Gender Stereotypes in Three Domains: Their Relationship to Perceived Ability and Subjective Task Value

Diane M. Early
University of Colorado

Jacquelynne S. Eccles
Sarah E. Lord
University of Michigan

Paper presented at the Fifth International Interdisciplinary Congress on Women
San Jose, Costa Rica
February, 1993.

The data collection reported in this paper was supported by grants to Jacquelynne S. Eccles from the National Institute of Mental Health, the National Institute of Child Health and Human Development and the Spence Foundation. The authors would like to thank Jan Jacobs, Douglas Mac Iver, Carol Midgley, and David Reuman for the invaluable role in the collection and processing these data.

In spite of supposed recent progress in the area of gender equality in the United States, a wide gap continues to exist between the number of men versus women in many occupations and educational tracts. Science and math related fields continue to attract men in much greater numbers than women, while occupations traditionally held by women are still largely female dominated. The U.S. Bureau of Labor Statistics (U.S. Bureau of the Census, 1990) indicated that in 1988 only 7.3% of individuals employed as professionals in the field of engineering were women and only 24.1% of natural scientists were women. Likewise, according to the U.S. National Center for Education Statistics (U.S. Bureau of the Census, 1990) in 1987 only 13.7% of people earning undergraduate degrees in engineering were women and only 28.4% of those earning undergraduate degrees in physical sciences were women. Women made up an even lower percent of people earning advanced degrees in these fields.

Opposite trends exist for traditionally female occupations and educational fields. The U.S. Bureau of Labor Statistics (U.S. Bureau of the Census, 1990) reports that in 1988 only 15.2% of elementary school teachers and 14.6% of librarians were men. In terms of education, only 23.8% of people receiving undergraduate eduction degrees in 1987 were men and only 34.2% of people receiving undergraduate degrees in letters were men. These gender differences do diminish markedly, but do not disappear, for doctoral level degrees (45.1% men in education, 43.6% men in letters).

What happens in childhood and early adolescence that leads to adult gender differences in occupational and educational choices? Clearly, the answer to this question is complicated and multi-faceted. A wide variety of biological and psychological explanations have been proposed to explain adult gender differences. However, there is an important finding that calls into question the idea that gender differences in adult occupational and educational choices can be explained by biological gender differences in aptitude: No gender differences in math or English grades or standardized test scores emerge regularly until at least junior high school (Kimball, 1989). Furthermore, even after entering junior high school, Kimball (1989) reports that boys show superior math performance on standardized test scores only. Girls, on the other hand,

show consistently superior math grades. Hyde, Fennema and Lamon (1990) report an even later onset of superior male math performance. In their meta-analysis of 100 studies of gender differences in math performance, these researchers report that male superiority does not emerge until high school. The findings from this meta-analysis indicates that females show slightly superiority in math performance until 14 years of age.

As mentioned above, in addition to this gender difference in aptitude explanation, many psychological influences have been proposed to explain adult gender differences. The work on parents' gender stereotypes appears to be particularly promising. Work in this field has focused primarily on the biasing effect of parents' gender stereotypes on both parents' and children's perceptions of children's ability and the value placed on various domains. Perception of ability and subjective task value have been linked, in turn, to educational and career choices.

Taigiuri (1969) defined stereotypes as the tendency to make assumptions about an individuals' traits on the basis of his or her group membership. Eccles-Parsons, Adler and Kaczala (1982) found that parents believe that boys are better at mathematics than girls. These beliefs have a negative relationship with both the parents' and children's perceptions of the children's mathematics ability, even when controlling for the impact of children's actual performance on perception of ability. Like most other researchers in this field, (Eccles et al., 1982) found no gender differences in math performance, making it unlikely that these parents and children were simply perceiving real differences. Instead, the gender stereotypes appear to have true biasing effects.

Eccles (1987; Eccles-Parsons et al., 1983) pointed out that understanding the antecedents to perception of ability is important because perception of ability has been linked to differences in career and educational choices. Presumably, people are not likely to pursue careers in domains in which they feel they lack ability because they do not believe they are likely to succeed in such careers or because they believe that success in such careers would take more work for them than for other people. Subjective task value has also been linked to differences in career and educational choices (Eccles, 1987; Eccles-Parsons et al., 1983, Eccles

et al. 1984). Eccles, et al. (1984) point out that any time the cost of the engaging in a task outweighs the task's rewards, the value of the task decreases and so does the amount of time and effort spent on the task. Thus, people tend to follow educational or career tracts that hold high subjective task value for them. Although perception of ability and subjective task value do not fully explain career choices, they do lend some understanding to this area.

The cultural stereotypes about gender differences in sports, math, and English talent and the interesting work done in the field of parents' gender stereotypes raise the question of how children's own gender stereotypes relate to their perceptions of their own ability. Children are already aware of the cultural stereotypes surrounding the appropriateness of various activities and traits by age five (Williams, Bennett & Best, 1974). Therefore, it seems important to understand the impact of such knowledge on children's perceptions of themselves. Such stereotypes may not only bias the way children view females versus males in general, but also the way in which they view themselves as members of one of these two groups. Unfortunately, the role of children's own gender stereotypes in children's self-perceptions has received no empirical attention.

The two central questions, then, for this paper are: How do children's gender stereotypes about differential ability in various domains relate to their perceptions of their own ability in these domains?, and how do these gender stereotypes relate to children's perceptions of the value of engaging or excelling in various tasks? That is, how do the beliefs that boys are better than girls at mathematics and sports and that girls are better than boys at English influence early adolescents' perceptions of their own abilities in these areas and their perception of the value of succeeding in these areas.

Method

Overview

Data reported in this paper were collected as part of the Michigan Study of Adolescent Life Transition (MSALT), an on-going longitudinal study of adolescent and young adult development. Students were recruited into this study at the beginning of their sixth grade year and have, at present, participated in seven waves of data collection. Due to time constraints and developmental changes in the subjects, slightly different measures have been used at each wave. The analyses reported in this paper for the math and English domains come primarily from data collected during Time 2, which was at the end of the subjects' sixth grade year. They also include a Time 1 covariate that was collected at the beginning of the subjects' sixth grade year. The analyses for the sports domain are all based on data collected during Time 1.

Subjects

Approximately 2,000 students from southeastern Michigan completed an in-classroom questionnaire as part of the MSALT. A smaller number, however, completed the Time 2 measure. Furthermore, due to nature of our specific hypotheses, the sample size for most analyses in the math and English domains was about 1,000, while the sample size for the sports domain was closer to 2,000. The sample was approximately 90% White and 10% Black. Most children came from working or middle class families.

Additional data were collected about these students from their teachers and schools. Teachers filled out a questionnaire about each student participating and the schools provided grades and standardized test scores.

Measures

The next two pages describe the measures used and provide Cronbach alphas and factor loadings where appropriate.

Child's Gender Stereotype

Children's gender stereotypes were assessed using the factor weighted mean of the standardized responses to three questions:

1) Who is better at ..., girls or boys?

2) How would you compare the usefulness of ... for men and women?

3) How would you compare the importance of ... for boys and girls?

1 = girls much more than boys
2 = girls somewhat more than boys
3 = girls and boys are the same
4 = boys somewhat more than girls
5 = boys much more than girls

(NOTE: because we do not have hypotheses about children who endorse counter-stereotypes (i.e., the opposite of the widely held stereotype), analyses were performed only on the data from children whose mean score was 3 or higher on the math and sports questions or 3 or lower on the English questions.)

Math : alpha = .54, eigen = 1.58, % of var. = 52.3

English : alpha = .76, eigen = 2.02, % of var. = 67.3

Sports : alpha: .61, eigen = 1.70, % of var = 56.5

Talent Information Received from the School

Math
Math grade, standardized within classroom
Teacher rating of math ability, standardized within teacher

Alpha = .78

English
Reading grade, standardized within classroom
Spelling grade, standardized within classroom

Alpha = .78

Sports
Teacher rating of sports ability, standardized within classroom

Standardized Test Scores (MEAP)

Children in this sample took Michigan's standardized test of basic skills administered as part of the Michigan Educational Assessment Program (MEAP) in the fall semester of the seventh grade. Thus, when the children rated their ability and value for each domain, they did not yet know their standardized test scores. Scores for the math and reading portions of this test are included in the analyses as an indicator of talent apart from the feedback they have received from the school.

Child's Perception of Ability

Children's perception of ability was assessed using the factor weighted mean of the standardized responses to five questions:

1) How good at are you at...?
   1=not at all good
   7=very good

2) If you were to rank all the kids in your class, from the worst to the best in ... where would you put yourself?
   1 = the worst
   7 = the best

3) How successful do you think you would be in a career that required math ability?
   1 = not very successful
   7 = very successful

4) In general, how hard is ... for you? (reverse coded)
   1 = very easy
   7 = very hard

5) Compared to other school subjects you have taken or are taking, how hard is ... for you? (reverse coded)
   1 = my easiest course
   7 = my hardest course

Math -- Time 1: alpha = .81, eigen = 2.83, % of var. = 56.7
Math -- Time 2: alpha = .84, eigen = 3.07, % of var. = 61.4

English -- Time 1: alpha = .82, eigen = 2.93, % of var. = 58.6
English -- Time 2: alpha = .79, eigen = 2.75, % of var. = 54.9

*Sports -- Time 1: alpha: .88, eigen = 2.45, % of var = 81.7
   *(NOTE: for sports only items 1, 2, and 3 were included, based on the results of the factor analysis)

Subjective Task Value

Subjective task value was assessed using the factor weighted means of the standardized responses to four questions:

1) For me, being good in ... is

2) In general, how useful is ...?

3) How useful do you think the ... you are learning will be for what you want to do after you graduate and go to work?
(for sports: In your daily life, how useful are the things you've learned while playing sports?)

4) Is the amount of effort it will take to do well in ... worthwhile to you?

Scale: 1 = not at all important/useful/worthwhile
   7 = very important/useful/worthwhile

Math -- Time 1: alpha = .75, eigen = 2.31, % of var. = 57.7
Math -- Time 2: alpha = .80, eigen = 2.50, % of var. = 62.4

English -- Time 1: alpha = .83, eigen = 2.69, % of var. = 67.2
English -- Time 2: alpha = .86, eigen = 2.80, % of var. = 70.0

Sports -- Time 1: alpha: .88, eigen = 2.94, % of var = 73.4

Results

All hypotheses were tested using simultaneous multiple regression analyses. The Values for R^2 reported below reflect the proportion of variance accounted for by that variable, when controlling for all other variables in the model. The interaction term between gender and stereotype was created by multiplying each subjects standardized stereotype score by the contrast code for his or her gender (-1 for males, +1 for females).

Sports

Perception of sports ability. Perception of sports ability at was regressed onto gender, gender stereotype and the gender by stereotype interaction, while controlling for the teacher's rating of the child's talent. The results were as follows:

** Boys rated themselves as more able in sports than girls (t (1, 2003) = -13.195, R^2= .080).

** Oddly, there was a main effect of gender stereotype, such that children who endorse the gender stereotype for sports tend to see themselves as less able in sports than children who do not endorse this stereotype (t (1, 2003) = -3.295, R^2= .005).

** The gender by stereotype interaction was a significant predictor of perceived sports ability (t (1, 2003) = -9.635, R^2= .044). Boys who endorse the gender stereotape that boys are better at sports than girls see themselves as better at sports than boys who do not endorse this stereotype. Just the opposite is true for girls (see Figure 1).

Subjective task value. A similar regression to the one describe above was conducted using subjective task value as the dependent variable. According to this analysis:

** Boys tend to value sports more than do girls (t (1, 2003) = -10.440, R^2= .052).

** The more a child endorse the sports gender stereotype, the less he or she values sports (t (1, 2003) = -3.916, R^2= .008).

** There is a significant interaction between these two variables such that for boys, endorsing the sports gender stereotype is positively related to subjective task value for sports, while just the opposite is true for girls (t (1, 2003) = -10.210, R^2= .050) (see Figure 2).

Math

Perception of math ability. Perception of math ability at Time 2 was regressed onto gender, gender stereotype and the gender by stereotype interaction, while controlling for talent information received from the school, MEAP math score, and Time 1 perception of math ability. The results were as follows:

** Boys perceive themselves as having more math ability than do girls (t (1, 944) = -3.035, R^2= .010).

** The gender by stereotype interaction is predictive of the perceived ability (t (1, 944) = -2.588, R^2= .007). Boys who endorse the gender stereotype see themselves as more able in math than boys who do not endorse this stereotype. The opposite is true for girls (see Figure 3).

Subject task value for math. A multiple regression similar to the one described above was conducted on Time 2 subjective task value for math. The findings were as follows:

** Contrary to our predictions there is no main effect of gender in predicting subjective task value for math (t (1, 944) = -.955, *n.s.*).

** There is a main effect for gender stereotype in predicating subjective task value (t (1, 944) = -2.633, R^2= .007). Children who endorse the gender stereotype that boys have more ability in math than girls, see math as less valuable than children who do not endorse this stereotype.

** In line with our predictions, the gender by gender stereotype interaction is also predictive of subjective task value (t (1, 944) = -2.401, R^2= .006). The more a girl endorses the gender stereotype that boys are better at math than girls, the less she values math, while for boys, there is no relationship between gender stereotype and subjective task value for math (see Figure 4).

English

Perception of English ability. The same analysis strategy employed for the math domain were used for analysis of the English domain. The results were as follows:

** Contrary to our predictions, gender is not a significant predictor of Time 2 perception of ability (t (1, 969) = 1.056, *n.s.*).

** Also contrary to our predictions, the gender by gender stereotype interaction is not a significant predictor of perception of ability (t (1, 969) = -1.083, *n.s.*) (see Figure 5).

Subjective task value. Using the same type of multiple regressions, the following results were found for subjective task value for English.

** Girls value English more than boys (t (1, 969) = 2.451, R^2= .006).

** Gender stereotype is predictive of subjective task value such that the more one endorses the gender stereotype, the more one values English (t (1, 969) = 3.397, R^2= .012).

** The gender by stereotype interaction was significant indicating that although gender stereotype is not related to subjective task value for girls, the more a boy endorses the gender stereotype, the less he values English (t (1, 996) = -3.550, R^2= .013) (see Figure 6).

Conclusions

The results from this study indicate that, as predicted, perceived ability and subjective task value do in fact vary with gender and beliefs in gender stereotypes. In the sports and math domains, boys rate themselves as having more ability and valuing the domains more than do girls and this gender difference is larger for children who endorse the stereotype that boys are more able in math than girls than for children who do not endorse this stereotype.

In the English domain, gender and the gender by stereotype interaction are also predictive of the child's subjective task value. Girls value English more than boys and this gender difference is larger for children who endorse the gender stereotype than for children who do not endorse the gender stereotype. However, contrary to our predictions, the same did not hold true for perceived ability in English.

In conclusion, this study indicates that gender and gender stereotypes are related to perception of ability and subjective task value. We would like to argue that gender stereotyping is biasing the child's perception of ability and subjective task value. That is, above and beyond the information the children receive from the school about ability, gender stereotypes are *causing* variations in children's perceived ability and task value. Unfortunately, the correlational nature of the data do not permit such a causal conclusion. However, it seems unlikely to us that the causal relationship is in the other direction. Most probably, children develop gender stereotypes and these gender stereotype are influential in determining perceived ability and task value.

References

Eccles, J. E. (1987). Gender roles and women's achievement-related decisions. Psychology of Women Quarterly, 11, 135-172.

Eccles-Parsons, J. E., Adler, T. F., & Kaczala, C. M. (1982). Socialization of achievement attitudes and beliefs: Parental influences. Child Development, 53, 310-321.

Eccles-Parsons, J., Adler, T., Futterman, R., Goff, S., Kaczala, C., Meece, J., & Midgley, C. (1983). Expectations, values and academic behaviors. In J. T. Spence (Ed.), Achievement and achievement motivation (pp. 75-146). New York: Freeman.

Eccles, J.S., Adler, T. & Meece, J.L. (1984). Sex differences in achievement: A test of alternate theories. Journal of Personality and Social Psychology, 46, 26-43.

Hyde, J. S., Fennema, E. & Lamon, S. J. (1990). Gender-differences in mathematics performance: A meta-analysis. Psychological Bulletin, 107, 139-155.

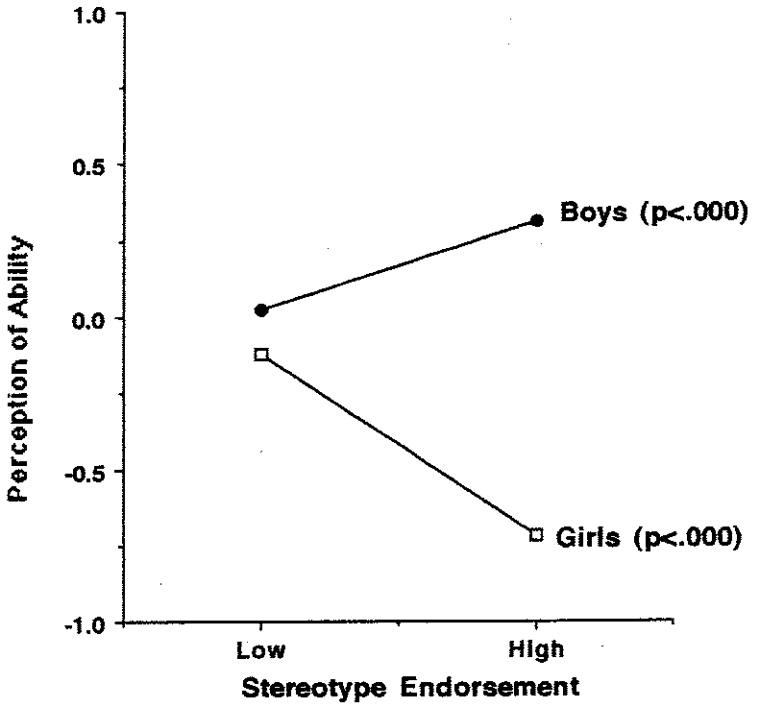
Kimball, M. M. (1989). A new perspective on women's math achievement. Psychological Bulletin, 105, 198-214.

Tagiuri, R. (1969). Person perception. In G. Lindzey and E. Aronson (Eds.). The handbook of social psychology, 2nd Edition. Reading, MA: Addison-Wesley Publishing. Co., 395-449.

U.S. Bureau of the Census, (1990). Statistical Abstract of the United States: 1990 (110th edition). Washington, D.C.

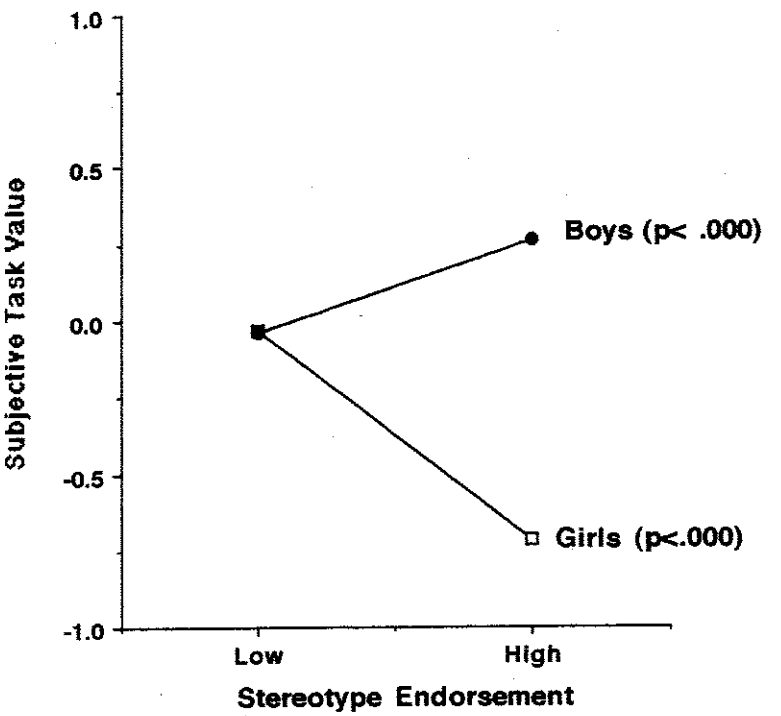
Williams, J. E., Bennett S., & Best, D. (1975). Awareness and expression of sex stereotypes in young children. Developmental Psychology, 11, 635-642.

Figure 1
Perception of Sports Ability



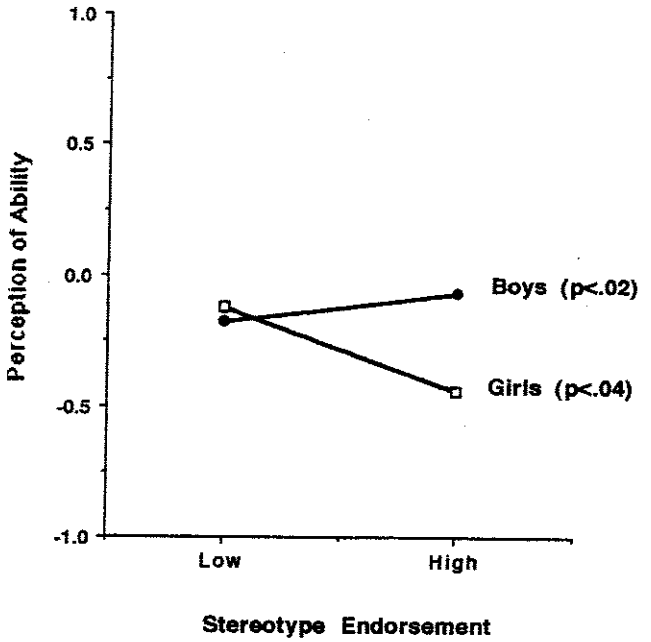
** Controlling for teacher rating of ability

Figure 2
Subjective Task Value for Sports



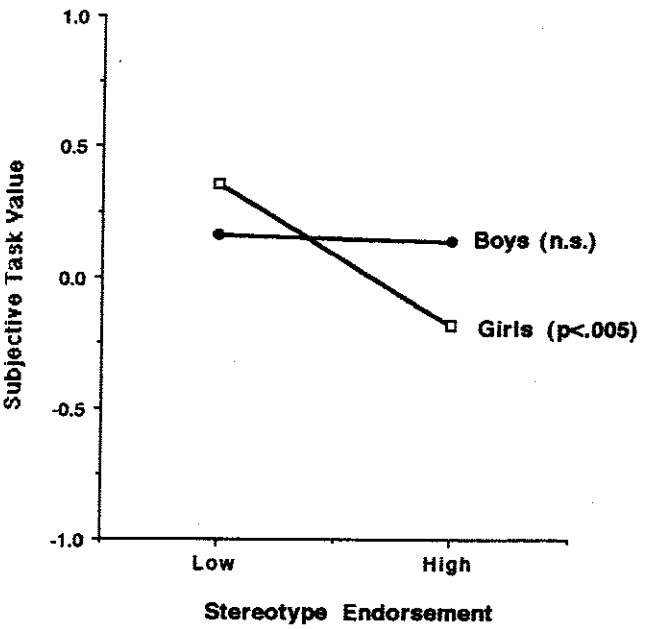
** Controlling for teacher rating of sports ability

Figure 3
Perception of Math Ability



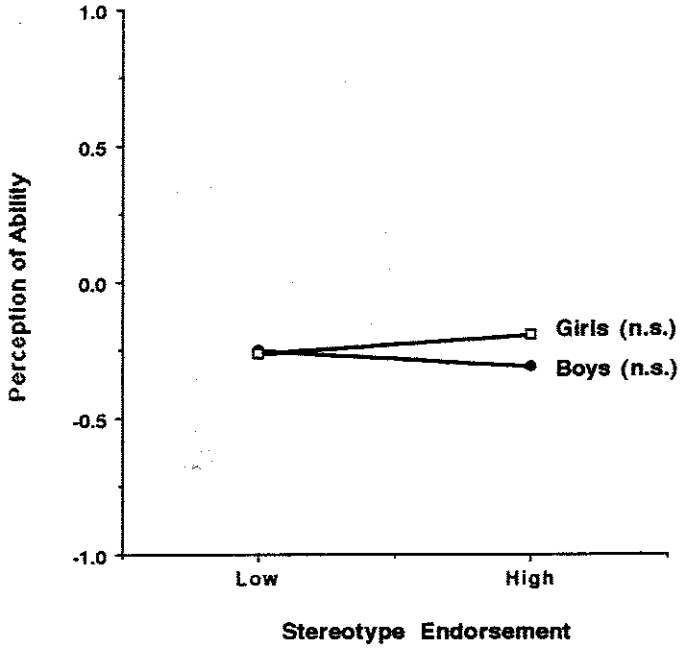
**Controlling for the previous wave's measure of perception of ability, talent information recieved from the school and MEAP math score.

Figure 4
Subjective Task Value for Math



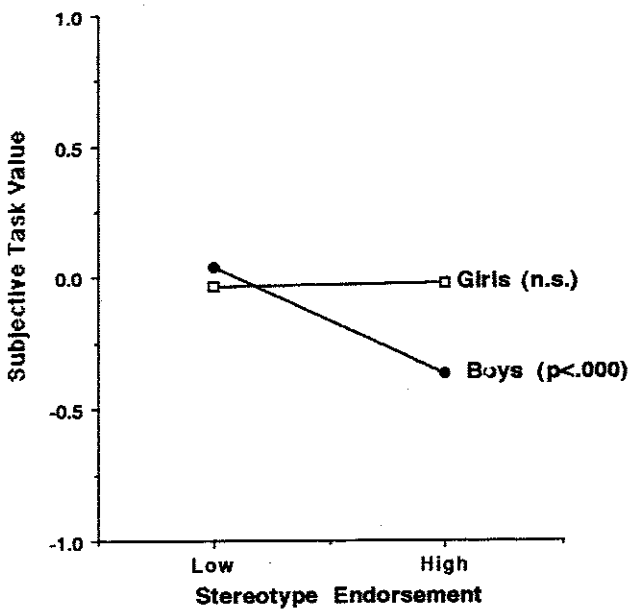
**Controlling for the previous wave's measure of subjective task value, talent information received from the school, and MEAP math score.

Figure 5
Perception of English Ability



****Controlling for the previous wave's measure of perceived ability, talent inforamation received from the school, and MEAP reading score.**

Figure 6
Subjective Task Value for English



****Controlling for the previous wave's measure of subjective task value, talent information received from the school, and MEAP reading score.**