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Class Placement At Age 8 and Subsequent Academic Achievement

L John Horwood Research Fellow

David M Fergusson Associate Professor

Christchurch Health & Development Study

Department of Psychological Medicine

Christchurch School of Medicine

PO Box 4345

CHRISTCHURCH

New Zealand

SUMMARY

The relationship between class placement at age 8 and academic achievement up to the age of 18 was studied in a birth cohort of Christchurch born children. This analysis suggested three major conclusions.

1. The child's class placement at age 8 years was influenced by a complex set of factors that included month of birth, IQ (assessed by the WISC-R), family social background, classroom behaviour and school attendance.

2. Children who entered Standard 2 by age 8 had higher scores on standardised tests of reading, mathematics and scholastic ability, and also showed superior academic outcomes at age 18.

3. To a large extent the superior performance of those entering Standard 2 by age 8 was explained by factors (IQ, social background, classroom behaviour) that were associated with class placement. Nonetheless, children who entered Standard 2 by age 8 had significantly higher scores on standardised tests assessed up to the age of 13, even after adjustment for selection processes associated with class placement. However, class placement was unrelated to academic outcomes at age 18 after adjustment for selection processes.

It is concluded that class placement at the age of 8 had a modest effect on levels of academic achievement during middle childhood and adolescence. However, this effect was not evident in a number of indices of school achievement (School Certificate success, reading ability, leaving school without qualifications, completing the Sixth Form) assessed at age 18.

INTRODUCTION

An issue that has attracted considerable attention in the educational literature concerns the ways in which class promotion and retention practices may influence subsequent academic success. The focus of this attention has varied according to the education system that is being studied. In the context of the US education system, attention has focused on the practice of grade retention in which academically less able children are held back a year to provide them with a better educational foundation for future work. Whilst the intention of grade retention practices was to address the difficulties faced by children who were less academically able, the available evidence suggests that this practice may have negative effects on the school achievement and adjustment of these children (Doyle, 1989; Holmes, 1989; Holmes & Matthews, 1984; Shepard & Smith, 1986; Smith & Shepard, 1987). In a comprehensive meta analysis of studies of grade retention Holmes (1989) found that even when age and ability measures were held constant, children held back showed poorer subsequent performance than those not held back. He comments "In studies where retained children and promoted controls were matched on IQ and prior achievement, repeating a grade had an average negative effect of -.30 standard deviations. The weight of the evidence argues against grade retention" (p.28). Collectively, the research evidence suggests that promotion may be more effective than retention for enhancing student performance and that any potential benefits of grade retention are far outweighed by the disadvantages (Holmes & Matthews 1984; Holmes, 1989; Meisels & Liaw, 1993; Smith & Shepard, 1987; Roderick, 1994).

The issues have emerged in a somewhat different guise in the context of the New Zealand education system. As McDonald (1988, 1989) has noted, whilst the New Zealand education system has focused on a commitment to social (age) promotion rather than ability promotion, in practice the rate at which children progress through the school system depends on both the month of the year in which they are born and decisions made about promotion and retention. In particular, for pupils born during the period from April to July there is some latitude during the second year of schooling about whether these children are considered for retention or promotion. This produces a system of promotion which is founded upon age promotion but is overlaid by further teacher based promotion decisions that particularly affect those born in the period from April to July (McDonald, 1989).

To the extent that the New Zealand education system operates in ways that may lead to both retention and accelerated progress through school it may be argued that the child's rate of promotion through the school system may influence later achievement, with those facing accelerated promotion being advantaged and those facing retention being disadvantaged. In a review of local evidence on the effects of promotion practices on educational achievement McDonald (1989) concludes "Holding back younger New Zealand children probably does neither good nor harm academically .... as long as they remain at school." (p.7). However, the evidence on which this conclusion was based was somewhat limited, with much of this evidence coming either from US research or from unpublished New Zealand studies conducted prior to the 1970s.

Against this background this paper reports on an analysis of the relationships between class placement at age 8 and educational outcomes up to the age of 18 in a birth cohort of Christchurch children born during the period from April to August 1977. The specific aims of this study were:

1. To examine the extent to which the child's class placement at the age of eight was related to his/her month of birth, cognitive ability, classroom behaviour and other social or demographic factors that may influence promotion decisions.

2. To examine the extent to which class placement at the age of 8 was related to subsequent levels of achievement.

3. To adjust any association between class level at age 8 and subsequent achievement for factors associated with class placement at age 8 including month of birth, ability, classroom behaviour and social and demographic background.

More generally this analysis seeks to examine the extent to which differences in rates of class promotion influence academic achievement when due allowance is made for the factors that may influence placement decisions

METHOD

The data described in this report were gathered over the course of the Christchurch Health and Development Study (CHDS). In this study a birth cohort of 1,265 children born in Christchurch maternity hospitals during the period from 15 April to 5 August 1977 has been studied at birth, four months, one year and annually to age 16 years and again at age 18 years using a combination of data collection methods including parental interviews, teacher assessments, standardised testing and interviews with the children (Fergusson, Horwood, Shannon & Lawton 1989). The following measures were used in the analysis.

Class Level

When survey children were aged 8 years information was obtained from the class teacher on the child's current class placement. At this age the great majority of children (74.7%) were placed in a J3 (Year 3) class, and 24.3% were placed in Standard 2 (Year 4). The remaining 1% of children were placed either in J2 (Year 2) or in a special class. For the purposes of the present analysis the 11 children placed in J2 or a special class were combined with the children in J3 to produce a binary measure reflecting whether the child was placed in Standard 2 at the time of her/his eighth birthday or in a lower class level. It should be noted that analyses including or excluding children in a J2 or special class placement from the sample provided similar results and led to the same general conclusions.

Measures of Educational Achievement (8-18 Years)

To describe the child's academic achievement over the period from 8-18 years a range of measures were selected for analysis.

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

a) Word recognition: At ages 8,10,12 years cohort members were administered the New Zealand revision of the Burt Word Reading Test (Gilmore, Croft & Reid, 1981). The child's score was given by the number of words correctly identified out of a possible 110. The reliability of all three measures, assessed by coefficient α, was in excess of .97.

b) Reading comprehension: At ages 10 and 12 years reading comprehension in the cohort was assessed using tests based on 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 were chosen to span an 8 year old to a 14 year old reading level. The reliability of both measures, assessed by coefficient α, was .83.

c) Mathematical reasoning: At age 11 years children were administered a mathematical reasoning test based around the Progressive Achievement Test of Mathematics

(Reid & Hughes, 1974). This test spanned items with difficulty levels from the 8 year age group to the 13 year age group. The reliability of the test was high (α = .87).

d) Scholastic ability: At age 13 years cohort members were assessed using the Test of Scholastic Abilities (TOSCA; Reid, Jackson, Gilmore & Croft, 1981). This test was scored as described in the test manual to give a total scholastic ability score. The reliability of this score was very high (α = .95).

Secondary School Outcomes: To assess educational outcomes up to age 18 years a series of measures were collected. These included:

a) School Certificate success: At age 18 years 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 receiving a C grade or better.

b) 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 age 18 years and ii) failed to obtain any educational qualifications.

c) Completion of the sixth form: Using information gathered at age 18 on the highest form level completed at secondary school it was possible to construct a binary measure reflecting whether the young person had completed the sixth form before leaving school.

d) Word recognition: To provide a measure of reading ability, cohort members were assessed at age 18 on the Burt Word Reading Test (Gilmore et al., 1981). The reliability of this measure was very high (α = .96).

Factors Associated with Class Placement

To adjust the observed associations between class placement at age 8 and subsequent school achievement for other factors that were associated with class placement, a range of measures were selected from the data base of the study. These included:

a) Intelligence: At age 8 years, cohort members were assessed using the revised version of the Wechsler Intelligence Scale for Children (WISC-R; Wechsler, 1974) modified for New Zealand conditions. Both verbal and performance IQ scores were computed using the method described in the test manual. The reliabilities of these measures, assessed using split half methods, were found to be high: verbal IQ reliability .93, performance IQ reliability .87.

b) Birth month

c) Gender

d) Child ethnicity: Children were classified as either Maori or non Maori on the basis of descent. If either natural parent was Maori or part Maori in descent then the child was classified as Maori, otherwise the child was classified as non Maori. Using this definition 11.2% of the sample were classified as Maori.

e) Family socioeconomic status: This was assessed at the time of the child’s birth using the Elley and Irving (1976) scale of socioeconomic status for New Zealand. This scale classifies families into six levels on the basis of paternal occupation. For the purposes of this analysis these levels were combined into a three point scale as follows: 1 = Levels 1,2 (professional , managerial); 2 = Levels 3,4 (clerical, technical skilled); 3 = Levels 5,6 (semiskilled, unskilled).

f) Maternal education: Maternal education level was assessed at the time of the child's birth using a three point scale which reflected the highest level of educational achievement attained. This scale was: 1 = mother lacked formal educational qualifications; 2 = mother had secondary level qualifications; 3 = mother had tertiary level qualifications.

g) Teacher ratings of classroom behaviour: When children were aged 8 years teachers were asked to provide reports of classroom behaviours based on an 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 behaviour: i) conduct problems - the extent to which children exhibit antisocial, aggressive and oppositional behaviours in the classroom and ii) attentional problems - the extent to which children exhibit inattentive, hyperactive or distractable behaviours in the classroom. For each child conduct problem and attention deficit scores were obtained from an unweighted sum of teacher ratings of behavioural symptoms. The reliabilities of these scores, assessed using coefficient α, were .93 for conduct problems and .91 for attentional problems.

h) School absence: When cohort members were aged 7 years and 8 years schools were asked to provide information on the child's record of attendance over the preceding year. This was recorded as the number of half days that the child had attended school out of the total possible number of half days of attendance. This information was used to construct a measure of the proportion of half days on which the child was absent from school over the period from 6-8 years.

Sample Sizes

Although this study is based on a birth cohort of 1265 children the sample sizes studied in this report are smaller than this, ranging from 769 to 1083. There were three reasons for these variations in sample size. First, over the period of the study there was attrition in the sample owing to the combined effects of subject refusal, outmigration from New Zealand and death. The result of this attrition was that by age 18 the original cohort was reduced to 1025 subjects, with these subjects representing 81.0% of the original sample and 92.3% of the sample still resident in New Zealand. Second, 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 members of the cohort resident in the Canterbury region. Canterbury residents represented approximately 80% of the cohort in any year. Finally, there were small amounts of missing data for some measures.

The variations in sample size raise the possibility that the results reported here may be influenced by the effects of non-random sample attrition. However, while previous analyses of educational outcomes for this cohort suggest a slight bias towards an under representation of children from more disadvantaged family backgrounds, analyses which incorporate statistical corrections for such bias produce essentially identical conclusions to those which do not incorporate such correction (Fergusson, Horwood & Lynskey, in press; Fergusson & Lloyd, 1991). In the context of the present analysis it can be shown that a necessary condition for sample loss to influence validity is for rates of sample loss to be correlated with class placement at age 8. Analyses of the relationship between class placement at age 8 and subsequent sample loss showed no significant relationship between the child's class placement at age 8 and the probability of inclusion or exclusion from analyses. These results support the view that sample loss processes are unlikely to affect the analysis adversely.

RESULTS

Factors Associated With Class Level At Age Eight

Table 1 shows the relationship between birth month and class level at the age of eight years for the sample of 1083 children studied to age 8. It is evident that there was a strong and highly significant ($p<.0001$; contingency coefficient = .33) relationship between the child's month of birth and his/her class level at age 8: of those born in April 54.3% had entered Standard 2 by age 8 whereas of those born in July/August only 8.5% had entered Standard 2. More generally the results show that those born earlier in the year had a higher rate of entry into Standard 2 by age 8, than those born later in the year.

INSERT TABLE 1 HERE

Whilst the results in Table 1 show a strong month of birth effect on rates of grade retention or promotion it is clear that this relationship was not completely deterministic. Some children born in April had not entered Standard 2 and thus were retained relative to their same age peers whereas some children born in July/August had entered Standard 2 and experienced accelerated promotion relative to their same age peers. These results suggest the presence of factors other than month of birth that determined the rate of class promotion. This issue is examined in Table 2 which compares those entering and not entering Standard 2 by the age of 8 on a series of measures observed by age 8. These measures included measures of IQ based on the Wechsler Intelligence Scale for Children, measures of demographic background (gender, ethnicity, social class and maternal education), measures of classroom behaviour including attentional problems and conduct problems, and a measure of school attendance prior to 8 years. It is clear that in all comparisons there were differences between children who had entered Standard 2 by the age of 8 and those who had not.

In general, the results in Tables 1 and 2 suggest a class promotion process that is influenced both by the child's month of birth and by the child's attributes including cognitive ability, gender, social background and classroom behaviour. Those most likely to enter Standard 2 by age 8 tended to be born earlier in the year, to have higher IQ, to be female, non Maori, of higher SES, to have well educated mothers, low rates of disruptive classroom behaviours and low rates of school absenteeism. Those least likely to enter Standard 2 had the opposite profile. To examine the net effects of various factors on rates of entry into Standard 2 a logistic regression model was fitted to the data in which the log odds of entry into Standard 2 by age 8 was modelled as a linear function of month of birth, IQ, gender, ethnicity, socio-economic status, maternal education, classroom behaviour and school attendance. Model fitting was conducted using both forward and backward methods of variable elimination to identify the most parsimonious and best fitting model. The results of this analysis are shown in Table 3 which shows the significant predictors of placement in Standard 2 by age 8. This table identifies the following factors as significant or marginally significant predictors of class level at age 8: month of birth ($p<.0001$); verbal IQ ($p<.0001$); performance IQ ($p<.05$); gender ($p<.0001$); maternal education ($p<.0005$); and teacher ratings of conduct problems at age 8 ($p<.10$).

INSERT TABLES 2 & 3 HERE

The Relationship Between Class Level At Age Eight and Subsequent Academic Achievement

Table 4 contrasts children who had entered Standard 2 by the age of 8 with those who had not entered Standard 2 on a series of measures of subsequent academic achievement assessed up to the age of 18. These measures are of two types: i) scores on standardised tests of word recognition, reading comprehension, mathematical reasoning and scholastic ability; ii) other measures, including the number of School Certificate subjects in which a C grade or better was obtained and measures of school retention. To facilitate the comparison of standardised test scores, all of these measures have been scaled to a mean of 100 with a standard deviation of 10. This convention makes it possible to readily convert differences in means to standard deviation units. All comparisons are tested for statistical significance. For continuously scored measures t tests for independent samples were used whereas for dichotomously scored measures the chi squared test of independence was used.

The table shows persistent and pervasive tendencies for children who entered Standard 2 by the age of 8 to have superior achievement throughout their school career. Those entering Standard 2 by the age of 8 scored significantly higher on all standardised tests ($p<.0001$); achieved greater success in School Certificate ($p<.0001$); and had significantly higher rates of school retention ($p<.0001$) than those who had not entered Standard 2 by age 8. The size of these differences is reflected in the differences in the mean scores on standardised tests. These comparisons show that the mean scores of those who entered Standard 2 by the age of 8 were between .81 to 1.03 standard deviations higher than those who had not entered Standard 2 by the age of 8.

INSERT TABLE 4 HERE

Relationships Between Class Level at Age Eight and Achievement Subsequent to Eight after Adjustment for Factors Influencing Class Level at Age Eight

The findings in Table 4 may be interpreted in two quite different ways. First, it could be argued that the differences between those entering Standard 2 at age 8 and those not entering Standard 2 reflect the effects of retention and promotion practices, with those entering

Standard 2 being advantaged by these practices and those failing to enter Standard 2 being disadvantaged. Alternatively, it could be argued that grade level at age 8 was irrelevant to the child's progress and that the superior performance of those who entered Standard 2 by the age of 8 reflects the fact that this group was selected for various attributes (IQ, gender, social advantage, classroom behaviour) that increased their chances of future academic success. It was possible to test the extent to which differences in the academic achievement of those entering and not entering Standard 2 by the age of 8 were due to class placement independently of IQ, gender, social background, classroom behaviour, school attendance and birth month by fitting regression models in which the relationship between class level and achievement was adjusted for the correlated effects of factors associated with class level at age 8.

For the continuously scored outcomes (standardised test scores, School Certificate results), adjustments were achieved using a multiple linear regression model of the form

$$Y_i = \beta_0 + \beta_1 X_1 + \sum_j \beta_j Z_j + U_i$$

where Y_i was the ith measure of academic achievement, X_1 was a dummy (0,1) variable representing placement in Standard 2 and Z_j were the set of covariate factors shown in Table 2. The unstandardised regression coefficient β_1 represents the effect of placement in Standard 2 on the outcome Y_i when the correlated effects of the covariates Z_j have been taken into account. A test of the extent to which class placement at age 8 is significantly related to academic achievement after adjustment for covariates is given by testing the null hypothesis $\beta_1 = 0$.

For the dichotomous measures of school retention, adjustments were based on a multiple logistic regression model of the form

$$\text{Logit}\left[\Pr(Y_i = 1)\right] = \beta_0 + \beta_1 X_1 + \sum_j \beta_j Z_j$$

where Logit [Pr(Y_i = 1)] is the log odds of the ith dichotomous outcome and the other variables in the model have a similar interpretation to the multiple linear regression model above. As is the case for the multiple linear regression model, a test of the extent to which class level differences in outcome risk are statistically significant after adjustment for covariates is given by testing the null hypothesis $\beta_1 = 0$.

Using the parameters of the fitted linear and logistic regression models it is possible to produce estimates of the adjusted class level differences in educational achievement after the correlated effects of the other factors in the model have been taken into account. The methods for producing adjusted estimates from these models are described by Lee (1981).

The results of the regression analyses are summarised in Table 5 which shows the covariate adjusted mean levels of achievement for children who entered and did not enter Standard 2 by the age of 8 together with a test of significance of the adjusted class level differences and a list of the covariate factors that were found to be significant in the regression model for each outcome. The adjusted means have the interpretation of being the mean levels of achievement that would have been observed in the two groups had both groups had an identical distribution of IQ, birth month, gender, ethnicity, social background, and classroom behaviours. Several features of the adjusted achievement scores are evident from the table.

1. Differences in achievement following covariate adjustment were far smaller than the differences shown in Table 4. For example, Table 4 shows that those in Standard 2 had mean scores on standardised achievement tests assessed up to age 13 that were between .81 to 1.03 standard deviations higher than those who had not entered Standard 2. After adjustment for the covariate factors these differences reduced to between .18 to .43 standard deviations. The principal reason for this was that control for between class level differences in IQ substantially reduced between class levels differences in subsequent achievement.

2. Nonetheless, even after such adjustment there remained statistically significant ($p<.05$) class level differences in the mean scores on all standardised tests of achievement assessed up to age 13. These results suggest that independently of month of birth, IQ, gender, ethnicity, family social background and early classroom behaviour, children who had entered Standard 2 by the age of 8 were at an academic advantage.

3. In contrast to the results for the standardised achievement measures, after adjustment for potentially confounding factors, grade level differences on the measures of achievement assessed at age 18 (School Certificate success, reading ability, school retention) became small and statistically non significant, suggesting that by the end of secondary school any grade level differences in school achievement had largely disappeared.

INSERT TABLE 5 HERE

Supplementary Analysis

To examine the sensitivity of the regression analyses reported in Table 5 to the way in which covariates were entered into this model, the analysis was extended to contrast two approaches for controlling covariates. The first approach controlled only the significant covariate factors identified in Table 5, whereas the second, controlled all covariate factors described in Table

4, irrespective of whether or not the covariate was statistically significant. Both analyses led to very similar conclusions about the relationship between class placement and later educational outcomes. This can be seen from Table 6 which compares the estimated regression coefficient linking class placement to each outcome after adjustment for confounding factors. These comparisons show that both control regimes (significant covariates; all covariates) produce very similar conclusions about the effects of statistical adjustments on the association between class placement and academic outcomes. Further exploration of statistical control processes suggested that, providing the significant covariates identified in Table 5 were included in models, the addition or deletion of further covariates did not materially affect the conclusions drawn.

INSERT TABLE 6 HERE

In addition, an examination was made of the pathways linking birth month to later academic achievement. This analysis suggested that birth month was related to later achievement by a causal chain model in which: a) birth month influenced class placement at age 8 (see Table 3); b) class placement at age 8 influenced later outcomes (see Tables 4,5) but c) with one exception (leaving school without qualifications), birth month was not related to later academic outcomes when the intervening effects of class placement at age 8 were taken into account (Table 5).

There have been suggestions in the literature that promotion practices may act to particularly disadvantage some groups of children and notably males and Maori (McDonald, 1988; Thompson, 1983). These arguments imply the possibility of an interactive model in which the effect of grade level is modified by ethnicity and gender. To examine this possibility the models above were extended to include tests of gender and ethnicity interactions with class level. No significant interactions were found. These results suggest that the ways in which grade differences influenced later achievement were similar for children of varying ethnicity and gender. Whilst boys and Maori were less likely to enter Standard 2 by the age of 8 there was no evidence to suggest that variations in class level had any greater or lesser effect on the achievements of these children than upon girls and non Maori.

DISCUSSION

There have been continued concerns about the effects of differential rates of class promotion in the early years of schooling with a growing literature suggesting that children who are held back may suffer continued disadvantage whereas those who are accelerated may be advantaged. In general, the results of this study reinforce concerns about the ways in which promotion practices may influence longer term academic achievement. A review of the major findings of this study and their implication is given below.

Factors Determining the Rate of Class Promotion

The major principle that guides class promotion in New Zealand is that, within the limits of practicality, rates of promotion should be determined by the child's age rather than ability or other factors. Whilst this principle underwrites the theory of promotion in New Zealand education our results clearly support Macdonald's (1988, 1989) contention that the reality is somewhat different from the theory. The results of this study show that whilst month of birth was a factor that determined rates of promotion within the school system by the age of 8, these rates were also influenced by other child related factors. In general, girls, non Maori, children with high IQ, children from socially advantaged backgrounds and children without problem behaviour tended to experience accelerated promotion relative to peers born in the same month whereas boys, Maori, children with low IQ, children from socially disadvantaged backgrounds and children with problem behaviours tended to experience retention or reduced rates of promotion. The system of promotion that emerges from this analysis is one in which whilst month of birth determines the child's rate of progression to some extent, the process of promotion is modified other factors relating to the child's ability, gender, ethnicity, social background and classroom behaviour. The net result of this is that the processes by which children are promoted through the school system are shaped by both month of birth and by other attributes of the child that may act to encourage class level retention or accelerated promotion.

The Effects of Grade Level at Age 8 Upon Later Achievement

Whilst there is clear evidence to suggest that New Zealand does not operate a system of educational promotion that is based solely on social promotion, it can be reasonably asked whether differences in promotion practices matter in the long run. In her analysis of this issue McDonald (1989) concluded that variations in promotion practices probably have little impact on childhood academic achievement in the long run. The results of this study are generally consistent with McDonald's conclusions but nonetheless suggest that placement decisions have an impact on achievement levels over a considerable period of the child's school career. A review of the major findings on the effects of grade level on later achievement is given below.

Children who entered Standard 2 by the age of 8 showed consistently superior school achievement that was manifest in higher scores on standardised tests, higher success rates in School Certificate examinations and higher rates of school retention. What was striking about these differences was their size, with children entering Standard 2 by the age of 8 often having mean scores on standardised tests that were nearly a standard deviation higher than those who had not entered Standard 2 by this age. There are two explanations of the clearly superior academic performance of those who entered Standard 2 by age 8. First, it could be suggested that this superiority arose from selection processes that resulted in children who were more academically able entering Standard 2. Alternatively, it could be suggested that these results reflected a class level effect in which those exposed to accelerated promotion were advantaged by this experience whereas those facing retention were disadvantaged. Subsequent analysis suggested that both processes were involved in the relationship between class level at age 8 and subsequent achievement.

First, a large amount of the differences between children entering Standard 2 by age 8 and those not entering Standard 2 by this time was explained by the fact that those entering Standard 2 tended to be of higher IQ, to be female, to come from more socially advantaged backgrounds, and to be less prone to disruptive behaviours. When class level differences were adjusted for these pupil specific factors, differences in achievement for children in different grades at age 8 were reduced substantially. Nevertheless, even when IQ, gender, ethnicity, social background and early classroom adjustment were taken into account children who entered Standard 2 by the age of 8 still had detectably higher scores on all standardised tests of achievement assessed up to age 13. After adjustment for pupil related factors, those entering Standard 2 by the age of 8 scored between .18 to .43 standard deviations higher on standardised achievement tests. However, for outcomes assessed at age 18, control for pupil specific factors was sufficient to explain between grade differences: after covariate adjustment, children entering Standard 2 by age 8 had no higher success rates in School Certificate, no better reading ability and no greater rates of school retention than those not entering Standard 2 by this age. Collectively, these findings suggest that independently of ability, social background and classroom behaviours, the class level at which children were placed by the age of 8 exerted a small to moderate effect on their subsequent school achievement through primary school, but in the longer term, by age 18 any class level differences in school achievement had all but disappeared.

It could be suggested, however, that the impression that class level differences in achievement had disappeared by age 18 may reflect the relative imprecision of the outcomes assessed at this age. It is possible that if more comprehensive measures of achievement at 18 had been analysed, differences may have been found. Nonetheless, the results indicate that in terms of a number of outcomes that are likely to affect future educational opportunities (School Certificate success, leaving school without qualifications, completing the sixth form), class placement by age 18 had no detectable effect on these outcomes when due allowance was made for selection processes associated with early class placement.

The results of this study show considerable agreement with findings of US based studies of grade retention to the extent that this study suggests that independently of ability, age, gender, social background and classroom behaviour, children who failed to enter Standard 2 by the age of 8 were disadvantaged whereas those who entered Standard 2 by this age were advantaged. It is of interest to note that the effect sizes found in this study for standardised tests appear to be very similar to the effects sizes reported in the US literature. The meta analysis reported by Holmes (1989) suggested that grade retention had an effect of -.30 standard deviations on mean test scores even when ability was taken into account. In this study effect size estimates for standardised tests ranged from -.18 to -.43 standard deviations for children who did not enter Standard 2 by the age of 8.

Collectively, the literature on grade level effects strongly supports the view that grade retention is likely to lead to reduced academic achievement which is clearly evident in the primary school years, whereas grade acceleration may lead to increased achievement with these effects being independent of individual ability, gender, social background and classroom behaviours (Holmes, 1989; Meisels & Liaw, 1993; Smith & Shepard, 1987). This conclusion raises the important issue of the processes by which exposure to a given grade history may act to impede or enhance academic achievement. These processes are by no means clear but it may be suggested that accelerated progress may advance learning by exposing children to classroom environments that extend their academic limits and horizons whereas class retention practices may inhibit academic achievement by placing constraints on the child's learning environment and also by leading to feelings of distress, failure and disillusionment that inhibit learning (Smith & Shepard, 1989). Nonetheless, the present study suggests that by the age of 18, class placement was unrelated to a number of indices of achievement including School Certificate success, leaving school without qualifications and completion of the sixth form, that are likely to be major determinants of the individual's future educational opportunities.

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TABLE 1 Relationship Between Month of Birth and Class Placement at Age 8

Month of Birth	N	% In J3 (Year 3)	% In Standard 2 (Year 4)
April	140	45.7	54.3
May	274	65.7	34.3
June	304	79.6	20.4
July/August	365	91.5	8.5
Overall	1083	75.7	24.3

χ^2 (3) = 135.5; p<.0001

Contingency coefficient = .33

TABLE 2 Comparison of Students in J3 and Standard 2 at age 8 on Predictors of Class Placement

Measure	N	Class Placement: J3 (Year 3)	Class Placement: Standard 2 (Year 4)	p[a]
WISC-R IQ (8 years)				
Mean verbal IQ	880	97.2	112.8	<.0001
Mean performance IQ	880	100.5	110.0	<.0001
% Male	1083	55.2%	37.2%	<.0001
% Maori	1083	13.1%	5.7%	<.001
% Family of semi-skilled/unskilled socio-economic status	1083	27.8%	17.9%	<.0001
% Mother lacked formal educational qualifications	1083	55.0%	38.8%	<.0001
Teacher ratings of behaviour (8 years)				
Mean attentional problems score	1083	10.0	8.8	<.0001
Mean conduct problems score	1083	23.2	21.6	<.0001
% Absent on >10% of school days (6-8 years)	859	14.3%	6.3%	<.005

[a] Comparison of means based on t-test for independent samples, comparison of percentages based on chi square test of independence

TABLE 3 Summary of Logistic Regression Model for the Prediction of Placement in Standard 2 at Age 8

Predictor	Regression Coefficient	Standard Error	p
Birth month	-1.101	0.108	<.0001
Verbal IQ (8 years)	0.074	0.009	<.0001
Performance IQ (8 years)	0.019	0.009	<.05
Gender	1.173	0.214	<.0001
Maternal education	0.391	0.126	<.005
Teacher rating of conduct problems (8 years)	-0.052	0.029	<.10

TABLE 4 Relationship Between Class Placement at Age 8 and Educational Outcomes at Ages 8-18 Years

Outcome	N	Class Placement: J3 (Year 3)	Class Placement: Standard 2 (Year 4)	Sample Standard Deviation	p[a]
Standardised Achievement Tests (8-13 Years)					
Mean Burt Word Reading Scores					
8 years	880	97.7	107.4	10.0	<.0001
10 years	836	97.7	107.6	10.0	<.0001
12 years	792	98.0	106.7	10.0	<.0001
Mean PAT Scores					
Reading comprehension 10 years	837	98.0	106.6	10.0	<.0001
Mathematics 11 years	820	98.0	106.8	10.0	<.0001
Reading comprehension 12 years	792	98.1	106.2	10.0	<.0001
Mean TOSCA Score 13 years	769	97.6	107.9	10.0	<.0001
Outcomes at Age 18 Years					
Mean number of School Certificate subjects with C grade or better	969	2.9	4.5	2.3	<.0001
Mean Burt word reading score	961	98.7	104.1	10.0	<.0001
% Leaving school without qualifications	969	27.9%	8.7%	39.2%	<.0001
% Completing 6th Form	969	69.6%	90.2%	43.5%	<.0001

[a] Comparison of means based on t-test for independent samples, comparison of percentages based on chi square test of independence

TABLE 5 Relationship Between Class Placement at Age 8 and Educational Outcomes at Ages 8-18 Years After Adjustment for Covariates

Outcome	Class Placement: J3 (Year 3)	Class Placement: Standard 2 (Year 4)	p	Significant Covariates and Regression Coefficients [a]
Standardised Achievement Tests (8-13 Years)				
Mean Burt Word Reading Scores				
8 years	99.0	103.3	<.0001	Verbal IQ (β = .52); SES (β = -.05); Attentional problems (β = -.13)
10 years	99.2	103.0	<.0001	Verbal IQ (β = .55); SES (β = -.06); Attentional problems (β = -.11)
12 years	99.4	102.4	<.0001	Verbal IQ (β = .49); Maternal education (β = .08); Attentional problems (β = -.14)
Mean PAT Scores				
Reading comprehension 10 years	99.6	101.8	<.01	Verbal IQ (β = .56); SES (β = -.06); Maternal education (β = .07); Attentional problems (β = -.15)
Mathematics 11 years	99.7	101.4	<.01	Verbal IQ (β = .54); Performance IQ (β = .20); SES (β = -.08); Attentional problems (β = -.11)
Reading comprehension 12 years	99.7	101.5	<.05	Verbal IQ (β = .44); Performance IQ (β = .11); SES (β = -.06); Maternal education (β = .09); Ethnicity (β = .06); Attentional problems (β = -.15)

TABLE 5 (continued)

Outcome	Class Placement J3 (Year 3)	Standard 2 (Year 4)	p	Significant Covariates and Regression Coefficients [a]
Mean TOSCA Score 13 years	99.2	102.7	<.0001	Verbal IQ (β = .54); Performance IQ (β = .17); SES (β = -.07); Maternal education (β = .07); Attentional problems (β = -.13)
<u>Outcomes at Age 18 Years</u>				
Mean number of School Certificate subjects with C grade or better	3.2	3.5	>.05	Verbal IQ (β = .34); Performance IQ (β = .13); SES (β = -.13); Maternal education (β = .17); Attentional problems (β = -.18)
Mean Burt word reading score	100.0	100.0	>.90	Verbal IQ (β = .40); Performance IQ (β = .18); Maternal education (β = .06); Attentional problems (β = -.15)
% Leaving school without qualifications	20.1%	20.3%	>.90	Verbal IQ (B = -.04); Performance IQ (B = -.04); SES (B = .67); Maternal education (B = -.41); Birth month (B = .22); Conduct problems (B = .07)
% Completing 6th Form	72.4%	80.6%	>.05	Verbal IQ (B = .03); Performance IQ (B = .02); SES (B = -.77); Maternal education (B = .60); Conduct problems (B = -.07)

[a] For continuously scored outcomes the table gives the standardised regression coefficients for significant (p<.05) covariates from the fitted multiple regression model. For dichotomous outcomes the table gives the unstandardised regression coefficients from the fitted multiple logistic regression model.

TABLE 6 Comparison of Regression Coefficients of Educational Outcomes on Class Placement at Age 8, After Adjustment for a) Significant Covariates Only; b) All Covariates.

	Method of Adjustment					
	Significant Covariates			All Covariates		
Outcome	B	(se)	p	B	(se)	p
Standardised Achievement Tests (8-13 Years)						
Burt Word Reading Scores						
8 years	4.30	(.67)	<.0001	3.78	(.68)	<.0001
10 years	3.82	(.71)	<.0001	3.47	(.72)	<.0001
12 years	2.99	(.78)	<.0001	2.73	(.79)	<.001
PAT Scores						
Reading comprehension 10 years	2.20	(.69)	<.01	1.73	(.70)	<.05
Mathematics 11 years	1.76	(.62)	<.01	1.69	(.63)	<.01
Reading comprehension 12 years	1.79	(.76)	<.05	1.74	(.77)	<.05
TOSCA 13 years	3.58	(.59)	<.0001	3.21	(.60)	<.0001
Outcomes at Age 18 Years						
Number of School Certificate subjects with C grade or better	.30	(.17)	>.05	.24	(.17)	>.15
Burt Word Reading Score	.06	(.78)	>.90	-.03	(.79)	>.90
% Leaving school without qualifications	-.02	(.35)	>.90	-.04	(.36)	>.90
% Completing 6th Form	-.59	(.32)	>.05	-.51	(.33)	>.10