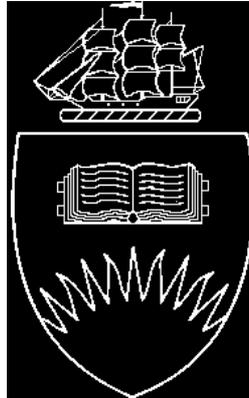


Student Optimism and Pessimism during the Transition to Co-education



Shirley M. Yates

Flinders University,

Adelaide Australia

The optimistic or pessimistic manner in which students account for the causes of events in their lives has been shown to have an influence on their personal adjustment, health, motivation and academic achievement. In this study longitudinal data on students' optimism and pessimism were collected immediately before and for the first two years following the introduction of co-education to a single sex boys' school. Information was obtained also on a number of other attitudinal and self descriptive measures, together with an index of achievement. The study involved all primary and secondary students in the school. In addition, in the first year of the study all of the instruments were administered to all primary and secondary students in a comparable single sex girls' school. Each of the questionnaires and the measure of achievement were Rasch scaled, so as to bring them to scales with common metrics. Comparisons were made between genders, across grade levels and across time, with a particular emphasis on changes associated with the transition from the single sex to co-educational school environment.

**Paper presented at the Australian Association for Research in Education Conference,
Sydney, December, 2000.**

Introduction

In the mid 1990s a non-government boys' school in metropolitan Adelaide, South Australia, made a decision to offer education on a co-educational basis. The school had been established in 1951 to provide single sex education for boys from Year 3 to Year 12. Boys from Year 3 to 7 were educated at a Junior School campus, with boys from Years 8 to 12 receiving their education at a separate Senior School site. While a small number of girls had been admitted annually to Years 11 and 12 only from the early 1970s, the decision to offer education to girls as well as boys at all year levels was an important milestone in the history of the school.

At the same time that co-education was introduced, many other significant changes were initiated in the school. The Junior School was expanded to admit Junior Primary students from Reception to Year 2 and the Year 7 classes were moved from the Junior campus to a newly formed Middle School, embracing Years 7 to 10, situated at the Senior School campus. In addition, some teachers were moved from the Junior to the Senior campus, many new teachers were appointed and an extensive building programme undertaken. This study was conducted during this period of considerable institutional change.

Single sex and co-education

Many studies have examined differences between single sex and co-educational schools, particularly at the secondary school level, but very few have investigated the transition from single sex schooling to co-education. In the 1980s a boys' high school and a girls' high school in Sydney were reorganised into two co-educational schools. Longitudinal information was collected from 1982 to 1985, covering the period before, during and after the transition to co-education (Marsh, Smith, Marsh & Owens, 1988). While there was an overall increase in multidimensional self concepts before and after the introduction of co-education, there was a small decrease in self concepts for students attending the co-educational classes in the transitional year. No significant differences in achievement in mathematics or English were found across the five years of the study.

A number of studies have investigated the effects of single sex and co-education on the academic achievement of secondary school students. In general, results are inconsistent, with some studies providing support for the benefits of co-education, (Marsh, 1989; Marsh *et al*, 1988), others supporting single sex education (Astin, 1977; Lee & Bryk, 1986; Riordan, 1985) and yet others reporting no differences in achievement (Miller & Dale, 1974; Rutter, Maughan, Mortimer & Outson, 1979). However, some differences in single sex and co-educational outcomes may be confounded by factors associated with school choice (Irving, 1976; Lee & Bryk, 1986; Marsh; 1989). A longitudinal study conducted in New Zealand over 18 years has demonstrated that once the effects of these selection processes were controlled for, students in single sex secondary schools performed slightly but consistently better on a range of educational outcomes in comparison with their co-educational peers (Woodward, Fergusson & Horwood, 1999).

Optimistic and Pessimistic Explanatory Style

Optimism has long been recognised as a positive attribute of character. Numerous studies of adults and children have found that those with an optimistic outlook on life enjoy better health, are more motivated, are less prone to depression and have higher levels of achievement at work, school and in sport (see: Buchanan & Seligman, 1995). Optimists view the causes of positive events as long term, due to their own efforts and generalisable across situations. Negative events are seen as being temporary, due to external causes and limited to specific occasions. The reverse is true of pessimists who interpret negative events as

permanent, personal and pervasive and positive events as transient, external and ephemeral. In the classroom pessimistically oriented students are more likely to be prone to depression, to discount their successes, and when confronted with failure, to give up more easily (Seligman, 1990). In response to repeated failures, pessimistic students display characteristically passive learned helplessness behaviours in the classroom by decreasing their efforts, ceasing to try or simply opting out altogether.

In general, children and adolescents have learned to make consistent attributions about the causes of everyday events from predominantly optimistic or pessimistic mental frames of reference by the age of 8 or 9 years (Nolen-Hoeksema & Girgus, 1995; Yates, 2000, 1998a; 1998b). These explanatory styles are reasonably consistent over time, although as students enter adolescence some changes are evident (Nolen-Hoeksema & Girgus, 1995). Boys have been found to be more pessimistic than girls (Nolen-Hoeksema, Girgus & Seligman, 1992; Yates, 2000; 1998a; 1998b), with girls becoming more pessimistic in later adolescence (Nolen-Hoeksema & Girgus, 1995). Parents, teachers and sports coaches are thought to have a significant influence on the development of explanatory style in childhood (Seligman, 1990), although the exact mechanisms by which this occurs are not known.

Explanatory Style and Achievement

Explanatory style has been shown to be significantly associated with general academic achievement in school aged children (Nolen-Hoeksema, Girgus & Seligman, 1986; 1992). Nolen-Hoeksema *et al.*, (1986) reported moderate, significant relationships between concurrent measures of academic achievement and explanatory style ($r = .26$, $p < .05$). In a five year longitudinal study of primary school children, a weak relationship was found between explanatory style and academic achievement measured six months later (Nolen-Hoeksema *et al.*, 1992). Children exhibiting pessimistic explanatory style were somewhat less successful on standardised achievement tests than those with an optimistic explanatory style (Nolen-Hoeksema & Girgus, 1995). Significant correlations between explanatory style and achievement were reported for students in Grade 4 ($r = .11$, $p < 0.10$), and Grade 5 ($r = .14$, $p < 0.05$) but not for students in Grade 6 ($r = .01$, ns) and Grade 7 ($r = .12$, ns). In this study, the boys consistently had more pessimistic styles than the girls both overall and in relation to their explanations for negative events. No gender differences in explanations for positive events were found. The relationship between the two variables over the longer term was not examined.

Significant relationships have also been found between explanatory style and achievement in mathematics (Yates, 1998a; 1999a; 1999b; 2000). In a longitudinal study primary and lower secondary students with a pessimistic explanatory style experienced a lower rate of achievement in mathematics, with boys consistently more pessimistic than girls over time (Yates, 1998a; 1999a; 1999b; 2000).

The Present Study

Data were collected on a range of student variables immediately prior to, during and after the introduction of co-education. All boys in Years 3 to 10 attending the school (School 1) in the last (fourth) term of single sex education were surveyed and then followed up over the next two years. In the initial year of the study, information was also collected from girls in Years 3 to 10 at a single sex girls' school (School 2). These two single sex schools were roughly comparable in that they were in the same geographical location and served many of the same families.

Students at both School 1 and School 2 were administered a range of attitudinal and self descriptive measures, together with an index of achievement. This paper is concerned with preliminary analyses of the optimistic and pessimistic explanatory style and achievement of the boys in School 1 measured immediately prior to, in the transitional year and the year following the introduction of co-education. Differences between boys' and girls' explanatory style and achievement in their respective single sex schools in the first year of the study are also considered.

Aim

To investigate the explanatory style and achievement of primary and secondary school students in single sex schools and over time in the transition to co-education.

Specific aims

1. To examine the influence of year level and gender on students' explanatory style and achievement in a context of single sex education.
2. To analyse, through a longitudinal design, boys' optimistic, pessimistic and total explanatory style and achievement before, during and after the change from single sex to co-educational schooling.

Method

The study, conducted over three consecutive years, commenced in the year immediately prior to the introduction of co-education to a non-government single sex boys' school. Data were collected from all boys in Years 3 to 10 in the fourth term of that year (Time 1) and from the same boys for the following two years (referred to as Time 2 and Time 3 respectively). At Time 2 the boys were in Years 4 to 11 and at Time 3, Years 5 to 12. In the first year of the study data were also collected from all girls in Years 3 to 10 in a comparable non-government single sex girls' school.

Participants

The numbers of boys and girls in Years 3 to 10 who participated in the study at Time 1 are presented in Table 1.

Table 1 Number of students by gender and year level at Time 1

Year Level	3	4	5	6	7	8	9	10	Total
Male	43	38	44	57	68	77	65	73	465
Female	54	62	60	62	59	96	90	80	563
Total	97	100	104	119	127	173	155	153	1028

The numbers of boys who participated in the study at Time 1, Time 2 and Time 3 are presented in Table 2.

Table 2 Number of boys by year level at Time 1, Time 2 and Time 3

Year	3/4/5	4/5/6	5/6/7	6/7/8	7/8/9	8/9/10	9/10/11	10/11/12	Total
Time 1	43	38	44	57	68	77	65	73	465
Time 2	37	40	37	57	59	65	55	67	417
Time 3	43	39	38	38	49	64	54	52	337

There is some variability in the student numbers over the three year period. The student ID numbers used for data entry in an SPSS programme (Norusis, 1993) were generated from the class lists supplied by the school at Time 1. Students may have been absent on the day that the questionnaire and achievement test were administered at either Time 1, 2 or 3 or may have left the school altogether at Time 2 or Time 3. There are, however, sufficient numbers of students at each year level on each occasion for the statistical analyses to be conducted.

Instruments

Optimistic and Pessimistic Explanatory Style

The Children's Attributional Style Questionnaire (CASQ; Seligman, Peterson, Kaslow, Tannenbaum, Alloy & Abramson, 1984), a forced-choice pencil and paper instrument was used to measure students' optimistic, pessimistic and total explanatory style. The questionnaire consists of 48 dichotomous items, with 24 positive items designed to measure optimism and 24 negative items measuring pessimism. For each item, students are presented with a hypothetical scenario depicting common everyday events. They then choose between one of two alternative responses to that scene.

Separate scores are formed for the 24 positive items (referred to as Optimism) and the 24 negative items (referred to as Pessimism). A composite score (referred to as a total explanatory style) is formed from the positive and reversed negative items.

Student Achievement

Student achievement was measured throughout the study with the Word Knowledge 1 and Word Knowledge 2 tests (Thorndike, 1973). These tests, developed and extensively validated for an experimental study of reading comprehension education in fifteen countries are short but effective measures of verbal ability. Word Knowledge 1 (Thorndike, 1973), referred to as the *Primary Word Knowledge Test* and Word Knowledge 2 (Thorndike, 1973), referred to as the *Secondary Word Knowledge Test* were each composed of forty pairs of words, with students asked to identify whether the words were the same or opposite in meaning.

Procedure

The CASQ and appropriate Primary or Secondary Word Knowledge test were administered to the boys in School 1 either by their classroom teachers or by a research assistant on the same day in the fourth term of each year of the study. Girls at Years 3 to 7 at School 2 were administered the instruments in their classrooms by a research assistant, while those in

Years 8 to 10 were administered the instruments by research assistants in year level groups in a large hall. These administrations took place at Time 1 in the same week in the fourth term as School 1.

At Time 1 students in Years 3 to 7 in the two single sex schools were administered the *Primary Word Knowledge Test*, with the *Secondary Word Knowledge Test* given to students in Years 8 to 10. At Time 2 and Time 3 the *Primary Word Knowledge Test* was administered to boys in Years 4 to 6 and 5 to 6 respectively, while boys in Years 7 to 11 and 7 to 12 respectively received the *Secondary Word Knowledge Test*.

Analyses

Rasch Scaling of the Instruments

The CASQ and the Word Knowledge tests were analysed with the Rasch calibration procedure (Rasch 1960: 1966), to bring them to common interval scales and to overcome any sample-item interdependence problems. Omitted responses could also be allowed for in appropriate ways in the scoring of the attitude data with this procedure. The final Rasch scaled CASQ and the Word Knowledge test were composed of only those items that met the requirements of item response theory.

For the CASQ, the 24 positive items (Optimism) and the 24 negative items (Pessimism) were analysed separately for the boys at School 1 and the girls at School 2, using the data from Time 1 for each sample respectively. The negative items were reversed in the analyses of the Pessimism and total CASQ scales. The results indicated that as all of the items on the Optimism and Pessimism scales fitted the Rasch model, the scales could be considered independently. All items were also found to fit the total CASQ scale. Case estimate scores for the girls were calculated for Time 1 only. Student scores for the boys were estimated concurrently for both the Optimism, Pessimism and total CASQ scales for Times 1, 2 and 3.

A combined *Word Knowledge Test*, which had been merged with the common item linking procedure, was constructed separately for the girls at Time 1 and for the boys concurrently at Times 1, 2 and 3. Misfitting items were deleted from the *Primary Word Knowledge Test* and *Secondary Word Knowledge Test* prior to the formation of the combined scale. An anchor file, using only those students who had answered all of the forty items in their respective test, was constructed for the scoring of the combined word knowledge test. The case estimate scores for the girls in School 2 at Time 1 and the boys in School 1 at Times 1, 2 and 3 were based on these anchored scores. Boys' case estimate scores were calculated through concurrent equating.

Statistical analyses

The data were analysed with correlational analyses, analysis of variance (ANOVA) and Hierarchical Linear Modelling (HLM5) techniques.

Results

The results are examined in terms of year level and gender differences in achievement and optimistic, pessimistic and total explanatory style in the context of single sex education at Time 1, for all students in Years 3 to 10 at School 1 and School 2. Secondly, the measures of achievement, optimistic, pessimistic and total explanatory style in the transition to co-education for the boys in School 1 at Time 1, Time 2 and Time 3 are considered.

The influence of year level and gender on students' achievement and explanatory style in a context of single sex education

The Word Knowledge scores of boys at School 1 and girls at School 2 are presented in Figure 1 and Table 3. While there is an overall trend for student achievement to increase across the year levels, gender differences are evident. In general, in comparison with the girls, the boys have higher mean achievement scores, with these gender differences significant at Year 3, Year 8, Year 9 and Year 10.

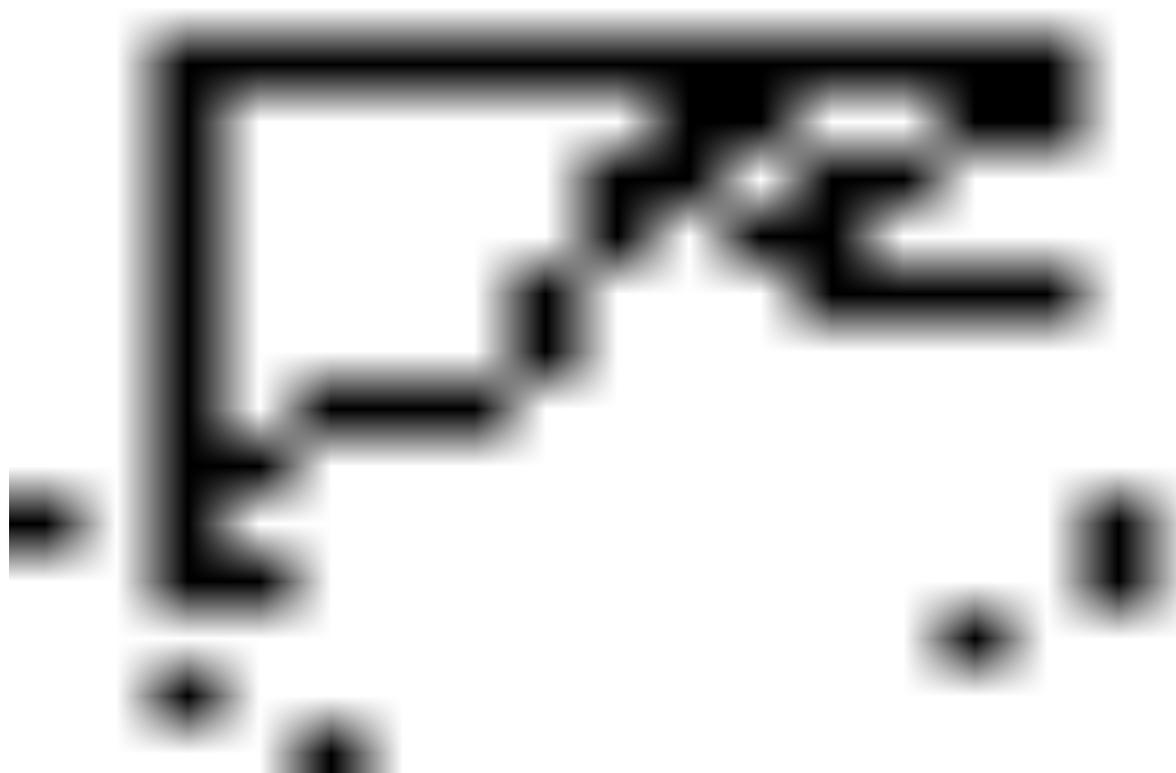


Table 3 Gender differences in word knowledge across year levels

	Boys		Girls		F	df
	Means	Std. Dev. (¶)	Means	Std. Dev. (¶)		
Yr 3	.09	.79	-.33	.98	5.31*	1,96
Yr 4	.44	1.21	.03	1.13	3.02	1,99
Yr 5	.59	1.05	.54	.87	.05	1,102
Yr 6	1.21	1.12	1.43	1.06	1.21	1,118
Yr 7	1.85	1.06	1.66	.99	1.15	1,126

Yr 8	1.24	1.02	.59	.85	20.90***	1,170
Yr 9	1.68	.85	1.01	.85	23.76***	1,155
Yr 10	1.48	1.25	.91	.80	11.70***	1,152
* p<.05, ** p<.01, *** p<.001						

Optimistic, pessimistic and total explanatory style at Time 1

Total explanatory style: Differences between the total explanatory style scores of boys in School 1 and girls in School 2 at Time 1 are presented in Table 4 and Figure 2. There is an overall trend for explanatory style to decrease across the year levels, with both boys and girls becoming less optimistic. However, at Time 1 boys are more pessimistic than the girls across all year levels. These gender differences are significant at Year 3, Year 7 and particularly at Year 9.

Optimistic explanatory style: Gender and year level differences in positive explanatory style for boys and girls are presented in Table 5 and Figure 3. Across the year levels there is a general pattern of a decrease in optimism for all students in both School 1 and School 2, although the pattern for girls is less consistent than that of the boys. There are significant gender differences at Year 5 and Year 9, with the girls significantly less optimistic than the boys at Year 5 and the boys significantly less optimistic than the girls at Year 9.

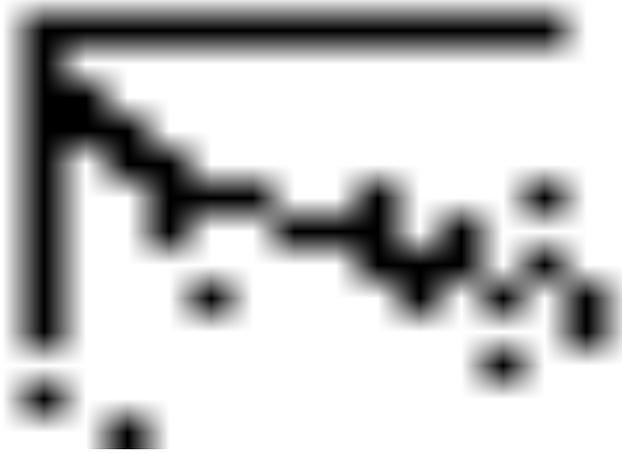
Table 4 Gender differences in total explanatory style across year levels at Time 1

	Boys		Girls		F	df
	Mean s	Std. Dev. (n)	Mean s	Std. Dev. (n)		
Yr 3	.072	.47	.95	.63	4.17*	1,96
Yr 4	.76	.47	.85	.54	.67	1,99

Yr 5	.61	.49	.62	.43	.02	1,103
Yr 6	.53	.51	.65	.57	1.62	1,118
Yr 7	.52	.55	.77	.44	7.91*	1,126
Yr 8	.44	.46	.50	.47	.75	1,172
Yr 9	.31	.60	.61	.47	12.17***	1,154
Yr 10	.45	.61	.56	.56	1.41	1,152
* p<.05, ** p<.01, *** p<.001						

Table 5 Gender differences in positive explanatory style across year levels at Time 1

	Boys		Girls		F	df
	Means	Std. Dev. (¶)	Means	Std. Dev. (¶)		
Yr 3	.39	.56	.58	.80	1.84	1,96
Yr 4	.42	.61	.34	.70	.36	1,99
Yr 5	.20	.75	-.11	.66	5.16*	1,103
Yr 6	.12	.71	-.07	.75	1.96	1,118
Yr 7	0	.60	.18	.65	2.68	1,126
Yr 8	-.0449	.59	-.15	.72	1.16	1,172
Yr 9	-.17	.75	.15	.74	7.13**	1,154
Yr 10	-.0242	.68	.10	.76	1.23	1,152
* p<.05, ** p<.01, *** p<.001						



Pessimistic explanatory style: Table 6 and Figure 4 show the gender and year level differences in negative explanatory style for all students at Time 1. While the overall pattern indicates that students in both School 1 and School 2 become more pessimistic across the year levels, the boys are clearly more pessimistic than the girls. These gender differences are significant at every year level except for Year 10.

Relationships between year level, optimistic and pessimistic explanatory style and achievement: Table 7 presents the correlations between year level, positive and negative explanatory style and achievement for students at Time 1 in both School 1 and School 2. Significant relationships are evident between all of the variables with the exception of pessimism and verbal achievement. However, in separate analyses of the Time 1 data for boys and girls, a significant correlation between pessimism and achievement is evident for boys ($r = .11, p < .05$), but not for girls ($r = .03, ns$). The relationships between optimism and year level and between optimism and achievement are shown as negative, as in each case optimism decreases across the year levels while the student year level and achievement increase.

Table 6 Gender differences in negative explanatory style across year levels at Time 1

	Boys		Girls		F	df
	Mean	Std. Dev. (¶)	Mean	Std. Dev. (¶)		
Yr 3	1.09	.72	1.48	.97	4.87*	1,96
Yr 4	1.08	.83	1.44	.76	5.01*	1,99
Yr 5	1.08	.63	1.54	.84	9.46**	1,103
Yr 6	.96	.67	1.55	.89	16.55***	1,118
Yr 7	1.14	.87	1.51	.73	6.83**	1,126
Yr 8	.98	.73	1.24	.70	5.56*	1,172

Yr 9	.83	.83	1.13	.67	6.22**	1,154
Yr 10	.98	.92	1.10	.80	.67	1,152
* p<.05, ** p<.01, *** p<.001						

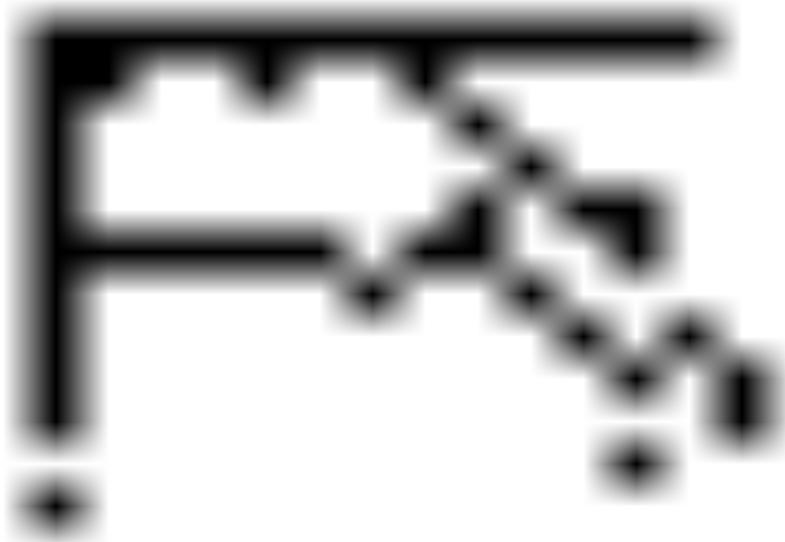


Table 7 Correlations between year level, optimism, pessimism and word knowledge at Time 1

N= 1028	Year Level	Optimism	Pessimism	Word Knowledge
Year Level	-	-.18***	-.14***	.34***
Optimism		-	.16***	-.13***
Pessimism			-	.02
Word Knowledge				-
* p<.05, ** p<.01, *** p<.001				

Optimistic, pessimistic and total explanatory style and achievement in boys during the transition from single sex to co-educational schooling

Achievement, optimism, pessimism and total explanatory style in primary and secondary school boys at School 1 were examined at Time 1, Time 2 and Time 3 before, during and after the transition from single sex to co-educational schooling. Hierarchical Linear Modelling

(HLM5) (Raudenbush, Bryk & Congdon, 2000) is used in the analyses of the explanatory style measures. All significant results are reported at the .05 level.

Achievement at Time 1, Time 2 and Time 3

The mean Rasch scaled scores for the word knowledge achievement test are presented in Figure 5. The overall trends indicate an increase in achievement across the year levels and over time.

Total explanatory style at Time 1, Time 2 and Time 3

The mean Rasch scaled scores for the total CASQ scale for Times 1, 2 and 3 are presented in Figure 6. While there is some variability in the pattern of explanatory style over time, the general trends indicate that the boys become less optimistic across the year levels and over time. HLM analysis indicates that these differences are significant overall. There is also a significant change in total explanatory style for the Year 9 cohort of boys over time. When the impact of the introduction of co-education at Time 2 is taken into account, a slight but significant overall decrease in total explanatory style is evident. There is also a significant change in Year 9 in this transitional year.



Optimistic explanatory style at Time 1, Time 2 and Time 3

The mean Rasch scaled scores for the 24 positive CASQ items for Times 1, 2 and 3 are presented in Figure 7. Generally there is a decrease in optimism over time and across the year levels, although the pattern changes somewhat in the senior secondary school years.

Analysis with HLM indicates a significant drop in optimism associated with the introduction of co-education at Time 2, particularly for the boys in the Year 8 cohort.



Pessimistic explanatory style at Time 1, Time 2 and Time 3





The mean Rasch scaled scores for the 24 negative items for Time 1, Time 2 and Time 3 are presented in Figure 8. As the negative scores were reversed during the Rasch scaling procedure, the results indicate a trend for boys to become more pessimistic across the year levels and over time, reaching the lowest point at Years 8 and 9. This trend is confirmed as significant by the HML analysis. There is a change in the pattern in Year 10 at Times 1, 2 and 3, although this is not maintained at Years 11 and 12. The HLM analysis indicates that boys in the Year 3 cohort are less pessimistic over time. However, there are no significant changes in pessimism in relation to the introduction of co-education at Time 2.

Summary of the results

Time 1: Single sex boys' and single sex girls' schools

1. Boys have higher achievement scores, with these gender differences significant at Years 3, 8, 9 and 10.
2. Boys are more pessimistic than the girls, with these gender differences for the total explanatory style scale significant at Years 3, 7 and 10 and for the pessimism scale for all year levels except Year 10.
3. Optimism, pessimism and achievement are significantly inter-related, except for pessimism and achievement where the relationship is significant only for boys.

Time 1, 2 and 3: The transition from boys' single sex to co-educational schooling

1. Boys become less optimistic across the year levels and over time.
2. There is a significant decrease in total explanatory style and in optimism associated with the introduction of co-education at Time 2, particularly for students in Years 8 and 9.
3. Boys are more pessimistic across year levels and over time, but this is not associated with the transition to co-education at Time 2.

4. Cohort effects are evident across time for the three explanatory style measures. These effects are significant for the Year 3, 4, 8 and 9 cohorts.

Discussion

The unique opportunity to study students' explanatory style and achievement during the process of the introduction of co-education to a single sex boys' school in South Australia has produced some very interesting findings. The results obtained not only extend previous research but also provide valuable insight into some of the factors associated with single sex and co-education. The preliminary analyses of the explanatory style and achievement measures taken initially in the two single sex schools and then for the boys during the period of transition from single sex to co-education have identified significant differences between the genders, across the year levels and over time. In addition, significant changes in optimism and total explanatory style were evident in boys in the immediate transitional co-educational period.

This study is also distinctive in that it encompassed both primary and secondary school students from Years 3 to 12. The greater prevalence of pessimism in boys across the year levels and over time has been cited in previous studies (see, Buchanan & Seligman, 1995; Yates, 1998). However, longitudinal information about explanatory style in older students has not been reported previously. Comparatively little is known about the development of explanatory style during childhood, particularly in both very young children and older adolescents. The developmental and gender related trends in this study indicate the need to explore these differences more fully in a much larger study, using a more representative sample and at least five data collection points.

The finding that optimism and total explanatory style decreased significantly, particularly for students in the Year 8 and 9 cohorts, in the year that co-education was introduced is of particular interest. Seligman (1990) has suggested that major life events have an influence on explanatory style. In this regard, he has focussed on personal events in children's lives, such as the loss of a mother. This result would suggest that significant changes at school may also be influential. In a previous study, Marsh *et al.* (1988) reported a slight decrease in self concepts for secondary students during the transition to co-education. In both studies there is clear evidence that at least for some students the institutional change had some impact on them, if only in the short term.

It has been hypothesised also that the development of explanatory style is influenced by significant people in children's lives such as parents, teachers and sports coaches (Seligman, 1990), but there is a paucity of research data to support these contentions. The cohort effects noted in the boys over the three years of the study would suggest that peer and school influences on explanatory style could also be profitably explored in future studies.

This paper has considered the preliminary analyses of two of the student variables measured during the period of transition from single sex to co-education in a non-government school in South Australia. Future reports will be directed at an exploration of this rich data source, and in particular, in the investigation of the inter-relationships between all of the variables that have been measured.

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Acknowledgments:

1. Professor John Keeves for his invaluable assistance with the data analyses.
2. John Harris for his exemplary research assistance.
3. Diane Harris and Ron Thomas for data entry.
4. Bruce Ellis, Greg Yates and Jenny Chapman for data collection at Time 1, Ron and Margaret Thomas for data collection at Times 2 and 3.
5. Milton Yates for computing work.
6. The Principals, staff and students of the two schools who made the study possible.
7. The research was supported by grants from the Flinders University Research Board and the Australian Research Council.