Gender and Achievement-Related Choices Among Gifted Youth

Corinne Alfeld-Liro and Jacquelynne Eccles

University of Michigan

Paper presented at the 12th World Conference of the Council for Gifted and Talented Children, July 29-August 3, 1997, Seattle, Washington (USA).

Research reported here was sponsored by a grant from the National Institute for Child Health and Human Development to J. Eccles. The authors would like to thank Rena Harold, Alan Wigfield, Carol Freedman-Doan, Phyllis Blumenfeld, Kwang Suk Yoon, Amy Arbreton, Rob Roeser, Lisa Colarossi, Cleanthe Mollasis, Jennifer Abraham, Dana Fuller Johnston, Jennifer Fredricks, and all of the school personnel and families contributing to the Childhood And Beyond (CAB) Study at the University of Michigan.
Correspondence may be addressed to alfeld@umich.edu or jeccles@umich.edu.
This paper will be revised and submitted for publication; **please do not cite this draft without permission.**

DRAFT

Despite recent efforts to increase the participation of women in advanced educational training and high status professional fields, women are still underrepresented in many fields, particularly those associated with technology, physics and applied mathematics. The fact that gifted women are underrepresented in these fields is especially worrisome since these women clearly have sufficient intellectual talent to participate as fully as their male peers in these educational and vocational settings. Jacquelynne Eccles and her colleagues have developed a model of achievement-related choices that can account for this phenomenon (Eccles, Adler, Futterman, Goff, Kaczala, Meece, and Midgley, 1983; Meece et al., 1982). We will first give you a brief overview of the social and psychological factors that determine such choices in Eccles' model. We will then discuss some of our most recent findings concerning gender differences among gifted and non-gifted youth.

A Model of Achievement-Related Choices

Eccles' model focuses on the motivational and social factors influencing such long and short range achievement goals and behaviors as career aspirations, vocational and avocational choices, course selections, persistence on difficult tasks, and the allocation of effort across various achievement-related activities. Given the striking differences in the educational and vocational patterns of intellectually able, as well as gifted, males and females, we have been particularly interested in the motivational factors underlying both males' and females' educational and vocational decisions. Frustrated with the number of seemingly disconnected theories proliferating to explain sex differences in these achievement patterns, Eccles developed a comprehensive theoretical framework to guide her research endeavors. Drawing upon the theoretical and empirical work associated with decision-making, achievement theory, and attribution theory (see Atkinson, 1964, Crandall, 1969, and Weiner, 1974), she has elaborated a model of achievement-related choices.

This model (see Figure 1) links educational, vocational, and other achievement-related choices most directly to two sets of beliefs: the individual's expectations for success and the importance or value the individual attaches to the various options perceived by the individual as available. The model also specifies the relation of these beliefs to cultural norms, experiences, aptitudes, and to those personal beliefs and attitudes that are commonly assumed to be associated with achievement-related activities by researchers in this field (Eccles et al., 1983). In particular, the model links achievement-related beliefs, outcomes, and goals to causal attributional patterns, to the input of socializers (primarily parents and teachers), to gender-role beliefs, to self perceptions and self concept, and to one's perceptions of the task itself. Each of these factors are assumed to influence both the expectations one holds for future success and the subjective value one attaches to various options. These expectations and values, in turn, are assumed to influence *choice* among these options.

For example, let us consider course enrollment decisions. The model predicts that people will be most likely to enroll in courses that they think they will do well in and for which they have high task value. Expectations for success depend on the confidence the individual has in his or her intellectual abilities and on the individual's estimations of the difficulty of the course. These beliefs have been shaped over time by the individual's experiences with the subject matter and by the individual's subjective interpretation of those experiences (for example, does the person think that her or his successes are a consequence of high ability or lots of hard work?). The value of a particular course is also influenced by several factors including the following: Does the person like doing the subject material?; Is the course seen as instrumental in meeting one of the individual's long or short range goals?; Have the individual's parents or counselors insisted that the course be taken or, conversely, have other people tried to discourage the individual from taking the course?; Is the person afraid of the material to be covered in the course?

Three features of Eccles' model are particularly important for understanding both sex differences and individual differences in the educational and vocational decisions of gifted individuals: The first of these is the focus on achievement-related choices as the outcome of interest. We believe that individuals continually make choices, both consciously and nonconsciously, regarding how they will spend their time and their efforts. Many of the most significant sex differences, as well as individual differences, among the gifted, for example in vocational aspirations, occur on achievement-related behaviors that involve the element of choice, even if the outcome of that choice is heavily influenced by socialization pressures and cultural norms. Conceptualizing sex differences in achievement patterns in terms of choice takes one beyond the question of "Why aren't gifted women more like gifted men?" to the question "Why do gifted women and men make the choices they do?". Asking this latter question, in turn, legitimizes the choices both gifted men and women make and suggests several new variables as possible mediators of the sex differences we observe in gifted individuals' achievement patterns. By legitimizing the choices of both men and women, it allows us to look at the sex differences from a choice perspective rather than a deficit perspective.

Conceptualizing sex differences in achievement-related behaviors in terms of choice highlights a second important component of our perspective; namely, the issue of what becomes a part of an individual's field of possible choices. Although individuals do choose from among several options, often they do not actively consider the full range of objectively available options in making their selections. Many options are never considered because the individual is unaware of their existence. Other options are not seriously considered because the individual has inaccurate information regarding either the option itself or his or her possibility of achieving the option. Still other options may not be seriously considered because they do not fit in well with the individual's gender-role schema.

The third important feature of this perspective is the explicit assumption that achievement-related decisions are made within the context of a complex social reality that presents each individual with a wide variety of choices; each of which has both long range and immediate consequences. Furthermore, the choice is often between two or more positive options or between two or more options that each have both positive and negative components. For example, the decision to enroll in a physics course is typically made in the context of other important decisions such as whether to take advanced English or a second foreign language, whether to take a course with one's best friend or not, whether it's more important to spend one's senior year working hard or having fun, etc. Too often theorists have focused attention on the reasons why gifted, capable women do not select the high status achievement options and have failed to ask why they select the options they do. This approach implicitly assumes that complex choices, such as career and course selection, are made in isolation of one another when in fact they are not.

The Childhood and Beyond Study

It is impossible in this short paper to go into detail about each of the components of the model and the evidence Eccles has found to support it. We would like to focus on just the expectancy and value components, examining their effects on achievement-related choices using some of our most recent data. These data come from one of Eccles' large, longitudinal studies, called "Childhood and Beyond." The study began in 1986 with 3 cohorts of children in kindergarten, first, and third grades in Southeastern Michigan. (See Figure 2 for a visual representation of the study's design). Eccles has been following the children and their families for over ten years now, collecting information on achievement, activity choice, peer and sibling influence, family dynamics, classroom characteristics, social support, and psychological variables with questionnaires completed by children, parents, and teachers.

Current Findings

In this paper, we attempt to document the motivational and psychological determinants, from childhood through adolescence, of the choice to take Advanced Placement (AP) courses in chemistry, physics, and calculus in high school. We pay special attention to possible gender differences among a subsample of 96 children identified as gifted in elementary school, and we compare the findings to the non-gifted participants in our study.

We have excluded AP biology for several reasons. First, Eccles has found that young women are motivated to pursue occupations in the health and life sciences because they value the human-oriented aspects of these fields (Eccles, Barber, Updegraff, & Wigfield, 1997; Jozefowicz, Eccles & Barber, 1994). Second, other studies have shown no gender differences in coursetaking or achievement in biology (Lee, Burkam, & Smerdon, 1997). We focus our paper, therefore, on AP coursetaking in mathematics and the physical sciences.

We have good news and bad news to report. The bad news is that we cannot focus the rest of the paper on the topic with which it was introduced: gender differences among the gifted in math and science. The good news, we are happy to report, is that it is because there are no gender differences in motivational patterns or coursetaking in mathematics and physical science among our sample of gifted students. We would like to point out a couple of caveats before explaining what we mean: First, this sample is demographically advantaged, in terms of their race, class, and school quality. They are mostly white and from middle- to upper-middle class communities. It could be that gender differences have generally decreased in this segment of the population, whereas gender differences may still exist among less advantaged gifted youth. Second, 96 students is a relatively small sample size compared to the 400-800 non-gifted students we are also analyzing. Thus, gender differences in the gifted sample have to be very large for them to reach significance. However, we have examined effect sizes in the gifted and non-gifted samples to get around the problem of differences in sample size.

That being said, it is important to note that Eccles' model was designed to study both individual and group differences in achievement. Consequently, on the one hand, according to her model, if there are no gender differences in expectancies and values, then there should be no differences in coursetaking (a choice about achievement behavior), and this is what we found. On the other hand, individual differences within gender in expectancies and values should predict individual differences within gender in coursetaking. This is also what we found.

What is the evidence for our claim that gender differences in achievement patterns may no longer exist, at least through the high school years, among gifted students? As Table 1 shows, gifted girls and boys are equally likely to have already taken or have plans to take Advanced Placement courses in chemistry, physics, and calculus. There are very slight differences here that in a larger sample may show up as significant, but overall the pattern for both sexes is strikingly similar. In our sample as a whole, we find that it is giftedness, not gender, that predicts AP coursetaking in these subjects. Similarly, among the gifted subsample, gender is not related to AP coursetaking in chemistry, physics, or calculus.

Mean Differences

While there are no gender differences in achievement behavior, let us examine findings regarding motivation over time among gifted and non-gifted girls and boys. In this analysis, Eccles' "expectations for success" construct is measured using questions about the individual's self-concept of ability in certain subjects. (The items of all the scales we are using are listed in the Appendix.) We will first examine mean differences (see Figure 3). We find that for the gifted students math self-concept of ability increases over time, peaking in early adolescence, whereas for the non-gifted students math self-concept of ability decreases steadily over time. In the last two waves of data, therefore, the differences between gifted and non-gifted students in math self-concept of ability become significant.

In the gifted subsample only (bottom of Figure 3), we see that gifted boys consistently report higher self-concepts of ability in math than gifted girls. However, these differences only reach significance in waves 3 and 4, around late childhood and early adolescence. By secondary school, gifted boys and girls are looking very similar in their self-concept of ability for math. This pattern is the same for non-gifted students. Thus, we see very few instances of gender differences in expectations for success, and the few differences that do exist fade out by early adolescence.

What about values? This construct measures several types of value specified in Eccles' model: utility value, attainment value, and intrinsic value for specific subjects. Figure 5 shows that among both gifted and non-gifted students, math value declines steadily, and alarmingly, from childhood through adolescence. Examining just the gifted students, we see the same pattern that was evident in the expectancies: gifted boys value math significantly more than do gifted girls, but only in the middle waves. By secondary school, although value for math is very low among both sexes, gifted boys and gifted girls have fairly equal levels.

Expectancies and Values as Predictors of AP Coursetaking

Now let us look at whether expectancies and values play different roles in predicting AP coursetaking in chemistry, physics, and calculus for gifted girls and boys. We'll begin with chemistry (see Figure 6). Here we see similar patterns among gifted girls and boys. For both sexes, neither self-concept of ability nor value for math play a significant role in determining coursetaking in AP chemistry until secondary. Therefore, early motivation does not make a difference for taking AP chemistry; rather it is the later, secondary school measures of expectancies and values that are critical. The patterns are similar in the non-gifted sample, except that math self-concept of ability begins to make a difference a little bit earlier, in wave 4. The results for AP coursetaking in physics and calculus (see Figures 7 and 8) are similar to those for AP coursetaking in chemistry. For both gifted and non-gifted boys and girls, neither math self-concept of ability nor math value matter until the last wave.

Although we do not find gender differences in motivation or achievement-related choices, the findings that we do have support Eccles' model in terms of motivational constructs being significant predictors of AP coursetaking. The new information is that expectations for success and values do not matter until secondary school, and they do not differ by gender. It is interesting to note that the effect sizes in the gifted sample are twice as large as those in the non-gifted sample when these motivational factors begin to make a difference. That is, Eccles' model works especially well to predict individual differences in AP coursetaking among the gifted students. Self-concept of ability in math and math value are more important predictors of achievement behavior for gifted than for non-gifted adolescents.

What Can Account for Gender Differences Later On?

We were puzzled with the lack of gender differences in AP coursetaking plans and motivation, when we know from other studies that girls are less likely to continue their educational or occupational trajectories in physical science and engineering in adulthood, even though they may have the ability to do so. We looked at some of the items in our survey that asked about the likelihood that the student would enter each type of occupational field. We focused on science- and math-related fields in this analysis and found that among the non-gifted students, gender did affect student-rated likelihood of entering math-and science-related occupations, with boys more likely to do so. In contrast, among the gifted students, being male or female did *not* affect plans to enter these fields, even when referring to fields that require a doctorate. Thus, we can rule out the possibility that gifted girls and boys have different occupational plans in high school, which would account for different achievement patterns later.

Is there anything at the high school level that can be making the difference for gifted girls' future achievement trajectories? We decided to examine differences in educational aspirations and expectations, desire to get married, and desire to have children. (see Figure 9) Educational aspirations are desired levels of attainment, whereas educational expectations are realistic estimates of likely attainment. Here, the significant gender differences are among the non-gifted students, with girls having higher educational aspirations and expectations than boys. The gifted students have plans to continue their education further than non-gifted students, and there are no significant gender differences.

Examining family plans (bottom of Figure 9), the significant gender differences are again among the non-gifted students. Interestingly, non-gifted boys have the greatest desire to get married of all the groups, and the gifted girls are the least likely to think they actually will get married (not shown on graph). However, the non-gifted girls have the greatest desire to have children and are the most likely to think they will have them. Future educational and family plans do *not* differentiate gifted boys and girls.

Psychological/Mental Health Differences

We then decided to look at some psychological factors in order to find out if they were making a difference. We examined self-esteem, depression, self-efficacy, and academic anxiety across the last two waves of data collection, when the students were in secondary school. To clarify, self-efficacy here is a general feeling of ability to cope with life's difficulties, as opposed to the self-concept of ability scale for academic subjects that I discussed earlier. Figure 10 shows that the largest gender differences are among the gifted students, with gifted boys having significantly higher self-esteem than gifted girls at both of the secondary school waves. Although boys have higher self-esteem than girls in the non-gifted sample as well, the difference is not significant.

Looking at depression we find the same pattern, with the significant gender differences occurring among gifted but not non-gifted students. Gifted girls have significantly higher levels of depression than gifted boys. Interestingly, *non-gifted* boys tend to have significantly higher levels of depression than *gifted* boys, meaning that gifted boys are the least depressed of all the groups. Gifted boys also exhibit higher levels of self-efficacy (see Figure 11) than non-gifted boys, although there were no significant gender differences in self-efficacy among the gifted or non-gifted at either wave. Finally, girls exhibit higher levels of academic anxiety, which includes worrying about making mistakes and being nervous when taking tests, than boys among the gifted and the non-gifted samples at both waves. While these gender differences among the gifted are worrisome, they are not affecting AP coursetaking plans in high school. It is interesting that in these analyses, the gender differences that we are finding are among the gifted, but not the non-gifted students. The pattern we are seeing is that boys in general have better psychological profiles than girls, as has been found in other studies of adolescence, but gifted boys in our sample are doing especially well while gifted girls seem to be faring the most poorly of all the groups.

Psychological Variables as Predictors of AP Coursetaking

Do these psychological factors play a role in AP coursetaking plans in math and science? For gifted girls (see Figure 12), low anxiety at wave 6 and high self-efficacy at wave 6 predict taking AP chemistry. None of the psychological factors predicts taking AP physics, but oddly enough, it is *low* self-efficacy at waves 5 and 6 that predict taking AP calculus among gifted girls! Perhaps gifted girls who already have high global self-efficacy feel that they don't need to take AP calculus. Perhaps they are choosing other courses; perhaps they do not feel as obligated to remain in the advanced track they have always been on. For gifted boys (see Figure 13), depression at wave 6 negatively predicts taking AP chemistry, high self-efficacy and low anxiety at wave 6 predict taking AP physics, and high self-efficacy at wave 6 predicts taking AP calculus.

There doesn't seem to be any consistent pattern to these gender differences in which psychological factors predict AP coursetaking, although it is clearly different factors that predict taking the different courses for gifted girls and boys. The only consistent finding is that it is mostly the wave 6 levels of the variable that are making a difference, not wave 5. AP coursetaking plans were also measured at wave 6; there seems to be evidence here that current, not previous, levels of self-esteem, depression, self-efficacy, and anxiety are what makes a difference for AP coursetaking plans in physical sciences and mathematics. However, despite different psychological profiles among gifted girls and boys, they are still taking AP chemistry, physics, and math in equal numbers. It will be important to keep studying these girls to see what effects, if any, these psychological variables have on their achievement behavior after high school. These psychological vulnerabilities may put them at risk in college if their grades in math and science drop.

Conclusion

In sum, although we are all concerned about the low rate at which gifted girls and women continue in math and science, we must begin to look more carefully at post-high school variables that make the difference. Our longitudinal data from the past 10 years shows that gifted girls and boys look very similar through childhood and into adolescence, particularly in terms of motivation and actual AP coursetaking behaviors, but also in terms of future educational, occupational, and family plans. We have some evidence that psychological factors may be negatively affecting gifted girls, but we don't yet have data from the participants as they go through college to determine just what kind of an impact they may have, or if they have any impact, on educational and occupational plans in mathematics and physical science. We do plan to continue collecting data from our participants as they make the transition to college and as they continue to make educational and occupational decisions in college and beyond. We look forward to being able to share findings on these gifted youth in our sample at future meetings.

Statistical Note:

The attached graphs were created for ease of presentation in a symposium setting, but tables of results can be provided to individual participants upon request.

All statistical tests were analyses of covariance (ANCOVA, with grade level used as a covariate), t-tests, or non-parametric tests.

Effect sizes were compared across subsamples with the eta^2 statistic printed in the ANCOVA results in order to ensure that the small sample size of the gifted students did not interfere with results or interpretation. Differences were reported as significant at the $p < .05$ level.

Appendix

Scale Items and Reliabilities

Math Self-Concept of Ability Items (alphas for each wave range from .62-.92)
How good at math are you? (1=not very good, 7=very good)
If you were to list all the students from best to worst in math, where are you? (1=one of the worst, 7=one of the best)
Compared to other subjects how good are you at math? (1=a lot worse, 7=a lot better)
How well do you expect to do at math this year? (1=not well, 7=very well)
How good would you be at learning something new in math? (1=not very good, 7=very good)
How upset would you be if you got a low mark in math? (1=not at all upset, 7=very upset) [this last item asked only at waves 3 and 4]

Math Value Items (alphas for each wave range from .65-.89)
How useful is what you learn in math? (1=not useful, 7=very useful) [did not ask at w3]
Compared to other subjects, how useful is math? (1=not as useful, 7=very useful)
For me, being good in math is (1=unimportant, 7=important)
Compared to other activities how important is it to be good at math? (1=unimpt, 7=impt)
I find working on math assignments to be (1=boring, 2=interesting)
How much do you like math? (1=a little, 7=a lot)
Compared to other subjects, how much do you like math? (1=not as much, 7=a lot more)
How often do you wish you were doing something else when you do math? (1=never, 7=almost every day) [this last item asked only at wave 5]

Self-Esteem (Harter, 1982) (alphas are w5=.78, w6=.77)
[For each question, mark which is more like you. On left side, 1=really true of me, 2=sort of true of me. On right side, 3=sort of true of me, 4=really true of me.]
Some kids feel they would like to change a lot of things about themselves but others would like to stay the same.
Some kids are happy being the way they are, but some kids wish they were different (R).
Some kids aren't very happy with the way they do things but others think the way they do things is fine.
Some kids are sure of themselves but other kids are not very sure of themselves (R).
Some kids feel good about the way they act but other kids wish they acted differently (R).
Some kids are sure that what they do is right but some kids aren't so sure whether or not they are doing the right thing (R).
Some kids think they are not a very good person but others are pretty sure they are a good person.

Depression (Derogatis, 1983) (alphas are w5=.90, w6=.89)
[During the last month (including today) how often have you: (1=almost never, 7=almost always)]
Felt so angry you wanted to smash or break something?
Felt hopeless?
Felt that you couldn't control your temper?
Felt like you don't care anymore?
Felt very sad?
Felt depressed?
Felt so upset you wanted to hit or hurt someone?
Had thoughts of ending your life?
Felt really unhappy because it seemed like nobody wanted you as a friend?

Self-Efficacy (alphas are w5=.76, w6=.87)
[How often are you: (1=almost never, 2=almost always)]
Very good at figuring out problems and planning how to solve them?
Very good at carrying out the plans you make for solving problems?
Very good at bouncing back quickly from bad experiences?
Very good at learning from your mistakes?

Academic Anxiety (alphas are w5=.78, w6=.77)
I worry what other people think of me when I make mistakes in front of the class. (1=almost never, 7=all the time)
If your teacher asked you to get up in front of the class and talk how nervous would you be? (1=not at all, 7=very nervous)
Does your heart beat faster when taking a test? (1=not at all, 7=a lot faster)
When taking a test, how nervous do you get? (1=a little, 7=a lot)

Single Items

Educational Plans
Educational Aspirations: If you could do exactly what you wanted, how far would you like to go in school? (scale below)
Educational Expectations: How far do you think you will actually go in school?
1=8th grade or less
2=9th-11th grade
3=graduate from high school
4=post high-school vocational or technical training
5=some college
6=graduate from a business college or a 2-year college with an associate's degree
7=graduate from a 4-year college
8=get a master's degree or technical credential
9=get a law degree, Ph.D., or medical degree

Family Plans
Do you want to get married someday? (yes/no)
Do you want to have children? (yes/no)
Do you think you will have children? (yes/no)

Job Plans
Rate how likely you would consider entering each of these kinds of jobs. (1=very unlikely, 7=very likely)
Health professional (B.A./M.A.)
Science or math-related field (B.A./M.A.)
Health (Ph.D./M.D.)
Science (Ph.D.)

Table 1. Plans to To Take AP Courses

Plan to Take:	Gifted Girls		Gifted Boys	
	yes	no	yes	no
AP Chemistry	12	38	14	32
AP Physics	13	37	16	30
AP Calculus	21	29	22	24

Note: yes= yes or already taken, no= no or don't know
The difference in frequency of gifted girls and gifted boys planning to take these courses is not statistically significant. Note the low frequencies among both, however.

Table 2. Means

	Gifted Sample	Non-Gifted Sample
GPA (calculated from self-reported grades in each subject)	3.66*	3.26

(also, gifted girls had significantly higher GPAs than did gifted boys, but there was no gender difference among the non-gifted)

	Gifted Sample		Non-Gifted Sample		Between
	Girls	Boys	Girls	Boys	Sample Sig.
Math SCA2	5.28	5.60	5.31	5.70*	
Math SCA3	5.07	5.40*	4.92	5.24*	
Math SCA4	4.95	5.44**	4.80	5.17 ^{t}	*
Math SCA5	5.57	5.88	4.89	5.07	***
Math SCA6	5.32	5.70	4.67	4.82 ^{t}	***
Math Val2	5.51	5.27	5.13	5.16	
Math Val3	4.81	5.31**	4.99	5.04	
Math Val4	4.57	5.16**	4.79	4.92 ^{t}	
Math Val5	4.28	4.29	4.16	4.16	
Math Val6	4.37	4.54	4.18	4.02	
Harter5	2.93	3.24 ^{t}	3.00	3.10*	
Harter6	2.93	3.22*	3.02	3.17*	
Efficacy5	5.25	5.39	5.12	5.30*	
Efficacy6	5.18	5.51	4.96	5.09*	
Depress5	2.88 ^{t}	2.49	2.83 ^{t}	2.77	
Depress6	2.78*	2.14	2.78*	2.49	
Anxiety5	3.69*	3.06	3.96*	3.61	
Anxiety6	3.60**	2.64	3.63*	3.11	

NOTES: The significance notation within the table above is from within-sample ANOVAs controlling for grade level. In the right-hand column are indications of signficant differences between samples, using Mann-Whitney U tests.

^{t} $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Math SCA = Math self-concept of ability (# is what wave of data collection)
Math Val = Value for math " "
Harter = Harter self-esteem scale (see Appendix for items and alphas)
Efficacy = Eccles self-efficacy scale " "
Depress = Derogatis depression scale " "
Anxiety= Eccles academic anxiety scale " "

Table 3. Predicting AP Coursetaking Among the Gifted **(do we need means?)**

Predictor	AP Calculus	AP Chemistry	AP Physics
Gender	2.80^t	n.s.	3.3^t
Girls Only			
Math SCA2	n.s	n.s	n.s.
Math SCA3	n.s.	n.s.	n.s.
Math SCA4	n.s.	n.s.	n.s.
Math SCA5	3.69^t	5.85*	3.37^t
Math SCA6	12.30*	4.22*	4.77*
Math Val2	n.s.	n.s.	n.s.
Math Val3	n.s.	n.s.	n.s.
Math Val4	n.s.	n.s.	n.s.
Math Val5	7.25**	n.s.	n.s.
Math Val6	14.74***	4.54*	6.83*
Boys Only			
Math SCA2	n.s	n.s	n.s.
Math SCA3	n.s.	4.83*	n.s.
Math SCA4	n.s.	n.s.	n.s.
Math SCA5	3.03^t	5.69*	3.39^t
Math SCA6	12.99**	11.08***	7.23*
Math Val2	n.s.	n.s.	n.s.
Math Val3	n.s.	n.s.	n.s.
Math Val4	n.s.	n.s.	n.s.
Math Val5	2.97^t	5.44*	n.s.
Math Val6	5.17*	3.38^t	6.25*

NOTE: Grade level was controlled.
^{t} $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$
See Table 4 for effect sizes.

Table 4. Effect Sizes for Predictors of AP Coursetaking

	AP Calculus	AP Chemistry	AP Physics
Gifted Girls			
Math SCA5	.08	.12	.07
Math SCA6	.25	.11	.12
Math Val5	.16	.08	n.s.
Math Val6	.29	.11	.17
Gifted Boys			
Math SCA5	.12	.17	.13
Math SCA6	.31	.36	.28
Math Val5	.07	.12	n.s.
Math Val6	.31	.09	.16
Non-Gifted Girls			
Math SCA5	.12	.09	.09
Math SCA6	.16	.09	.08
Math Val5	.09	.08	.09
Math Val6	.12	.08	.12
Non-Gifted Boys			
Math SCA5	.05	.07	.02
Math SCA6	.11	.09	.07
Math Val5	.03	.03	n.s.
Math Val6	.04	.04	.02

NOTE: These are taken from the eta^2 statistic in the ANOVA analysis.

Table 5. Gender Differences in Future Plans

	Gifted Sample		Non-Gifted Sample	
	Girls	Boys	Girls	Boys
Education				
Ed asp 5	8.07	8.16	7.74 *	7.35
Ed asp 6	8.30	8.19	7.77 *	7.49
Ed exp 6	8.03	8.00	7.33 *	6.99
Marriage				
Want to marry	49%	51%	46% *	55%
Likely will marry[1]	5.47	5.88	5.86	5.82
Children				
Want kids	53%	46%	57% *	43%
Will have kids	54%	46%	58% *	42%

Notes:

[t] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

[1] Likelihood of marriage is not graphed with the other family plans (Figure 11) because it had a different answer format.

Table 6. Means on Psychological Variables

	Gifted Sample		Non-Gifted Sample	
	Girls	Boys	Girls	Boys
Harter5	2.93	3.24 [t]	3.00	3.10*
Harter6	2.93	3.22*	3.02	3.17*
Efficacy5	5.25	5.39	5.12	5.30*
Efficacy6	5.18	5.51	4.96	5.09*
Depress5	2.88 [t]	2.49	2.83 [t]	2.77
Depress6	2.78*	2.14	2.78*	2.49
Anxiety5	3.69*	3.06	3.96*	3.61
Anxiety6	3.60**	2.64	3.63*	3.11

NOTES: The significance notation within the table above is from within-sample ANOVAs controlling for grade level.

[t] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Harter = Harter self-esteem scale (see Appendix for items and alphas)
Efficacy = Eccles self-efficacy scale " "
Depress = Derogatis depression scale " "
Anxiety= Eccles academic anxiety scale " "

Table 7. Differences in AP Coursetaking by Psychological Variables

	AP Chemistry		AP Physics		AP Calculus	
	yes	no	yes	no	yes	no
Gifted Girls						
Harter5						
Harter6						
Efficacy5					4.93	5.47
Efficacy6	5.57	5.02			4.96	5.43^t
Depress5						
Depress6						
Anxiety5						
Anxiety6	2.92	3.89			3.04	3.87^t
Gifted Boys						
Harter5						
Harter6						
Efficacy5						
Efficacy6			5.84	5.18	5.73	5.03
Depress5						
Depress6	1.84	2.37				
Anxiety5						
Anxiety6						

Note: Only significant results from t-tests comparing those who plan vs. don't plan to take AP courses on psychological variables are reported. Numbers above are means.

Figure 1

General Model of Achievement Choices

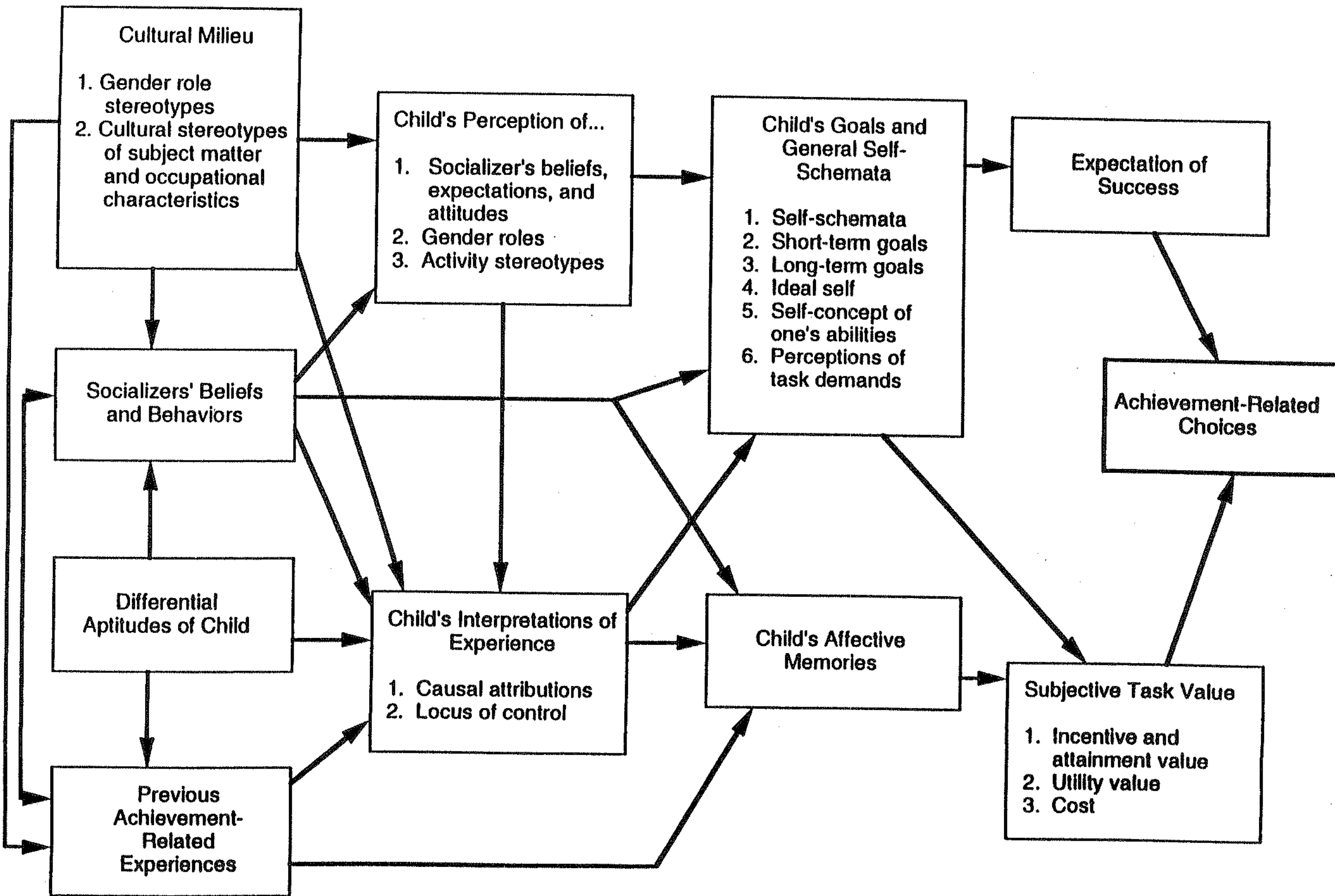


Fig. 2: Math Value Among All Students

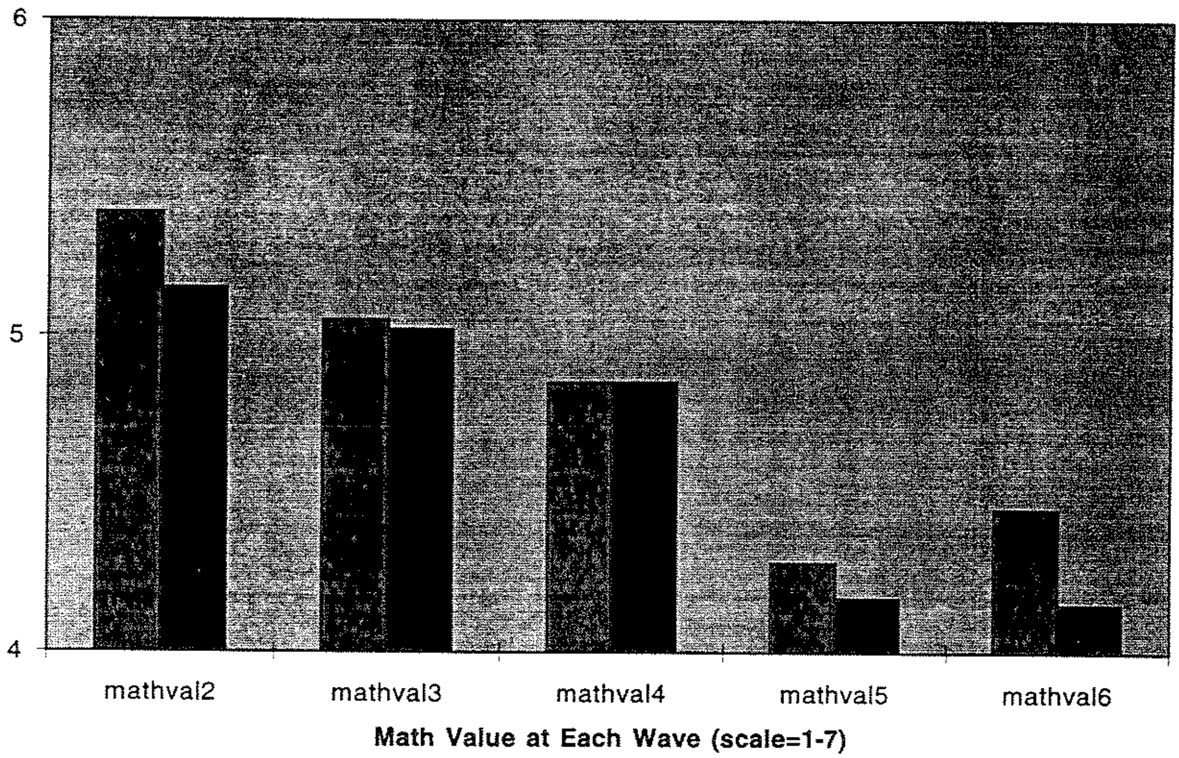


Fig. 3a: Gender Differences in Math Self-Concept of Ability (Expectancy) Among Gifted Students

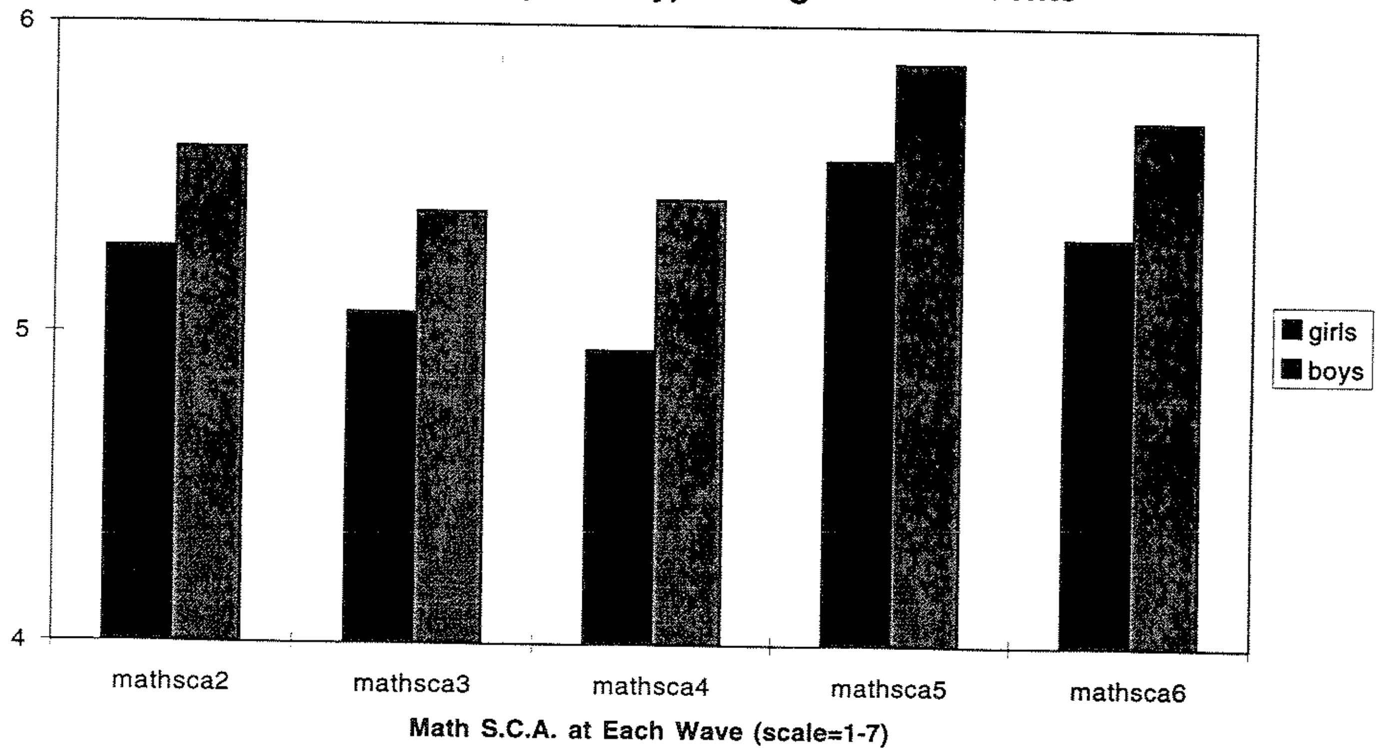


Fig. 3b: Gender Differences in Math Self-Concept of Ability (Expectancy) Among Non-Gifted Students

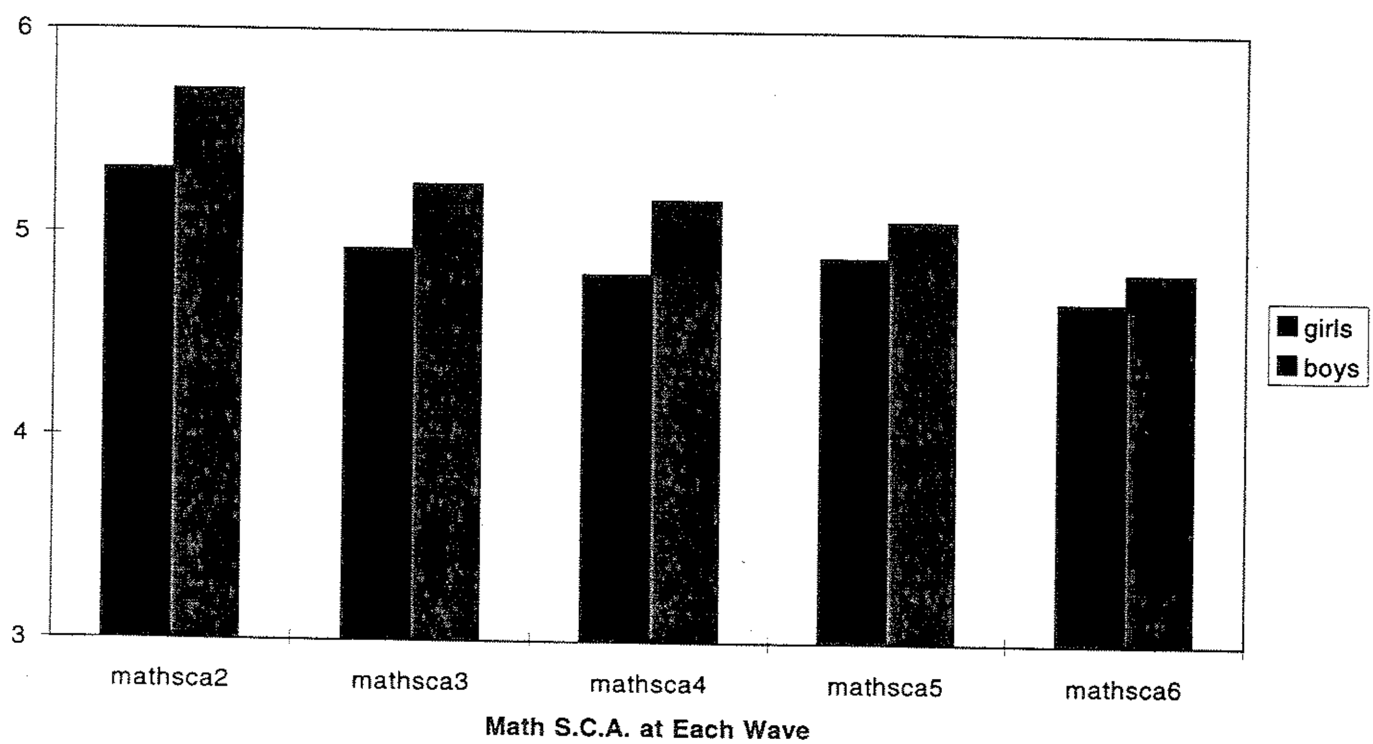


Fig. 4a: Gender Differences in Math Value Among Gifted Students

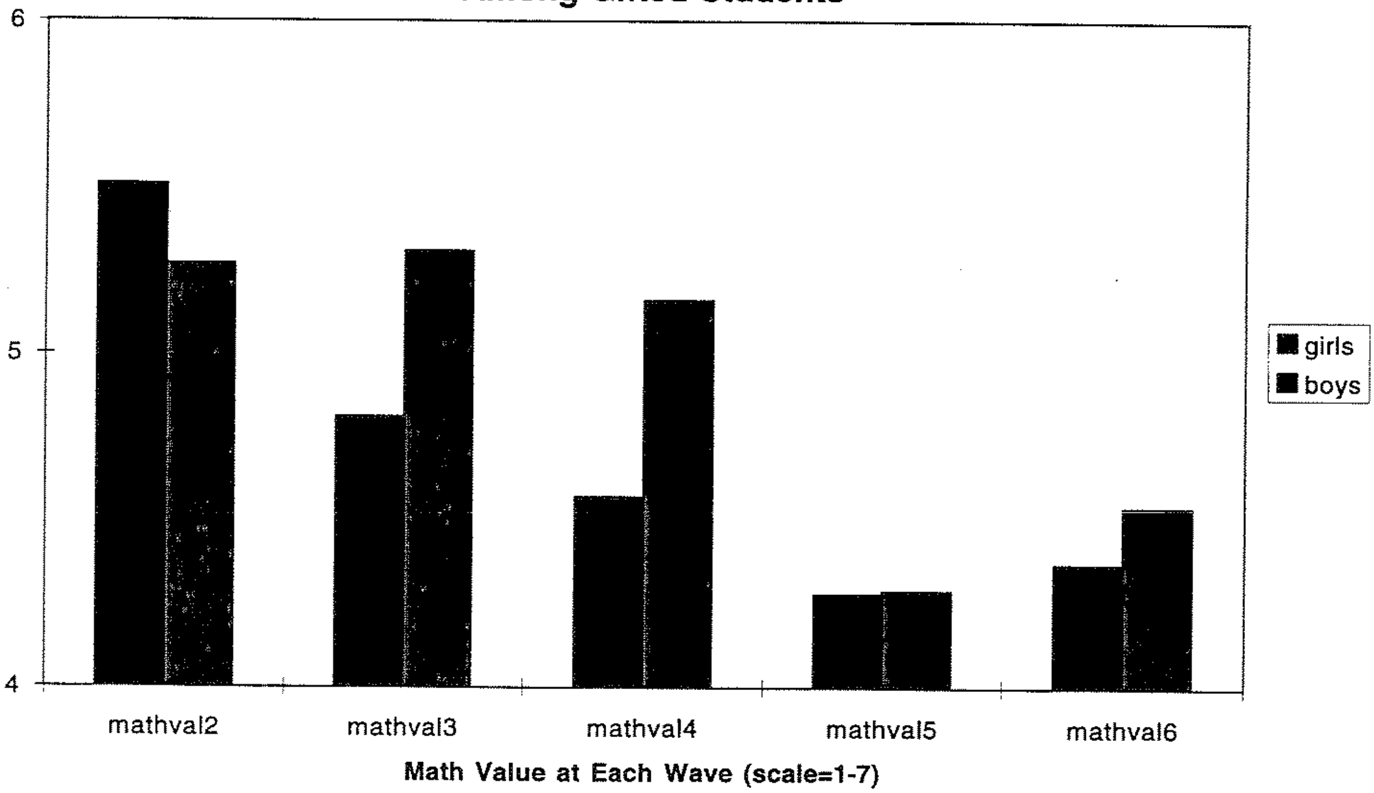


Fig. 4b: Gender Differences in Math Value Among Non-Gifted Students

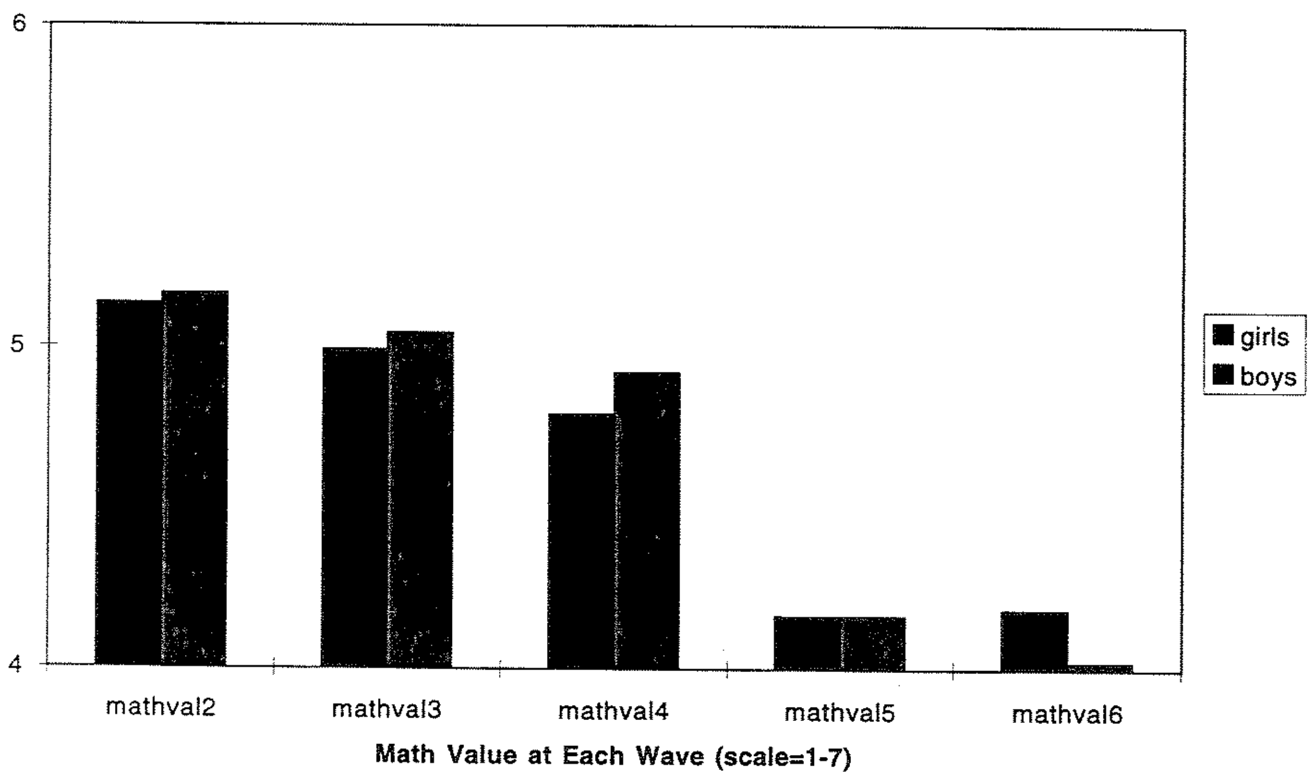


Fig. 5a: Levels of Math S.C.A. and Math Value Among Gifted Girls Who Plan vs. Don't Plan to Take AP Chemistry

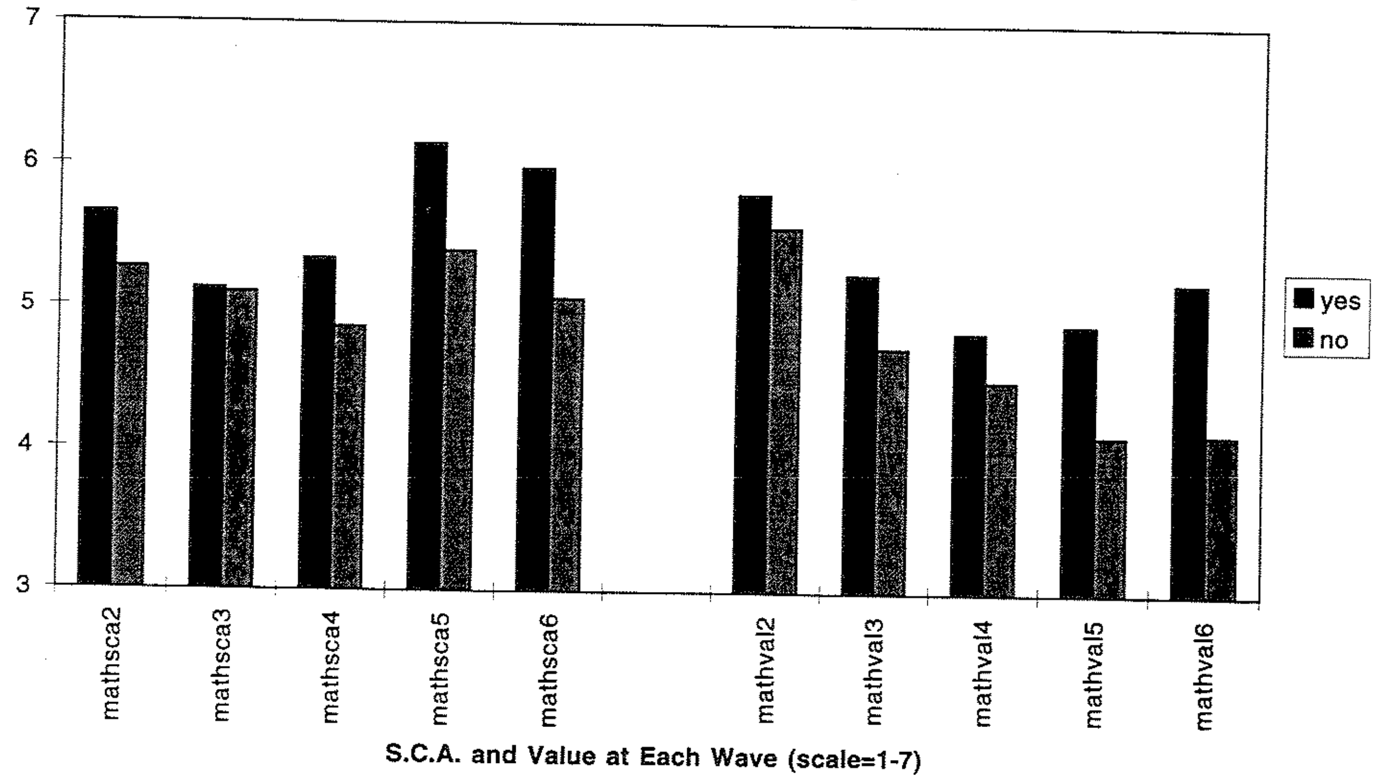


Fig. 5b: Levels of Math S.C.A. and Math Value Among Gifted Boys Who Plan vs. Don't Plan to Take AP Chemistry

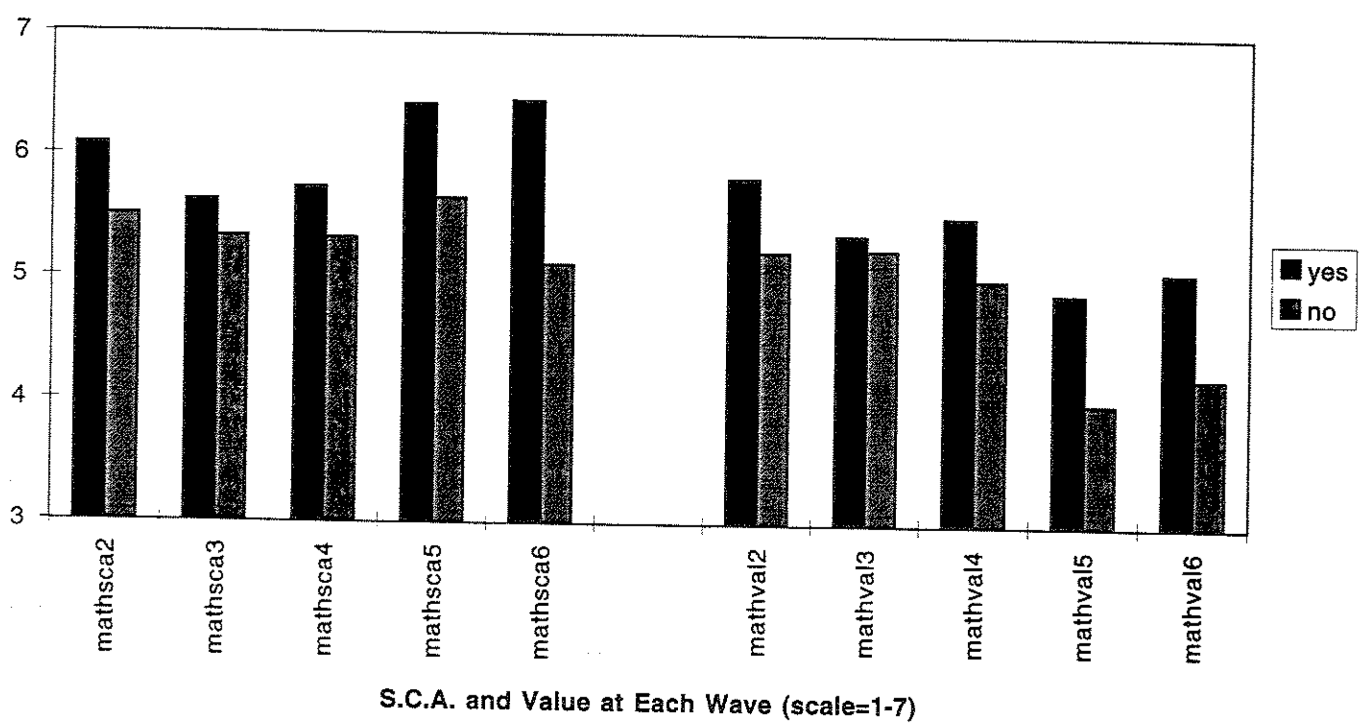


Fig. 6a: Levels of Math S.C.A. and Math Value Among Gifted Girls Who Plan vs. Don't Plan to Take AP Physics

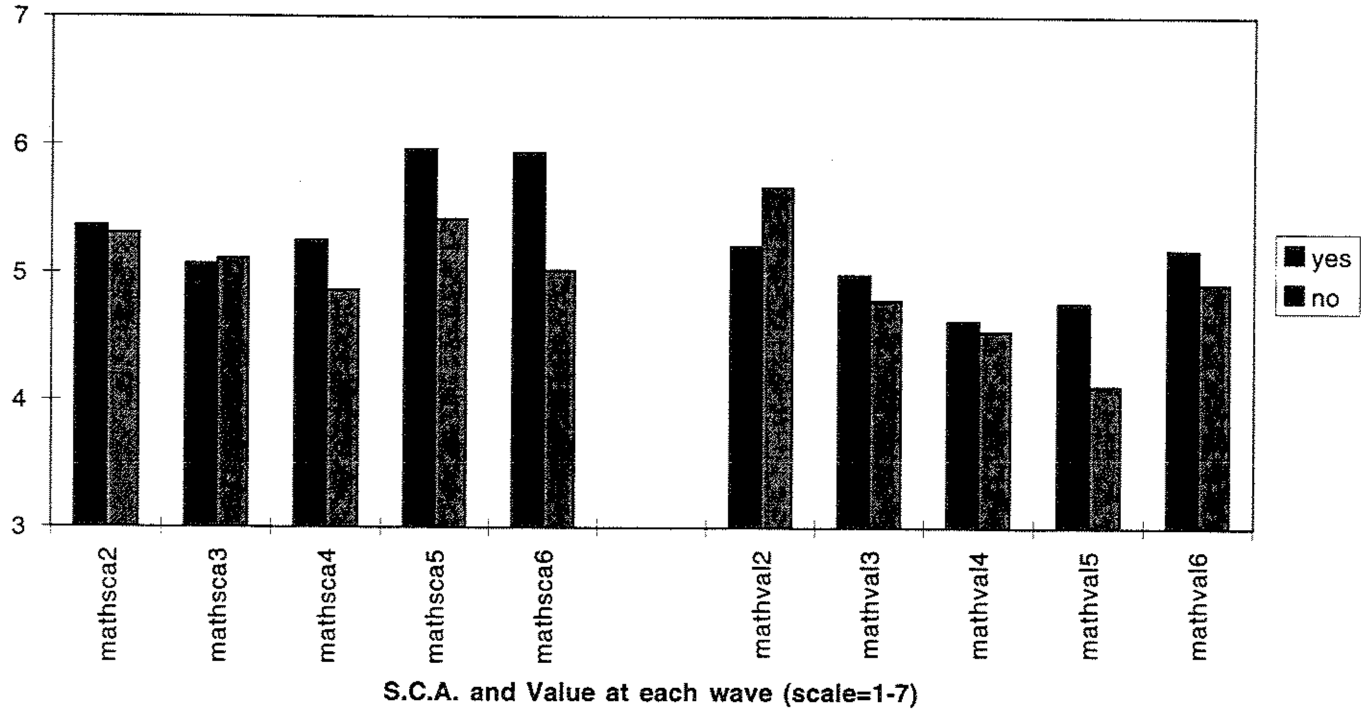


Fig. 6b: Levels of Math S.C.A. and Math Value Among Gifted Boys Who Plan vs. Don't Plan to Take AP Physics

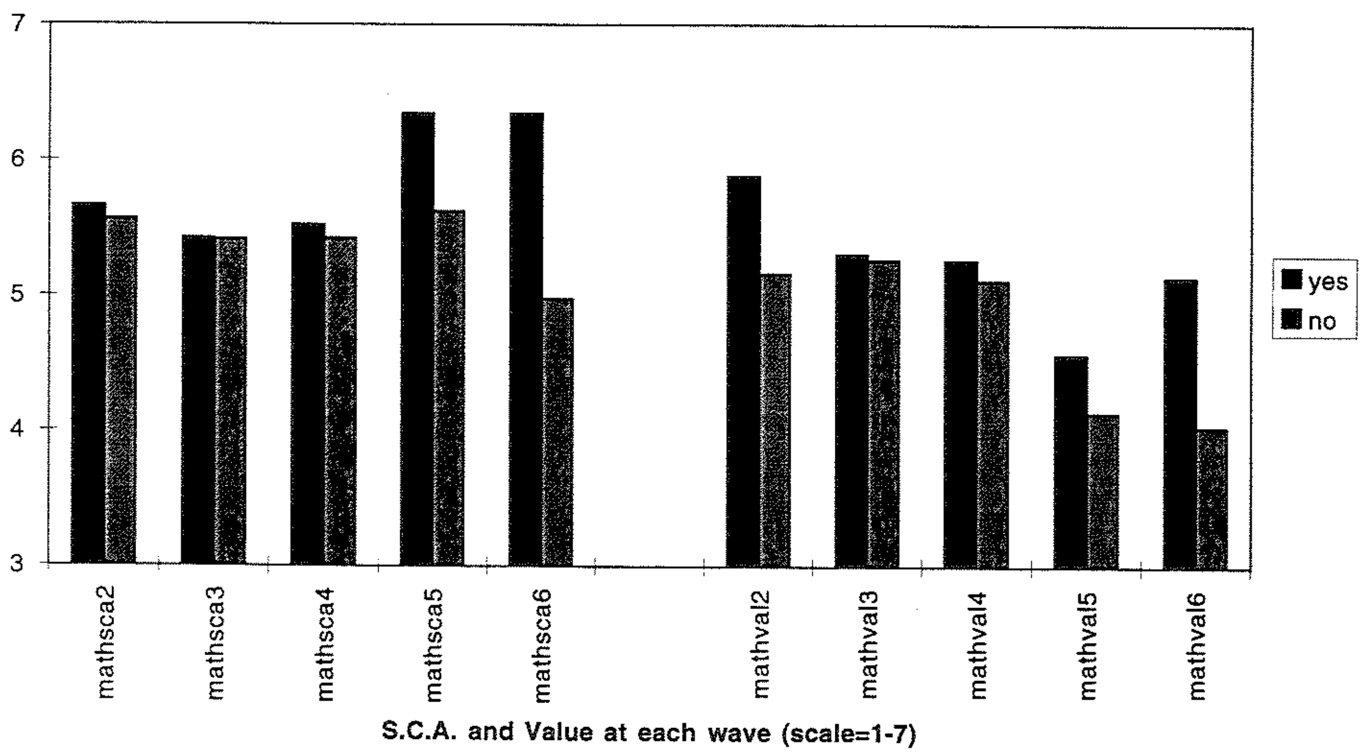


Fig. 7a: Levels of Math S.C.A. and Math Value Among Gifted GirlsWho Plan vs. Don't Plan to Take AP Calculus

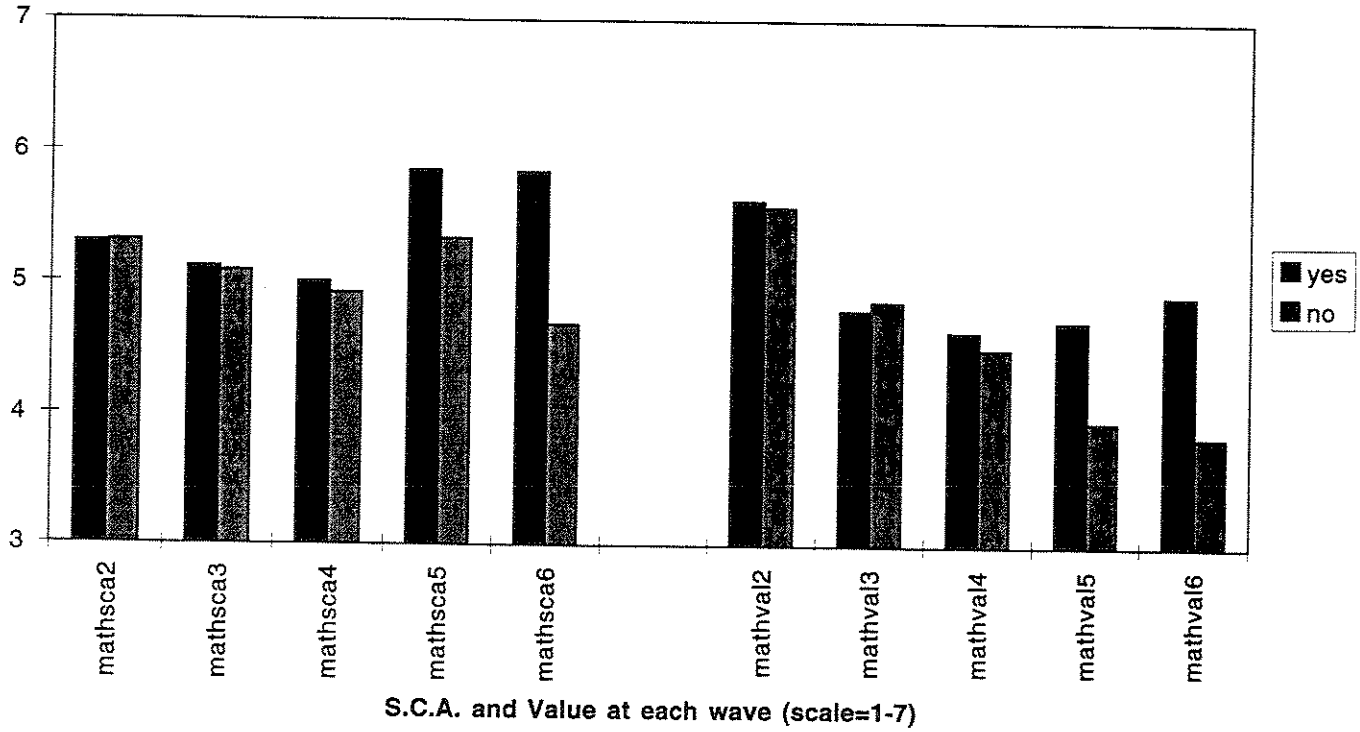


Fig. 7b: Levels of Math S.C.A. and Math Value Among Gifted Boys Who Plan vs. Don't Plan to Take AP Calculus

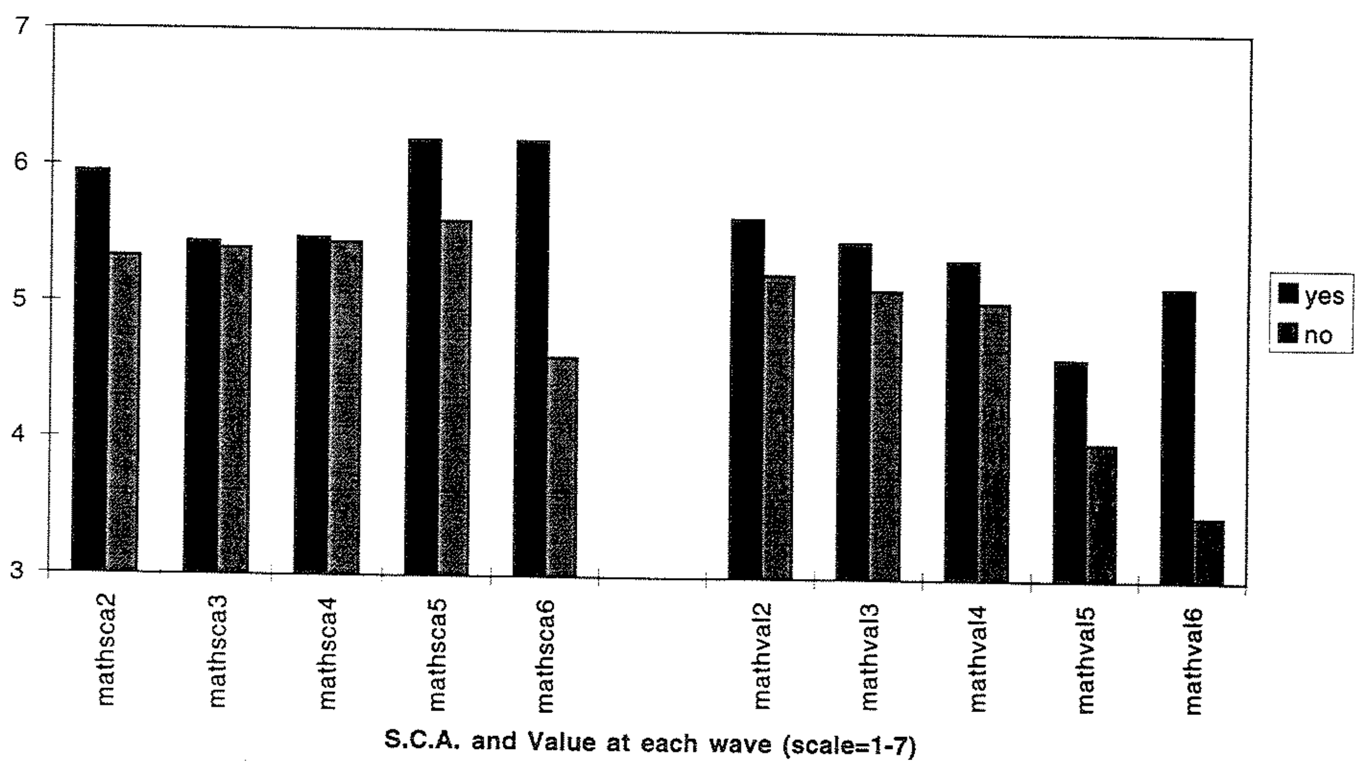


Fig. 8: Gender Differences in Educational Aspirations and Expectations Among Gifted and Non-Gifted Students

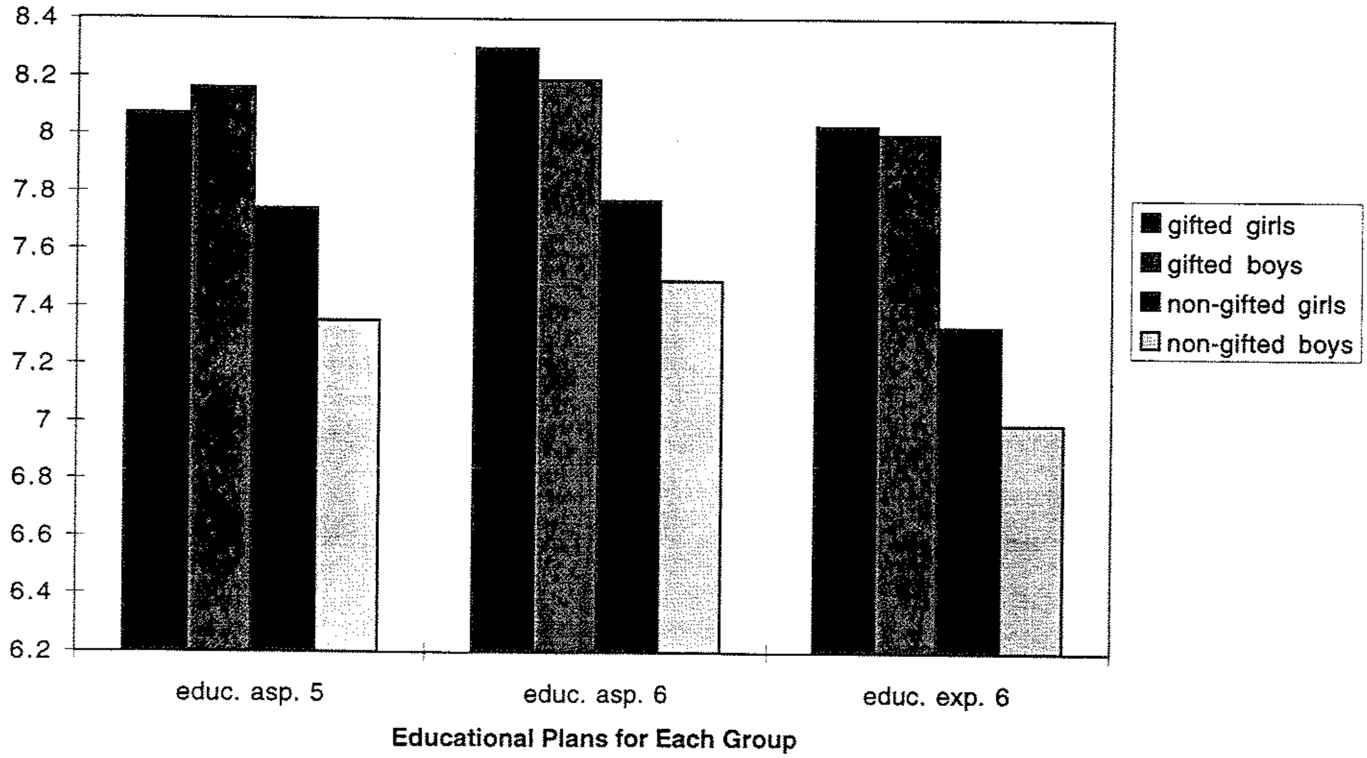


Fig. 9: Gender Differences in Family Plans Among Gifted and Non-Gifted Students

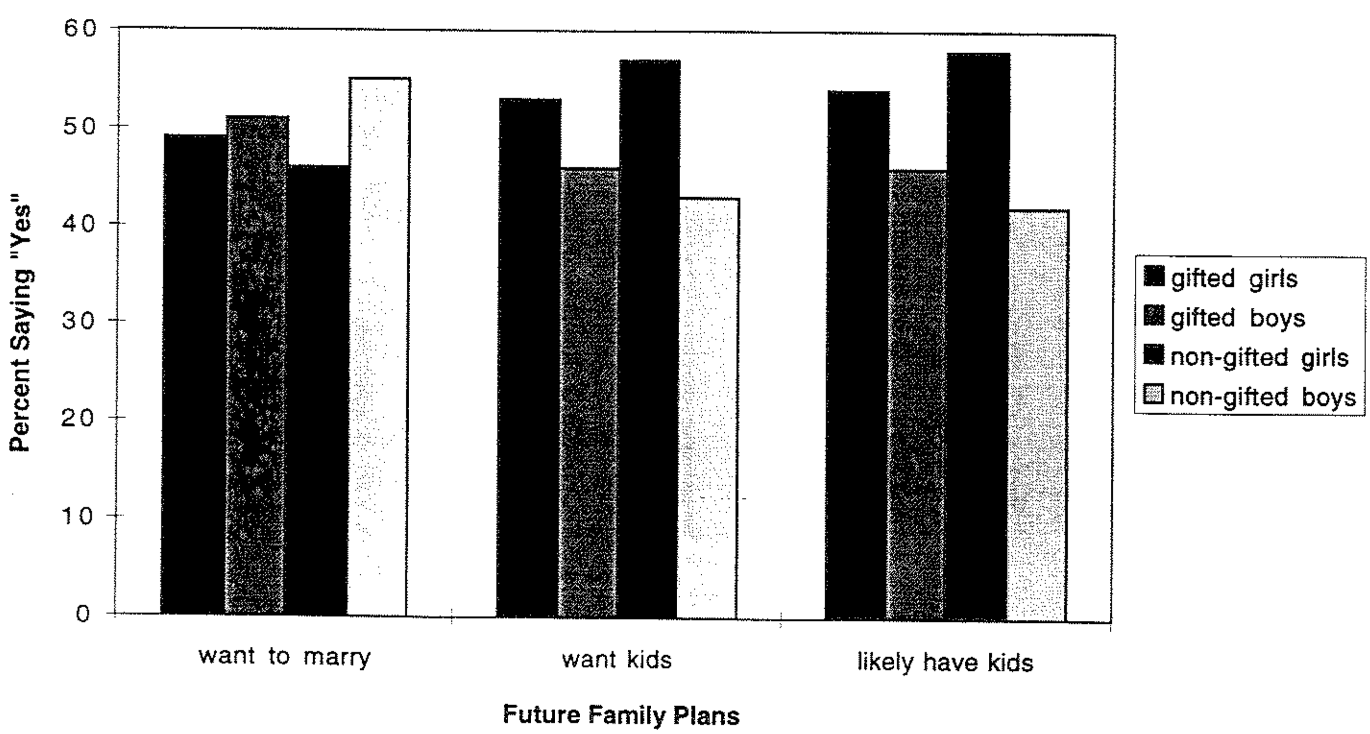


Fig. 10: Levels of Self-Esteem Among Gifted and Non-Gifted Boys and Girls

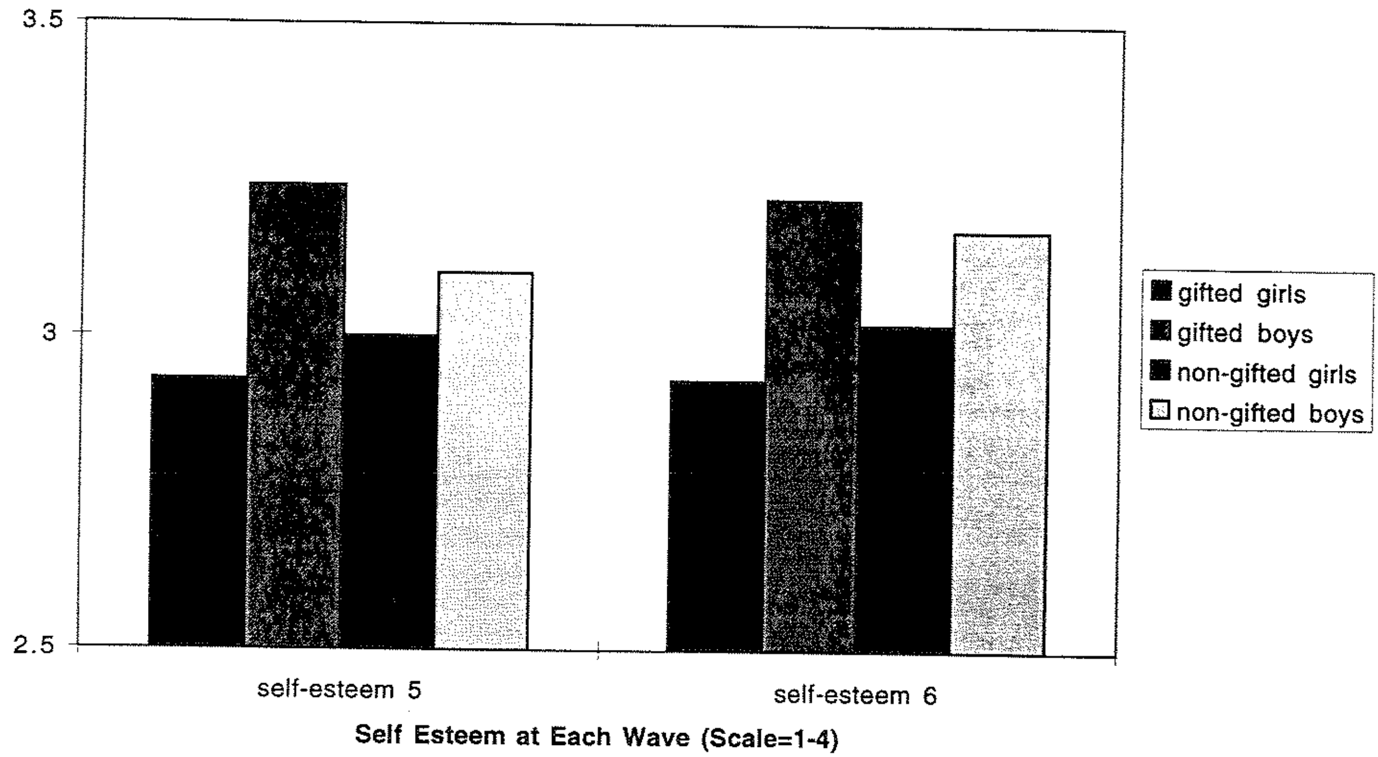


Fig. 11: Levels of Depression Among Gifted and Non-Gifted Girls and Boys

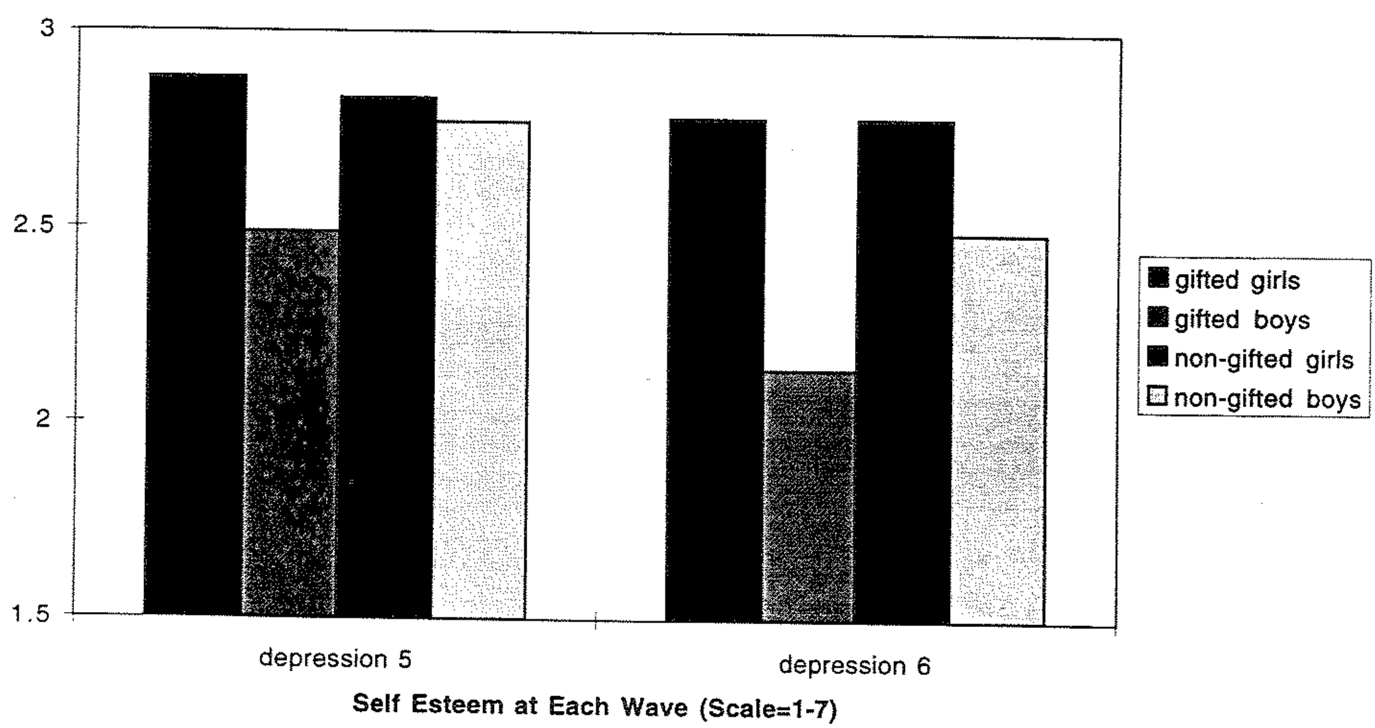


Fig. 12: Levels of Self-Efficacy Among Gifted and Non-Gifted Girls and Boys

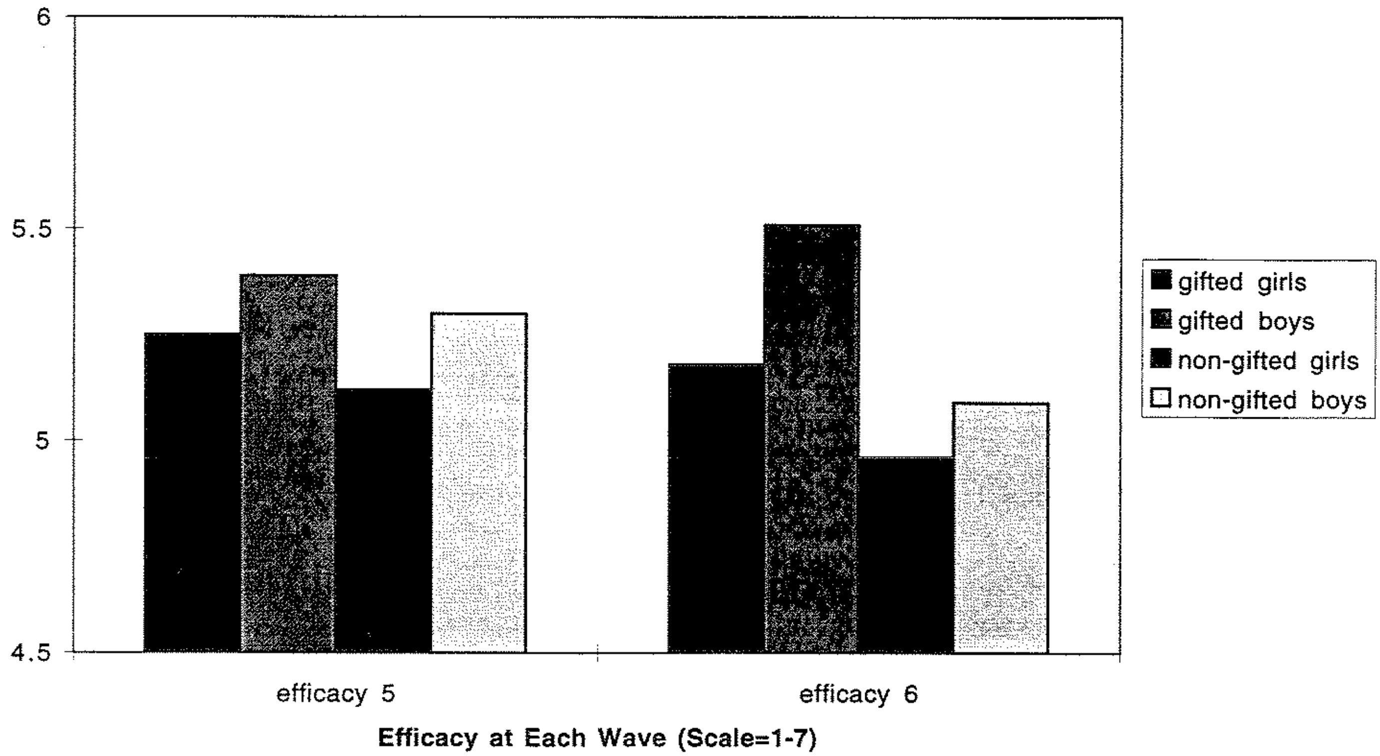
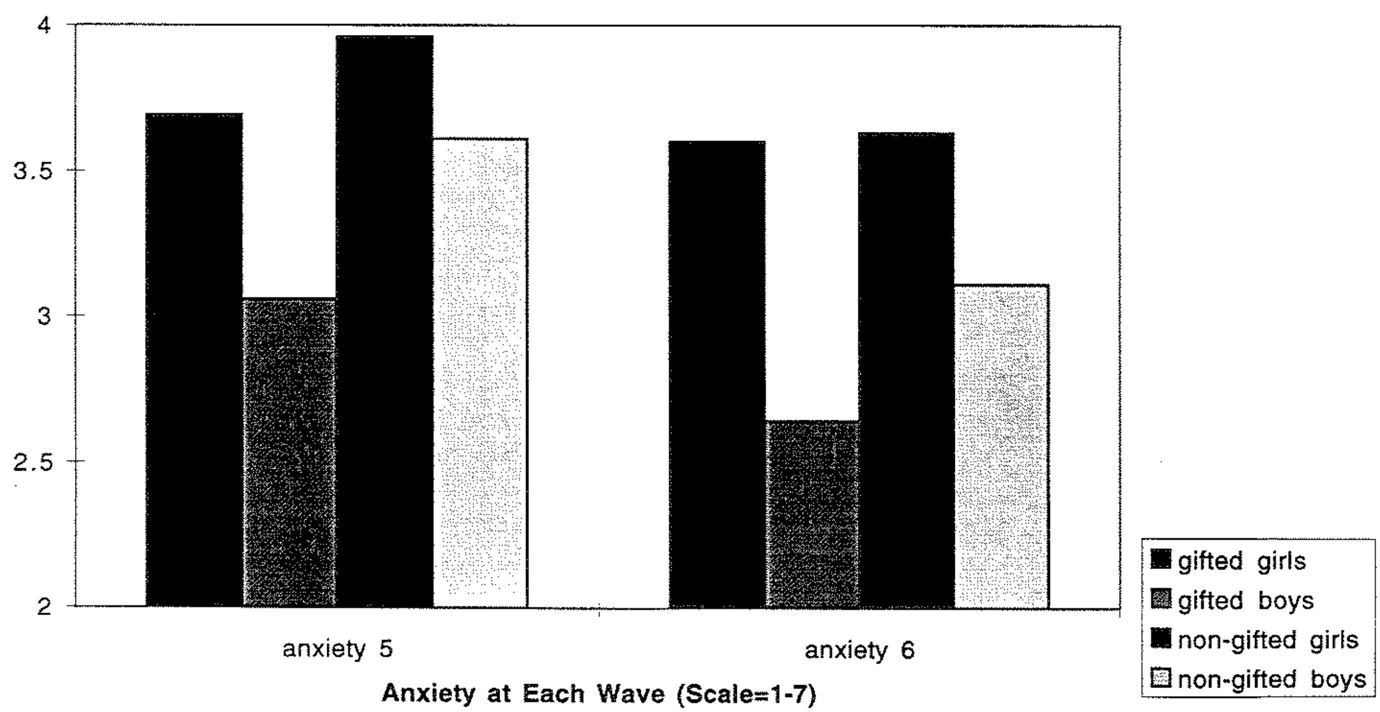


Fig. 13: Levels of Anxiety Among Gifted and Non-Gifted Girls and Boys



References

Atkinson, J. W. (1964). An introduction to motivation. Princeton, NJ: Van Nostrand.

Crandall, V. C. (1969). Sex differences in expectancy of intellectual and academic reinforcement. In C. P. Smith (Ed.), Achievement-related behaviors in children (pp.11-45). New York: Russell Sage Foundation.

Eccles (Parsons), J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., and Midgley, C. (1983). Expectations, values and academic behaviors. In J. T. Spence (Ed.), Perspective on achievement and achievement motivation. San Francisco: W. H. Freeman.

Eccles, J. S., Barber, B. L., Updegraff, K., & Wigfield, A. (1997, March). Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Jozefowicz, D. M. H., Barber, B. L., & Eccles, J.S. (1994). Adolescent work-related values and beliefs: Gender differences and relation to occupational aspirations. Paper presented at the biennial meeting of the Society for Research in Child Development, New Orleans, LA, March 28, 1993.

Lee, V. E., Burkam, D., & Smerdon, B. (1997, March). Debunking the myths: Exploring common explanations for gender differences in high school science achievement. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Meece, J. L., Eccles (Parsons), J., Kaczala, C. M., Goff, S. B., & Futterman, R. (1982). Sex differences in math achievement: Toward a model of academic choice. Psychological Bulletin, 91, 324-348.

Weiner, B. (1974). Achievement motivation and attribution theory. Morristown, NJ: General Learning Press.