

# Do Parents' Academic Gender Stereotypes Influence Whether They Intrude on their Children's Homework?

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In this study, we explored the possibility that when parents endorse particular academic gender stereotypes (e.g., boys are better at math, girls are better at English) they are more likely to engage in uninvited intrusions with homework, intrusions which then undermine children's confidence in these domains. Participants included 38 fifth to eighth grade students (mean age = 12.16 years, 60% girls, 87% White) and their mothers and fathers. The findings indicated that even though boys received more parental intrusive support with homework, girls were more sensitive to these intrusions, specifically when they involved math. Parents' intrusive support mediated the relationship between parents' math-related gender stereotypes and girls' math ability perceptions, which suggests that these behaviors communicate to girls their parents' math stereotype beliefs.

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**KEY WORDS:** gender stereotypes; parental intrusive support; math ability perceptions.

An important finding in the achievement literature is that children's self-evaluations of their academic competencies are more strongly related to their parents' appraisals of their academic abilities than to their actual academic performance (Entwisle & Baker, 1983; Jacobs & Weisz, 1994; Klebanov & Brooks-Gunn, 1992; Parsons, Adler, & Kaczala, 1982; Phillips, 1987). We know, in turn, that parents' ability appraisals are colored by their stereotypes about boys' and girls' aptitudes in particular academic domains (Andre, Whigham, Hendrickson, & Chambers, 1999; Eccles & Jacobs, 1986; Parsons et al., 1982; Yee & Eccles, 1988). What is less well understood is *how* parents convey to their children these stereotypic beliefs. In the present study, we explored the possibility that when parents endorse particular academic gender stereotypes (e.g., boys are better at math, girls are better at English) they are more likely to engage in uninvited intrusions

with homework, intrusions which then undermine children's confidence in these domains.

## Parents' Ability Beliefs and Gender Stereotyped Beliefs

There is strong evidence that parents' gender stereotypes about sex-typed subject domains directly influence parents' perceptions of their children's ability (Jacobs, 1991; Jacobs & Eccles, 1992). For example, when parents endorse the gender stereotype that math and science are male domains, they are more likely to underestimate their daughters' abilities in these domains and to overestimate their sons' abilities (Eccles & Jacobs, 1986; Tiedemann, 2000). In contrast, when parents endorse the gender stereotype that English and social science are female domains, they tend to overestimate their daughters' abilities in these subjects and to underestimate their sons' abilities (Frome & Eccles, 1998). More important, parents' gender stereotyped beliefs about their children's academic competencies directly influence children's ability perceptions (Bleeker & Jacobs, 2004; Jacobs, 1991; Jacobs & Eccles, 1992). This occurs irrespective of the child's actual ability.

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For example, in a sample of sixth graders, Frome and Eccles (1998) found that even when girls received higher math grades than their male classmates, they tended to underestimate their ability in math—consistent with their mothers' reports of their daughters' math skills and aptitude. Frome and Eccles (1998) noted that this reliance on stereotypes about math was truer of mothers than fathers. That is, unlike mothers, fathers' perceptions of their child's ability in both math and English were more closely aligned with the child's actual grades. Similarly, Jacobs (1991) found that, regardless of how strongly they held gender stereotyped beliefs, mothers who endorsed a math stereotype underestimated their daughters' ability in math. For fathers, this was only the case among those fathers who most strongly endorsed the stereotype. Among fathers whose views were less stereotyped, judgments of their daughters' math abilities were more accurate.

### **Homework as a Context for Conveying Gender Stereotyped Beliefs**

There are probably many opportunities for parents to communicate to their children their stereotypic beliefs about particular academic domains, such as math and English. One possible occasion may be parent-child interactions involving homework. One of the purported benefits of homework is that it affords parents a "window" into their child's schoolwork (Featherstone, 1985). Yet, at the same time, it provides parents a platform whereby they can communicate either positive or negative expectations for their child's academic success (Epstein, 1992). It is therefore not surprising that the link between parents' involvement with homework and children's achievement outcomes has been found to be both positive and negative (Balli, Demo, & Wedman, 1998; Epstein, 1988; Hoover-Dempsey et al., 2001; Keith et al., 1993; Leone & Richards, 1989). For instance, in a study involving elementary school children, mothers' helping with homework did not improve their child's academic achievement (Levin et al., 1997). Similarly, Ginsburg and Bronstein (1993) reported finding both mothers' and fathers' surveillance of fifth-grade students' homework was negatively associated with children's achievement scores. On the other hand, Sui-Chi and Willms (1996) found parental involvement in homework to be positively associated with academic achievement among eighth graders. Epstein's (1986, 1987) work has also

found that students benefit when their parents are involved in schoolwork at home.

Despite these inconsistencies, one recurring finding is that when parents provide uninvited help and monitoring with homework, children feel less competent in their abilities (Ginsburg & Bronstein, 1993; Grolnick & Slowiaczek, 1994; Ng, Kenney-Benson, & Pomerantz, 2004; Pomerantz & Eaton, 2001; Pomerantz & Ruble, 1998). Further, parents tend to provide such unsolicited—or intrusive support—when they perceive that their child is not doing well in school (Chen & Stevenson, 1989; Muller, 1995; Ng et al., 2004; Pomerantz & Eaton, 2001). As Hoover-Dempsey et al. (2001) explain, parents associate children's low performance as "invitations" to get involved with homework (p. 201). Given this relationship between children's achievement and parents' intrusive support, one might expect that parents would be motivated to help daughters more than sons with math if they believe that girls are not as good at math as boys are. In the same way, they would be motivated to help sons more than daughters with English if they believe that boys are not as good at English as girls are. However, this hypothesis has not been tested. And, if true, it is unclear whether it would hold equally for both mothers and fathers.

One shortcoming of the research on parents' intrusive support with homework is that it has been based almost exclusively on mothers. We know from the parental involvement literature that mothers tend to be more involved with homework than fathers are (Grolnick & Slowiaczek, 1994; Levin et al., 1997). However, we still do not know whether fathers, when they are involved, engage in the same level of intrusive support as mothers do. Studies on parental teaching styles indicate mothers and fathers not only adopt different teaching styles (Gonzalez & Palacios, 1992; McGillicuddy-DeLisi, 1988; Tenenbaum & Leaper, 2003), but that this difference often depends on the gender of the child (Carter & Wojtkiewicz, 2000; Crowley, Callanan, Tenenbaum, & Allen, 2001; Deslandes, Bouchard, & St-Amant, 1998; Laakso, 1995). This suggests that there may be differences in the amount of intrusive support that mothers and fathers provide.

In the current study, we examined whether there are in fact differences in the amount of intrusive support that mothers and fathers provide their children and whether these differences vary with the gender of the child and/or the academic subject domain (i.e., math or English). We then determined

whether parents' intrusive support mediated the link between parents' academic gender stereotypes and children's perceptions of their academic abilities. Based on the literature reviewed, we hypothesized that parents who held strong gender stereotyped beliefs would provide more intrusive support to their children, which would negatively relate to children's ability perceptions.

## METHOD

### Sample

The study was conducted in a midwestern semi-rural county. The sample was comprised of 38 fifth to eighth grade students (mean age = 12.16 years; 60% girls, 40% boys; 87% European-American, 3% Asian-American, 10% other ethnic groups) and their mothers and fathers (with the exception of one single-mother family). The children were predominantly high-achievers (mean grade in math = 7.76, and mean grade in English = 8.24), where letter grades were coded to reflect a system ranging from D = 1 to A+/A = 9. The families were recruited through advertisements in newspapers and campus community email lists, which were circulated within the local community. Each family was provided \$30 on the completion of the study as token of appreciation for their participation.

### Procedure

Each family member completed a questionnaire. Children reported on their self-perceptions of their math and English abilities. Each parent reported on his or her perceptions of the child's math and English abilities, and also his or her gender stereotyped beliefs about math and English. The questionnaires were sent to each family's residential address so the families could complete the questionnaires at home.

Once families had completed the surveys, they received a packet of "homework checklists" for the child to fill out at home, five each for math and English. Children were instructed to report on five individual math and five individual English homework sessions when an interaction took place with either parent. For each homework session, the child completed one of the corresponding homework checklists immediately after the homework session ended.

Families were asked to report on five math and five English homework sessions that occurred within a 2-week period. Families were not instructed about which 10 specific sessions to consider, but instead asked to choose any 10 of their own choice. Based on the dates of the sessions families reported to us, most families reported on five consecutive math homework sessions, and five consecutive English homework sessions.

Parents were instructed not to assist the child as the child completed the survey and checklists. As an additional assurance, follow-up calls were made to each family to address any questions the child may have had about the survey and checklists. At that time, we reiterated to the child that he or she not seek any help from his/her parent when filling out the survey and checklists.

### Measures

#### *Children's Perceptions of Abilities*

Separate scales were used to assess children's self-perceptions of their math and English abilities. The items on these scales were based on the Self-Perception Questionnaires developed by Eccles and her colleagues (Eccles, Adler, & Meece, 1984; Parsons et al., 1980). Both math ability and English ability perceptions were measured by two items, each of which were on a 5-point, Likert-type response scale: "How good are you at math/English?"; "In comparison to most of your other academic subjects, how good are you at math/English?" In the current study the internal reliability estimates were .75 and .83 for math and English, respectively.

#### *Parents' Perceptions of Child's Abilities*

Mothers and fathers individually reported on their perceptions of their child's abilities in math and English using a modified version of items developed by Parsons et al. (1982). Both math ability and English ability perceptions were measured by five items, each of which were on a 5-point Likert scale (e.g., "How is your child doing in math/English this year?"; "How much natural talent does your child have in math?"). The internal reliability estimates for mothers were .81 for math and .88 for English in the current study. The corresponding estimates for fathers were .87 and .85.

### *Parents' Academic Gender Stereotyped Beliefs*

Mothers and fathers individually reported on their general beliefs about boys' and girls' relative math and English competencies. For each subject domain, a two-item scale was used. The items on these scales were modified versions of items used previously by Jacobs and her colleagues (Bleeker & Jacobs, 2004; Jacobs, 1991). The items read: "Generally speaking, how do you believe males and females compare in their aptitude or ability for math?"; "Generally speaking, do you believe there are differences in performance levels of boys and girls in math?" The items were averaged so that a high score of 5 indicated a strong stereotyped belief in favor of boys for math. Similar questions were asked comparing boys and girls on English, and a high score of 5 indicated a strong stereotyped belief in favor of girls for English. The internal reliability estimates for mothers were .85 for math stereotypes and .86 for English stereotypes in the current study. The corresponding estimates for fathers were .82 and .78.

### *Parent's Intrusive Support*

An index of parents' intrusive support behavior was derived from the homework checklists. The checklists included modified versions of the items on the homework checklists used by Pomerantz and her colleagues (Pomerantz & Eaton, 2001; Pomerantz & Ruble, 1997). The checklist items indexed whether during a particular homework interaction the parent had provided *unsolicited help* (e.g., "Did your parent offer to help you with your English/math homework today without you asking first?"), *monitoring* (e.g., "Did your parent check your answers to make sure you did them right without you asking?"), and *reminding* (e.g., "Did your parent remind you that you needed to do your English/math homework today?"). The items were scored such that a 0 indicated that the behavior had not occurred, and a 1 indicated that the behavior had occurred. To address social desirability concerns, these items were mixed in with a set of several items that asked about other aspects of the homework session. A score for each of the three intrusive support behaviors was computed for each parent, one for math and one for English. Each score was calculated by summing the number of times a parent exhibited the behavior and dividing by the number of times the parent helped with homework. For each subject domain, these three pro-

portion scores (i.e., unsolicited help, monitoring, and reminding) were then averaged as an index of the parents' intrusive support.<sup>3</sup> Thus, intrusive support scores could range from 0, which means that the parent had never provided intrusive support, to 1, which means that every time the parent helped he/she had provided intrusive support. If a parent did not help at all with homework in a particular subject, the parent would receive a missing intrusive support score for that subject.

## RESULTS

In the first set of analyses, we examined whether mothers and fathers differed in how often they had provided intrusive support to their child, as well as whether parents differed in their perceptions of their child's ability and their gender stereotyped beliefs depending upon the gender of their child or academic subject domain. In order to test these differences, we ran separate 2 (parent gender)  $\times$  2 (child gender)  $\times$  2 (subject domain) ANOVAs for each of the three variables. Table I includes the means and standard deviations for mothers' and fathers' intrusive support scores, ability perceptions, and gender stereotyped beliefs by gender of child and academic subject domain.

### **Differences in Mothers' and Fathers' Intrusive Support**

The ANOVA for parents' intrusive support scores<sup>4</sup> resulted in a significant main effect for

<sup>3</sup>The intrusive support behaviors (i.e., helping, monitoring, and reminding) were not significantly interrelated. Nevertheless, it was valuable to average across these items. As suggested by Pomerantz and Eaton (2000), parents may engage in only one form of intrusive support behavior during a particular homework session. For instance, parents may not provide unsolicited help to the child, as they may have already monitored the child's answers. Therefore, each child may experience different forms of intrusive support. Yet, how the child interprets each form may contribute to their general conceptions of parental intrusiveness. Also, the intrusive support behaviors separately would yield a large number of analyses, thus increasing the likelihood of Type I error.

<sup>4</sup>Given the proportional nature of the means and standard deviations of the intrusive support scores, the ANOVAs were first computed using logarithmically transformed scores (Kirk, 1982). These results were identical to those using the nontransformed scores. For ease of interpretability, the analyses with the nontransformed scores are reported.

**Table I.** Means and Standard Deviations for Child and Parent Variables for Math and English by Gender of Child

Measure	Mother						Father					
	Sons			Daughters			Sons			Daughters		
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Intrusive support												
Math	.37	.14	11	.21	.20	18	.35	.21	7	.20	.19	14
English	.31	.19	13	.24	.19	21	.22	.22	6	.13	.13	8
Parent's perceptions												
Math	3.85	.76	15	4.10	.60	23	4.19	.50	15	4.22	.65	22
English	3.83	.60	15	4.32	.48	23	4.12	.61	15	4.43	.48	22
Gender stereotyped beliefs												
Math	3.10	.57	15	3.30	.58	23	3.67	.94	15	3.39	.90	22
English	3.67	.59	15	3.28	.70	23	3.60	.57	15	3.64	.66	22

child gender,  $F(1, 90) = 8.16, p < .01$ , which indicates that, overall, boys received more intrusive support than did girls, irrespective of parent gender or subject domain ( $M = .32, SD = .19$  and  $M = .21, SD = .18$  for boys and girls, respectively;  $d = .59$ ). There were no other main or interaction effects.

**Differences in Mothers' and Fathers' Ability Perceptions and Stereotyped Beliefs**

The ANOVA for parents' perceptions of their child's ability resulted in a significant main effect for parent gender,  $F(1, 142) = 4.91, p < .05$ , which indicates that, overall, irrespective of their child's gender and academic subject domain, fathers reported higher perceptions of their child's ability than did mothers ( $M = 4.26, SD = .57$  and  $M = 4.06, SD = .62$  for fathers and mothers, respectively;  $d = .34$ ). In addition, there was a significant main effect for child gender,  $F(1, 142) = 7.75, p < .01$ . Parents of girls reported higher perceptions of the child's ability than did parents of boys ( $M = 4.27, SD = .56$  and  $M = 4.00, SD = .63$  for girls and boys, respectively;  $d = .45$ ). A 2 (child gender)  $\times$  2 (subject domain) ANOVA for children's own ability perceptions resulted in no main or interaction effects, which indicates that boys and girls reported similar beliefs about their abilities in both math ( $M = 3.93, SD = .73$  and  $M = 3.76, SD = .71$  for boys and girls, respectively) and English ( $M = 3.83, SD = .92$  and  $M = 3.91, SD = .79$  for boys and girls, respectively).

The ANOVA for parents' gender stereotyped beliefs resulted in a main effect for parent gender; overall, fathers reported stronger stereotyped beliefs than mothers did ( $M = 3.56, SD = .78$  and  $M = 3.33, SD = .64$  for fathers and mothers, respectively;  $d = .32$ ). This main effect for parent gender appeared

to be moderated by a significant three-way interaction effect,  $F(1, 142) = 3.70, p = .056$ . To evaluate this interaction, separate 2 (child gender)  $\times$  2 (subject domain) ANOVAs were conducted for mothers and fathers. The analyses resulted in one significant effect, and it was for mothers only. For mothers there was a significant child gender by subject domain interaction effect,  $F(1, 72) = 4.08, p < .05$ . As can be seen in Table I, mothers of boys reported stronger gender stereotypes about English than did mothers of girls, whereas the reverse was seen for math; mothers of girls reported stronger gender stereotypes about math than did mothers of boys. In other words, overall mothers endorsed stronger gender stereotypes in English favoring girls, and stronger gender stereotypes in math favoring boys.

**Interrelationships Among the Parent Variables and Children's Ability Perceptions**

In the next set of analyses, we tested our hypothesis that parents who reported strong gender stereotyped beliefs would provide more intrusive support to their children, which would negatively relate to children's perceptions of their own abilities. We conducted separate analyses for each subject domain. In our sample of 38 families, mothers were more likely than fathers to help with homework; mothers helped 61% of the time with math and 73% of the time with English. This meant that we were unable to include the variables for each parent in our analyses because our sample size was further restricted. Therefore, for each subject domain analysis we restricted our sample to include the parent in each family who helped the majority of the time with homework in that particular subject domain (i.e., the parent for whom we had three or more checklists completed for

**Table II.** Intercorrelations among Parent and Child Variables for Math (above Diagonal) and for English (below Diagonal)

	1	2	3	4
1. Parents' gender-related stereotypes	—	-.27	.39*	-.43**
2. Parents' perceptions of child's ability	.13	—	-.46**	.54**
3. Parents' intrusive support	-.12	.06	—	-.39*
4. Child's self-perceptions of ability	-.19	.09	.20	—

Note:  $n = 38$  in each cell.

\* $p < .05$ .

\*\* $p < .01$ .

a particular subject domain).<sup>5</sup> This resulted in the selection of 25 mothers and 13 fathers who helped with math and 27 mothers and 10 fathers who helped with English. A series of *t*-test comparisons indicated that the subset of parents selected did not differ significantly from the remaining parents with respect to parents' perceptions of their child's abilities, gender stereotyped beliefs, and intrusive support.

To begin, we computed Pearson product-moment correlations among parents' intrusive support, their perceptions of the child's abilities, gender stereotyped beliefs, and children's perceptions of their own abilities within each subject domain (i.e., collapsed across child gender). We chose first to calculate the intercorrelations collapsed across child gender in order to determine if, overall, these relationships emerged within each subject domain. As seen in Table II, there were no significant relationships among the variables for English. When we calculated the correlations for English by child gender only one significant correlation emerged. For girls, there was a negative correlation between parents' gender stereotypes about English and the amount of intrusive support they provided daughters with English homework,  $r(22) = -.49$ ,  $p < .05$ . That is, parents who believed that girls are better at English were less likely to intrude on their daughters' English homework. Because there were no other significant correlations involving English, the remainder of the analyses focused on math only.

### The Case of Math

As can be seen in Table II, both parents' gender stereotypes about math and perceptions of their

child's math ability were significantly related to their intrusive support during math homework. Parents who reported stronger math-related gender stereotypes were more likely to engage in intrusive support during math homework. And parents who reported lower perceptions of their child's ability were more likely to provide intrusive support. All three parent variables were significantly correlated with children's perceptions of their math ability, such that children with low perceptions of their math ability had parents who reported stronger math gender stereotypes, low perceptions of their child's math ability, and provided more intrusive support.

Table III presents the intercorrelations for math by child gender. Here, we can see that the intercorrelations were significant for girls but not for boys. The only significant correlation to emerge for boys was between boys' perceptions of their ability and parents' perceptions of their sons' ability, which indicates that boys who reported high perceptions of their math ability had parents who perceived their sons to be doing well in math. It is possible that the correlations for boys did not reach significance due to the small number of boys in our study. However, because the correlations for girls did reach significance we focused our remaining analyses on girls only.

### The Case of Girls and Math

The significant correlations among the variables for girls met the conditions for testing the possible mediation of parents' intrusive support on parents' math-related gender stereotyped beliefs and girls' self-perceptions of their math ability (Baron & Kenny, 1986). As illustrated in Fig. 1, we tested the hypothesis that parents' beliefs about gender stereotypes had an effect on their level of intrusive support provided to their daughters, which in turn had an effect on girls' perceptions of their own math ability. The results of the regression are presented in

<sup>5</sup>In one family, the child completed only four checklists, two each for the mother and the father. In this case, we made the decision to include only the mother in our analyses because the father's intrusive support score was 0.

**Table III.** Intercorrelations among Parent and Child Math-Related Variables for Girls (above Diagonal) and for Boys (below Diagonal)

	1	2	3	4
1. Parents' gender-related stereotypes	—	-.24	.48*	-.45*
2. Parents' perceptions of child's ability	-.40	—	-.48*	.48*
3. Parents' intrusive support	.25	-.32	—	-.55**
4. Child's self-perceptions of ability	-.40	.73**	-.28	—

Note.  $n = 23$  for girls (above the diagonal),  $n = 15$  for boys (below the diagonal).

\* $p < .05$ .

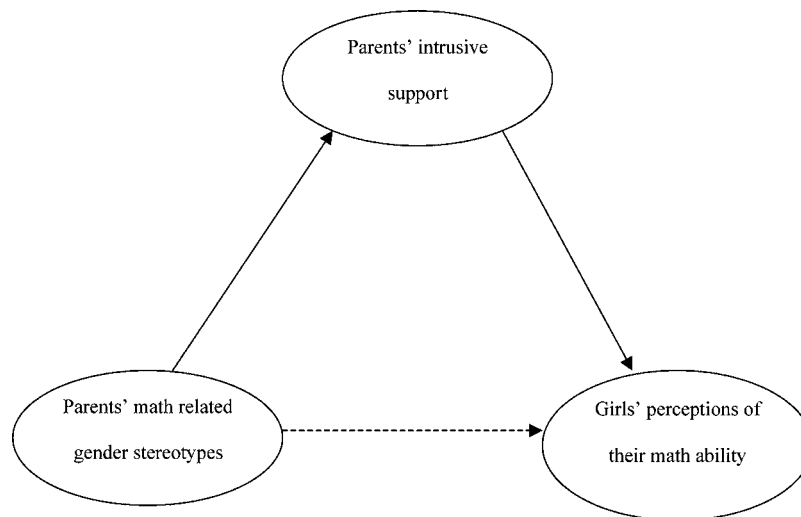
\*\* $p < .01$ .

Table IV. As predicted, when girls' self-perceptions of their math ability was regressed on both parents' intrusive support and parents' beliefs in math stereotypes, the relationship between parents' math-related gender stereotypes and girls' self-perceptions of their math ability did not reach significance, although the direct relationship between parents' intrusive support and girls' perceptions of their own math ability remained significant. This suggests that parents' intrusive support mediated the relationship between parents' math gender stereotypes and girls' perceptions of their own math ability. The results are included in Table IV.

*Parents' Math Ability Perceptions*

Because parents' perceptions of their daughter's math ability also correlated with intrusive support (see Table III), we examined the relative predictive

contribution of parents' perceptions of their daughters' math ability and their beliefs in math-related stereotypes on parents' intrusive support behavior during math homework. Both parents' perceptions and gender stereotyped beliefs were put together into a stepwise linear regression model as predictors. The analyses indicated that parents' perception was the better predictor as it was entered first into the regression analysis,  $\beta = -.48$ ,  $t = -2.51$ ,  $p < .05$ ; it predicted 23% of the variance in parents' intrusive support with math. However, parents' math-related gender stereotypes was retained in the second step,  $\beta = .39$ ,  $t = 2.11$ ,  $p < .05$  and it predicted an additional 14% of the variance in parents' intrusive support with math  $F(2, 22) = 5.89$ ,  $p < .01$ ,  $R^2 = 37\%$ . This suggests that, even after parents take into account their assessments of their daughters' ability in math, parents' decisions about whether to intrude on math homework are further influenced by their math-related gender stereotyped beliefs.



**Fig. 1.** A model of the mediation effect of parents' intrusive support behavior during math homework on the direct relationship between parents' math-related gender stereotypes and girls' perceptions of their math ability.

**Table IV.** Hierarchical Regression Analyses for Predictors of Girls' Math Ability Perceptions with Parents' Math Gender Stereotypes as the Independent Variable

	$R^2$	$\Delta R^2$	$\beta$	$\Delta F$ ratio	Significance
Step 1					
Parents' intrusive support	.30	.30	-.55	9.23	$p < .01$
Step 2					
Parents' intrusive support			-.44		$p < .05$
Parents' gender stereotypes	.35	.05	-.24	1.41 <sup>a</sup>	<i>n.s.</i>

<sup>a</sup>Overall  $F(2, 20) = 5.41, p < .05$ .

## DISCUSSION

We found that, even though boys are the recipients of more parental intrusive support with homework, girls may be more sensitive to these intrusions specifically when they involve math. It appears from our findings that girls are affected by parental intrusive support behaviors because these behaviors communicate to girls their parents' stereotyped beliefs about math as a subject in which boys do better than girls.

The boys in our sample not only received more intrusive support from both mothers and fathers, but this occurred irrespective of whether it was English or math homework. At the same time mothers and fathers reported lower perceptions of boys' abilities than girls' abilities in these subject domains. When we examined the children's school grades in math and English we found that parents' perceptions were consistent with the actual achievement differences between the boys and the girls in our sample; overall, boys had lower grades than girls,  $F(1, 67) = 5.45, p < .05$  ( $M = 7.46, SD = 2.01$ , and  $M = 8.40, SD = 1.30$  for boys and girls, respectively). This suggests that the parents were motivated to help boys with homework because they perceived their sons as not doing well and therefore in need of parental help (Ng et al., 2004; Pomerantz & Eaton, 2001). Although in our sample parents' perceptions of their sons' abilities did not significantly correlate with the amount of intrusive support parents provided, the relationship was in the expected negative direction.

For the girls in our sample, we found significant relationships among parents' stereotyped beliefs, intrusive support, and children's perceptions of their abilities, but only with respect to math. In line with previous research, girls whose parents believed that math is a male domain were less confident in their own math ability. At the same time, parents' gender stereotyped beliefs about math were positively related to the amount of intrusive support they provided to their daughters. Consistent with our predic-

tions, parents' intrusive support accounted for the association between parents' beliefs in math gender stereotypes and girls' perceptions of their math ability. Because our data are cross-sectional, it is impossible to conclude the true directionality of these influences. However, our findings suggest that perhaps girls are interpreting parents' intrusions with homework as parents' endorsement of the stereotype that math is difficult for girls. Put another way, when parents intrude with math homework, girls are reminded of their minority status in math. This possible stereotype threat effect (Aronson, Quinn, & Spencer, 1998; Steele, 1997) is supported by the fact that in our sample these relationships for girls did not hold for English.

Again, our findings suggest that girls' perceptions of their math ability may be negatively influenced by their parents' intrusions with homework because these intrusions make salient to girls the stereotype that math is a male domain. This is particularly important given the persistent findings that by middle school girls are less confident in math than are boys, even though girls perform as well or better than boys do (Frome & Eccles, 1998; Jacobs, 1991; Wigfield et al., 1997). The most widely accepted explanation for this gender difference has been that culturally held gender role stereotypes socialize girls and boys to different beliefs about their ability potential in gender stereotyped domains such as math (Crouter, Manke, & McHale, 1995; Eccles, 1994; Eccles & Jacobs, 1986; Eccles, Wigfield, & Schiefele, 1998). Our data therefore suggest that one way in which this happens is through the intrusions girls receive from parents when they attempt to do math homework. Our finding that parents' beliefs about math stereotypes independently contributed to parents' intrusive support behavior even after we took into account parents' beliefs about their child's ability in math suggests that a reminder of gender stereotypes is powerful even when it is subtle (e.g., a parent checking over a daughter's math homework) and that it can contribute to a cycle



of self-doubt for girls. Therefore, one might expect that when parents make explicit statements to girls about their belief in stereotypes, the potential impact on girls' math self-confidence may be even more profound (Tenenbaum, Aldrich, & Hickman, 2004; Tenenbaum & Leaper, 2003).

Because of the small number of families in our study, our results must be interpreted cautiously. Also, our sample size did not allow us to look at whether our set of relationships was moderated by parent gender. It is interesting to note, however, that in our sample overall, fathers reported stronger gender stereotypes about math and English than did mothers. If gender stereotypes influence parents' decisions to intrude on their daughters' math homework, and if fathers have stronger beliefs about math stereotypes, it will be important to determine if fathers' intrusions have a particular impact on girls' perceptions of their math ability.

Another limitation of our study is that we did not look at the relationships among parents' stereotyped beliefs, intrusive support, and children's perceptions of their ability over time. If we had looked at the process over time, it is likely that we would have seen a set of circular relations. We would expect to see girls exhibit more helplessness, help-seeking, and challenge avoidance when their math confidence is compromised, which perhaps would provoke parents to engage in more intrusive support. Therefore, longitudinal investigations are required to examine further these causal pathways by which parents' beliefs influence children's self-assessments. Moreover, it is likely that the messages that parents communicate, and the way that children interpret them, may vary by ethnic group (Chao & Tseng, 2002; Cooper, Lindsay, & Nye, 2000; Huntsinger, Jose, & Larson, 1998; Huntsinger, Jose, Liaw, & Ching, 1997), which emphasizes the importance for future researchers to study more diverse samples.

Despite the limitations of our study, we consider our results to be both interesting and provocative. The girls' perceptions of their abilities in subjects such as math and science are critical to their persistence in these academic domains (Eccles, 1987, 1994; Farmer, Wardrop, & Rotella, 1999; Fennema, 1984; Hackett & Betz, 1989, 1992; Kahle, 1985; Maple & Stage, 1991; Oakes, 1990, 1992; Sax, 1994; Seymour, 1995). Yet, despite the widely appreciated significance of self-perceptions of math and science abilities, we know little about why these perceptions become increasingly negative for girls during the adolescence years. Our findings suggest that girls'

confidence may be eroded through the interactions they have with parents regarding math homework. Specifically, it seems from our findings that girls are susceptible to negative interpretations of even the most subtle and seemingly innocuous parental behaviors, such as being reminded to do their math homework or being offered help with their math homework. If parents believe that math is a male domain, then their intrusions with their daughter's homework may take on a particular meaning to girls, that is, that girls cannot do math. If we are to boost girls' confidence in domains such as math and science, we need to continue to try to understand the process by which parents and other adults communicate messages to girls about girls' ability. At the same time, we need to help girls learn to interpret these messages to their advantage.

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## REFERENCES

- Andre, T., Whigham, M., Hendrickson, A., & Chambers, S. (1999). Competency beliefs, positive affect, and gender stereotypes of elementary students and their parents about science versus other school subjects. *Journal of Research in Science Teaching, 36*, 719-747.
- Aronson, J., Quinn, D. M., & Spencer, S. J. (1998). Stereotype threat and the academic underperformance of minorities and women. In J. K. Swim & C. Stangor (Eds.), *Prejudice: The target's perspective* (pp. 83-103). San Diego, CA: Academic Press.
- Balli, S. J., Demo, D. H., & Wedman, J. F. (1998). Family involvement with children's homework: An intervention in the middle grades. *Family Relations, 47*, 149-157.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Personality and Social Psychology, 51*, 1173-1182.
- Bleeker, M. M., & Jacobs, J. E. (2004). Achievement in math and science: Do mothers' beliefs matter 12 years later? *Journal of Educational Psychology, 96*, 97-109.

- Carter, R. S., & Wojtkiewicz, R. A. (2000). Parental involvement with adolescents' education: Do daughters or sons get more help? *Adolescence*, 35, 29–44.
- Chao, R., & Tseng, V. (2002). Parenting of Asians. In M. H. Bornstein (Ed.), *Handbook of parenting: Vol. 4. Applied and practical parenting* (2nd ed., pp. 59–93). Mahwah, NJ: Erlbaum.
- Chen, C., & Stevenson, H. W. (1989). Homework: A cross-cultural examination. *Child Development*, 60, 551–561.
- Cooper, H., Lindsay, J. J., & Nye, B. (2000). Homework in the home: How student, family, and parenting-style differences relate to the homework process. *Contemporary Educational Psychology*, 25, 464–487.
- Crouter, A. C., Manke, B. A., & McHale, S. M. (1995). The family context of gender intensification in early adolescence. *Child Development*, 66, 317–329.
- Crowley, K., Callanan, M. A., Tenenbaum, H. R., & Allen, E. (2001). Parents explain more often to boys than to girls during shared scientific thinking. *Psychological Science*, 12, 258–261.
- Deslandes, R., Bouchard, P., & St-Amant, J. (1998). Family variables as predictors of school achievement: Sex differences in Quebec adolescents. *Canadian Journal of Education*, 23, 390–404.
- Eccles, J. S. (1987). Gender roles and women's achievement-related decisions. *Psychology of Women Quarterly*, 11, 135–171.
- Eccles, J. S. (1994). Understanding women's educational and occupational choices. *Psychology of Women Quarterly*, 18, 585–609.
- Eccles, J. S., Adler, T. F., & Meece, J. L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology*, 46, 26–43.
- Eccles, J. S., & Jacobs, J. E. (1986). Social forces shape math attitudes and performance. *Journal of Women in Culture and Society*, 11, 367–380.
- Eccles, J. S., Wigfield, A., & Schiefele, U. (1998). Motivation to succeed. In N. Eisenberg (Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 1017–1095). New York: Wiley.
- Entwisle, J., & Baker, D. (1983). Gender and young children's expectations for performance in arithmetic. *Developmental Psychology*, 19, 200–209.
- Epstein, J. L. (1986). Parents' reactions to teacher practices of parent involvement. *Elementary School Journal*, 86, 277–293.
- Epstein, J. L. (1987). Parent involvement: What research says to administrators. *Education and Urban Society*, 19, 119–136.
- Epstein, J. (1988). *Homework practices, achievements, and behaviors of elementary school students* (ERIC Document Reproduction Service No. PS 017 621). Baltimore: Center for Research on Elementary and Middle Schools, Johns Hopkins University.
- Epstein, J. (1992). *School and family partnerships* (Report No. 6). Baltimore: Center on Families, Communities, Schools and Children's Learning, Johns Hopkins University.
- Farmer, H. S., Wardrop, J. L., & Rotella, S. C. (1999). Antecedent factors differentiating women and men in science/nonscience careers. *Psychology of Women Quarterly*, 23, 763–780.
- Featherstone, H. (1985). What does homework accomplish? *Principal*, 65, 6–7.
- Fennema, E. (1984). Girls, women, and mathematics. In E. Fennema & M. J. Ayer (Eds.), *Women and education* (pp. 137–164). Berkeley, CA: McCutchan.
- Frome, P. M., & Eccles, J. S. (1998). Parents' influence on children's achievement-related perceptions. *Journal of Personality and Social Psychology*, 74, 435–452.
- Ginsburg, G. S., & Bronstein, P. (1993). Family factors related to children's intrinsic/extrinsic motivational orientation and academic performance. *Child Development*, 64, 1461–1474.
- Gonzalez, M. M., & Palacios, J. (1992, September). *The genesis of cognitive-linguistic competence in the context of parent-child interactions*. Poster presented at the European Conference on Developmental Psychology, Seville, Spain.
- Grolnick, W. S., & Slowiaczek, M. L. (1994). Parent's involvement in children's schooling: A multidimensional conceptualization and motivational model. *Child Development*, 65, 237–252.
- Hackett, G., & Betz, N. E. (1989). An exploration of the mathematics self-efficacy/mathematics performance correspondence. *Journal for Research in Mathematics Education*, 20, 261–273.
- Hackett, G., & Betz, N. E. (1992). Self-efficacy perceptions and the career-related choices of college students. In D. H. Schunk & J. L. Meece (Eds.), *Student perceptions in the classroom* (pp. 229–246). Hillsdale, NJ: Erlbaum.
- Hoover-Dempsey, K. V., Battiato, A. C., Walker, J. M. T., Reed, R. P., DeJong, J. M., & Jones, K. P. (2001). Parental involvement in homework. *Educational Psychologist*, 36, 195–209.
- Huntsinger, C. S., Jose, P. E., & Larson, S. L. (1998). Do parent practices to encourage academic competence influence the social adjustment of young European American and Chinese American children? *Developmental Psychology*, 34, 747–756.
- Huntsinger, C. S., Jose, P. E., Liaw, F., & Ching, W. (1997). Cultural differences in early mathematics learning: A comparison of Euro-American, Chinese-American, and Taiwan-Chinese families. *International Journal of Behavioral Development*, 21, 371–388.
- Jacobs, J. E. (1991). Influence of gender stereotypes on parent and child mathematics attitudes. *Journal of Educational Psychology*, 83, 518–527.
- Jacobs, J. E., & Eccles, J. S. (1992). The impact of mothers' gender-role stereotypic beliefs on mothers' and children's ability perceptions. *Journal of Personality and Social Psychology*, 63, 932–944.
- Jacobs, J. E., & Weisz, V. (1994). Gender stereotypes: Implications for gifted education. *Roeper Review*, 6, 152–155.
- Kahle, J. B. (1985). Retention of girls in science: Case studies of secondary teachers. In J. B. Kahle (Ed.), *Women in science: A report from the field* (pp. 49–76). Philadelphia: Falmer Press.
- Keith, T. Z., Keith, P. B., Troutman, G. C., Bickley, P. G., Trivette, P. S., & Singh, K. (1993). Does parental involvement affect eighth-grade students' achievement? Structural analysis of national data. *School Psychology Review*, 22, 474–496.
- Kirk, R. E. (1982). *Experimental design: Procedures for the behavioral sciences* (2nd ed.). Monterey, CA: Brooks/Cole.
- Klebanov, P. K., & Brooks-Gunn, J. (1992). Impact of maternal attitudes, girls' adjustment, and cognitive skills upon academic performance in middle and high school. *Journal of Research on Adolescence*, 2, 81–102.
- Laakso, M. (1995). Mothers' and fathers' communication clarity and teaching strategies with their school-aged children. *Journal of Applied Developmental Psychology*, 16, 445–461.
- Leone, C. M., & Richards, M. H. (1989). Classwork and homework in early adolescence: The ecology of achievement. *Journal of Youth and Adolescence*, 18, 531–49.
- Levin, I., Levy-Shiff, R., Appelbaum-Peled, T., Katz, I., Komar, M., & Meiran, N. (1997). Antecedents and consequences of maternal involvement in children's homework: A longitudinal analysis. *Journal of Applied Developmental Psychology*, 18, 207–227.
- Maple, S. A., & Stage, F. K. (1991). Influences on the choice of math/science major by gender and ethnicity. *American Educational Research Journal*, 28, 37–60.
- McGillcuddy-DeLisi, A. V. (1988). Sex differences in parental teaching behaviors. *Merrill-Palmer Quarterly*, 2, 147–162.
- Muller, C. (1995). Maternal employment, parent involvement, and mathematics achievement among adolescents. *Journal of Marriage and the Family*, 57, 85–100.

- Ng, F. F., Kenney-Benson, G. A., & Pomerantz, E. M. (2004). Children's achievement moderates the effects of mothers' use of control and autonomy support. *Child Development, 75*, 764–780.
- Oakes, J. (1990). *Lost talent: The underparticipation of women, minorities, and disabled persons in science*. Santa Monica, CA: Rand Corporation.
- Oakes, J. (1992). Opportunities, achievement, and choice: Women and minority students in science and mathematics. In C. B. Cazden (Ed.), *Review of research in education* (Vol. 16, pp. 153–222). Washington, DC: American Educational Research Association.
- Parsons, J. E., Adler, T. F., Futterman, R., Goff, S., Kaczala, C., & Meece, J. (1980). *Self-perceptions, task perceptions and academic choice: Origins and change*. Final Report to the National Institute of Education, Washington, DC: NIE.
- Parsons, J. E., Adler, T. F., & Kaczala, C. M. (1982). Socialization of achievement attitudes and beliefs: Parental influences. *Child Development, 53*, 310–321.
- Phillips, D. A. (1987). Socialization of perceived academic competence among highly competent children. *Child Development, 58*, 1308–1320.
- Pomerantz, E. M., & Eaton, M. M. (2000). Developmental differences in children's conceptions of parental control: "They love me, but they make me feel incompetent." *Merrill-Palmer Quarterly, 46*, 140–167.
- Pomerantz, E. M., & Eaton, M. M. (2001). Maternal intrusive support in the academic context: Transactional socialization processes. *Developmental Psychology, 37*, 174–186.
- Pomerantz, E. M., & Ruble, D. N. (1997). Distinguishing multiple dimensions of conceptions of ability: Implications for self-evaluation. *Child Development, 68*, 1165–1180.
- Pomerantz, E. M., & Ruble, D. N. (1998). The role of maternal control in the development of sex differences in child self-evaluative factors. *Child Development, 69*, 458–478.
- Sax, L. J. (1994). Mathematical self-concept: How college reinforces the gender gap. *Research in Higher Education, 35*, 141–166.
- Seymour, E. (1995). The loss of women from science, mathematics, and engineering undergraduate majors: An explanatory account. *Science Education, 79*, 437–473.
- Steele, C. M. (1997). Threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist, 52*, 613–629.
- Sui-Chi, E. H., & Willms, J. D. (1996). Effects of parental involvement on eighth-grade achievement. *Sociology of Education, 69*, 126–141.
- Tenenbaum, H. R., Aldrich, N., & Hickman, D. (2004, April). *Parent-child talk about future course selections*. Poster presented at the Gender Development Research Conference, San Francisco, CA.
- Tenenbaum, H. R., & Leaper, C. (2003). Parent-child conversations about science: The socialization of gender inequities? *Developmental Psychology, 39*, 34–47.
- Tiedemann, J. (2000). Parents' gender stereotypes and teachers' beliefs as predictors of children's concept of their mathematical ability in elementary school. *Journal of Educational Psychology, 92*, 144–151.
- Wigfield, A., Eccles, J. S., Yoon, K. S., Harold, R. D., Arbreton, A. J. A., & Blumenfeld, P. C. (1997). Changes in children's competence beliefs and subjective task values across the elementary school years: A 3-year study. *Journal of Educational Psychology, 8*, 451–469.
- Yee, D. K., & Eccles, J. S. (1988). Parent perceptions and attributions for children's math achievement. *Sex Roles, 19*, 317–333.