Underestimation of Academic Ability in the Middle School Years

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Abstract

This study examines the characteristics of children who underestimate their academic ability in math and English. It was found that girls tend to underestimate their math ability and boys tend to overestimate their math ability. In English, there were no gender differences in the accuracy of estimation. The results also show that underestimation of ability tends to be a domain specific phenomenon and that different variables seem to predict to underestimation of ability depending on the gender of the student and the domain in question.

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In any group of children there are those who underestimate their academic ability despite objective evidence of this ability. Underestimating one's academic ability could be one of the phenomena that inhibit achievement behavior. For example, underestimating one's overall academic ability has been linked to having lower expectancies for success, which has been negatively associated with achievement behavior (Phillips, 1984; Eccles, 1983). In this study, we examined the possible causes of underestimating one's academic ability in two specific domains- math and English. We also investigate whether underestimation of one's academic abilities is a domain specific phenomenon, or whether it is a more global occurrence.

Research Questions

1) Which students underestimate their academic ability?

2) Is underestimation of academic ability a domain specific or a global phenomenon?

3) Which of the following variables will predict to a child's underestimation of her/his academic ability:

- the degree to which parents underestimate their child's ability
- the amount of effort that parents believe their child needs to exert in order to be successful in an academic domain
- the degree to which children believe that stereotypes regarding a domain favor their gender
- the degree to which the child believes that it is important to do well in math
- the child's causal attributions for success and failure

4) Are there gender differences in the predictive power of the above variables?

5) Are there domain differences in the predictive power of the above variables?

Methods

Sample:

- the data for this research a part of a longitudinal investigation -The Michigan Study of Adolescent Life Transitions (P.I. Jacquelynne Eccles)

- the data reported here were collected in the spring of the students' sixth grade year and the fall of the students' seventh grade year

- 708 children whose mother and father had participated in the study were included in these analyses

- the students in this study are primarily Caucasian and come from low- to middle-income communities.

Measures:

- in the domains of math and English constructs assess children's self-concepts of ability, perceptions of the importance of doing well, gender-role stereotypes, attributions for success and failure, parent's level of underestimation of child's ability, and parent's perception of the effort needed by the child to do well

- child's ability is measured by a composite score of their grades and standardized test score

Results

1) Which students underestimate their academic ability?

Math:

- there is a main effect of gender on the level of underestimation, $F(1, 651)= 15.29$, $p < .001$, such that, on average, girls underestimate their ability and boys overestimate their ability (see Figure 1)

- there is a main effect of actual ability on the level of underestimation, $F(1,651)=5.52$, $p < .01$, such that low ability students are more likely to underestimate their ability, and high ability students are more likely to either overestimate or accurately estimate their ability (see Figure 1)

English:
- gender is not significantly related to accuracy and direction of ability estimation

- there is a main effect of actual ability on the level of underestimation, $F(1, 747)=6.18$, $p < .01$, such that low ability students are more likely to overestimate their ability and average ability students are more likely to accurately estimate their ability (see Figure 2)

2) Is underestimation of academic ability a domain specific or a global phenomenon?

- 60% of the students did not fall into the same group (underestimator, accurate estimator, or overestimator) for both math and English

3)Which variables predict to underestimation of academic ability?

Math (see Table 1):
- for both genders, students' belief that it is important to do well in math predicts to overestimation of ability

- for both genders, attributing failure to task difficulty predicts to underestimation of ability

English (see Table 2):
- for both genders, attributing success to having learned the basic skills in English predicts to overestimation of ability

4)Are there gender differences in the predicted power of the above variables?

Math:
- for girls only, parents' perception that their daughter has to exert a lot of effort to do well in math and student's attributing success to having received help predict to underestimation of ability

- for boys only, attributing success to ability, attributing success to effort, and attributing success to having learned the basic skills predict to overestimation of ability

- for boys only, attributing failure to lack of effort predicts to underestimation of ability

English:
- for girls only, holding stereotypic beliefs about English ability that favor the student's own gender predicts to overestimation of ability

- for boys only, believing that it is important to do well in math, parents' overestimation of the child's English ability, and attributing success to ability all predict to overestimation of ability

- for boys only, attributing failure to lack of ability predicts to underestimation of ability

5) Are their domain differences in the predictive power of the variables?

•some variables predicted underestimation in math but not in English (parent's perception of effort needed to do well, success attributions to effort and help, failure attributions to task difficulty and lack of effort (see Table 3)

•there were no variables which predicted underestimation in English that did not also predict underestimation in math

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*underestimation refers to a variable which ranges from underestimation to overestimation

Discussion

The results show that in math girls are more likely to underestimate their ability and boys are more likely to overestimate their ability. This pattern seems to reflect a combination of the stereotype that boys are better in math and the tendency of boys to overestimate their ability while girls tend to be more modest in estimating their ability (Crandall, 1969). Thus, the only girls who are able to overcome stereotypical ideas about girls' math ability and accurately estimate their ability are those who have very high math ability. In English, the combination of boys' tendency to overestimate with the stereotype that boys have low English ability creates a pattern where most boys accurately estimate their ability. The combination of girls' tendency to be modest in their self-evaluations with the stereotype that girls have high math ability result in the pattern that girls tend to accurately estimate their English ability.

The results also show that underestimation of ability appear to be highly influenced by the domain in question and the gender of the student. First, most students did not hold the same pattern of underestimation in both domains. Second, there were differences in which variables significantly predicted underestimation according to the gender of the student and according to the domain.

For both genders importance of doing well in math and attributing failure to task difficulty predict to self-concept of math ability. The first finding indicates that children engage in a self-protective behavior by overestimating their ability in an area in which they value doing well. The second finding, that attributing failure in math to task difficulty predicts to underestimation of math ability, might be showing the students perceive task difficulty as being reflective of their ability. Students who find math difficult might infer that it is difficult for them specifically because they lack ability. They might believe that if they had higher math ability they would find math to be an easier task.

There were gender differences in what variables predicted to underestimating one's math ability. For girls, the harder parents think that their daughters need to work to do well in math the lower were daughters ability perceptions. In addition, the more girls, but not boys, attribute their success to having received help the lower their

self-concepts of ability. These two findings fit together especially well in light of Eccles (1983) hypothesis that parents provide students with a model of attributions that students may incorporate into their own attributional systems. For example, parents who believe that their child must work hard to do well in math (as opposed to parents who believe that their child can do well in math based on her ability) might be sending a message to their daughters that the daughter's successes in math are not due to her ability.

For boys, attributing success and failure to effort predicted to overestimation and underestimation of ability, respectively. Although attribution theory would predict the opposite pattern (that attributing one's success to effort instead of ability would decrease one's ability perception), it does fit with other theories. For example, a mastery-oriented child or a child who has an incremental theory of intelligence would believe that increased effort would lead to increase ability (Dweck, 1988; Dweck, 1983). They would see their effort as having the effect of increasing their math ability. In addition, for boys, attributing success to ability and to having learned the basic skills in math leads to overestimation of ability. These findings could represent a different group of boys than the ones above who seem to hold incremental theories of intelligence. However, these findings could also represent the same group of boys and could signify that children who have incremental beliefs about intelligence view ability as being stable in that it cannot be lost (although they would believe that it can be increased through effort). These children would believe that their success in math is due to a combination of their ability and effort.

In English, for girls, holding stereotypic views about math which favor girls lead to overestimating one's English ability. Stereotypic views did not predict boys' ability perceptions. These two findings both seems to be self-protective factors since on average girls stereotypes regarding English favored them, while boys' views did not.

Boys seem to be engaging in additional self-protective beliefs in that the more value they place on doing well in English the more they overestimate their English ability. Boys' under/overestimation is also predicted positively by their parents' overestimation of their son's ability in English.

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Figure 1. Math self-concept of ability by actual ability

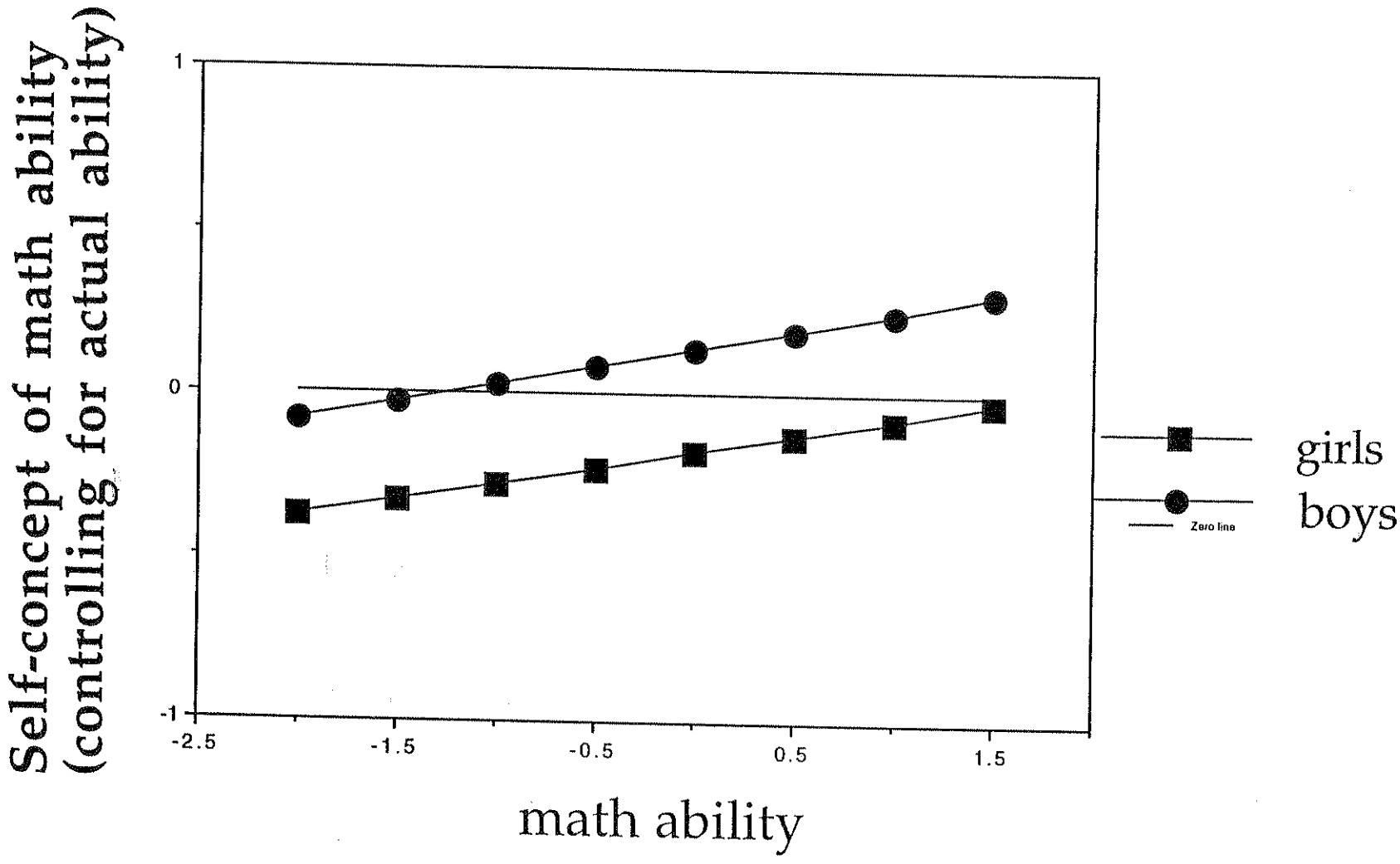

Figure 2. English Self-concept of ability by actual ability

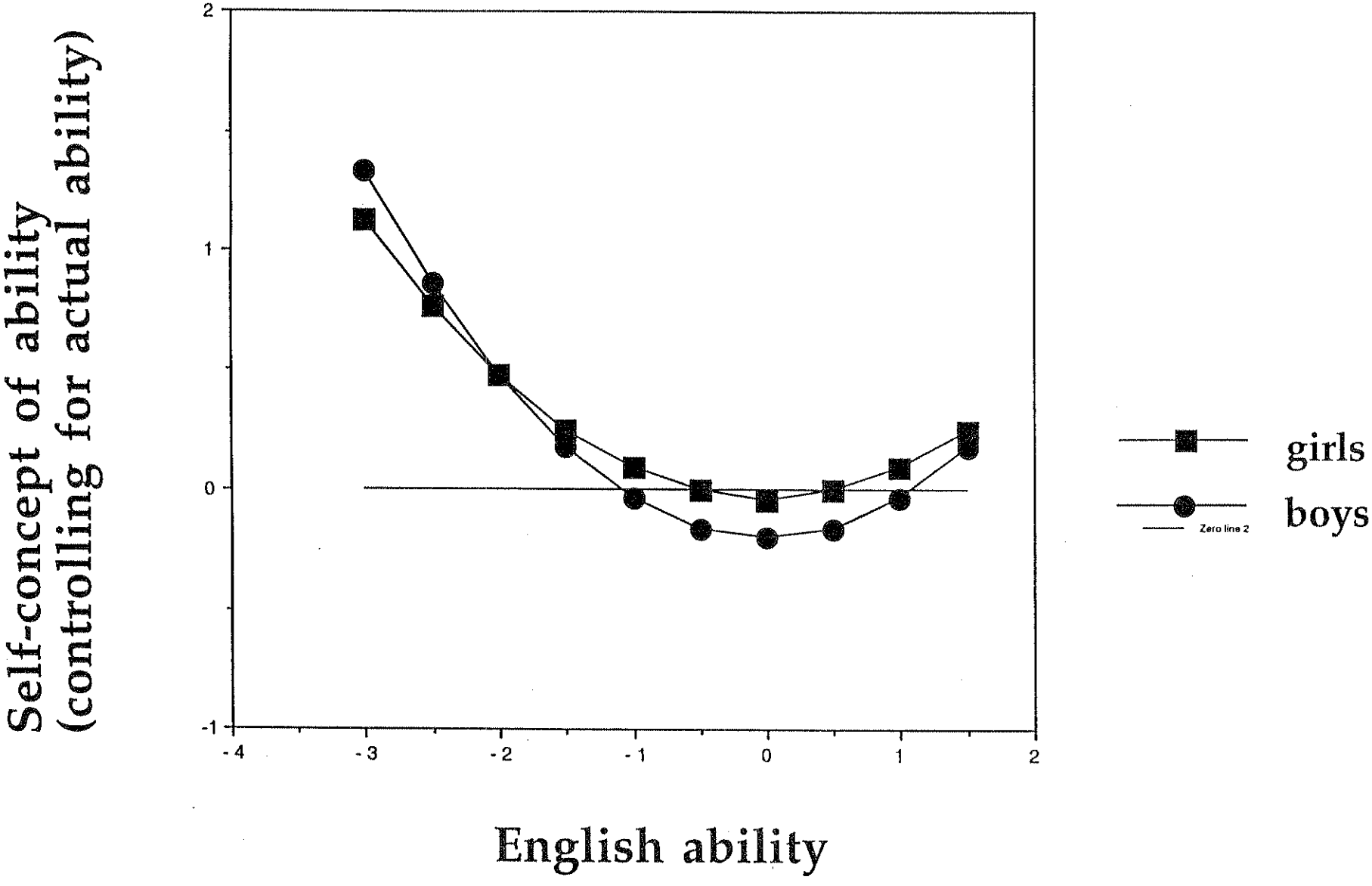

Table 1

DV: Self-concept of math ability (controlling for actual ability)

Mother Model

Father Model

Predictors:	Girls B(Beta)	Boys B(Beta)
child thinks math stereotypes favor their gender	**ns**	**ns**
	ns	ns
importance of doing well in math to child	**.17(.16)****	**.11(.11)***
	.18(.17)**	.10(.10)t
parent's perception of effort needed by child to do well in math	**-.10(-.14)***	**ns**
	-.12(-.14)**	ns
talent-success attribution	**ns**	**.08(.14)***
	.07(.12)*	.09(.15)**
study-success attribution	**ns**	**.06(.12)***
	ns	.06(.12)*
help-success attribution	**-.07(-.13)***	**ns**
	-.07(-.11)t	ns
basic skills-success attribution	**ns**	**.12(.19)****
	ns	.13(.19)*
study-failure attribution	ns	-.08(-.17)*
	ns	-.08(-.17)**
task difficulty- failure attribution	**-.14(-.29)****	**-.08(-.16)****
	-.15(-.29)***	-.08(-.16)**

Mother Model	**R Square=.17*****	**R Square=.21*****
Father Model	**R Square=.16*****	**R Square=.20*****

*p < 05, **p < .01, ***p < .001, t p < .10 Girls N=298 Boys N=339

-other non-significant predictors in the regression were: mom's under/overestimation of child's math ability, easy test-success attribution, talent-failure attribution, help- failure attribution, bad skills-failure attribution

Table 2

DV: Self-concept of English ability (controlling for actual ability)

	Girls	Boys
Mother Model / Father Model	B(Beta)	B(Beta)
Predictors:		
child thinks English stereotypes favor their gender	**.47(.18)*** / .52(.19)***	**ns** / ns
importance of doing well in English to child	**ns** / ns	**.20(.20)*** / .20(.19)***
parent's under/ overestimation of child's English ability	**ns** / ns	**.14(.11)t** / .24(.17)***
ability-success attribution	**ns** / ns	**.12(.16)**** / .12(.16)**
basic skills-success attribution	**.23(.28)*** / .22(.28)***	**.10(.13)t** / .10(.14)*
ability-failure attribution	ns / ns	-.12(-.17)** / -.13(-.19)**
Mother Model	**R Square=.16*** **	**R Square=.19*** **
Father Model	**R Square=.16*** **	**R Square=.20*** **

*p < 05, **p < .01, ***p < .001, t p < .10 Girls N=319 Boys N=393

-other non-significant predictors in the regression were: mom's perception of effort needed by child to do well in English, effort-success attribution, task difficulty-success attribution, help-success attribution, effort-failure attribution, task difficulty- failure

Table 3

DV: Self-concept of ability (controlling for actual ability)

	Math	English
Predictors:	B(Beta)	B(Beta)
child thinks math stereotypes favor their gender	**ns**	**ns**
	ns	ns
importance of doing well in math	**.14(.14)*** **	**.07(.07)t**
	.13(.13)**	.08(.08)*
parent's under/overestimation of child's math ability	**.09(.08)***	**.17(.13)****
	ns	.24(.18)***
parent's perception of effort needed by child to do well in math	**-.07(-.10)***	**ns**
	-.07(-.09)*	ns
ability-success attribution	**.07(.13)****	**.07(.10)***
	.08(.15)**	.07(.11)**
effort-success attribution	.05(.08)*	ns
	.04(.08)*	ns
help-success attribution	-.06(-.10)**	ns
	-.06(-.10)*	ns
basic skills-success attribution	.06(.09)*	.13(.18)***
	ns	.13(.17)***
task difficulty- failure attribution	-.11(-.23)***	ns
	-.11(-.22)**	ns
effort -failure attribution	-.05(-.10)*	ns
	-.05(-.10)*	ns
Mother Model	R Square=.18***	R Square=.12***
Father Model	R Square=.17***	R Square=.13***

*p < .05, **p < .01, ***p < .001, t p <.10

Math N=637 English N=688

Correlation Matrix

* girls above the diagonal, boys below the diagonal

Math	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Child's self-concept of ability		.16**	-	-.22**	.16**	-.19**	-	.13**	-	-	-	-	-.15**	-	-.25**	-	-
2. Importance of doing well	.26**		.12*	-.16**	-	-.14**	.15**	.16**	.27**	.10*	.25**	.37**	-	.13*	-	-	-
3. Child's stereotypes of math	-	.11*		-	-	-	-	-	-	-	-	-	.10*	-	-	-	-
4. Mother's perception of needed effort	-.18**	-	-		-.36**	.56**	-.22**	-.25	-	-.14**	-.09*	-.16**	.12*	-	-	-	-
5. Mother's perception of child's ability	.15**	-	.11*	-.44**		-.21**	.53**	.10*	-	-	-	-	-	-	-	-	-
6. Father's perception of needed effort	-.16**	-.13**	-	.63**	-.32**		-.29**	-	-	-	-	-.16**	-	-	.10*	-	-
7. Father's perception of child's ability	.13**	.12*	-	-.38**	.62**	-.42**		-	-	-	-	-	-	-	-	-	-
8. ability- success attribution	.14*	.30**	.18**	-.19	.14**	-.22**	.11*		.17**	.27**	.23**	.23**	.13*	-	-	-	-
9. effort- success attribution	-	.23**	-	-	-	-	-	.17**		.10*	.38**	.37**	-	.22**	.22*	.26*	.18**
10. task difficulty-success attribution	.29**	.17**	.15**	-	-	-.09*	-	.34**	.10*		.12*	.15**	-	-	-	-	-
11. help- success attribution	-.11*	.30**	-	.18*	-	-	-	.14**	.40**	.19**		.46**	-	.23**	.13*	.20**	.16**
12. basic skills- success attribution	-.18**	.50**	-	-.09*	-	-	-	.37**	.34**	.29**	.43**		-	.11*	.10*	.11*	.13*
13. ability- failure attribution	-.17**	-.11*	-	.26**	-	.24**	.14**	-	.10*	-	.12*	-.10*		.19**	.31**	.21**	.28**
14. effort- failure attribution	-	-	-.13**	.13**	-	.14**	-	-.13**	.29**	-	.20**	-	.39**		.42**	.53**	.46**
15. task difficulty- failure attribution	-.17**	-	-	.16**	-	.17**	-.14**	-	.12**	-	.16**	-	.38**	.42**		.50**	.50**
16. help- failure attribution	-	-	-	.22**	-	.19**	-.15**	-	.17**	-	.18**	-	.48**	.53**	.55**		.69**
17. basic skills- failure attribution	-	-	-	.19**	-.09*	.18**	.12*	-	.22**	-	.21**	-	.57**	.54**	.53**	.69**	

Correlation Matrix

* girls above the diagonal, boys below the diagonal

English	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Child's self-concept of ability		.10*	.20**	-.10*	.13**	-	.13**	.17**	.18**	.12*	.20**	.32**	-	-	-	-	-
2. Importance of doing well	.29**		-	-.14**	.10*	-.09*	-	.13**	.23**	-	.22**	.26**	-	.11*	-	-	-
3. Child's stereotypes of math	-	.11*		-	-	-	-	-	-	-	-	-	-	-	-.10*	-	-
4. Mother's perception of needed effort	-.18**	-	-.11*		-.50**	.45**	-.33**	-.23**	-.13**	-.11*	-.12*	.21**	-	-	-	-	-
5. Mother's perception of child's ability	.19**	-	-	-.54**		-.25**	.48**	.15**	.16**	-	.13**	.15**	-	-	-	-	-
6. Father's perception of needed effort	-	-	-	.50**	-.28**		-.39**	-.15**	-.10*	-	-	-.15**	-	-	-	-	-
7. Father's perception of child's ability	.20**	-	-	-.38**	.57**	-.42**		.12*	.16**	-	.14**	.18**	-	-	-	-	-
8. ability- success attribution	.28**	.31**	.17**	-.19**	.12**	-.11*	.09*		.20**	.34**	.16**	.23**	.15**	-	-	-	-
9. effort- success attribution	.13**	.22**	-	-	-	-	-	.31**		.17**	.42**	.47**	-	.30**	.10*	.14**	.12*
10. task difficulty-success attribution	.15**	.15**	.18**	-.16**	.15**	-.12**	-	.54**	.25**		.21**	.17**	.13**	-	.22**	-	-
11. help- success attribution	.11*	.24**	.15**	-	-	-	-	.35**	.60**	.33**		.66**	-	.22**	-	.27**	.12*
12. basic skills- success attribution	.27**	.29**	.19**	-.20**	.13**	-.10*	-	.54**	.46**	.51**	.52**		-.13**	.20**	-	.15**	.11*
13. ability- failure attribution	-.18**	-	-.09*	.23**	-.15**	.15**	-.12**	-	.13**	-	.09*	-		.34**	.51**	.42**	.48**
14. effort- failure attribution	-	-	-	-	-	-	-	-	.21**	.10*	.22**	.18**	.47**		.57**	.57**	.51**
15. task difficulty- failure attribution	-	-	-	-	-	-	-	.10*	.17**	.21**	.17**	.15**	.55**	.47**		.51**	.50**
16. help- failure attribution	-	-	-	.17**	-	.17**	-	-	.25**	-	.26**	.21**	.55**	.54**	.55**		.78**
17. basic skills- failure attribution	-	-	-	.12**	-	.15**	-	-	.22**	-	.20**	.11*	.53**	.48**	.52**	.71**	