Gender Differences in Mathematics
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"I can, but I don't want to"

The Impact of Parents, Interests, and Activities on Gender Differences in Math

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Although the mathematics performance gap between males and females has narrowed over the past decade (e.g., Hall, Davis, Bolen, & Chia; 1999; Hyde, 1997; National Center for Education Statistics [NCES], 2001), there continues to be a gulf between the number of women and men who pursue college degrees in engineering, physical sciences, computer sciences, and mathematics (Bae & Smith, 1996; Higher Education Research Institute, 1996; Stumpf & Stanley, 1996). Furthermore, women who hold bachelor's degrees in science and engineering are less likely than men with similar degrees to actually be employed in those fields; women constitute only 23% of the science and engineering labor force (National Science Foundation [NSF], 2000). The underrepresentation of women is especially evident in the physical sciences, where women comprise only 9% of employed engineers and 10% of employed physicists (NSF, 2000).

In light of diminishing performance differences, the continuing gender gap in math/science educational and career choices suggests that such choices are based on much more than achievement (Linver, Davis-Kean, & Eccles, 2002). Numerous theories dealing with competence, expectancy, and control beliefs provide explanations for performance on different kinds of achievement tasks; however, many of these theories do not systematically address another important motivational question: What makes the individual *want* to do math or science? Even if individuals feel competent, they may not want to pursue it. Over the past 20 years, we have used the Eccles' parent socialization model to consider the role played by parents in children's achievement choices in a variety of domains. In this chapter, we use this perspective to consider gender differences in children's math and science achievement choices and the environment provided by parents to support children's interests in math and science. We begin by reviewing the theoretical perspective and previous work to support it, and then we present new evidence related to the "gendered" nature of the math/science opportunities and expectations that parents provide for their children.

Theoretical Perspective

According to some of the modern expectancy-value theories (e.g., Eccles et al., 1983; Feather, 1982; Wigfield & Eccles, 1992), an individual's values for particular goals and tasks can help explain *why* a child chooses one field of study over another. Eccles (Parsons) and her colleagues elaborated and tested an expectancy-value model of activity choice (e.g., Eccles, 1987; Eccles, Adler, & Meece, 1984; Eccles & Wigfield, 1995; Eccles [Parsons] et al., 1983; Meece, Parsons, Kaczala, Goff, & Futterman, 1982; Meece, Wigfield, & Eccles, 1990) that focuses on the social-psychological influences on choice and persistence. According to this model, the key determinants of choice will be the relative value and perceived probability of success of each available option. Expectancies and values are assumed to directly influence performance and task choice, and to be influenced by task-specific beliefs, such as self-perceptions of competence, perceptions of the task demands, and the child's goals (both short- and long-term) and self-schemas. These social cognitive variables, in turn, are influenced by the child's perceptions of other peoples' attitudes and expectations for them, gender roles and activity stereotypes, and their own interpretations of their previous experiences with achievement outcomes. Finally, the child's perceptions are influenced by the greater cultural milieu, socializers' beliefs, their own aptitudes or talents, and their previous achievement-related performances.

Various aspects of this model have been confirmed in the domain of mathematics (e.g., Eccles, 1987; Eccles et al., 1984; Eccles, Wigfield, Harold, & Blumenfeld, 1993; Meece et al., 1982; Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991), and our findings make it clear that task values play an important role in future plans to pursue math and science. In addition, we have found that key determinants of value are parents' attitudes and behaviors, children's self-perceptions, and gender role expectations (e.g., Eccles [Parsons] et al., 1983; Jacobs, 1991; Jacobs & Eccles, 1992). In this chapter, we briefly review previous research focusing on the importance of gender and parents' roles in children's achievement choices, and we then turn to some recent findings to illustrate these aspects of achievement choices.

Parent Socialization Model

Although many experiences and a variety of socializers help shape children's values, we focus primarily on the role of parents. Over the years, numerous studies have linked parenting practices to children's achievement motivation (see Eccles, Wigfield, & Schiefele, 1998, for review); however, few researchers have focused on how parents motivate their children to do different things or to value different activities.

The Eccles (Parsons) et al. (1983) model of parent socialization is presented in Fig. 12.1. As indicated in the model, we believe that characteristics of the parents, family, and neighborhood, and characteristics of the child, will influence parents' behaviors and their general beliefs about the world, as well as their specific beliefs about the child. We expect these beliefs to then influence their parenting behaviors, which, in turn, will affect child outcomes. Examples of each of these constructs are given in Fig. 12.1. Although the model is drawn in a linear fashion and the original model (Eccles [Parsons] et al., 1983) proposed a causal sequence, it is important to acknowledge that parents' and children's outcomes are likely to influence each other reciprocally and that different beliefs depicted as a single construct in the model are likely to influence each other (e.g., gender role stereotypes and personal values).

We focus on the three boxes in the middle of Fig. 12.1, depicting parents' general beliefs and behaviors, parents' child-specific beliefs, and parenting behaviors. Although several examples of each construct are listed in Fig. 12.1 we focus only on the following four ways in which parents influence their children: (1) by the general social-emotional climate they offer and by their general childrearing beliefs; (2) by providing specific experiences for the child (e.g., enrollment in lessons, involvement in church activities); (3) by modeling involvement in valued activities; and (4) by communicating their perceptions of the child's abilities and expectations for performance.

According to this model, the environment, role modeling, and messages that parents provide regarding the value they attach to science and math activities are expected to influence children's motivation to pursue those fields. Over time, children develop their own level of interest in math and science and integrate these interests or values into their self-systems. Ultimately, the values that are incorporated into one's self-beliefs will affect future task choices (it is important to remember, however, that the influence between self-beliefs and values is bidirectional). Parents' roles may shift in this process from providing exposure, opportunities, and role modeling of math and science activities at early ages to providing encouragement and guidance for activities that continue to be supportive of the child's developing interest in math/science (if there is a lack of interest, we would expect less encouragement in the field of math). We have tested and found support for each of the four components of parent influence (e.g., Eccles, 1994; Eccles [Parsons] et al., 1983; Jacobs, 1991; Jacobs & Eccles, 1985, 1992; Jacobs, Finken, Griffin, & Wright, 1998). Our findings on each are briefly reviewed in the following sections.

Social-Emotional Climate and General Beliefs

Positive parent–child relationships have often been connected with successful parental socialization. Although we have not emphasized this construct, Eccles, Early, Frasier, Belansky, & McCarthy (1996) found that

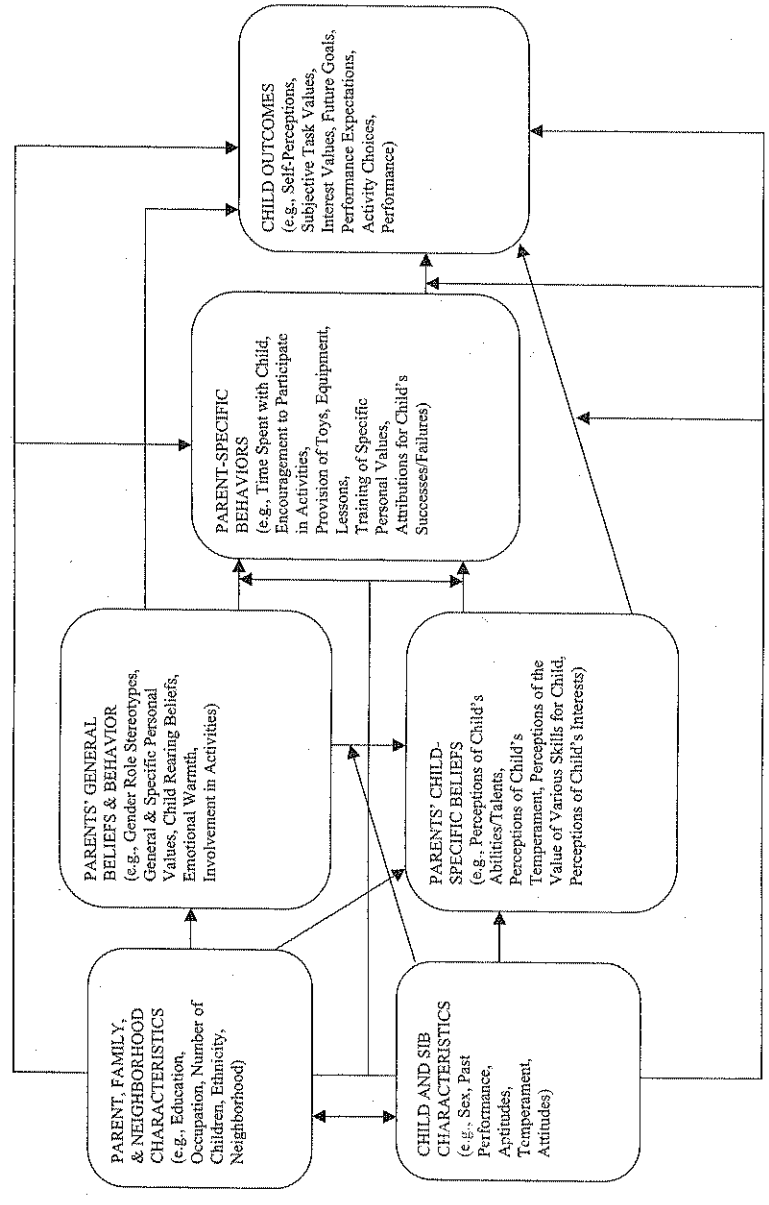

FIGURE 12.1 Model of parent socialization

perceived high levels of connectedness and emotional support were positively related to both psychological and behavioral indicators of successful development during early adolescence, particularly for girls. We have also found support for the impact of parental emotional support during childhood on later adolescent behaviors and parent–adolescent relationships. For example, we found that parents' reports of perceived closeness to their elementary school-age children are positively related to the children's perceptions of parent support, affection, and monitoring several years later during adolescence, and negatively related to perceptions of parental strictness and involvement in problem behaviors (Jacobs, Hyatt, Tanner, & Eccles, 1998). Other researchers also have emphasized the importance of positive parent–child relationships (Connell & Wellborn, 1991), emotional support (Deci & Ryan, 1985), or connectedness (Barber, Olsen, & Shagle, 1994) for children's mental health, self-esteem, and achievement motivation. Our work has focused on the nature of children's emotional relationships with their parents, and how these connections may be related to developing values and activity choices. As might be expected, perceptions of high levels of connectedness and emotional support from parents are related positively to both psychological and behavioral indicators of successful development.

Parents also provide messages about their own worldviews and values, either directly by discussing them or indirectly through the opportunities they provide and the interpretations they give. The values in question may range from specific values for particular activities (e.g., the parent who loves science and talks about it, watches special science programs, and enrolls the child in science activities) to general world beliefs and values (e.g., the parent who doesn't believe girls should do math because it is for boys). Children are likely to discern the parents' values by noticing how free time is spent, by comparing how much time, money, or effort goes into one activity vs. another, and from conversations with parents in which the parent conveys enthusiasm or interest about one topic, but little about another.

We have documented the indirect effects of parents' general beliefs on the goals that they set for their children in the area of gender-stereotyping (Jacobs, 1991; Jacobs & Eccles, 1992). We investigated the relationships between parents' gender-based stereotypes, their beliefs about their own children's abilities, and their children's self-perceptions and performance in two studies (Jacobs, 1991; Jacobs & Eccles, 1992). The first study focused on stereotypes, beliefs, and performance related to mathematical ability only. The second study involved three domains of ability (mathematics, sports, and social). Parents' gender stereotypes in both studies and in all domains directly influenced their perceptions of their children's abilities, resulting in more positive perceptions for children favored by the stereotypes (e.g., daughters for social skills, sons for math and sports skills). Parents'

perceptions, in turn, influenced their children's performance and their self-perceptions of their abilities in each domain, even after controlling for the child's previous performance. These findings suggest that parents hold general beliefs (stereotypes) that influence the way in which they interpret their children's performance, depending on individual characteristics of the children, such as gender. More importantly, their interpretations of that performance are conveyed to their children and tend to influence the children's self-perceptions and grades, ultimately carrying more weight than previous performance. In a follow-up to that study, we found that parents' gender stereotypes about math had long-lasting effects on their children's career choices (Bleeker & Jacobs, 2004). In this study, daughters of mothers who held stereotypes about male math abilities when their children were in the sixth grade were less likely to choose physical science careers than other more traditional science careers (e.g., nursing) or nonscience careers.

Provision of Specific Experiences for the Child

Parents structure children's experiences in a variety of ways that should impact self and task values, skill acquisition, preferences, and choice. We have found that exogenous child and family characteristics (e.g., parents' income, education, child gender, age) influence the experiences parents provide for their children primarily through their impact on parents' perceptions of their children's abilities and interests, and on parents' valuing of the activity domain. For example, parents were more likely to provide extra sports experiences for their children if they believed that the children were interested in the activity and had sports ability (Fredericks, 1999). This is a good example of the reciprocal nature of parent–child attitudes: parents are using the feedback they receive from the child, as well as their own assessment of the child, to inform their decisions about which opportunities to provide.

This has sometimes been described as the "opportunity structure" provided by parents. Although most children have the opportunity to be exposed to mathematics and science in school, parents may provide earlier math-related activities, play math games with the child, and encourage involvement in extra math or science activities (e.g., specialized clubs or competitions as the child gets older). The type of opportunities provided will depend on many factors – what is available in the community or school, economic resources, and time constraints (single parents, two-earner families, and families with many children may have less time to devote to their child's participation in extracurricular activities). Participation in extracurricular activities has been associated with socioeconomic class (e.g., Coleman, 1961; Hollingshead, 1949). Participation in activities also may raise an individual's status within the school, extend the child's social network, and even serve as a protective factor against dropping out

(e.g., Czikszentimihalyi, Rathunde, & Whalen, 1993; Eder & Parker, 1987; Kinney, 1993; Mahoney & Cairns, 1997). Therefore, parents' decisions to provide or to curtail particular opportunities may have an impact that reaches beyond the child's activity values and perceptions of competence.

Not surprisingly, parents often provide experiences for their children that fit existing expectations for gender-appropriate activities. For example, in a study by Altenburg-Caldwell, Jacobs, & Eccles (1999), we found that parents provide equal numbers of organized activities during early middle childhood for girls and boys, but that the activities provided differ by gender. Similar effects are likely to be found in the math and science domains.

Modeling Involvement in Valued Activities

The importance of role models in socializing behavior has been well documented in the developmental literature (e.g., Bandura & Walters, 1963). According to this work, parents exhibit behaviors that children may later imitate and adopt as part of their own repertoire. The influence of role models may include the messages they provide about their beliefs regarding their own abilities and about their values in general, and previous work suggests that children perceive these messages accurately. The ways in which parents spend their time, the choices they make between available activities, and the sense of self-competence that they project send strong messages to their children about activities that are valued and about acceptable ways to spend time. To test this facet of parental influence, we include numerous indicators of parents' practices and involvement in different types of activities in our research. Findings from one of our earlier studies lend support to this concept. We found that children's perceptions of their parents' enjoyment of math were significantly correlated with the parents' self-reports of past and present math ability, math difficulty, and the effort needed to do well in math. In addition, children who saw their parents do household math (e.g., balancing a checkbook) believed that their parents liked math more than those whose parents did not engage in math activities at home (Eccles-Parsons, Adler, & Kaczala, 1982). Another marker of parental valuing of an activity is their involvement in related activities with the child. For example: Are parents involved in math and science activities with the child? Do they help with homework in these areas? Does their involvement vary by gender? Others have found that parental involvement influences children's leisure activities and achievement behaviors because it communicates parents' perceptions about the value of the activity, as well as their beliefs about the child's ability in that arena (Ginsburg & Bronstein, 1993; Larson, Dworkin, & Gillman, 2001).

Communicating Ability Perceptions, Values, and Future Expectations

Another way in which parents influence their children's task values is by acting as "interpreters of reality" through the messages they provide

regarding their perceptions of their children's world and experiences (Eccles, Lord, Roeser, Barber, & Jozefovicz, 1997; Goodnow & Collins, 1990; Phillips, 1987). When children are young, they are not particularly good at assessing their own competence (Nicholls, 1978), so they must rely on their parents' interpretations of their performance as a major source of information about their competence. We have found that parents' perceptions of their children's abilities and their expectations for the child's future success have a large impact on children's developing perceptions of self-competence (e.g., Eccles-Parsons et al., 1982; Jacobs & Eccles, 1992). In these studies, parents' perceptions of their children's abilities, their expectations for their children's success, and their gender stereotypes predict children's self-perceptions of competence and their actual achievement, even after previous indicators of achievement are controlled. In addition, parents' inappropriately low estimations of their children's competence are related to children's lower self-perceptions of their competence in the same areas. Due to the links between self-competence and values, the accuracy of parents' interpretations are critical to children's continued interest, participation, and ultimate valuing of an activity. However, we know that many things will influence parents' interpretations, including the values and expectations within their culture. Although parents are clearly forming their opinions about the child's ability based on objective indicators such as grades and sports competitions, it appears that the direction of influence for perceptions of competence is from parents to children and that parents' views of their children's abilities are quite stable over time (Yoon, Wigfield, & Eccles, 1993).

The Role of Gender

As we have already indicated, much of our research has focused on the role gender (both their own gender and that of their child) plays in influencing children's choices, self-perceptions, and values, and also in the way it influences parents' views of their children and parental behavior in the way they structure the environment for either boys or girls. We have found gender-role stereotypic differences for sports, social activities, English, and music (Eccles et al., 1989, 1993; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Wigfield et al., 1991) across age groups. As a child, one of the ways to express one's gender identity is by participating in and valuing gender-appropriate activities. Data from our longitudinal Childhood and Beyond (CAB) study (Altenburg-Caldwell, Jacobs & Eccles, 1999) suggests that participation in activities during elementary school is highly gender typed. Girls participate significantly more than boys in art activities, hobbies, clubs, and individual competitive sports; however, boys participate in team sports significantly more than girls. Not surprisingly, this behavioral instantiation of their social identities is related to children's intrinsic values. For example, children who participate the most in team sports, not

only value sports the most, but value the arts the least; and those who participate in the arts, have the lowest values for sports.

In addition, we know that perceptions of math competence and values for math are often different for girls and boys, especially at the youngest ages. Previous theories and research have suggested that the gap widens as children get older; however, in a recent study we found that, although males' have higher self-perceptions of math ability than females in the early grades, those differences decrease with age so that by the 12th grade the differences are gone (Jacobs et al., 2002). These results, indicating that gender differences decline with age, complement and extend earlier shorter-term longitudinal studies (e.g., Eccles et al., 1989; Wigfield et al., 1991; Wigfield, Eccles, Yoon, & Harold, 1997). The findings are also consistent with those reported by Marsh, showing no age-related changes in gender differences in general self-concept (Marsh, 1993) and no gender differences in developmental models (Marsh & Yeung, 1997, 1998). However, as suggested at the beginning of this chapter, these findings are at odds with what is known about gender differences in career and educational choices. We believe that the answer may be found in gender-differentiated family support for math/science that results in gender differences in interest in these topics.

Current Questions

We described our general conceptualization of the ways in which parents might influence children's decisions to pursue one achievement domain over another and the role that gender is likely to play; however, there has been little information in the literature on specific parenting practices related to achievement in math/science and little focus on parents' values and attitudes. To fill in some of the gaps in our knowledge about parenting practices and attitudes related to math and science achievement, we present data that address the following questions: (1) does parent support for extracurricular math/science activities vary by sex and grade?, (2) are parents' math-promotive behaviors and attitudes about math related to children's later interest in math and later performance in math?, and (3) are parents' gender stereotypes related to children's interests in math/science?

EVIDENCE

Description of Dataset

The CAB longitudinal data set was collected in Michigan with the goal of investigating the development of children's self-perceptions, task values, and activity choices (Eccles et al., 1983). Beginning in 1987, children ($n = 864$), parents ($n = 550$), and teachers ($n = 70$) were recruited through

10 elementary schools. All children in kindergarten, grade 1, and grade 3 were asked to participate, and 75% of the children both agreed to participate and obtained parental permission. A cross-sequential design was employed in which three cohorts of children were followed longitudinally across the elementary, middle, and high school years. The original sample consisted of 53% girls and 47% boys, and these proportions remained the same throughout the waves of data collection (kindergarten thru 3 years post-high school). Participants were interviewed almost every year between 1987 and 2000 (due to lack of funding there was no data collection in years 1991–3). A similar set of protocols and questions were used at every wave of data collection with additions and deletions made based on the changing ages of children. Information about income provided by the school districts indicates that the children were from middle-class backgrounds with average family income around $50,000 at the initial time of data collection. Over 95% of the children were European American. Attrition in the sample was due mostly to children moving away from the school districts sampled, although every effort was made to relocate children each year, and the longitudinal sample included children who continued to live in the same general area, even if they no longer attended participating schools.

Does Parent Support for Extracurricular Math/Science Activities Vary by Sex and Grade?

Our model suggests that parents may convey the importance of math and science to their children in a variety of ways. They may model their own interest in math and science by spending time on such activities at home. They may also show support of these topics by working on math/science activities with their children, or by providing toys, books, and games on these topics. In the CAB project, we asked parents to report on each of these methods of socializing children about the importance and value of math/science. Mothers' reports can be seen in Fig. 12.2, indicating that they were significantly ($p \leq 0.001$) more likely at every grade to purchase math/science items for sons than for daughters, regardless of child's grade in school.

We also asked parents how much time they spent working on math and science activities with their children. Mothers were significantly more likely than fathers to report involvement in children's math/science activities in kindergarten ($F(1, 78) = 15.28, p < 0.001$), first grade ($F(1, 210) = 5.13, p < 0.05$), second grade ($F(1, 200) = 5.09, p < 0.05$), and third grade ($F(1, 239) = 5.19, p < 0.05$), but mothers and fathers spent similar amounts of time on math with their children after grade three. As children got older, both mothers and fathers indicated significantly less involvement in children's

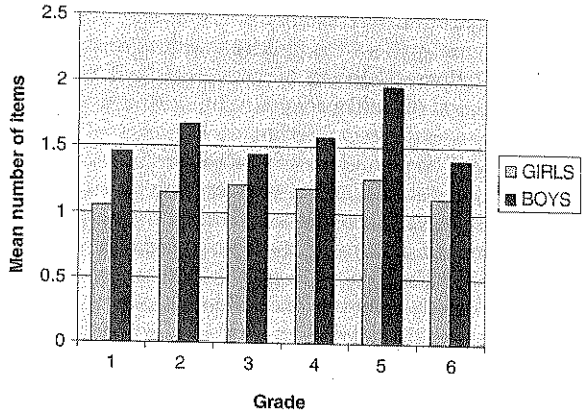

FIGURE 12.2. Math/science items purchased for child during last year.

math/science activities ($F(1, 247) = 15.75, p < 0.001$). Although some gender differences were found, these were not consistent by parent or grade.

Finally, to examine parental modeling of involvement in math/science, we asked parents how much time they spent around the house on math/science activities themselves. In this sample, parents did not report spending much time on these activities (just over one hour per week on average), and time spent by mothers and fathers did not differ significantly.

Are Parents' Math-Promotive Behaviors and Attitudes About Math Related to Children's Later Self-Perceptions of Ability and Actual Achievement?

Our previous research has shown that parents' specific beliefs about their children and their general beliefs about the world (i.e., gender stereotypes) influence children's own beliefs about their abilities and their achievement behaviors (Jacobs, 1991; Jacobs & Eccles, 1992). We wanted to know if parent socialization practices regarding math and science might contribute to the prediction of these previously tested relationships between parent and child beliefs. To test this, we developed a composite variable that included math/science items purchased by the mother (mothers' reports were used due to the larger sample size and nonindependence of father reports), mothers' involvement in math/science activities themselves, and mothers' involvement in such activities with their children. We used linear regression to test the effects of mothers' math/science purchases, activities with their child, and modeling on children's later math/science GPA. We also included mothers' values for achievement in math/science. To control for mothers' perceptions of their children's abilities and interests,

we included those two variables in the model. Not surprisingly, the positive beta weights for these variables indicate that children, who reported the highest self-perceptions of math ability, have the highest math/science GPA a year later (see Table 12.1). More important for the topic at hand is the fact that mothers' math-promotive behaviors were significantly related to later achievement, even after controlling for children's self-perceptions of ability and interest. It is interesting to note that mothers' values for math/science do not make a significant independent contribution to the model after children's beliefs and parenting practices have been included.

Are Parents' Gender Stereotypes about Math Related to Children's Later Interest in Math?

Our earlier work and the Eccles model of parent socialization describe a prominent role for parents' general worldviews, as well as their perceptions of their own children. We investigated this topic in an earlier study with another data set, and found that both mothers' and fathers' gender stereotypes about math had a large influence on their beliefs about their own children's abilities, as well as the children's later self-perceptions of their abilities in math. Because the gap between males' and females' achievement in math has narrowed (e.g., Catsambis, 1999, Hyde, 1997; Marsh & Yeung, 1998; Serbin, Zekowitz, Doyle, & Gold, 1990) and females are participating in some areas of science in greater numbers (e.g., Burkam, Lee, &

TABLE 12.1. *Role of Mother's Math/Science Promotive Activities and Child Attitudes on Math/Science GPA, One Year Later*

Variable	B	SE B	β
Block 1[1]			
Child gender	−0.14	0.44	−0.02
Grade	1.3	0.18	0.33***
Block 2[2]			
Child's math interest (Y2)	−0.13	0.12	−0.06
Child's self-perception of math ability (Y2)	0.59	0.23	0.13**
Block 3[3]			
Mother's math/science items, activities, and modeling (Y2)	0.37	0.15	0.11**
Mother's value for math/science	0.22	0.16	0.07

[1] R^2 for Block 1 = 0.11
[2] R^2 for Blocks 1 & 2 = 0.13
[3] R^2 for Blocks 1, 2, & 3 = 0.15
** $p < 0.01$
*** $p < 0.001$

TABLE 12.2. *Role of Parent Gender Stereotypes on Child Math Interest, One Year Later*

	MOM			DAD		
Variable	B	SE B	β	B	SE B	β
Block 1[1]						
Child gender	0.17	0.16	0.05	0.19	0.19	0.06
Gender stereotype (Y3)	−0.23	0.08	−0.14***	0.00	0.10	0.02
Interaction of child gender and gender stereotype	0.17	0.15	0.05	0.37	0.20	0.11*
Grade	−0.30	0.06	−0.23***	−0.26	0.07	−0.20***
Block 2[1]						
Parent's perception of child's math ability (Y3)	0.33	0.07	0.23***	0.35	0.09	0.22***

[1] R^2 for Mothers' Block 1 = 0.08, R^2 for Fathers' Block 1 = 0.06;
[2] R^2 for Mothers' Blocks 1 & 2 = 0.13, R^2 for Fathers' Blocks 1 & 2 = 0.11
* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Smerdon, 1997; NCES, 2001), we expected to find fewer gender stereotypes favoring males than we have found previously.

Using the CAB data, we constructed a regression model in which we used mother's gender stereotype, child's grade, and child's past perception of math ability to predict interest in math. Table 12.2 describes the results. The negative beta weights for both mother's gender stereotype and child's grade indicate that children who are younger and children who have mothers with less traditional views about gender are more likely to indicate interest in the domain of math. The positive beta weight for past perception of math ability supports past findings that indicate that children who are more positive about their abilities in math are also more likely to be interested in math. Child's gender and math/science activities were not related to interest. For the model using data from fathers, the interaction of father's gender stereotype and child's gender, child's grade, and child's earlier perceptions of math ability were significant predictors of child's interest in math. Once again, the negative beta weight for child's grade indicates that younger children are more interested in math. The positive beta weight for the interaction of father's gender stereotype and child's grade indicates that girls' interest in math decreases as fathers' gender stereotypes increase, whereas boys' math interest increases as fathers' gender stereotypes increase (see Fig. 12.3). Once again, the positive beta weight for past perceptions of math ability indicates that children who

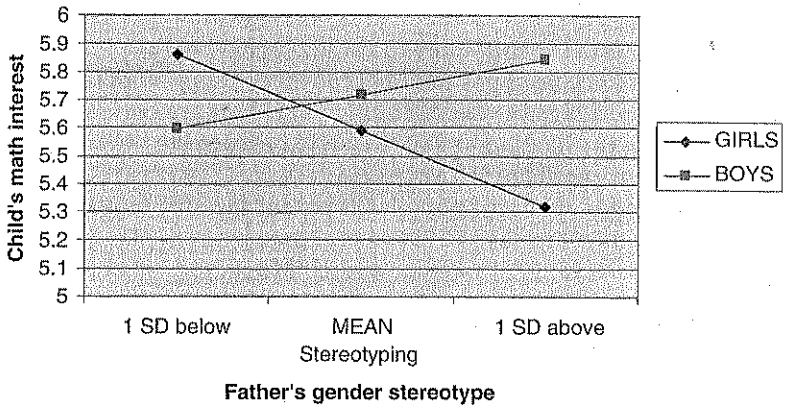

FIGURE 12.3. Influence of father's gender stereotype on child's interest in math.

are more positive about their abilities in math are also more likely to be interested in math.

CONCLUSION

In this chapter, we used the Eccles' parent socialization model to consider the role played by parents in children's math/science achievement choices. We focused on gender differences in children's math and science attitudes and achievement, and on the environment provided by parents to support girls' and boys' interests in math and science. We began by reviewing the theoretical perspective and our previous work, indicating that key determinants of children's self-perceptions and values for math are parents' attitudes and behaviors, children's self-perceptions, and gender-role expectations (e.g., Eccles, 1987; Eccles et al., 1993; Eccles [Parsons] et al., 1983; Jacobs, 1991; Jacobs & Eccles, 1992; Wigfield et al., 1991).

We then presented new evidence related to the "gendered" nature of the math/science opportunities and expectations that parents provide for their children. Parents appear to provide more math-supportive environments for their sons than for their daughters by purchasing more math/science toys for sons, spending more time on math/science with sons, and holding higher perceptions of their sons' than daughters' math abilities as well as gender-typed worldviews about natural talent in math. We also provided evidence of the relations between children's earlier math interests, self-perceptions, and activities and their later math/science GPAs, and between parents' gender stereotypes and child-specific beliefs and the child's later interest in math. These longitudinal findings emphasize the importance of the middle childhood years for later math/science achievement choices. If girls are not interested in math and science at early ages or if they believe that their parents do not value their competence in those topics, they may

be less likely to pursue them as they get older. Research has suggested that girls' interest in math continues to decline across high school even when their performance (as measured by grades) is higher than the boys' (Linver, Davis-Kean, & Eccles, 2002). Thus, even if girls are performing at high levels in math, the likelihood that they will be interested in pursuing math-related majors in college is low.

Although the Eccles' theoretical model of parent socialization attempts to describe the relationships between the multifaceted contexts provided by parents, the interactions of parents and children, and what children bring to the mix, most of the evidence for the model emphasizes only one part of the picture at a time because it is a complex process that takes place over years and across many interactions. It is clear that much of what parents do is in response to their perceptions of their children and may be elicited by the child; thus, the process of providing a math-supportive environment may begin with the child in many cases. Although the process might be somewhat different if the child initiates it, we cannot assume that children who begin by valuing math necessarily maintain that interest and involvement without some parental support and/or encouragement.

The general conclusion that we draw from our work is that, although girls' performance and self-perceptions of ability suggest that they feel competent in math, they are less likely than boys to find it intrinsically interesting and their parents are less likely to create math-supportive or math-promotive environments for them. It appears, instead, that the achievement environment in many homes is a gendered environment and that messages from parents about achievement continue to be sent through gender-typed filters.

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To my sons, Patrick and Andrew, who amaze me daily and who have changed the way I see the world.
With all my love . . .
– AMG

To Dr. Jennie Lynn Kaufman Singer, my sister and wonderful friend,
With pride, friendship, admiration, and love
– JCK