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ABSTRACT

This paper describes a longitudinal study which followed a group of young women through high school and college. The purpose of this study was to determine the relationship between: (1) aspirations and achievement of young women; (2) the relative influence of high school and college on career choice in young women; and (3) the interactions between various kinds of high schools and colleges on young women's attitudes, aspirations, and achievements. Subjects were 56 ninth-grade school girls from co-educational and all-girls schools. The sample included members of minority groups as well as students on full or partial scholarship to these schools. Results suggest that after two years of conducting this study, there are no significant differences between adolescent females who attend all-girls schools and those at co-educational schools on the following measures: attitudes to gender issues; grades in mathematics, science and English; and overall academic average. The longitudinal study is intended to continue following these girls throughout the rest of their high school years to monitor their attitudes and aspirations through repeated administration of the survey and through yearly interviews. Contains 25 references. (SR)

Attitudes and Aspirations of Female Adolescents: A Longitudinal Study-in-Progress

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In the last twenty-five years, there has been a strong movement away from single-sex education to coeducation, both at the college and the secondary school level. Ironically, this came about at a time when research was just beginning to demonstrate a positive effect of single-sex education for women at the college level. Tidball (1973) showed that women's colleges were much more likely to produce women of achievement, especially in nontraditional fields like the sciences. Tidball and Kistiakowsky (1976) demonstrated that women who obtained doctorates in the biological and physical sciences were more likely to have graduated from women's colleges than from coeducational undergraduate institutions.

Much less research has been done on the effects of single-sex education at the secondary school level. Studies in Great Britain, Australia and Canada seem to indicate that girls in single-sex schools are less likely to view the sciences and calculus as "masculine" and more likely to enroll in these courses than girls at coeducational schools (Kahle, 1983). In the United States, Lee and Bryk (1986) compared girls attending coeducational Catholic schools to those at all-girls Catholic schools and found strong effects in favor of the single sex situation: girls at the all-girls schools were more positive about academics in general, expressed a greater interest in mathematics, showed greater achievement gains in science, and had higher educational aspirations than their peers at coeducational schools. Lee and Marks (1990) also showed that these same girls held less stereotyped views about the role of women in the workplace, which may lead these girls to choose more nontraditional careers.

At this time, most of the high schools that remain single-sex are either Catholic schools or independent college preparatory schools. (Since the passage of Title IX in 1972, single-sex public education has almost vanished;

two all-girls public high schools remain, in Philadelphia and Baltimore.) Since the 1970s, the pool of applicants for girls' independent schools has diminished, as many boys' schools have become coeducational, drawing off many of the girls who might have gone to girls' schools. At present, the remaining all-girls independent schools, in order to attract new applicants, are marketing their schools as places free from gender stereotyping, places that encourage girls to develop their full potentials (National Coalition of Girls' Schools, 1993; Harvard magazine, 1992). However, no one until now has tried to examine whether, like the women's colleges, the girls' high schools produce young women more likely to achieve higher educational goals, especially in nontraditional fields.

Research begun several years ago by the author compared the subsequent careers established by graduates of girls' independent schools to the careers of women graduates of similar schools that are coeducational (Shmurak, 1994). Career information was provided by the alumnae offices of thirteen independent schools in the northeastern United States. To the extent that these were available, the present careers of women graduates of the thirteen schools from the classes of 1960 through 1985 were examined. The number of women in each of ten fields were recorded for each class. The ten fields were: medicine, law, engineering, dentistry, veterinary medicine, finance, computers, scientific research, architecture and psychology. A total of 12,651 alumnae records were screened.

Statistical analysis revealed that graduates of coeducational schools were more likely than girls' school graduates to have careers in four fields: law, computers, scientific research and psychology. No significant differences were found among the other fields between girls' school and

coeducational alumnae. Surprisingly, in *none* of these ten fields did the graduates of the girls' schools have a proportionately larger number of women. Since this seems to contradict studies by other researchers that show positive effects of girls' schools, careful consideration of these results is in order.

One obvious difference between this study and those of Tidball (1973; 1976) is that those studies looked at the effects of women's vs. coeducational colleges, while the author's study looked at high schools. It may well be that the effect of college is much more significant to a woman's eventual career choice than any effects of the high school she attended. It has been shown (Tobias, 1990) that 40% of students who enter college planning to major in science change their minds by the end of freshman year; also women seem to change their minds about majoring in science more often and for different reasons than men (Ware & Steckler, 1983). Thus it may be that many of the girls' school graduates who had chosen nontraditional careers during high school, and who went on to coeducational colleges, became discouraged or disenchanted with their fields and changed to more traditional fields,

The studies that showed the empowering effect of girls' high schools (Lee & Bryk,1986; Lee & Marks, 1991) not only looked at a different population (Catholic girls' schools rather than independent schools), but also examined only attitudes and aspirations. No attempt was made in those studies to determine whether these young women actually *achieved* the careers to which they aspired in high school. Riordan (1990) has shown, in fact, that there are no differences in occupational attainment between the graduates of Catholic girls' schools and Catholic coeducational schools. Again, it may be possible that girls' schools instill in young women the desire to achieve in

nontraditional fields, but that desire is easily turned aside by the pressures of college and coeducation.

A longitudinal study, which follows a group of young women through high school and college and measures changes in their aspirations, attitudes and achievements as they proceed through their schooling, would provide valuable information about this problem. Such a study is the subject of this report.

The present study is designed to run for at least eight years, following a group of young women from the 9th grade through college, and perhaps beyond. Its purpose is to trace the development of the participants' thinking about school, career and women's roles while also tracking their grades, standardized test scores and college admission data. It is hoped that this study will help answer questions about the relationship between aspirations and achievement of young women and the relative influences of high school and college on career choice of young women.

Prominent educators (Goodlad, 1984; Fennema & Leder, 1990; Lee & Marks, 1991; Riordan 1990) have begun to question the wisdom of coeducation in public high schools and have urged empirical study of single-sex schooling once again. Lee and Marks (1991) have even suggested that the disappearance of single-sex schools may be detrimental to the achievement of gender equity. Recent publications such as the AAUW report (1992) and the Sadkers' latest book (1994) have fueled the argument for single-sex schools in the popular press. The previous study by this author did not support this argument; the present study takes the research several steps further and looks at questions that other studies have left unanswered: (1) the relationship between aspirations and achievements of young women, (2) the relative influences of

high school and college on achievement of young women, and (3) the interactions between various kinds of high schools and colleges on young women's attitudes, aspirations and achievements.

Methodology and Preliminary Results

The author received the cooperation of four independent schools in Connecticut, two that are coeducational and two that are all-girls schools. Within each school, a group of ninth grade girls were recruited to be part of the study . This sample of girls (25 from coeducational schools, 31 from girls' schools) includes members of minority groups (7 of the 56 girls are African-American and 2 are Latina), as well as students who are on full or partial scholarship to these schools. Thus the sample reflects some of the cultural and economic diversity that these schools attempt to achieve.

For purposes of anonymity, the four schools involved are referred to only by number. Two of the schools, #1 and #2, are girls' schools, while two of the schools, #3 and #4, are coeducational. For a similar reason, the study participants will be referred to by pseudonyms, names that they themselves chose.

Year One:

In the fall of 1992, all 9th grade girls in each of the four schools were administered questionnaires that included questions about school and career aspirations as well as a well-validated survey known as the Attitudes Towards Women Scale or AWS (Spence & Helmreich, 1979). In some schools, one or two 9th grade girls may have been omitted due to absence. By administering these

questionnaires early in the fall, it was hoped that any effects of the school itself would be minimized and the attitudes thus measured would represent the girls' opinions independent of the school they attended. Results of the AWS were tabulated and appear in Table 1, line 1; it can be seen that there were no significant differences among the initial attitudes of girls attending the different schools. (The maximum score on the AWS is 45, representing a consistently feminist viewpoint.)

Letters were sent to the parents of these girls from the administrators of the four schools, asking their cooperation in allowing their daughters to participate in the study. The response of the parents varied considerably from school to school: 85% of the parents at school #3 responded positively, while only 50% at school #1, 40% at school #2, and 33% at school #4. To some extent, this may have reflected the aggressiveness of the administrators in seeking the parents' cooperation. Thus a total of 56 girls became the subjects for this study. The AWS scores of these girls were compared across schools and again it was shown that they were not significantly different, either from each other or from the total group from which they were selected; see Table 1, line 2. (Only 55 AWS scores are shown because one of the participants in this study was absent on the day the AWS was administered at School #4.)

The SSAT scores, both verbal and mathematics, of the participants were obtained (with parents' permission) from the four schools, along with data as to race/ethnicity, wnether they were boarding or day students, and whether they were receiving full or partial financial aid. As Table 2 indicates, the average SSAT scores were remarkably consistent across the four schools; the range was about 270-330 in each school. (Nationally, SSAT scores run from 230 to 350; a score of 300 is equivalent to the 50th percentile of students taking the SSAT exam, for both the verbal and quantitative tests.) If the SSAT scores are a

valid measure of academic ability, this group of girls is well-matched across schools.

Table 1. Average Scores on AWS

	School #1	School #2	School #3	School #4	
Fall 1992 (All 9th gr.)	38.72 (30)	38.61 (41)	38.10 (20)	37.89 (23)	F=0.23
Fall 1992 (Study group)	38.60 (15)	38.94 (16)	37.76 (17)	38.00 (7)	F=0.21
May 1993 (Study group)	38.77 (15)	40.53 (16)	38.06 (17)	38.44 (8)	F=1.12

(For this size group, an F > 2.76 would be statistically significant)

Table 2. Average SSAT Scores

	School #1	School #2	School #3	School #4	
Verbal Score	304.1 (15)	305.8 (16)	305.8 (14)	307.8 (8)	F=0.10
Math Score	298.2 (15)	296.4 (16)	298.2 (14)	308.9 (8)	F= 1.11

(For this size group, an F > 2.76 would be statistically significant)

As to race/ethnicity, there are 7 African-American girls (1 from school #2, 5 from school #3, 1 from School #4) and 2 Hispanic girls (1 from school #1 and 1 from school #2), but surprisingly no Asian-American girls; perhaps the need for privacy within the Asian-American cultures kept those parents from allowing their daughters to participate in the study. It should be noted that the designation "Hispanic" is somewhat problematic here, since the two girls

are from rather wealthy families in Mexico and Colombia - not what is usually meant by the term. There are 30 boarders and 26 day students in the study, 5 students on full scholarship and 21 on partial scholarship.

In May of 1993, the investigator visited each of the four schools and conducted interviews with the girls; again, a few were missed due to absence. At this time, the subjects also chose pseudonyms and filled out the questionnaire a second time. Those that missed the interview sessions returned the questionnaires by mail. The majority of the interviews were taped, with the girls' permissions, and later transcribed. A few girls requested that they not be taped, so notes were taken during those interviews. In June 1993, the schools forwarded the final grades of the 56 girls and these were also tabulated.

Table 1, line 3, shows the May 1993 AWS scores for the girls in the study. In general, all of the scores have increased slightly, and there is still no statistically significant difference among the schools. Table 3 displays the grades of the subjects in science, mathematics, English and overall academic subjects. (Grades used were grades for the year, if the school recorded them that way. School #2 did not give year grades, so for school #2, second semester grades were used; thus they are not strictly comparable.) Again there are no statistically significant differences, although it may be worth noting that school #2 is consistently lower and school #4 consistently higher in almost every case. Given the similarity in SSAT scores of the girls in the study, one must wonder about differences in grading policies among the schools.

Table 3. Average Grades, June 1993

	School #1	School #2	School #3	School #4	
Science	7.00 (12)	6.93 (15)	6.23 (17)	8.50 (8)	F=1.62
Math	8.30 (15)	6.88 (16)	7.29 (17)	7.63 (8)	F=1.12
English	7.07 (15)	7.00 (16)	7.35 (17)	8.10 (8)	F=0.50
All Subjects	7.69 (15)	6.97 (16)	7.13 (17)	8.20 (8)	F=0.93

Grades were computed on a 12 point scale, where 12=A+, 11=A, 10=A-, 9=B+, 8=B, 7=B-, 6=C+, 5=C etc.

(For this size group, an F > 2.76 would be statistically significant)

Table 4. Correlation between Grades and SSATs

	School #1	School #2	School #3	School #4
SSAT-Verbal & English	0.50	0.28	0.55*	- 0.11
SSAT-Math & Math	0.23	0.58*	0.63*	0.77*

* These are statistically significant at the 0.05 level.

Table 4 shows the correlation, or lack thereof, between academic grades and SSAT scores at each of the four schools. Notice that in all but one case, the SSAT-math scores do correlate with achievement in mathematics courses, and the SSAT- verbal scores do not correlate with English grades. Given this, schools may want to consider the usefulness of requiring SSAT scores for

admission. A similar correlation done at school #2 ten years ago similarly found little predictive value in SSAT scores.

Findings from Interviews

The interviews required between 15 and 30 minutes per girl. Interview questions were based to a large extent on ideas put forth by Elizabeth Fox-Genovese (1993), in her AERA address, "What Do We Want for Our Daughters (and Sons)?" Fox-Genovese suggested that primary issues for girls include developing a sense of competence (as opposed to a need to please others), and finding mentors who hold high expectations for achievement. Several of the interview questions addressed these issues.

The primary impression that the investigator obtained from the interviews is that, despite well-publicized findings about lack of self-esteem in adolescent females(Brown & Gilligan 1992; AAUW, 1991), this is a remarkably self-confident and high-aspiring group of young women. After some preliminary questions about the school, each girl was asked what she had discovered she was good at during the year; this was an attempt to get Fox-Genovese's idea of developing a sense of competence. There was some initial hesitation - whether from simply needing time to consider a question that no one had ever asked of her before or from a hesitancy to "brag" - but every girl but one (Elizabeth II from school #2) was able to talk about something she had learned she was good at. For a high proportion of the girls at the coeducational schools (8 out of 17 and 7 out of 8), the answer was "sports." At the girls' schools, sports were mentioned with far less regularity (5 out of 15 at school #1 and 3 out of 16 at school #2). Of the academic subjects mentioned, the most frequently mentioned was mathematics (3 out of 15, 2 out of 16, 1 out

of 17, 4 out of 8); all other academic disciplines were mentioned at least once, with the exception of science *which was not mentioned by a single girl as something she had discovered she was good at!* It is interesting to speculate on the connection between this and the fact that in colleges today there are equal numbers of male and female mathematics majors, but there is still a significant gender gap in science majors. Girls who choose one of the sciences as a major in college usually have identified science as something they are good at by sophomore year in high school (Maple & Stage, 1991), so encouragement during the freshman year would seem to be vital.

Related to Fox-Genovese's idea of mentoring, the next question asked about teachers who were especially encouraging. In answer, girls mentioned advisors (especially in school #1, where more than half of the girls credited their advisor as the person who most encouraged them), coaches (2 or 3 mentions at each school), and teachers of all disciplines. Math teachers were mentioned by three or four students at every school. Here biology teachers *were* mentioned (5 times at school #1 and twice at school #4), but at schools #2 and #3, *not one girl mentioned a science teacher as encouraging.* It is interesting to note that these two schools gave lower science grades than the other two schools as well. Perhaps the science departments of these schools might consider what messages they are sending to their female students. Also note that the variable of coeducational vs. girls' school is not relevant here. At school #3, three out of the five African-American girls spoke of the Spanish teacher, whom they described as "inspiring," "strong-willed" and "perseverant"; the investigator concluded that this teacher, if she herself is African-American, is serving as a role model for these girls, and probably points up the importance of having minority faculty at these schools.

When asked what they had learned about themselves this year, many of the girls said they had learned that they were more capable than they thought and more independent. This was true at all four schools. Many said they had learned to speak up for themselves or simply to be themselves, but Anne and Jocelyn at school #3 mentioned they were speaking less than they had the year before, particularly in class, because they were concerned about being wrong or appearing stupid. Given the pervasiveness of girls' being silent in class in schools throughout the country, one has to wonder if this isn't a problem related to coeducation. It's interesting to note that when asked what they learned about themselves this year, more of the girls at the co-ed schools replied with negative things they had learned (8 positive and 7 negative responses at school #3, and 4 positive and 3 negative responses at school #4) than girls at girls' schools (16 positive and 2 negative responses at school #1, and 9 positive and 3 negative responses at school #2). Of course, some negative things are important to learn; for example, Kasmira at school #3 and Taylor at school #4 both had learned that they let people take advantage of them too much. Anna, at school #2, had learned that she was very competitive, "but that's not acceptable here." Many girls had personal insights about what was important to them. Kasmira, an African-American girl at school #3, whose mother is white and who had been raised in a white community, said that she had learned that she was black ("when I look in the mirror, I see a black girl") and that she was doing her best to learn about African-American history on her own.

When asked how this year had affected how they view their futures, the most common responses had to do with getting into a good college. In some cases, they had learned they'd have to work harder to get into a good college

than they had previously supposed, while others felt the year had put them far ahead of their friends in public schools. Other frequent responses were that they were less sure about what career they wanted - not a negative thing in most cases, merely an awakening to all the possibilites out there, and a broadening of outlook. Two of the girls at school #3, however, mentioned the narrowing of options: Kasmira has learned that "I won't make it as far as I thought because I'm not as smart as I thought" and Shelby said "the possibilities are closing down - I'm not good at science so I can't be doctor." Maria at school #2 started the year planning to major in engineering and become an architect; in May she was undecided about a major and thinking of teaching as a career. In all three cases, it is hard to say whether this is a premature foreclosure or simply the facing of facts. Maria got Bs in her math and science courses, Kasmira an A- in math but a C in science, and Shelby a B in math but a D in science.

Clearly adolescence is a time for trying on and discarding possible futures. Several of them had decided to be English or Spanish teachers on the basis of liking their present teacher. Anne, from school #1, even said that she might like to be an educational researcher as a result of her interview with me! Several girls at each school wanted to be psychologists - most often "because they help people with their problems." In comparing their career aspirations, as shown on their questionnaires, from fall to spring, some interesting changes appeared. Anne, at school #1 changed from a career as a psychologist to that of a "mother." At schools #1 and 2 there was one girl and at school #3 there were two girls who had gone from writing "undecided" as a career choice to "math" or "science" - this despite the alleged absence of encouraging science teachers at schools #2 and #3!

Some of the girls remained devoted to their aspirations to be doctors, despite extremely low grades in science and/or math. Of the two girls aspiring to be doctors at school #1, one took no science her freshman year and another received a D+; 2 of the 5 aspiring MDs at School #2 received a grade of C- in science, and one of the 3 aspiring MDs at school #3 got a D+ in math and a C in science - not one of these changed her mind as a result! Whether this is persistence or lack of realism is difficult to tell. The 14-15 year old perspective (or lack thereof) on the future is well-typified by Elizabeth at school #2 who said "I have my future all planned out... I'm going to go to UC- San Diego. From UC-San Diego, ...I'm going to go to Stanford Med... I'm going to become a cardiologist. I'm going to live in San Diego, and I'm going to have a practice, and I'm going to marry a guy with brown hair."

One other interesting aspect of career choice is what they said about their parents' careers. Many of the girls whose mothers worked outside the home could not explain what their mothers did; they were much more precise about their fathers' careers. Others said, "she doesn't do anything - she's just a mom." Some girls were proud of their professional mothers - accountants, lawyers, businesswomen - but the significant number who weren't really sure about their mother's working lives gave support to the importance of the idea of "taking your daughter to work" day.

Conclusions from Year One:

The preliminary results showed no significant differences between girls enrolled at the girls' schools and girls at the coeducational schools. Attitudes towards women's roles, career aspirations, academic ability and academic achievement were similar across all four schools. Some findings

were suggestive of differences between schools, but these did not necessarily parallel girls' school/coeducational school lines. Thus, the first year of the study made a good starting point from which to view subsequent changes.

Year Two:

Attrition:

One girl at school #1 returned to Mexico at the end of 1992-93; since she knew from the start that she was leaving, it is difficult to see why she volunteered for a four year study in the first place. One girl at school #3 also left at the end of 1992-93 after doing poorly academically. Another girl at school #3 missed her interview and did not return the questionnaire by mail; three others at school #3 missed their interviews but did return the survey through the mail. Several of the girls who have indicated that they will be abroad or at another school during 1994-95 have indicated willingness to return surveys in the mail in spring of 1995. At school #4, one girl joined the study who had not been part of it the previous year.

AWS scores:

In Year Two, there were still no significant differences among the schools in the girls' responses to the gender attitudes survey (AWS). Nonetheless, it is interesting to note that the scores at the coeducational schools have been increasing or staying the same, while those at the girls' schools have been decreasing or vacillating. The most common reason for girls' scores to decrease appears to be a tendency to go from a strong response (strongly agree or strongly disagree) to a weaker one (mildly agree or mildly

disagree) rather than switching entirely from an agree position to a disagree position or vice versa. The drop in scores may thus indicate an understanding of the complexity of some of these issues(i.e., not seeing things as either/or issues), rather than a reversal of values.

Table 5. Average Scores on AWS

	School #1	School #2	School #3	School #4	
Fall 1992	38.60 (15)	38.94 (16)	37.76 (17)	38.00 (7)	F=0.21
May 1993	38.77 (15)	40.53 (16)	38.06 (17)	38.44 (8)	F=1.12
May 1994	38.36 (14)	39.44 (16)	40.27 (15)	38.44 (9)	F=0.62

(For this size group, an F > 2.76 would be statistically significant)

Responses to one statement on the AWS were especially interesting. The statement, with which girls may agree or disagree, reads "Boys are naturally better at math than girls." At school #4, a coed school, every girl strongly disagreed. At school #1, a girls' school, two mildly disagreed, while the others strongly disagreed. At school #2, two girls mildly *agreed;* these two girls had previously disagreed with the statement - one strongly, the other mildly. Interestingly, neither of these girls had poor math grades themselves. (One had a B- freshman year and a B+ this year, the other a B+ as a freshman and B as a sophomore.) One wonders where they picked up this attitude, especially with no boys in their classes. At school #3, two girls also mildly agreed with the statement, one who had previously strongly disagreed, and

one who had previously mildly agreed; interestingly, both of these girls received an A- in math during their sophomore year, so they were among the strongest of the math students in this sample. How are they being made to feel this way?

Academic achievement:

Tables 6 and 7 display the grades of the students in science, mathematics, English and overall academic subjects for the past two years. (Grades used were grades for the year, if the school recorded them that way. School #2 did not give year grades, so for school #2, second semester grades were used; thus they are not strictly comparable.) Again there were no statistically significant differences, although it may be worth noting that for both years, school #2 gave consistently lower grades in math and science than the other schools. Only the very high English grades, and some high grades in foreign languages (not shown in the table), kept school #2 from being the lowest grading school two years in a row. School #4 again gave the highest grades overall of the four schools. As these girls were shown last year to be equal in SSAT scores across schools , discrepant grading policies are worthy of note. Would the same girl, going from school #2 to school #4, experience an overall increase in her grades?

Grades overall seem to have dropped considerably at school #1. In general, the tone of interviews (see below) at school #1 was somewhat less positive than the previous year; girls seem to feel that the work was harder and that teachers were less supportive than during freshman year. Whether the lower grades were the cause or the result of the more downbeat mood is

hard to say. School #3, similar to the previous year, seems to have grades somewhere in the middle or near the low end of the grades for these schools.

Table 6. Average Grades, Freshman Year (1993)

	School #1	School #2	School #3	School #4	
Science	7.00 (12)	6.93 (15)	6.23 (17)	8.50 (8)	F=1.62
Math	8.30 (15)	6.88 (16)	7.29 (17)	7.63 (8)	F=1.12
English	7.07 (15)	7.00 (16)	7.35 (17)	8.10 (8)	F=0.50
All Subjects	7.69 (15)	6.97 (16)	7.13 (17)	8.20 (8)	F=0.93

Grades were computed on a 12 point scale, where 12=A+, 11=A, 10=A-, 9=B+, 8=B, 7=B-, 6=C+, 5=C etc.

(For this size group, an F > 2.76 would be statistically significant)

Table 7. Average Grades, Sophomore Year (1994)

	School #1	School #2	School #3	School #4	
Science	7.25 (12)	6.50 (16)	7.06 (16)	7.22 (9)	F=0.31
Math	7.21 (14)	6.81 (16)	7.81 (16)	8.00 (9)	F=0.63
English	6.57 (14)	8.10 (16)	7.00 (16)	7.78 (9)	F=1.53
All Subjects	6.84 (14)	7.78 (16)	7.46 (16)	7.78 (9)	F=0.75

Grades were computed on a 12 point scale, where 12=A+, 11=A, 10=A-, 9=B+, 8=B, 7=B-, 6=C+, 5=C etc.

(For this size group, an F > 2.76 would be statistically significant)

Tables 8 and 9 show the correlation, or lack thereof, between academic grades and SSAT scores at each of the four schools. Notice that in the first year, in all but one case, the SSAT-math scores did correlate with achievement in mathematics courses, while in the second year this is so only at school #3. In the first year, the SSAT-verbal scores did not correlate with English grades, except at school #3; in the second year, school #1 shows a strong positive correlation and the other schools do not. It is possible that by junior year, there will be no correlation between SSAT scores and grades at any of the schools, again calling into question the usefulness of the SSATs as an admission criterion. It will be interesting to look next year at the correlation between SSATs and PSATs; this will probably be positive and statistically significant.

Table 8. Correlation between Freshman Grades and SSATs

	School #1	School #2	School #3	School #4
SSAT-Verbal & English	0.50	0.28	0.55*	- 0.11
SSAT-Math & Math	0.23	0.58*	0.63*	0.77*

* These are statistically significant at the 0.05 level.

Table 9. Correlation between Sophomore Grades and SSATs

	School #1	School #2	School #3	School #4
SSAT-Verbal & English	0.70*	0.12	0.37	- 0.10
SSAT-Math & Math	- 0.13	0.30	0.57*	- 0.11

* These are statistically significant at the 0.05 level.

It should also be mentioned that "science" and "math" do not mean exactly the same thing at all four schools. At school #1, 9 of the girls were taking chemistry, 2 biology, and 1 a lower level chemistry course. At school #2, 9 were taking biology, 3 chemistry, 3 a lower level chemistry course and 1 was taking marine biology. At school #3, all 15 girls were taking biology, some in an honors section. At school #4, 8 girls were taking chemistry, some in an honors section, and 1 was in biology. For simplicity, all of these courses were called "science", whereas in fact they are probably very different. Similarly, all math courses were treated simply as "math" although some girls were enrolled in algebra 2 (8 at school #1, 3 at school #2, 7 at school #3, 4 at school #4) and some were in geometry (6 at school #1, 12 at school #2, 8 at school #3, and 5 at school #4); no distinctions were made about honors sections here either.

College and career aspirations:

Some girls who had been previously undecided about majors in college made a (tentative?) decision in Year Two. At school #1, three previously undecided girls checked math, science or engineering; on the other hand, two who had previously checked math were now undecided. (These two received a C and a B respectively in their math courses.) Three who had previously checked science checked English, archeology, and undecided. The girls' decisions are not clearly related to grades in courses. Indeed, one of the girls who persistently checked science as a major both years received a D+ in science both years! At school #2, two girls also switched from undecided to math. At school #3, three girls switched from undecided to science or math and at school #4, two girls switched from undecided to math or science.

As for careers, again there were some interesting changes. At school #1, a girl previously planning to be a doctor wrote archeologist; she received a D in math and took no science her sophomore year. Another previously planning to be a doctor wrote "teacher or housewife"; she received Cs in both math and science sophomore year. A would-be biologist changed to a writer, despite an A- in math and a B in science. Still others persisted: one continued to want to be a veterinarian despite a C in science, and a former potential vet wanted to be a psychiatrist despite a D+ in science.

At school #2, a girl persisted in writing "doctor' as career choice despite a D in science in year two and a C+ the previous year. She did say, "I've always liked science, but I'm not doing well at it at this school." Still another maintained that she wants to be a cardiologist despite a D- in science this year and a C- last year. One girl previously undecided started thinking of being an accountant, and another who was planning to teach wrote architect as her choice. Unlike school #1, however, there did not seem to be girls giving up on their nontraditional careers at school #2.

At school #3, a girl who wanted to be a doctor changed to UN official; she was very explicit about this being the result of her poor grades in math and science (C+ in both). The fact that both of her parents are physicians may make her more realistic than some of her classmates. One girl, previously undecided, selected science or medicine as a career; here an A- in science and a B+ in math, both improvements over last year's grades, may have been influential. Among the "persisters," were a would-be zoologist, a pediatrician and a marine biologist, whose grades in math and science ran the gamut from C to A-.

At school #4, two girls previously planning to be lawyers were considering careers in medicine (they received a B or B+ in science and an A- or B+ in math). Another girl, previously undecided, wrote doctor as her career choice; she received an A- and B+ in science and math during year one, but Bs in both during year two. Interestingly, no student at school #4 wrote "undecided" as a career choice.

Overall, there do not seem to be significant differences in college or career aspirations related to type of school. A complete listing of career choices appears in Table 10.

Findings from interviews :

Interview questions have been based on the work of Brown and Gilligan (1992), Fox-Genovese (1993), Gilligan *et al.* (1989), Josselson (1983), Tangri (1975), and Zweigenhaft & Domhoff (1991). Questions concerning a developing sense of competence, loss or finding of voice, development of identity, and roles of parents and teachers were included. The first question, designed as an ice-breaker, was, "Has it been a good year for you?" Overwhelmingly, the answer was "yes." At school #1, however, a significant number of girls replied that it had not. An incident involving stealing, disciplinary action related to drugs, and a recent election seemed to be casting a pall; moreover, the greater difficulty of courses was mentioned several times.

Whether the answer given was yes or no, at all schools the reasons given were similar: friends, academics and sports. Friends were mentioned by 3 girls at school #1, 8 girls at school #2, 5 girls at school #3, and 5 girls at school #4. Academics (for good or ill) were mentioned by 7 girls at

Table 10. Career choices, June 1994

	School #1	School #2	School #3	School #4
Undecided	6	3	5	0
Doctor	2	5	2	3
Scientist	0	1	3	0
Housewife	1	1	0	1
Diplomat	0	2	1	0
Accountant	0	1	1	0
Architect	0	1	0	1
Actress	0	2	0	0
Advertising	0	0	1	0
Archeologist	1	0	0	0
Business mgr	1	0	0	0
Coach	0	0	0	1
Designer	0	0	1	0
Lawyer	0	0	0	1
Magazine	0	0	0	1
Politician	1	0	0	0
Psychologist	0	0	0	1
Real estate	0	0	1	0
Veterinarian	1	0	0	0
Writer	1	0	0	0

school #1, 9 girls at school #2, 7 girls at school #3 and 3 girls at school #4. Sports were mentioned by 2 girls at school #1, 4 girls at school #2, 6 girls at school #3 and 3 girls at school #4. Only one girl, at school #2, mentioned having a boyfriend as a reason for the year to be a good one.

The second question, repeated from the year before, was "What have you found that you are good at?" This question concerns a developing sense of competence, as suggested by Fox-Genovese (1993). Many girls responded with a sport; unlike last year, sports were almost as likely to be mentioned at the girls' schools as at the coed schools. Four girls at school #1, 4 girls at school #2, 6 girls at school #3 and 3 girls at school #4 mentioned a sport as the thing they had discovered they were good at. Additionally, dance was mentioned by girls at all schools except #3. Among the academic subjects mentioned, math was named at all schools except #2 (last year, math was mentioned at school #2). History was mentioned only at the coed schools. Science was mentioned at school #4 only. (Last year science was not mentioned at any of the schools.) English and art were mentioned at school #2 only. Acting was mentioned at schools #2 and #3, and singing at school #1 and #3. Being good with people was mentioned by girls at schools #1 and #4.

Related to Fox-Genovese's idea of mentoring, the next question asked was about teachers who were especially encouraging. In answer, several girls mentioned their chemistry teacher at schools #1, #2 and #4. (Last year, the biology teacher at schools #1 and #4 were also mentioned, though not at school #2.) On the other hand, at school #3, the teacher of the honors biology section was mentioned by several girls this year as being especially *discouraging*. This appears to be a male teacher whom the girls find very intimidating and sarcastic. To quote one of them, "He makes you feel dumb."

Math teachers were mentioned as encouraging at every school except #1; last year they were mentioned at every school. Teachers of English and history were mentioned at every school at least once. Teachers of French and Spanish were named at schools #2 and #4. (Last year the Spanish teacher at school #3 was mentioned a lot; she was not mentioned this year.) Advisors were mentioned at every school except #4, and coaches were mentioned at schools #1 and #3.

When asked whether they speak out when they feel strongly about something, girls were divided almost 50/50 at each school except #2, where twice as many said they speak out as said they "hold it in." At every school, those that "hold in" worry about hurting others' feelings or being thought badly of by their peers. This is consistent with the findings of Brown & Gilligan (1992). When asked about participating in class, however, the majority of the girls indicated that they did, unless there was a teacher who made them uncomfortable. The presence of boys was not mentioned as a reason for being quiet at the coeducational schools.

Conclusions Thus Far:

As of June 1994, there are still no significant differences between the adolescent females who attend all-girls schools and those at coeducational schools on the following measures: attitudes to gender issues, grades in mathematics, science and English, and overall academic average. Interview data indicates that *at all four schools:* (1) girls define the year's success in terms of friends, academics and sports, with a little more emphasis on academics at the girls' schools and a little more emphasis on sports at the coed schools; (2) girls develop a sense of competence based largely on academic

success and judgments of adults; (3) girls feel encouraged by teachers in all fields, including mathematics and science, especially if the teacher is female; (4) about half of the girls tend not to speak out about their negative feelings for fear of hurting others' feelings; (5) a majority of girls feel that they participate actively in class; (6) a majority of the girls aspire to "nontraditional" careers.

At each of the schools, there are girls who see themselves headed for careers in science and medicine whose grades in math/science reinforce those aspirations, as well as those who persist in their desire for careers in medicine despite poor grades in math/science. These aspirations seem largely unrelated to parents' careers; in fact, the only girl who has given up on a medical career because of poor math/science grades is the daughter of two physicians, although, of course, this may mean that she has a more realistic view of what it takes to get into medical school. Only one of the African-American students seems to be struggling with issues of racial identity, but the fact that the interviewer is white may affect their willingness to mention this issue.

The longitudinal study will continue to follow these 54 adolescent girls throughout the rest of their high school years, looking at their achievements in terms of GPA, SAT and other standardized test scores, and college acceptances, and monitoring their attitudes and aspirations through repeated administration of the survey and through yearly interviews. Thus the effects of going to a coeducational vs. a girls' high school on an adolescent girl's attitudes, aspirations and achievements will be charted over the four year time span. A strong effort will be made to retain the young women in the study as

they move into college, and thus the effects of the high school/college transition on their attitudes and aspirations will also be studied. It is hoped that, through the personal rapport developed in the interviews, the retention rate will be high and the study can follow the majority of the young women over their eight years of secondary and post-secondary schooling.

References:

AAUW (1991). *Shortchanging girls, shortchanging America.* Washington,DC: American Association of University Women.

AAUW (1992). *How schools shortchange girls.* Washingon, D.C.: American Association of University Women.

Brown, L.M. & Gilligan, C. (1992). *Meeting at the crossroads: women's psychology and girls' development.* Cambridge, MA: Harvard University Press.

Fennema, E. & Leder, G.C. (1990). *Mathematics and gender.* New York: Teachers College Press.

Fox-Genovese, E. (1993). What do we want for our daughters (and sons)? Paper presented at annual meeting of American Educational Research Association, Atlanta, GA.

Gilligan, C. Lyons, N.P. & Hammer, T.J. (1989) *Making connections: the relational worlds of adolescent girls at Emma Willard School.* Cambridge,MA: Harvard University Press.

Goodlad, J. (1984) . *A place called school.* New York: McGraw-Hill.

Harvard Magazine (1992). Advertisement for Emma Willard School, back cover, November/December 1992.

Josselson, R. (1983). *Finding herself: pathways to identity development in women.* San Francisco: Jossey-Bass.

Kahle, J. (1984). The disadvantaged majority: science education for women. AETS Outstanding Paper. Burlington, NC: Carolina Biological.

Lee, V.E. & Bryk, A.S. (1986). Effects of single-sex secondary schools on student achievement and attitudes. *Journal of Educational Psychology* , 76(5), 381-395.

Lee, V.E. & Marks, H.M. (1990). Sustained effects of the single-sex secondary school experience on attitudes, behaviors and values in college. *Journal of Educational Psychology*, 82(3), 578-592.

Lee, V.E. & Marks, H.M. (1991) Who goes where? Choice of single-sex and coeducational independent secondary schools. *Sociology of Education* 65(3), 226-253.

Maple, S.A. & Stage, F.K. (1991). Influences on choice of mathematics/science major by gender and ethnicity. *American Educational Research Journal*, 28(19), 37-60.

National Coalition of Girls' Schools. (1993). *What every girl in school needs to know.* Concord, MA: National Coalition of Girls' Schools.

Riordan, C. (1990) *Girls and boys in school: together or separate?* New York: Teachers College Press.

Sadker, M.P. & Sadker, D.M. (1994) *Failing at fairness: how America's schools cheat girls.* New York: Scribners.

Shmurak, C. (1994). Girls' high schools - How empowering have they been? *The High School Journal*, 78(1), 1-12.

Spence, J.T. & Helmreich, R.L. (1979) *Masculinity and femininity: their psychological dimensions, correlates and antecedents.* Austin, TX: University of Texas Press.

Tangri, S.S. (1975) Determinants of occupational role innovation among college women, in Mednick, M.T.S., Tangri, S.S. & Hoffman, L.W., (eds.) *Women and achievement.* New York: John Wiley.

Tidball, M.E. (1973). Perspective on academic women and affirmative action. *Educational Record*, 54, 130-135.

Tidball, M.E. & Kistiakowsky, V. (1976) Baccalaureate origins of American scientists and scholars. *Science*, 193, 646-652.

Tobias, S. (1990). *They're not dumb, they're different; stalking the second tier.* Tucson, AZ: Research Corporation.

Ware, N. & Steckler, N. (1983). Choosing a science major: the experience of women and men. *Women's Studies Quarterly*, 11(2), 12-15.

Zweigenhaft, R.L. & Domhoff, G.W. (1991) *Blacks in the white establishment: a study of race and class in America.* New Haven: Yale University Press.