

Gender differences in perceptions of school climate:

A longitudinal study of school reform



While several studies attest to significant relationships between student perceptions of school climate and educational achievement, these associations have not been studied over time in the context of school reform. Co-education was introduced into a single sex non-government boys' school in South Australia in 1999. The restructuring of the school took place initially at the secondary school level, with girls admitted to the primary school grades in 2000. Educational progress and perceptions of relationship and personal dimensions of school climate were measured annually in all primary and secondary students in the school over a four-year period from 1999. Structural equation modelling has revealed significant relationships between students' gender, educational progress and perceptions of the relationship dimensions of cohesiveness, friction and satisfaction and the personal dimensions of competitiveness and difficulty of schoolwork. In particular, perceptions of interpersonal friction within the school play a significant pivotal role in students' educational progress and perceptions of the school's learning environment's psychosocial climate. These results have clear implications for the ongoing debate of whether boys and girls should be educated separately or together.

School climate has long been recognised as having an important effect on student learning and achievement (Agnew 1981; Anderson, 1982; Brookover & Lezotte, 1979; Howe 1985; Lezotte, Hathaway, Miler, Passalacqua, & Brookover, 1980; Stickard & Mayberry 1986; Stronge & Jones, 1991; Fraser, 1994; Bulach, Malone & Castleman, 1995). While the concept of school climate has been variously defined (see, Bulach *et al.*, 1995) there is general agreement that schools are major social environments in which students share beliefs, fears, values and norms (Hofman, Hofman & Guldmond, 2001) and where in turn students' "cognitive and affective functioning is shaped by the characteristics of their schools and schooling" (Hofman *et al.*, 2001, p 172). The climate of a school is one of the most important ingredients of a successful instructional program (Hoyle, English, and Steffy, 1985) and "without a climate that creates a harmonious and well functioning school, a high degree of academic achievement is difficult, if not downright impossible to obtain" (Hoyle *et al.*, 1985, p 15). In a manual for school leaders, Sweeney (1988, p. 1) states "a winning school climate provides the very foundation for a sound educational program. When the climate is right, people are inspired to do their best. Teachers and students ... do what needs to be done to stimulate learning. Achievement generally rises".

Learning in schools takes place in social contexts both inside and outside the classroom (Hofman *et al.*, 2001). A large body of evidence found student perceptions of classroom psychosocial characteristics to be strongly related to cognitive and affective outcomes (Haertel, Walberg & Haertel, 1981; Fraser, Welch, Hattie & Walberg, 1987; Fraser, 1998). A meta-analysis of studies of 17,805 students in 823 classes in eight subject areas across four nations, found higher student achievement in classrooms with greater Cohesiveness, Goal Direction and Satisfaction and less Disorganisation and Friction (Haertel, *et al.*, 1981). These elements of classroom climate are derived from Moos (1974) social environment classification system. Cohesiveness, Satisfaction and Friction are encompassed within Moos (1974) Relationship Dimension of involvement, affiliation with others, and teacher support in the classroom. Goal direction and disorganisation are part of his System Maintenance and Change Dimension involving orderliness, rule clarity, and teacher strictness in enforcing

rules. Moos (1974) also postulates a third dimension of Personal Development, embracing Competitiveness and Difficulty, which concerns the self-enhancement and personal development of all classroom members. All three dimensions have been studied in many different environments (Fraser, 1998), but have not been measured in schools over time during the reform from unisex to mixed sex education.

Single sex and coeducational schools and classes have been examined over several decades (Mael, 1998), and although proponents of each system cite various benefits (Caspi, 1995), research evidence is inconsistent (Mael, 1998). Some studies support single sex schooling (Astin, 1977; Riordan, 1985; Lee & Bryk, 1986) particularly for females (Moore, Piper & Schaefer, 1993), some co-education, (Marsh, 1989; Marsh, Smith, Marsh & Owens, 1988) and yet others report no differences in academic achievement (Miller & Dale, 1974; Rutter, Maughan, Mortimer & Outson, 1979). Other evidence suggests that school type does not benefit either boys or girls once other variables are controlled (Marsh, 1989; Marsh & Rowe, 1996). At the classroom level, some studies suggest boys are disadvantaged in single sex classes (Milligan & Thomson, 1992; Parker & Rennie, 1995; Forgasz & Leder, 1996; Gill, 1996; Rennie & Parker, 1997; Jackson & Smith, 2000), and that, relative to girls, fare better in co-educational classrooms where they receive different types of assigned academic tasks, different feedback patterns and more academic support from teachers (Steinbeck & Gwizdala, 1995; Good, Nichols & Sabers, 1999). All of these studies have focussed on students at the secondary school level.

Although the advantages and disadvantages of single sex and coeducation have been debated extensively, few studies have examined schools before, during and after their reform from single to mixed sex education. Three longitudinal studies found no significant differences between the achievement of boys and girls following the introduction of coeducation into single sex schools (Marsh, 1989; Marsh *et al*, 1988; Xxxxx, 2001a; 2001b; 2002). Negative changes in student characteristics, evident during the initial period of the reform of these non-government schools, were not maintained once the transitional period had passed (Marsh *et al.*, 1988; Xxxxx, 2000). A fourth study examined girls' perceptions of the mathematics classroom climate prior to and during the merger of two single sex secondary schools (Steinbeck & Gwizdala, 1995) but did not investigate whether the girls' negative attitudes persisted over time.

The present study was designed to investigate boys' and girls' educational progress and perceptions of school climate following the introduction of coeducation into a non-government fee-paying single sex boys' school. The study commenced in the first year in which coeducation was introduced at the secondary school level (T1) and continued over the next three years (T2, T3 & T4). Girls were admitted to the primary school grades at T2.

Aims

The aims of this study are to:

- 1 measure, monitor and evaluate students' educational progress and perceptions of school climate during the reform from single sex education to coeducation;
- 2 investigate inter-relationships between students' gender, progress and perceptions of the school's psychosocial climate during this time.

Method

Participants

All primary school boys in Grades 3 to 7 and all secondary boys and girls in Grades 8 - 11 attending the school participated at (T1). All students in Grade 3 - 12 participated at (T2), (T3) and (T4). Table 1 presents the participants at T1, T2, T3, and T4.

Table 1 *Number of boys and girls at T1, T2, T3 and T4*

Time	T1	T2	T3	T4	Total
Boys	441	512	491	489	1933
Girls	43	92	123	151	409
Total	484	604	614	640	2342

Instrumentation

School Climate Questionnaires:

Student perceptions of the school's psychosocial climate were measured with *My School Inventory* (MSI), adapted from *My Class Inventory* (Fisher & Fraser, 1981; Fraser, Anderson & Walberg, 1982) or the *School Learning Environment Inventory* (SLEI), a modification of the *Learning Environment Inventory* (Anderson & Walberg, 1974; Fraser *et al.*, 1982). MSI and SLEI each have three common subscales of Cohesiveness, Friction and Satisfaction measuring Moos (1974) Relationships Dimension and two common subscales of Competitiveness and Difficulty assessing students' perceptions of the Personal Development Dimension within the school. Table 2 presents sample items of the dimensions and scales.

Table 2: *Sample items for the Relationship and Personal Development Dimensions within My School Inventory and School Learning Environment Inventory*

Relationship Dimensions :

Cohesiveness

MSI	Item 28	<i>Children in our school like each other as friends</i>
SLEI	Item 31	<i>Students in the school are frequently personal friends</i>

Friction

MSI	Item 2	<i>Children are always fighting with each other</i>
SLEI	Item 6	<i>There is constant bickering among students</i>

Satisfaction

MSI	Item 16	<i>Most children say the school is fun</i>
SLEI	Item 73	<i>Students look forward to coming to classes</i>

Personal Development Dimensions:

Competitiveness

MSI	Item 24	<i>Some students try to do their work better than the others</i>
SLEI	Item 30	<i>Students compete to see who can do the best work</i>

Difficulty

MSI	Item 3	<i>In our school work is hard to do</i>
SLEI	Item 54	<i>Students tend to find the schoolwork hard to do.</i>

Educational Progress:

Students' educational progress was measured with *Word Knowledge Test 1, 2 or 3* (WKTest1, WKTest2 & WKTest3) (Thorndike, 1973). Each test consists of 40 word pairs,

rated as the same or opposite in meaning. WKTest1 and WKTest2 have 13 common word pairs and WKTest2 and WKTest3 have 20 items in common. One word pair is common to all three tests. Table 3 presents some sample Test items.

Table 3: *Sample items from Word Knowledge Test 1, Test 2 and Test 3*

Item no.	<i>WKTest1</i>		<i>WKTest2</i>		<i>WKTest3</i>	
1	quick	slow	savoury	insipid	acquire	dispel
40	scarce	rare	obvious	indisputable	ephemeral	eternal

Procedure

The relevant school climate questionnaire and word knowledge test were administered to all students in their classrooms at T1, T2, T3 and T4 at the same time and day in October. WKTest1 was administered to Grades 3 - 7, WKTest2 to Grades 8 - 10 and WKTest3 to Grades 11 - 12. Students in Grades 3 - 7 were administered MSI, with the SLEI given to Grades 8 - 12. All students in Grades 8 - 9 also completed MSI to provide a common group for equating purposes.

Analyses

Students' responses at T1, T2, T3 and T4 were entered into a Statistical Package for the Social Sciences file (Norusis, 1993), with data matched across the four occasions with a student ID. Reliability and validity of the MSI, SLEI and WK tests were examined with QUEST (Adams & Khoo, 1994) and all non-fitting items deleted. The Rasch scaling procedure (Rasch, 1966) was used to calibrate the word knowledge tests and questionnaires to bring them to common interval scales. Five separate school climate subscales of Cohesiveness, Competitiveness, Difficulty, Friction and Satisfaction were then formed from the designated items in the MSI and SLEI. Subscales from the two inventories were linked by responses of the Grade 8 and 9 students who had completed both questionnaires. The combined Cohesiveness subscale contained 13 items, the Competitiveness subscale 12 items, the Difficulty subscale 14 items, the Friction subscale 15 items and Satisfaction subscale 14 items.

A single *Word Knowledge* (WK) scale of educational progress was formed from *Word Knowledge Tests 1, 2 and 3*, with the tests linked by the common items. Scoring of WK was anchored to those students who answered all items at T1. Case estimate scores were equated concurrently for the WK scale and school climate subscales for all students from Grades 3 - 11 at T1, and Grades 3 - 12 for T2, T3 and T4.

Results

Case estimate scores for WK and five climate subscales were pooled across the four occasions and analysed with structural equation modelling (SEM), using the software package AMOS (Analysis of Moment Structure) (Arbuckle & Wothke, 1999). SEM, which examines a series of dependence relationships simultaneously, is particularly useful when one dependent variable become an independent variable in subsequent dependent relationships. This set of relationships, each with dependent and independent variables, is the basis of structural equation modelling (Hair, Anderson, Tatham, & Black, 1995). The results of the SEM are presented in Figure 1, with the direct, indirect and total effects listed in Table 5.

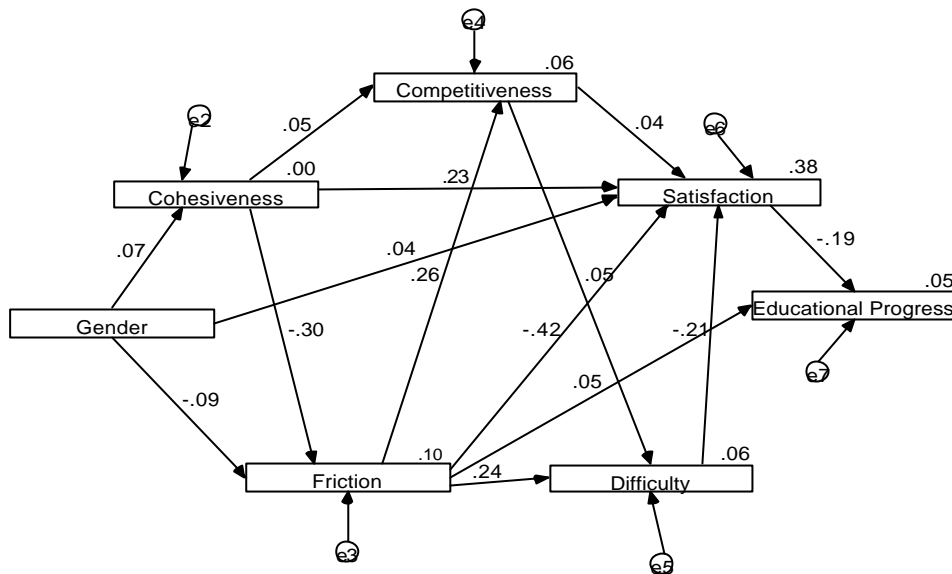


Figure 1 Path Model of factors influencing educational progress

Table 5 Direct, Indirect and Total Effects for the Path Model

	GENDER	Cohesive	Friction	Compet.	Difficulty	Satisfact.
Standardized Direct Effects - Estimates						
Cohesiveness	0.07					
Friction	-0.09	-0.30				
Competitiveness		0.05	0.26			
Difficulty			0.24	0.05		
Satisfaction	0.05	0.23	-0.42	0.04	-0.21	
Educ. Progress			0.05			-0.19
Standardized Indirect Effects - Estimates						
Cohesiveness						
Friction			-0.02			
Competitiveness			-0.03	-0.08		
Difficulty			-0.03	-0.07	0.01	
Satisfaction			0.07	0.14	-0.04	-0.01
Educ. Progress			-0.03	-0.08	0.09	-0.01
Standardized Total Effects - Estimates						
Cohesiveness	0.07					
Friction	-0.11	-0.30				
Competitiveness	-0.03	-0.03	0.26			
Difficulty	-0.03	-0.07	0.25	0.05		
Satisfaction	0.11	0.37	-0.46	0.03	-0.21	
Educ. Progress	-0.03	-0.08	0.14	-0.01	0.04	-0.19

In Figure 1 the five school climate subscales are presented within the rectangular boxes, together with gender and the outcome measure of educational progress. Arrows between the boxes show only the significant relationships between variables, with the values along each

line reflecting estimates of standardised direct effects. In addition, significant indirect effects are calculated by AMOS for each variable as presented in Table 5. Although these indirect effects contribute to the estimates of the standardised total effects shown in Table 5, for the most part they are less than 0.10 and very small. However, an exception to this general finding is Cohesiveness, which has an indirect effect on Satisfaction through Friction.

Results from the Figure 1 and Table 5 clearly indicate no significant direct relationship between gender and educational progress. However, gender is directly and significant related to Cohesiveness, Friction and Satisfaction, with girls more cohesive and more satisfied with school life than the boys but with the boys perceiving a higher level of friction than the girls. All of these relationships are small but positive. Educational progress is directly influenced by Satisfaction and Friction, with the value of the each path negative. However, Satisfaction and Friction are themselves mediated by other variables. There is a direct positive relationship between Cohesiveness and Satisfaction and Competitiveness and Satisfaction, with Cohesiveness also influencing Satisfaction through Competitiveness. More cohesive students are more satisfied with life at school as are those who are less competitive.

Satisfaction is also influenced by students' perceptions of Friction between themselves and by the difficulty of their schoolwork. Both of these paths are negative, suggesting that students who report higher levels of interpersonal conflict are less satisfied with school life, as are those who perceive their schoolwork to be more difficult. However, Friction is itself influenced negatively by Cohesiveness, with students expressing higher levels of cohesion reporting less Friction. In turn, Friction has a direct effect on Competitiveness, difficulty and Satisfaction. The path between Friction and Competitiveness is positive, indicating less cohesive students who perceive more friction also report higher levels of competitiveness. More competitive students are also more likely to perceive their schoolwork to be difficult. In addition there is a direct, positive path between Friction and Difficulty and a negative path between perceptions of Difficulty and Satisfaction, such that students who find their schoolwork difficult are more likely to perceive friction and be less happy at school. Conversely, students who perceive more friction have higher educational progress, although this relationship is very small.

Discussion

Moos (1979, p. 96) has suggested that "we need to focus on relationship, personal growth, and system maintenance and change dimensions in describing, comparing, evaluating, and changing educational settings". This study used the Relationship and Personal Development dimensions of Moos' (1974) theoretical framework to tap students' perceptions of life within their newly reformed coeducational school. In addition, educational progress was measured in all students in the school over four years. At T1 girls had been admitted to secondary level grades, but from T2 onwards girls were present and in increasing numbers at every Grade level. This study involved primary and secondary students from Grades 3 to 12 within the same school, so it was imperative to select measurement instruments that could cover the broad range of grades. As there was no one curriculum area studied by all students throughout the school, the *Word Knowledge* tests (Thorndike, 1973) were selected to give a general measure of educational progress. Not only have these tests been used for this purpose in international studies, but also the common items within the tests allowed for the construction of a single scale of educational progress across the school. Use of the MSI and SLEI and their common subscales of Cohesion, Competition, Difficulty, Friction and Satisfaction also facilitated an examination of the perceptions of students across all students in the school. It was important to study these perceptions over a sufficiently long period of time to allow for any initial "halo" effects to have attenuated.

Gender per se was not a significant factor in education progress in this study, suggesting that boys were not disadvantaged by the inclusion of girls in their classrooms. Equally, girls were not disadvantaged academically by entering classrooms that had been formerly and exclusively dominated by boys. Thus previous findings of boys being disadvantaged in single sex classrooms (Milligan & Thomson, 1992; Parker & Rennie, 1995; Forgasz & Leder, 1996; Gill, 1996; Rennie & Parker, 1997; Jackson & Smith, 2000) and advantaged in coeducational classrooms (Steinbeck & Gwizdala, 1995; Good *et al.*, 1999) were not substantiated. However, elements of the psychosocial climate of the learning environment in the school did play a significant role in determining educational progress, with student perceptions of Cohesiveness, Friction and Satisfaction in particular being gender related. Girls were more cohesive and satisfied but perceived less friction than boys.

Concepts of Cohesiveness, Satisfaction and Friction have their origin in Moos (1974) Relationship Dimension of the learning environment, defined as involvement, affiliation with others, and teacher support. In the path diagram presented in Figure 1, Satisfaction was influenced by Cohesiveness, Competitiveness, Friction and Difficulty and in turn was negatively related to Educational Progress. The negative relationship between Satisfaction and Progress was not unexpected, as previous analyses have shown satisfaction to decrease across the Grade levels (Xxxxx, 2001b). What is surprising are the interrelationships between Moos (1974) Relationship dimensions of Cohesion, Satisfaction and Friction and the Personal Development dimensions of Competitiveness and Difficulty. These two dimensions did not operate independently of each other. The meta-analysis conducted by Haertel *et al.*, (1981) showed that at the classroom level, student achievement was higher where there was greater Cohesiveness, Goal Direction and Satisfaction and less Disorganisation and Friction. It is clear from this study that the Relationship Dimensions of Cohesiveness, Friction and Satisfaction were also significant at the school level, but these variables interacted together and with the Personal Development dimensions of Competitiveness and Difficulty in a manner that has not been recognised previously. In particular, student perceptions of Friction seem to play a central role in mediating student progress. Friction was related directly to Educational Progress, but at the same time it was influenced by Cohesiveness and had an influence on Competitiveness, Difficulty and Satisfaction.

Directions for further studies

Structural equation modelling enabled gender differences in perceptions of school climate to be examined, using data pooled across a four-year period of school reform. The effects of time and cohort and grade level groupings which have not been considered in this analysis will be examined with Hierarchical Linear Modelling (Raudenbush, Bryk & Congdon, 2000) on completion of the fifth year of the study in October, 2003. Gender effects will also be investigated further with two simultaneous models in AMOS. Furthermore, this is a single study of one non-government fee-paying school during a period of institutional reform. While impressions of students at both primary and secondary school levels were captured over time, there is a need to replicate the study with a more representative sample to determine the extent to which the findings are generalisable. In particular it would be beneficial to determine the relationship between friction and educational progress in single sex and coeducational schools and classrooms.

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