing. From the age of 8 to the age of 13 years children in this cohort were assessed using a series of standardised tests. These included:

a) Intelligence: At ages 8 and 9 years cohort members were assessed using the revised version of the Wechlser Intelligence Scale for Children (WISC-R, Wechsler, 1974) modified for New Zealand conditions. At each age performance IQ, verbal IQ and total IQ scores were computed using the method described in the test manual. The reliabilities of these measures were assessed by using split half methods and ranged from .87 to .95.

b) Word recognition: At age 8 years cohort members were assessed using the New Zealand revision of the Burt Word Reading Test (Gilmore, Croft & Reid, 1981). The child's test score was given by the number of words correctly identified out of a possible total of 110. Test reliability assessed by coefficient alpha was .98.

c) Reading comprehension: At ages 10 and 12 years reading comprehension in the cohort was assessed using tests based around the Progressive Achievement Test of Reading Comprehension (Elley & Reid, 1969). For the 10 year measure test items were chosen to span an 8 year old to a 12 year old reading level. For the 12 year measure test items spanned an 8 year old to a 14 year old reading level. The reliability of both measures was .83.

d) Mathematical reasoning: At age 11 children were administered a mathematical reasoning test based around the Progressive Achievement Test (PAT) of Mathematical Reasoning (Reid & Hughes, 1974). This test spanned items with difficulty levels from the 8 year age group to the 13 year age group. The subject's test score was given by the number of correct responses to the test. Reliability of the test assessed by coefficient alpha was .87.

e) Scholastic ability: At age 13 cohort members were administered the Test of Scholastic Abilities (TOSCA, Reid, Jackson, Gilmore & Croft, 1981). This test was scored as recommended in the test manual to give a total scholastic ability score. The reliability of this score assessed by coefficient alpha was .95.

Teacher Ratings. Results from standardised test scores were supplemented by teacher ratings of academic performance in relation to same aged peers based on a five point scale with 1 denoting very good and 5 very poor at ages 8-12 years. Ratings were obtained for reading, written expression, mathematics and spelling. Assessment of the reliability of teacher ratings using an auto-regressive modelling method suggested that these were of moderate reliability, with reliabilities ranging from .66 to .78 (Fergusson, 1988).

Outcomes at Age 18. To assess educational outcomes at age 18 a series of measures were collected. These included:

a) Measures of word recognition based on the New Zealand revision of the Burt Word Reading Test (Gilmore, Croft & Reid, 1981). This measure was scored in two ways. First, for each subject a total test score representing the number of correct responses was computed. Second, a dichotomous measure of reading delay was constructed by classifying subjects with a test score that was below the mean score of the cohort at age 12 as being reading delayed.

b) School Certificate success: Each subject was asked about the number of School Certificate subjects that s/he had sat and the number of these subjects for which a C grade or better was obtained. A measure of the extent of achievement in School Certificate examinations was constructed from the number of subjects sat for which the subject reported a C grade or better.

c) Leaving school without qualifications: Using data gathered at ages 16 and 18 years it was possible to identify cohort members who had: i) left school by the age of 18 years and ii) failed to obtain any educational qualifications.

The above measures were selected for analysis as they provided an account of the scholastic achievements of the cohort measured at different ages and from different perspectives including standardised testing, teacher ratings and levels of achievement at around the point of school leaving.

Measures of Classroom Behaviour. From the age of six years to the age of 12 years, teachers were requested to provide reports of classroom behaviours based on a behaviour inventory that combined the Rutter (Rutter, Tizard & Whitmore, 1970) and Conners (1969) teacher questionnaires. Factor analyses of these questionnaires (Fergusson, Horwood & Lloyd, 1991) have suggested that they measure two correlated dimensions of child

behaviours: a) conduct problems - the extent to which children exhibit antisocial, aggressive and oppositional behaviours in the classroom and b) attentional problems - the extent to which children exhibit inattentive, hyperactive or distractable behaviours in the classroom. At each age conduct problem and attentional problem scores were obtained by an unweighted sum of teacher ratings. These scores have been shown to be of good reliability with reliability coefficients ranging from .88 to .95.

Sample Size

The analyses in this report are based on all available data for cohort members at the time a given outcome was assessed. Sample sizes ranged from as high as 1110 to as low as 784. There were two reasons for these variations in sample size. First, over the period of the study there was an attrition in the sample owing to the combined effects of subject refusal, subject outmigration from New Zealand and death. The result of this attrition was that the original cohort was reduced to 982 subjects at age 16 with these subjects representing 78% of the original cohort and 88% of subjects resident in New Zealand. For standardised testing sample size was further reduced owing to the fact that for logistic reasons it was necessary to confine standardised tests to those cohort members resident in Canterbury. Canterbury residents of the cohort represented approximately 80% of the cohort.

It is very unlikely that sample size variations will influence the validity of the findings reported in this study. It can be shown that to threaten such validity, any sample losses need to be correlated with the child's gender. Throughout the course of this study sample losses were consistently unrelated to gender.

RESULTS

Gender differences in educational achievement

Table 1 shows the cohort stratified by gender and for each gender group outcomes on a series of measures of educational achievement assessed over the period from age 8 to 18 are shown. The measures of academic achievement used are of three types: a) scores on standardised tests of word recognition, reading comprehension, mathematical, reasoning and scholastic ability; b) teacher ratings of school performance in the areas of reading, written expression, spelling and mathematics; c) measures of educational outcomes at age 18 years including levels of achievement in School Certificate examinations, reading delay and leaving school without qualifications. Each comparison is tested for statistical significance: for continuously scored measures t tests for independent samples were computed whereas for dichotomous measures, significance was assessed using the chi square test of statistical independence.

INSERT TABLE 1. HERE

The table shows evidence of pervasive differences in the school achievement of males and females with males having lower scores on all standardised tests; being uniformly rated as performing less well in the areas of reading, written expression, mathematics and spelling, and at age 18, having lower success rates in School Certificate examinations, higher rates of reading delay and more often leaving school without qualifications. It is notable that of the 18 comparisons made in Table 1 in all cases there is evidence of better female achievement and in all but one case (mathematical reasoning at age 11) these differences are statistically significant ($p<.05$). The table provides generally compelling evidence to suggest that throughout the school career of this cohort, boys were educationally disadvantaged when compared with girls.

Gender differences in cognitive ability

It could be proposed that the consistently poorer academic performance of males was due to the fact that males were cognitively less able than females. This issue is examined in Table 2 which shows scores on the performance, verbal and total scales of the WISC-R IQ test at ages 8 and 9. These comparisons show that, in contrast to the pervasive differences in academic achievement that were present for males and females, there were no differences between males and females in terms of IQ scores. In no case were the mean IQ scores for boys lower than the mean IQ scores for girls and in all cases there were no significant gender differences in IQ. The clear interpretation of the results in Tables 1 and 2 is that males and females were populations of very similar cognitive ability but were distinguished by females having better academic achievement.

INSERT TABLE 2. HERE

Gender differences in classroom behaviours

The findings above suggest the presence of some set of factors that operate largely independently of cognitive ability to either disadvantage males or advantage females. One explanation is that the poorer academic achievement of males may reflect the presence of gender differences in classroom behaviour. In particular, it might be proposed that males are more prone to disruptive, inattentive or distractable behaviours that act to impair learning within the classroom and to impede male academic achievement (Fergusson, Lloyd & Horwood, 1991). This issue is examined in Table 3 which compares the mean scores of boys and girls on two measures of teacher rated classroom behaviour: a) conduct problems - the extent to which the child was described as engaging in aggressive, antisocial or oppositional behaviours in the classroom and b) attention problems - the extent to which the child was

described as engaging in inattentive, restless or distractable classroom behaviours. These measures span the ages from six to 12 years and in all cases have been scaled to a mean of 100 and a standard deviation of 10. These conventions make it possible to make all comparisons on the same scale units and also make it possible to interpret gender differences in mean scores in terms of standard deviation units.

The Table shows that at all ages considered, males had significantly higher ($p<.0001$) rates of both conduct problems and attentional problems with male mean scores being between .4 to .6 standard deviations higher than female mean scores.

INSERT TABLE 3. HERE

The relationships between gender and achievement after adjustment for gender differences in classroom behaviour

The above evidence provides a prima facie case for the view that the gender differences in educational achievement shown in Table 1 may have arisen from the gender differences in classroom behaviours shown in Table 3. To address this issue further the relationships between gender and academic achievement shown in Table 1 were adjusted for the gender differences in classroom behaviour shown in Table 3. These adjustments were achieved by fitting regression models in which each of the educational outcomes in Table 1 was modelled as a linear function of: a) the child's behaviour and b) the child's classroom behaviour assessed at age 6 and concurrently with the outcome measure. For continuously scored outcomes, adjustments were obtained using multiple linear regression methods, whereas for dichotomous outcomes, multiple logistic regression was used. More formally the analysis was as follows:

1. For continuously scored outcomes the model fitted was:

$$Y_i = \beta_o + \beta_1 X_1 + \Sigma_j \beta_j Z_j + U_i$$

Where Y_i was the ith measure of academic achievement; X_1 was a dummy variable representing gender and Z_j were the set of relevant classroom behaviour measures. Using the ordinary least squares estimates of the coefficients β_i, β_j it is possible to estimate the differences in mean male and female achievement scores on the measure Y_i adjusted for the effects of classroom behaviours Z_j correlated with gender. The adjusted means are given by:

$$E(Y_{ia})m = \beta_o + \Sigma_j \beta_j \overline{Z_j}$$

$$E(Y_{ia})f = \beta_o + \beta_1 + \Sigma_j \beta_j \overline{Z_j}$$

Where $E(Y_{ia})m$, $E(Y_{ia})f$ are the adjusted mean scores on Y_i for males and females respectively and Z_j is the mean score on the measure Z_j. The adjusted scores have the counter factual interpretation of being the mean levels of achievement that would have been observed for males and females had both gender groups shown an identical distribution of classroom behaviours. A test of the extent to which gender differences are significant after adjustment for behavioural differences is given by testing the null hypothesis $\beta_1 = 0$.

2. For dichotomously scores measures, the model fitted was:

$$\text{Logit } [Pr(Y_i = 1)] = \beta_o + \beta_1 X_1 + \Sigma_j \beta_j Z_j$$

Where Logit $[Pr(Y_i = 1)]$ is the log odds of a rating of poor achievement for the ith dichotomous outcome and the other variables in the model have a similar interpretation to the multiple linear regression model above. From this model it is possible to obtain estimates of the rates of poor achievement ratings for males and females adjusted for the correlated effects of classroom behaviour. An account of the method for producing adjusted estimates in logistic regression models has been given by Lee (1981). As is the case for the linear

regression model, a test of the extent to which gender differences are statistically significant after adjustment for behavioural differences is given by testing the null hypothesis $\beta_1 = 0$.

The results of this analyses are summarised in Table 4 which compares gender differences in school achievement for males and females after adjustment for gender differences in classroom behaviour. The Table shows that the effects of this adjustment were to eliminate any consistent gender difference in achievement and, with one exception, there were no significant differences in mean levels of achievement for males and females. These findings have the substantive interpretation that had boys and girls behaved in similar ways in the classroom setting there would have been no evidence of consistent gender related differences in school achievement.

The Table also shows the behaviour factors that were significant in each regression model. This Table suggests that the critical factor that explained gender differences in educational achievement related to rates of attentional problems and, particularly attentional problems present by the age of six years.

Collectively these findings clearly suggest that gender and school achievement were linked by a causal chain process in which:

1. Gender acted to influence classroom behaviours with boys being more prone to distractable, disruptive and inattentive behaviours from the point of school entry.

2. Classroom behaviour and, particularly attentional problems, influenced the child's level of academic achievement throughout his/her school career.

3. By virtue of 1. and 2. boys showed small but consistent deficits in educational achievement throughout their school career.

INSERT TABLE 4. HERE

DISCUSSION

In this study we have examined gender differences in educational achievement amongst a birth cohort of New Zealand children who spent their school career in an historical period (1982 - 1995) during which there was an increasing emphasis on the educational underachievement of girls and the need for gender equity in education. The major findings of this analysis are reviewed below.

Contemporary Gender Differences in Educational Achievement

The findings of this study show that from middle childhood up to the age of 18 years males were at a small but consistent educational disadvantage: boys tended to perform less well on standardised tests of achievement including reading, mathematics and scholastic ability; they were more frequently rated by teachers as performing poorly in the areas of reading, written expression, spelling and mathematics and, at age 18, males were more often reading delayed, had lower success rates in School Certificate examinations and more often left school without educational qualifications. It is unlikely that these results reflect measurement artefacts or are specific to this cohort for two reasons. First, it has been possible to show that boys were educationally disadvantaged using a number of different methods of assessment including standardised testing, teacher evaluations and outcomes at age 18. On all of these indices there were consistent tendencies for boys to perform less well than girls. Second, the findings of the present study are consistent with recent findings reported in the 1995 Minister of Education's report that showed higher rates of educational success amongst females than amongst males. These comparisons suggest that the findings reported in this study are unlikely to be specific to this cohort and are likely to apply equally to other contemporary

cohorts. There can be little doubt on the basis of these findings that any gender bias within the contemporary New Zealand education system, up to the age of school leaving is in the direction of leading to male under achievement rather than to female educational disadvantage.

The Origins of Contemporary Gender Differences in Education

Whilst it is possible to show that males were at an educational disadvantage, a more important question centres around the origins of male educational disadvantage. It could be suggested that the better educational performance of females reflects an intrinsic female academic superiority that has become evident as a result of contemporary gender equity policies in education. The evidence from this research does not support this conclusion. In particular, when members of this cohort were assessed on IQ tests at ages 8 and 9 years, there was no evidence to suggest that males were of lesser cognitive ability than females: in no comparison were mean IQ scores for males poorer than those of females. To the extent that measures of IQ are likely to give measures of the individual cognitive ability that are less affected by prior learning and classroom conditions than tests of academic achievement, these results strongly suggest that males and females were populations of equivalent cognitive ability that were distinguished by superior female academic achievement.

One explanation of gender differences in educational achievement is that these may arise from gender differences in classroom behaviour with the higher rates of disruptive, inattentive behaviours in boys impairing male learning and leading to lower rates of academic success for boys (Fergusson, Lloyd & Horwood, 1991). The results of this study strongly support this explanation. Comparison of males and females showed that from the point of school entry onwards, males were more prone to engage in both disruptive and inattentive classroom behaviours. Furthermore, adjustment of gender differences in educational

achievement for gender differences in classroom behaviours revealed that after this adjustment there were no systematic gender differences in educational achievement. These results clearly suggest that had boys and girls behaved in the same way in the classroom their level of educational achievement would have been similar or conversely, that the poorer levels of male achievement were a reflection of the fact that boys were more prone to disruptive and inattentive classroom behaviours.

These findings are consistent with a large body of evidence from the developmental literature which has consistently reported higher rates of disruptive behaviour problems in boys (Anderson, Williams, McGee & Silva, 1987; Cohen, Velez, Kohn, Schwab-Stone & Johnson, 1987; Fergusson, Horwood & Lynskey, 1993; Offord et al, 1987; Robins, 1991). Furthermore, there is considerable evidence to suggest that children who exhibit disruptive behaviour problems and particularly attentional problems or attention deficits are at increased risks of academic under achievement and difficulties (Anderson, Williams, McGee & Silva, 1989; Fergusson & Horwood, 1995; Fergusson, Lynskey & Horwood, in press; Frick et al, 1991; Hinshaw, 1992a; Hinshaw, 1992b). This relationship has been shown to persist when measures of cognitive ability and social background are taken into account (Fergusson & Horwood, 1995; Fergusson et al, in press). These findings clearly suggest the presence of gender related differences in behaviour that are likely to conspire to place males at an educational disadvantage because of their classroom behavioural patterns. The association between gender and academic achievement found in this study appears to be a special case of a more general tendency for children prone to disruptive and inattentive classroom behaviour to be at increased risks of educational under achievement.

Policy Implications

The preceding results and conclusions have a number of implications for contemporary educational policy and policy directions. First, previous writing on gender differences has left the New Zealand education system with an intellectual legacy in which it has been widely assumed that girls are educationally disadvantaged. For example a 1993 Ministry of Education report commented on these issues in the following ways:

"Over the past two decades there has been growing recognition of the fact that women and girls are not necessarily offered the same range of educational opportunities, occupational options and life chances as their male counterparts. A number of overview reports has identified substantial gender differences in participation, attainment and outcomes in education as well as differential employment patterns". (Sturrock, 1993, page 11).

Similar claims have been made in a growing number of publications and analyses that have emphasised various aspects of female educational disadvantage but which have seldom addressed the possibility of male educational disadvantage (Middleton, 1990; Middleton & Jones, 1992; New Zealand Council for Educational Research, 1988; O'Neill, 1990; Sturrock, 1993). The present analysis suggests that this emphasis on female educational disadvantage is very much out of date and that for cohorts of children entering the school system since the mid 1980s any gender bias in educational achievement within the New Zealand school system has been in the direction of male under achievement rather than female educational disadvantage. Furthermore, it is likely that these differences will be perpetuated in the area of tertiary education as successive cohorts entering the school system since the mid 1980s move into the tertiary education system. There seems little doubt that the pervasive emphasis that has been placed on female educational disadvantage is likely to have obscured and rendered invisible an emerging male educational disadvantage. These considerations clearly suggest

the need for more balanced treatments of gender issues in education that examine the disadvantages faced by both males and females rather than an approach that focuses exclusively on perceived issues of female disadvantage.

It might be thought that the findings of the present study suggest the need for explicit policies that focus on males and attempt to reduce male education disadvantage. Further reflection however, suggests that approaches which begin with gender as a key policy variable are likely to be both inefficient and potentially inequitable. As we have noted earlier, the tendency for males to have poorer achievement emerges as a special case of a more general tendency for children prone to disruptive and inattentive classroom behaviours to be at risk of later educational under achievement. Accordingly, the appropriate policies are not those centred around the politics of gender in the school system but rather policies that develop practical classroom management practices to address the issue of children with disruptive and inattentive classroom behaviours in a way which minimises the risks of educational under achievement faced by these children. There is a very important difference between policies that address male disadvantage and policies that address the issue of disruptive classroom behaviours. In particular, whilst the majority of children with disruptive classroom behaviours are male there is nonetheless a minority of females who present with these problems and who are at risk of educational under achievement (Anderson et al, 1987; Cohen et al, 1987; Fergusson et al, 1993; Offord et al, 1987). Policies that focus on male disadvantage would, in effect, ignore the difficulties faced by these at risk girls. All of these considerations suggest the need for policies and debates about educational achievement to move away from the narrow confines of gender based theory and toward a more broad based developmental model that takes into account the wide range of individual and social factors that impinge on individual academic achievement.

Finally, we believe that this study provides a case history of the way that enthusiastic extrapolation of research findings in education may mislead rather than enlighten. We have been aware of a discrepancy between the claims that females were educationally disadvantaged and the school performance of this cohort for over a decade. However, in an intellectual climate which was dominated by strong claims that females were educationally disadvantaged it has been difficult to convince others of the discrepancy between educational theory and classroom reality. Indeed, on the occasion on which we pointed out evidence of male educational disadvantage (Fergusson, Lloyd & Horwood, 1991) it was argued that our results were due to methodological error and analytic imprecision (McDonald, 1994). It is clear now that our cohort has ceased its secondary schooling that this was not the case and that, in fact, from the point of school entry to the point of school leaving, males in this (and other contemporary) cohorts have been at a small but consistent educational disadvantage. The irony of this situation is that over the entire school career of our cohort, views of gender differences in education have been dominated by a model that has promoted the view that girls were being unfairly treated and disadvantaged by the New Zealand education system. This may well have been so up to the mid 1980s but it is clear that by the mid 1990s, any female educational disadvantage (up to the point of school leaving) has largely disappeared and has been replaced by an emerging male educational disadvantage

AUTHOR NOTES

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TABLE 1 Gender Comparisons of Standardised Test Scores, Teacher Ratings of School Performance and 18 Year Educational Outcomes

Measure	Sample Size	Female	Male	p[1]
Standardised Tests				
Mean Burt Word Reading Score (8 years)	881	47.8	42.4	<.0001
Mean Reading Comprehension PAT Score (10 years)	847	11.3	9.5	<.001
Mean Mathematical Reasoning PAT Score (11 years)	831	25.4	24.4	>.05
Mean Reading Comprehension PAT Score (12 years)	804	13.3	12.5	<.05
Mean TOSCA Score (13 years)	784	36.4	32.9	<.005
Teacher Ratings (% Poor/Very Poor)				
Reading (8 years)	1081	8.3%	22.7%	<.001
Written Expression (8 years)	1081	12.6%	27.6%	<.001
Spelling (8 years)	1081	13.6%	28.7%	<.001
Mathematics (8 years)	1081	12.8%	18.9%	<.01
Reading (12 years)	1005	8.3%	18.8%	<.001
Written Expression (12 years)	1004	10.5%	25.0%	<.001
Spelling (12 years)	1005	12.7%	28.0%	<.001
Mathematics (12 years)	999	14.3%	20.0%	<05
18 Year Outcomes				
Mean Burt Word Reading Score	1015	97.8	95.7	<.05
% Reading age <12 years	1015	6.4%	11.4%	<.005
Mean number of A, B or C grades in School Certificate	1025	3.5	3.0	<.005
% Left school with no qualifications	1025	16.4%	22.2%	<.05

[1] Comparison of means based on t test for independent samples, comparison of proportions based on chi square test of independence.

TABLE 2 Gender Comparisons of Mean Cognitive Ability (WISC-R) Scores at 8, 9 Years

Measure	Sample Size	Female	Male	p[1]
WISC-R Verbal IQ				
8 years	881	100.5	101.6	>.30
9 years	811	100.2	101.8	>.15
WISC-R Performance IQ				
8 years	881	102.8	102.8	>.90
9 years	811	106.5	107.5	>.30
WISC-R Total IQ				
8 years	881	101.5	102.2	>.40
9 years	811	103.4	104.8	>.20

[1] Based on t test of means for independent samples

TABLE 3 Gender Comparisons of Mean Teacher Ratings of Disruptive Behaviours at 6,8,10,12 Years

Measure	Sample Size	Female	Male	p[1]
6 Years				
Attentional problems	1110	97.1	102.8	<.0001
Conduct problems	1110	98.3	101.7	<.0001
8 Years				
Attentional problems	1083	97.1	102.8	<.001
Conduct problems	1083	97.8	102.1	<.0001
10 Years				
Attentional problems	1056	96.9	103.1	<.0001
Conduct problems	1056	97.6	102.3	<.0001
12 Years				
Attentional problems	1007	97.1	102.9	<.0001
Conduct problems	1007	98.2	101.8	<.0001

[1] Based on t test of means for independent samples

TABLE 4 Gender Comparisons of Standardised Test Scores, Teacher Ratings of School Performance and 18 Year Educational Outcomes Adjusted for Teacher Ratings of Disruptive Childhood Behaviours

Measure	Female	Male	p	Significant Control Variables
Standardised Tests				
Mean Burt Word Reading Score (8 years)	45.6	44.5	>.30	1,2
Mean Reading Comprehension PAT Score (10 years)	10.6	10.2	>.30	1
Mean Mathematical Reasoning PAT Score (11 years)	24.6	25.3	>.15	1
Mean Reading Comprehension PAT Score (12 years)	12.8	13.0	>.50	1
Mean TOSCA Score (13 years)	34.8	34.6	>.90	1
Teacher Ratings (% Poor/Very Poor)				
Reading (8 years)	12.8%	17.5%	<.05	1,2
Written Expression (8 years)	18.8%	20.5%	>.30	1,2
Spelling (8 years)	19.3%	22.7%	>.10	1,2,5
Mathematics (8 years)	16.3%	15.2%	>.60	1
Reading (12 years)	13.3%	13.7%	>.80	1-4
Written Expression (12 years)	16.4%	18.6%	>.30	2,3,5
Spelling (12 years)	18.0%	21.5%	>.10	1-5
Mathematics (12 years)	21.6%	19.2%	>.15	1,2
18 Year Outcomes				
Mean Burt Word Reading Score	96.5	97.5	>.30	1
% Reading age <12 years	8.2%	8.9%	>.60	1
Mean no. of A, B or C grades in School Certificate	3.3	3.3	>.90	1
% Left school with no qualifications	19.7%	18.6%	>.60	1

Significant Control Variables: 1 = Attentional problems 6 years; 2 = Attentional problems 8 years; 3 = Attentional problems 12 years; 4 = Conduct problems 6 years; 5 = Conduct problems 8 years.