

Sex Differences in Motivation, Self-Concept, Career Aspiration and Career Choice:

Implications for Cognitive Development

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In this chapter we discuss gender differences in motivation, self-concept, self-esteem, career aspirations, and occupational choice. We also consider how parents and teachers influence these variables, and link these differences to sex differences in cognitive development. We focus on these personality constructs and social influences because we strongly believe that any observed sex differences in cognition (and participation in different careers) are due in part to sex differences in motivation, self-concept, and views on what are appropriate activities for males and females to do. As we discuss in more detail later, these constructs can have causal influences on cognitive outcomes such as school achievement, and other important outcomes such as occupational choice. To understand gender differences in crucial outcomes in children's lives, motivation and self-concept need to be considered, along with the evolutionary and neurobiological factors considered by Geary and Fitch and Bimonte in their chapters for this volume, as well as the constructs considered by other authors in this volume. We concentrate primarily on sex differences in these constructs during the elementary and secondary school years.

We begin the chapter with a word of caution. As other authors have pointed out, drawing conclusions about sex differences must be done carefully (see Eisenberg, Martin, & Fabes, 1996; Ruble & Martin, 1998). Although such differences often are observed, in general they tend to be relatively small, in terms of the amount of variance explained (e.g., Marsh, 1989). Thus there often is substantial overlap between boys and girls and men and women in the many different variables measured in studies of sex differences. Individual differences within groups of males and females often are stronger than differences between the two groups. Having said that, however, there do appear to be reliable sex differences in many of the motivation and self-concept constructs we and others study.

We first briefly discuss sex differences in achievement and performance; this review is brief because many other authors in this volume provide complete discussions of such differences. We then discuss work on sex differences in motivation, self-concept, and career plans and occupational choice. Issues regarding stereotype and stereotype threat could have been presented here; these topics instead are covered by Martin and Dinella in their chapter for this volume. We conclude the chapter with a consideration of how parents, teachers, and factors in

school environments influence the sex differences in motivation, self-concept, career plans, and occupational choice. Throughout the chapter we note how these sex differences can influence developing sex differences in cognitive outcomes.

### SEX DIFFERENCES IN ABILITIES, ACHIEVEMENT AND PERFORMANCE

Sex differences in abilities, achievement, and performance in different areas have been of long-standing interest in developmental and educational psychology. In their classic volume on sex differences Maccoby and Jacklin (1974) concluded that there are gender differences favoring girls in verbal abilities and performance, favoring boys in mathematics ability and performance (particularly in problem solving rather than computation, during adolescence), and favoring boys in spatial ability. In their more recent reviews of gender differences in these areas, Hyde and Linn (1988) and Linn and Hyde (1989) argued that many of these differences have decreased to the point where they are negligible (see also Eisenberg et al., 1996). However, in the mathematics ability area boys continue to be more highly represented in the highest performing groups of children and adolescents (see Royer, Tronsky, & Chan, 1999). Gender differences in physical skills also have been observed. After puberty boys do better than girls on activities that involve strength and power; girls continue to be less likely to participate in activities requiring these skills (see De Lisi & McGillicuddy-De Lisi's chapter in this volume for a more complete review of these findings).

There also are interesting academic performance differences between boys and girls. In general, girls earn higher grades than boys across the school years, even in math and science, despite not doing as well on tests of mathematical ability during adolescence (see Royer et al., 1999). Although the overall math ability differences favor boys, in certain mathematical areas such as counting and computation girls do better, especially in elementary school. Further, differences in problem solving in math vary some depending on what kinds of problems are presented.

To conclude this brief section, gender differences in abilities and performance remain. Especially with respect to various abilities, however, gender differences appear to have decreased over the last 25 years (but see Ruble and Martin, 1998 for some cautions about this conclusion). Girls continue to outperform boys in school, if grades are the indicator of performance. How do these differences compare to the observed sex differences in motivation and self-concept?

## SEX DIFFERENCES IN MOTIVATION, SELF-CONCEPT, AND CAREER ASPIRATIONS

### Gender Differences in Motivation

Motivation is crucial to cognition and performance because motivation directs individuals' behavior. More specifically, motivation influences individuals' choices of which activities to do, level of engagement in them, and degree of persistence at them (Weiner, 1992). Researchers studying achievement motivation have examined a variety of motivational constructs posited to influence choice, engagement, persistence, and performance (see Eccles, Wigfield, & Schiefele, 1998; Pintrich & Schunk, 1996, for complete review). Broadly, these constructs can be broken down into those having to do with children's sense of competence, efficacy, and control; and those having to do with children's purposes and reasons for engaging in different activities. Competence-related beliefs are motivational because when children believe they can accomplish a given task or activity they are more likely to continue to do the activity, overcome obstacles to compete it, and choose more challenging activities on subsequent occasions.

Constructs related to purposes and reasons for action include achievement values, achievement goals, and intrinsic and extrinsic motivation. Children's reasons or purposes for engaging (or not engaging) in achievement activities also are crucial to their motivation. Simply believing one is competent often is not enough reason for the individual to engage in an activity. Individuals must value the activity, have goals for doing it, or find it intrinsically or extrinsically motivating in order to engage in it. Thus to understand choice and performance the purposes and reasons for action also must be understood.

We have taken an expectancy - value theoretical perspective on motivation in our own work, and have developed a model of achievement choice based in this perspective (e.g., Eccles, 1987; Eccles et al., 1983; Wigfield & Eccles, 1992). The essence of this perspective is that individuals' competence-related beliefs along with their valuing of achievement are the strongest motivational predictors of task engagement, choice, and performance. Individuals' competence-related beliefs and values themselves are influenced by children's goals, their previous experiences, by parents, and by experiences they have in school. We organize our review of sex differences in motivation around these two broad sets of constructs, incorporating some of the other constructs mentioned above into our review. Because there have been few if any studies of sex differences in achievement goals, we do not discuss that construct in detail in this section.

Beliefs about competence and control. Gender differences in competence beliefs during childhood and adolescence often are reported, particularly in gender-role stereotyped domains and on novel tasks. For example, boys hold higher competence beliefs than girls for math and sports, even after all relevant skill-level differences are controlled. By contrast, girls have higher competence beliefs than boys for reading, English, and social activities (Eccles, 1984; Eccles et al., 1989, Huston, 1983; Wigfield et al., 1991; Wigfield et al., 1997). These differences emerge remarkably early. Wigfield et al. (1997) conducted a longitudinal study of children's competence beliefs and valuing of different activities, including math, reading, and sports. They began when the children were in first, second, and fourth grade, and followed them for three years. The results showed that boys had higher competence beliefs for math and sports, and girls for English, even among the first graders. The age differences in beliefs did not change over time. Jacobs et al. (2000) followed these same children through the end of high school, and found that gender differences in math competence beliefs narrow by the end of high school. Gender differences in English competence beliefs favoring girls remain at the end of high school, but also are smaller than during the earlier school years.

The extent to which children endorse the cultural stereotypes regarding which sex is likely to be most talented in each domain predicts the extent to which girls and boys distort their ability self-concepts and expectations in the gender stereotypic direction (Early, Belansky & Eccles, 1992; Eccles & Harold, 1991). That is, boys who believe that in general boys are better in math are more likely to have more positive competence beliefs in math. However, these sex differences are not always found (e.g., Dauber & Benbow, 1990; Schunk & Lilly, 1982) and, when found, are generally quite small (Marsh, 1989).

These sex differences in beliefs about competence are important with respect to sex differences in cognition because competence beliefs relate strongly to individuals' performance on different tasks or activities, and choices of which activities to do (Bandura, 1997; Eccles et al., 1998). When individuals believe they are competent they are more likely to continue participating in an activity; when they are less confident they are more likely to discontinue the activity. Such choices could impact cognitive development, as continuing participation in an activity likely fosters cognitive growth, and discontinuing hampers it.

Attributions for success and failure concern children's understanding of their achievement activities. In general, attributing success to one's ability and effort and failure to lack of effort is seen as positive for subsequent

motivation, whereas attributing success to luck and failure to lack of ability has negative connotations for motivation (see Weiner, 1985). Findings regarding gender differences in attributions are also mixed. Some researchers (e.g., Dweck & Goetz, 1978) find that girls are less likely than boys to attribute success to ability and more likely to attribute failure to lack of ability. Others have found that this pattern depends on the kind of task used: occurring more with unfamiliar tasks or stereotypically masculine achievement task and sometimes does not occur at all (see Parsons, Adler, & Kaczala, 1982; Yee & Eccles, 1988). More generally, sex differentiated attributions can impact males' and females' subsequent motivation, which can influence cognitive outcomes such as achievement.

Gender differences are also sometimes found for locus of control, another construct related to the individual's sense of whether he or she can accomplish a task or activity. For example, Crandall, Katovsky, and Crandall (1965) found that girls tended to have higher internal locus of responsibility scores for both positive and negative achievement events and the older girls had higher internality for negative events than did the younger girls. The boys' internal locus of responsibility scores for positive events decreased from tenth to twelfth grade. These two developmental patterns resulted in the older girls accepting more blame for negative events than the older boys (Dweck & Repucci, 1973; Dweck & Goetz, 1978). Similarly, Connell (1985) found that boys attributed their outcomes more than girls to either powerful others or unknown causes in both the cognitive and social domains.

This greater propensity for girls to take personal responsibility for their failures, coupled with their more frequent attribution of failure to lack of ability (a stable, uncontrollable cause) has been interpreted as evidence of greater learned helplessness in females (see Dweck & Licht, 1980). However, evidence for gender differences on behavioral indicators of learned helplessness is quite mixed. In most studies of underachievers, boys outnumber girls 2 to 1 (see McCall, Evahn, Kratzer, 1992). Similarly, boys are more likely than girls to be referred by their teachers for motivational problems and are more likely to drop out of school before completing high school. More consistent evidence exists that females, compared to males, select easier laboratory tasks, avoid challenging and competitive situations, lower their expectations more following failure, shift more quickly to a different college major when their grades begin to drop, and perform more poorly than they are capable of on difficult, timed tests (see Dweck & Licht, 1980; Ruble & Martin, 1998; Spencer & Steele, 1995).

In sum, reliable sex differences in beliefs about competence for different activities have been found. As noted earlier, these differences are important with respect to sex differences in cognition because competence-related

beliefs are strong predictors of performance (Bandura, 1997; Eccles et al., 1983; Meece, Wigfield, & Eccles, 1990). Researchers looking at relations of competence beliefs to performance do not find sex differences in these relations; the links are as strong for girls as for boys (Meece et al., 1990). But given that the sexes differ in their level of competence beliefs for different activities, their locus of control, and (to a lesser extent) their attributions for success and failure, their performance may in part reflect these beliefs. Two examples can be used to illustrate this point. Girls doubt their competence in math more than boys do, and this likely influences their performance in that subject. Boys doubt their competence more in reading, again likely influencing their performance.

Achievement task values. Achievement values refer to different purposes or reasons individuals have for engaging in different activities. Eccles et al. (1983) defined four components of task value: attainment value, intrinsic value, utility value, and cost. They defined attainment value as the personal importance of doing well on the task. They also linked attainment value to the relevance of engaging in a task for confirming or disconfirming salient aspects of one's self-schema. Because tasks provide the opportunity to demonstrate aspects of one's actual or ideal self-schema, such as masculinity, femininity, and/or competence in various domains, tasks will have higher attainment value to the extent that they allow the individual to confirm salient aspects of these self-schemata, see Eccles, 1984, 1987). Intrinsic value is the enjoyment the individual gets from performing the activity, or the subjective interest the individual has in the subject. This component of value is similar to the construct of intrinsic motivation as defined by Harter (1981), and by Deci and his colleagues (e.g., Deci & Ryan, 1985; Ryan, Connell, & Deci, 1985). Utility value is determined by how well a task relates to current and future goals, such as career goals. A task can have positive value to a person because it facilitates important future goals, even if he or she is not interested in task for its own sake. In one sense then this component captures the more "extrinsic" reasons for engaging in a task (see Harter, 1981 for further discussion of extrinsic motivation). But it also relates directly to individuals' internalized short and long term goals. Finally, cost is conceptualized in terms of the negative aspects of engaging in the task, such as performance anxiety and fear of both failure and success as well as the amount of effort that needed to succeed and the lost opportunities that result from making one choice rather than another.

Eccles, Wigfield and their colleagues have found gender-role stereotypic differences in both children's and adolescents' valuing of sports, social activities, and English (e.g. Eccles et al., 1989; Eccles et al., 1993; Wigfield et al., 1991, Wigfield et al., 1997). They primarily have studied the attainment, intrinsic, and utility aspects of value.

Across these studies, boys value sports activities more than girls do, although girls also value them highly. Relative to boys, girls value reading and English more, and also value music more. Interestingly, in earlier work gender differences in the value of math did not emerge until high school (Eccles, 1984); in a recent study high school girls and boys reported valuing math equally (Jacobs et al., 2000). Although it is encouraging that boys and girls value math equally, the fact that adolescent girls have less positive views of their math ability is problematic because these differences likely contribute to girls' lower probability of taking optional advanced level math courses and physical science and entering math-related scientific and engineering fields, thus contributing to sex-differentiated cognitive outcomes (see Eccles, 1994). We return to career choice issues later in this chapter.

Values also can be conceived more broadly, to include things such as notions of what are appropriate activities for males and females to do. Sometimes such values can conflict with engagement in achievement. The role of conflict between gender roles and achievement in gifted girls' lives is well illustrated by results of an ethnographic study of group of gifted elementary school girls. Bell (1989) interviewed a multiethnic group of third to sixth grade gifted girls in an urban elementary school regarding the barriers they perceived to their achievement in school. Five gender-role related themes emerged with great regularity: (a) concern about hurting someone else's feelings by winning in achievement contests; (b) concern about seeming to be a braggart if one expressed pride in one's accomplishments; (c) over reaction to nonsuccess experiences (apparently not being the very best is very painful to these girls); (d) concern over their physical appearance and what it takes to be beautiful; and (e) concern with being overly aggressive in terms of getting the teacher's attention. In each case the gifted girls felt caught between doing their best and either appearing feminine or caring.

Academic interests and intrinsic motivation. There is an extensive literature on gender differences in activities and interests during the preschool years (see Eisenberg et al., 1996; Ruble & Martin, 1998, along with Martin & Dinella in this volume). Starting early on boys and girls do very different activities, and play with quite different toys. In research done prior to the 1980s elementary school aged children often classified school subjects as either masculine or feminine (see Huston, 1983). Math and science were viewed as masculine, and reading/English and the arts as feminine. This no longer appears to be the case, as gender stereotyping of school subjects now is less consistent (see Etaugh & Liss, 1992).



Although school subjects no longer appear to be clearly gender stereotyped, boys and girls do vary in their interest in different subject areas. In Eccles' and Wigfield's work just reviewed (e.g., Eccles et al., 1993; Wigfield et al., 1997), boys and girls differed in their interest in reading, music, and sport in gender stereotypic ways. However, boys' and girls' interest in math did not differ during elementary school (see also Folling-Albers & Hartinger, 1998). During secondary school boys appear to be more interested in math than are girls. Similar findings have been reported for science and other technical fields (see Gardner, 1998, for review). By adolescence girls report less interest in science than do boys, and are much less likely to enroll in science and technically-oriented classes, or pursue these areas for their careers.

Explanations for these differences in interests and activity preferences have focused on several things, including children's understanding of what is appropriate for each sex to do. Children's understanding of stereotypes about what are gender-appropriate activities increase across the childhood years (see Eisenberg et al., 1996; Martin & Dinella, this volume; Ruble & Martin, 1998, for further discussion). From the perspective of the constructs discussed in this chapter, perhaps children develop more positive competence-related beliefs and values for activities they believe are appropriate for their gender, and thus engage more in those activities. Parents likely contribute to these differences through the toys they provide and activities they encourage children to do (see further discussion later). Peers have a strong role as well (Eisenberg et al., 1996).

The differences in patterns of interest potentially are crucial for understanding differences in cognitive performance. Various researchers have documented how interest impacts comprehension and performance (e.g., Krapp, Hidi, & Renninger, 1992; Renninger, 1992, 1998; Schiefele, 1999). When individuals are interested in the activity they are working on, they often process the information received more deeply, retain it better, and stay engaged with it for a longer period of time (though the effects of interest sometimes are complex; see Renninger, 1992, 1998). Individuals' interests play strong roles in their choices of which activities to pursue, both in and out of school. For instance, interest has strong implications for decisions like occupational choice, as we will discuss later. Thus to understand gender differences in cognition and performance it is crucial to consider interest as a motivational variable.

Intrinsic motivation is another important motivational construct that is related to the interest construct. When individuals are intrinsically motivated they do activities because they enjoy them and of their own volition (see

Deci & Ryan, 1985; Ryan, 2000). Although much has been written about intrinsic motivation, researchers assessing it rarely have examined sex differences in it. Gottfried's (1990) study of young elementary-school aged children's intrinsic motivation for math and is one exception; she found no gender differences in intrinsic motivation for either subject.

In summary, as with competence beliefs there are gender differences in children's and adolescents' valuing of different activities, and their interest in them. These differences are important for understanding the development of gender differences in cognition and performance. In our research children's and adolescents' valuing of different activities relates strongly to their choices of whether or not to continue to pursue the activity (Eccles et al., 1983; Meece, Wigfield, & Eccles, 1990). Such choices can have an impact on actual competence and subsequent performance. The choice to participate in an activity likely will increase one's performance; choosing not to do the activity will decrease performance.

#### Gender Differences in Self-Concept and Self-Esteem

The literature on self-concept (SC) and self-esteem (SE) is voluminous, and cannot be reviewed completely here (see Harter, 1998, for a thorough review of the development of self-representations). However, because SC and SE both have been tied to achievement and motivation, it is important to consider them in this chapter. Further, there have been numerous studies of gender differences in SC and SE.

The literature on SC and SE has been plagued by definitional and measurement problems. Often the two terms are used interchangeably. We define SC as individuals' understanding of their roles and characteristics. SE can be defined as individuals' affective reactions to their characteristics, and overall evaluation of themselves as persons (see Wigfield & Karpathian, 1991). So for example, part of one's SC could be "I am a good tennis player". If tennis is a central activity to this individual, then her SE may be enhanced. We believe it is useful to distinguish these two terms, in order to attach specific meaning to each.

Historically, measures of SC often were global, with one overall score derived (see Harter, 1998). Global measures often relate only weakly to other constructs such as achievement; this is due in large part to the difficulty in determining exactly what influences constructs as general as global SC. Modern theorists posit that SC is multidimensional, and thus argue that specific aspects of SC should be measured rather than measuring it globally (e.g., Harter, 1990; 1998; Marsh, 1993). For instance, if a researcher is interested in relations of SC to math

performance then he or she should measure SC in this domain, rather than just using a general SC measure. Popular questionnaire measures of SC developed by researchers such as Harter and Marsh focus on perceived competence as the crucial aspect of self-concept, and these measures assess this construct in several domains. Interestingly, because of this focus on perceived competence these measures have some overlap with the measures of competence and expectancies discussed above.

By contrast, because SE reflects one's overall affective appraisal, it tends to be measured more generally. Although there are important theoretical reasons for considering SE as an overall self-evaluation, by measuring SE generally researchers often find relatively weak relations of SE to different aspects of performance. This is because SE is influenced by so many different factors.

Historically, research on sex differences in general SC produced a conflicting pattern of findings, with some studies showing that boys have higher SCs, some studies showing that girls do, and others finding few differences (see Wylie, 1979). The more recent work utilizing specific measures of SC has produced more consistent findings that are in line with those reviewed earlier in the section on perceived competence: boys have higher SCs for physical activities and math, and girls do so for reading and music (Harter, 1982; Marsh, 1989). Marsh noted, however, that these differences were not very substantial in terms of the amount of variance explained. However, such differences could have an impact on the development of cognitive differences between the sexes, as was discussed earlier in the section on competence beliefs.

One interesting group to consider is gifted children, who obviously are advanced in their cognitive skills. Research on gifted boys' and girls' perceived competence, SC, and SE also has produced a conflicting set of findings, particularly when researchers have studied general SC and SE. Some researchers find that gifted girls have higher general SC and SE than gifted boys do (Bartell & Reynolds, 1986; Coleman & Fults, 1982), whereas others find no such differences between gifted boys and girls (Karnes & Wherry, 1981; Loeb & Jay, 1989). The conflicting results could be the result of using different measures of SC and SE, though several of these researchers have used the same measure in their work.

The picture is clearer when researchers use measures that tap specific aspects of SC. Seigle and Reis (1998), in a large scale study of gifted boys' and girls' SC in different areas, found that girls rated their competence in language arts higher than boys did, and also valued language arts more than did the boys. Boys rated their

competence as higher in math, science, and social studies. These results are similar to those in “non-gifted” samples of children reviewed above; even within gifted populations girls and boys differ in their views of their competence in sex stereotypical ways. Again, these differences have implications for males' and females' continued involvement in different kinds of activities. Based on their sense of competence gifted boys and girls may gravitate toward different achievement domains, with implications for their cognitive development in the different domains. Continued involvement in an academic subject area likely means stronger cognitive growth in that area.

It is important to consider what research has shown about the relations of SC to achievement. Although the causal direction in this relationship has been long debated and likely is reciprocal by middle childhood (see Marsh & Yeung, 1997; Wigfield & Karpathian, 1991), it has been clearly documented. When children have positive SCs in a given area they also achieve better, and vice versa. Moreover, there is intriguing evidence that there are sex-differentiated patterns in relations of specific aspects of SC to achievement, and to general academic SC. Skaalvik and Rankin (1990) found that for boys, math SC and verbal achievement predicted general academic SC. For girls verbal SC and math achievement most strongly predicted general academic SC. Skaalvik and Rankin interpreted these results in terms of gender stereotypes about who has better math and verbal abilities. They suggested that if the stereotypes that boys are better at math and girls are better at verbal skills are accepted, then girls' math SCs would not influence their general academic SC, and the same would be true for boys' verbal SCs. These fascinating findings need to be replicated, but show how stereotypes and beliefs about specific aspects of self relate to both general SC and achievement. Such stereotypes could impact sex differences in cognitive development.

Work on gender differences in SE also has produced some interesting findings. During the middle childhood years boys and girls report similar levels of SE. By the early adolescent years, however, girls tend to report lower SE than boys. Although in general SE rises as children move through adolescence (Dusek & Flaherty, 1981), the gender difference remains (Kling, Hyde, Showers, & Buswell, 1999). Further, young women seem more likely than young men to develop more serious negative self-evaluations, such as depression, during the adolescent years (see Eisenberg et al, 1996; Harter, 1998; Nolen-Hoeksema & Girigus, 1994).

A variety of explanations have been offered for these sex differences in SE and depression. Boys have been described as being more likely to handle difficulties by engaging in "externalizing" behavior, such as aggression. Girls, by contrast, tend to "internalize" problems to a greater extent (see Eisenberg et al., 1996). Nolen-Hoeksema

and Girigus (1994) suggested that females' SE is based more on the approval of others and on pleasing others, making it more difficult for them to maintain self-approval, especially when they encounter difficulties.

Physical appearance issues likely are central as well. Harter (1990, 1998) made three essential points about physical appearance and SE, based on her own work and that of others. First, as boys and girls go through childhood and move into adolescence, girls (relative to boys) are increasingly less satisfied with their own appearance. Second, society and the media place an incredibly strong emphasis on physical appearance as a basis for self-evaluation, and this is especially true for women. There are clear (and often unrealistic) standards for women's appearance that young women strive to attain, often unsuccessfully. Third, Harter's empirical work clearly has shown that for both boys and girls (and men and women as well), satisfaction with physical appearance is the strongest predictor of SE. Taking these three points together, girls are increasingly unhappy about an aspect of themselves that seems to be the primary predictor of SE. Hence girls are more likely to develop lower SE at this time.

Another explanation for girls' lower SE during adolescence concerns socialization into male and female roles. A variety of authors have argued that interest in gender-appropriate behavior becomes pivotal at early adolescence, with both boys and girls wanting to conform to appropriate roles (see Harter, Waters, Whitesell, & Kastelic, 1997, for review). Hill and Lynch (1983) called this phenomenon "gender intensification". For females traditionally appropriate feminine behaviors include caregiving, pleasing others, being agreeable, and wanting to maintain connections between self and other. Note that high achievement is not on this list. Gilligan (1993) discussed these issues extensively (see also Pipher, 1994). She argued that because of the importance of these things, particularly the importance of maintaining relations to others, many young women become hesitant to express themselves fully, for fear of disrupting their relations with others. Gilligan referred to this phenomenon as "losing voice". Because stifling one's voice means presenting oneself falsely, lower SE may result. Gilligan has conducted interviews with early adolescent girls and found that many expressed concerns about these issues and felt that their voices indeed were stifled at adolescence.

Harter et al. (1997) conducted a series of questionnaire-based studies to examine the extent to which young women indeed do lose their voice at adolescence. They first assessed with whom adolescents felt they could express themselves fully. Not surprisingly, adolescent boys and girls felt that they could express themselves the most with same-gender friends and classmates, and less with opposite-gender classmates, parents, and teachers. Of particular

relevance to this chapter, they found no decreases across sixth through twelfth grade in females' sense of being able to express their voice, nor did they find overall gender differences in voice at these ages. Instead, they found that adolescents (both male and female) most likely to lose voice were those who felt they lacked social support from parents and others. Also, girls who perceived themselves as strongly feminine were more likely to lose voice, especially in the classroom setting.

Harter and her colleagues' intriguing findings showed, as Harter et al. (1997) stated "no evidence that girls, in general, lose their voices at adolescence. Rather, they suggest that Gilligan's analysis speaks primarily to a particular subset of adolescent females, namely, feminine girls who report lower levels of voice in public contexts" (p. 169). So although Gilligan's analysis appears to be too sweeping, it does appear that some girls are more at risk for losing voice at adolescence. Believing that one cannot express oneself in public setting like classrooms has strong implications for school performance; these girls perhaps are more likely to begin to do less well in school than their male counterparts, and female peers who do not share this gender orientation.

The findings about sex differences in SE potentially have important implications for sex differences in cognitive development. Girls focusing on social approval and physical appearance as the means to attain SE may be less invested in achieving well in school, with consequences for their cognitive development. Depression and achievement also are negatively correlated. It is important to reiterate, however, that children's general SE does not relate as strongly to achievement as do specific aspects of SC. Thus the more powerful effects on cognitive development likely come from the latter variables.

#### Gender Differences in Career Choice and Occupational Aspirations

We now turn to a consideration of gender differences in career choice and occupational aspirations. We begin by summarizing recent statistics on gender differences in occupations, and then discuss some of the individual and social factors likely contributing to the observed gender differences in career choice.

Gender differences in career choice. U. S. Census Bureau statistics (Statistical Abstract of the United States, 1999) indicate that women persist in choosing jobs that conform to the cultural stereotype of female occupations. Between the years 1983 and 1998, there was no appreciable change in the extent to which women dominated fields such as nursing, teaching and caring for young children, clerical positions, minor accounting jobs, ancillary health care workers, and food service.

During these same years there were modest increases in female employment in some typically male-dominated, professional occupations associated with higher educational attainment. The percentage of women in the roles of physician, dentist, architect, lawyer, and engineer nearly doubled. However, considering the remarkably low female participation in these careers in 1983, the 15-year increase yields women no more than a 30% overall inclusion rate in 1998, leaving these prestigious and higher-paying careers still largely occupied by men. Even those jobs requiring little education beyond high school, but which have a stereotypical male orientation (e.g., fire fighting, police work, auto mechanics, construction trades, and truck driving), continue to draw few women into their ranks.

There are also persistent trends in men's and women's choices about math and science careers. In 1998, male participation in professions based on proficiency in math and science continued to be much higher than women's. These include professions such as chemists and biological scientists (67-70% male); aerospace, chemical, civil, electrical, industrial, and mechanical engineers (80-93% male); computer systems analysts (73% male); and drafting, surveying, and mapping specialists (80-87% male). Furthermore, when women choose professional careers, they continue to gravitate toward those that are helping, or relationally oriented, far outweighing men's participation rates in areas such as personnel and labor relations (66% female); educational administration (63% female); educational and vocational counseling (69% female); social work (68% female); and public relations (68% female) (Statistical Abstract of the United States, 1999).

Finally, women continue to occupy lower ranking positions within broad categories of occupational fields. For instance, when health careers are considered, men dominate the more prestigious diagnosing occupations such as physician and dentist (74% male), while women overpopulate the less autonomous assessment or treating occupations such as nurse, dietitian, respiratory or physical therapist (73-93% female). Within the category of sales occupations, men in 1998 are over-represented in supervisory and proprietorship jobs (60% male); securities and financial service sales (71% male); and sales of commodities (74% male), while women tend to dominate in retail sales (65% female) and cashiering (78% female) (Statistical Abstract of the United States, 1999).

Given the evidence that sex differences in abilities are slight (see De Lisi & McGillicuddy-De Lisi, this volume; Eisenberg et al., 1996; Ruble & Martin, 1998), there is little evidence to suggest that the overall relegation of women to lower paying and less prestigious jobs has much, if anything, to do with their ability to perform in other areas. What then, are the developmental processes that help shape boys' and girls' differential attitudes about occupational attainment, and their occupational choices?

Gender differences in career aspirations. Boys and girls share the process of coordinating their self-beliefs, values, and career aspirations. Indeed, researchers have found that both boys and girls use thoughts about future occupation to refine their developing SCs, thereby using the career domain as one important domain to test salient personal traits (Bregman & Killen, 1999; Mullis, Mullis, & Gerwels, 1998). Also, McCullough, Ashbridge, and Pegg (1994) found that regardless of gender, adolescents who had aspirations to attain a high-status career demonstrated leadership in school, high SE, and an internal locus of control. These adolescents also tended to come from cohesive families.

Despite these similarities, studies suggest that broad gender differences in career-related self-determinants exist. Gifted boys, for example, embody the investigative nature of scientists and architects in their career choice profiles, while gifted girls are more at ease with the ambiguity, idealism, and imagination associated with writers and artists (McGinn, 1982; Shamai, 1996). Boys also demonstrate stronger interests and corresponding career preferences for realistic themes (working with objects, working outdoors, and a need for structure), while girls score higher on social (interest in people and the helping professions) and conventional (preference for traditional chain-of-command work environments) themes (Mullis et al., 1998). Adolescent females who value themselves in future roles as family caretakers have been shown to place high importance on occupational choices that will allow them the time to reinforce that important self trait in their adult lives (Eccles, 1987; Curry, Trew, Turner, & Hunter, 1994).

Similarly, the young women in Jozefowicz, Eccles, & Barber (1993) placed more value than the young men on a variety of female-stereotyped career-related skills and interests such as doing work that directly helps people and meshes well with child-rearing responsibilities. These values, along with ability SCs, predicted the gender stereotyped career plans of both males and females (see Eccles & Harold, 1992, for further review).



Gender stereotyping of career roles. Young children tend to have fairly inflexible belief systems about male-only participation in masculine occupations and female assignment to feminine adult roles, and demonstrate sex-stereotyped ideas about adult occupations that closely mirror the actual distribution of men and women in the labor force. Reid (1995) studied first, third, and fifth grade children's beliefs about who can occupy specific adult occupations. Children's answers were very much in accordance with who does occupy these roles. These results suggested that in general, young children may be limited in thinking about possibilities that conflict with what they actually see happening in the world of work. Some gender differences emerged in this study. Fifth grade boys, for instance, expressed stronger sex stereotyped beliefs about male occupations than did fifth grade girls. The older girls also were less sex-stereotyped about male occupations than were the youngest girls; however, all groups stereotyped traditionally female careers as more appropriate for women. Thus fifth grade girls in this study may have been moving away from sex stereotyping of male occupations.

Other research suggests that as girls get older they are less likely to believe that certain careers should be occupied by males only. Sandberg, Ehrhardt, Mellins, Ince, & Meyer-Bahlburg (1987) found that 18 year-old females demonstrated a wider diversity of career options than they did at age eight, suggesting that for girls, there exists an age-related trend away from self-limiting gender notions about potential career opportunities. Jackson and Tein (1998) found that high school-aged males had more strongly sex-stereotyped beliefs about parenting and career roles than did adolescent females.

Furthermore, girls appear to contemplate a wider range of possible outcomes than do boys when it comes to career planning. Eccles (1987) found that adult men exhibit single-minded devotion to one particular goal, whereas women are more likely to place equal value on a greater number of potential adult roles, predisposing them to plan more diverse life-paths that reflect the interface of family and career. In support of Eccles, Fiorentine's (1988) longitudinal study demonstrated that from the late 1960's to the mid 1980's, college women were engaged in a process of adding to their life goals, rather than becoming single-minded about careers like males do. That is, the women were in fact adding status/prestige occupational goals to their strong adult family orientation, thereby expanding the number of life domains to which they saw themselves committed as adults. Interestingly, Curry et al. (1994) found evidence of these trends in 6th

grade girls, who were found to have higher levels of concern about fulfilling multiple life domains than did their male peers.

Although adolescent girls now seem to believe they have the ability to perform a wider variety of occupations and believe that it is appropriate for females to enter these occupations, they still tend to aspire to careers that traditionally have attracted females. One main reason for this likely is adolescent girls' concerns about committing to careers that are costly in terms of time away from family. Indeed, the choice of traditional careers often is based on the concern that less traditional careers will mean too much time spent away from family (Corder & Stephan, 1984; Curry et al., 1994; Leslie, 1986). Thus it seems to be girls' valuing of different life roles rather than their ability to perform certain occupations that are driving their career choices.

Effects of sex differences in career aspiration on gender differences in cognition. Cognitive developmental theory suggests that children incorporate salient sex role knowledge gained from social interaction into existing mental schemas about the self; prompting, in this context, the reorganization of thinking over time about gender, careers, and related aspirations to accommodate new data. The integration of new knowledge into pre-existing, organized sets of ideas (schemas) also has the effect of making the information more retrievable, or accessible in memory, than other kinds of information that is not as readily assimilated into the child's schema (Bjorklund, 2000). This social-cognitive feedback loop perpetuates gender stereotypes when a young girl decides, based on consistent gender-stereotyping social feedback, for instance, that it is not appropriate for her to become a physician. When that occurs, future information that is consistent with that dominant non-physician self-schema is more likely to be attended to and encoded than information that challenges the belief. Conversely, the young boy who receives regular social reinforcement, (or tacit permission from the environment) to consider "physician" as a possible future self, constructs over time an increasingly more elaborate physician self-schema that is cognitively primed to receive and encode supporting information. These different self-schema in turn can impact specific aspects of cognitive development in different achievement areas. To continue the above example, the girl's choice not to consider becoming a physician may limit her cognitive development in areas of study related to medicine, while potentially increasing development in other areas she does choose to pursue. The boy's

cognitive development regarding things medical would increase, at the expense of other things. Thus sex-differentiated self-schemas, like other motivational constructs discussed earlier, drive choices of activities, indirectly affecting cognitive development.

## SOCIAL FACTORS IN THE HOME AND AT SCHOOL INFLUENCING THESE GENDER DIFFERENCES

### Parental Influences

Parents have a strong impact on many aspects of children's development, despite some recent claims to the contrary (see Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000). These influences extend to the constructs we discuss in this chapter. How do parents influence the observed sex differences in motivation, self-concept, and occupational plans? There has been debate in the literature over the years on how differently parents treat boys and girls. Maccoby and Jacklin (1974) concluded that there were few such differences, and Lytton and Romney (1991), in a meta-analysis of the effects of parental treatment, also concluded that in general boys and girls are treated similarly. Others disagreed with these conclusions, arguing that parents do treat boys and girls differently in a number of important ways, particularly in terms of play and toy experiences provided, degree of independence allowed, beliefs about sons' and daughters' abilities, and expectations for their achievement (see Beal, 1994; Eccles et al. 1993, Eisenberg et al., 1993; Ruble & Martin, 1998). Parents also may influence how much children value different activities. In this section we discuss parental influences on the major constructs we have been discussing: competence-related beliefs, task values, and career aspirations.

Parents' influence on children's competence-related beliefs. Researchers have found that parents of elementary and middle-school aged children believe boys have more ability in sports than girls do, and girls have more ability in reading than boys do. Overall, parents do not differ in beliefs about boys' and girls' math ability. They also appear to offer similar amounts of encouragement to boys and girls in math. However, those mothers who do believe males have more natural talent in math believe boys have greater competence in math. Mothers thinking males and females have equal natural talent in math believe sons and daughters to be equally talented in math. By adolescence, parents continue to believe sons and daughters are equally competent in math. However, they also begin to believe that math is harder for girls to do, and that boys will do better in careers requiring math (see Eccles et al., 1993, for further discussion). These differences exist even when actual performance differences between boys and girls are controlled (e.g.; Eccles et al., 1989; Eccles & Harold, 1991; Jacobs, 1992; Jacobs & Eccles, 1992; see

Eccles et al. 1993, for more complete review). That is, the child's sex influences parents' judgments about their abilities independently of the child's actual performance.

Researchers have also assessed sex of child effects on parents' attributions for their children's performance on academic and non-academic activities. Yee and Eccles (1988) found that parents of boys rate natural talent as a more important reason for their children's math successes than parents of girls. In contrast, parents of girls rate effort as a more important reason for their children's math successes than parents of boys (see also Dunton et al., 1988 and Holloway et al, 1986). Similarly, in Eccles et al. (1992), mothers gave gender-role stereotypic causal attributions for their adolescent children's successes and failures in mathematics, reading and sports: sons' successes in math and sports were more likely to be attributed to natural talent than daughters'; daughters' success in English was more likely to be attributed to natural talent than sons'. Furthermore, as predicted, the sex differences in these mothers' ratings of their adolescents' abilities in each domain were substantially reduced once these sex difference in the mothers' causal attributions was controlled. These findings support the hypothesis that parents' gender-role stereotyped causal attributions mediate parents' gender-role stereotyped perceptions of their children's math competence.

What are some of the mechanisms by which parents' beliefs and behaviors might impact children's own motivation and achievement? One possibility is parental role-modeling. Interestingly, Eccles and her colleagues have found that parents' influence on children's math achievement through role modeling of engagement in math does not seem to have strong effects on children's motivation and achievement. Instead, parents' beliefs and interpretations of children's experience seem more important (see Eccles et al., 1993). Many researchers have focused on parents' general beliefs and practices, and levels of involvement with their children. These researchers have found that these parental variables influence the development of children's competence-related beliefs, SE, and motivation (see Eccles et al., 1998; Goodnow & Collins, 1990; Sigel, McGillicuddy-DeLisi, & Goodnow, 1992, for reviews).

Parents' specific beliefs about their children's abilities also have been shown to influence children's motivation and performance. One well established link is that between parents' educational expectations and children's academic motivation and performance; parents who have higher expectations for their children tend to have children who do better in school (e.g., Alexander & Entwisle, 1988; Brooks-Gunn, Guo, & Furstenberg, 1993;

Gottfried, 1991; Kandel & Lesser, 1969; Schneider & Coleman, 1993). Parents' perceptions of their children's competencies and likely success also have been shown to influence children's motivation and achievement behavior (e.g., Alexander & Entwisle, 1988; Parsons et al., 1982, Pallas et al., 1994; Phillips, 1987). For example, parents' perceptions of their adolescents' abilities are significant predictors of adolescents' estimates of their own ability and interest in math, English, and sports even after the significant positive relation of the child's actual performance to both the parents' and adolescents' perceptions of the adolescents' domain specific abilities is controlled (Jacobs, 1992; Jacobs & Eccles, 1992; Parsons et al., 1982). Furthermore, Eccles and her colleagues found support for the hypothesized causal direction of this relationship using longitudinal panel analyses (Eccles et al., 1993; Yoon, Wigfield, & Eccles 1993). The impact of parents' specific beliefs on boys' and girls' expectation was shown by Baker and Entwisle (1987). They found that mothers' sex-differentiated expectations for boys' and girls' success in math contributed to grade school boys' and girls' differential expectations for their own math success.

Of particular relevance to this chapter is evidence that parents' broad gender role stereotypes influence their views of their own children's abilities and interests. Using path analytic techniques, Jacobs and Eccles (1992) tested whether parents' gender-role stereotypes generalized to their perceptions of their own children's ability. They found that parents who endorsed gender-role stereotypes regarding which sex is most interested in, and has the most natural talent for, math, English, and sports also distorted their ratings of their own children's abilities in each of these domains in the gender-role stereotypic direction (c.f., Jacobs, 1992). This did not occur for parents who did not hold these gender stereotypes.

Parents likely convey these beliefs to their children in a variety of ways. For example, they may make causal attributions for their children's performance, praising their child for that "A" in math by pointing out either the child's natural talent or great diligence. As noted above, there appear to be gender differences in the kinds of attributions parents make for boys' and girls' performance in different areas. They may also communicate their impression of their children's relative abilities by telling them what they are good at, or, more subtly, by encouraging them to try or discouraging them from trying, particular activities. Finally, they may make more general comments to their children about the importance of talent versus effort in accounting for individual differences in competence-statements such as "you have to born with music talent" or "anyone can be good at sports if they just work hard enough".

Parents' influence on children's valuing of different activities. The messages parents provide regarding the value they attach to various activities also ought to influence children's motivation and achievement. Parents may convey differential task values through explicit rewards and encouragement for participating in some activities rather than others. Also, parents may influence children's interests and aspirations, particularly with regard to future educational and vocational options, through explicit and implicit messages they provide as they counsel children. For example, parents, teachers, and counselors are more likely to encourage boys than girls to pursue math-related interests (see Eccles & Harold, 1992; Eccles & Hoffman, 1984). They also may have sex-differentiated beliefs about the external barriers to success coupled with beliefs regarding both effective strategies to overcome these barriers and their own sense of efficacy to implement these strategies for each child.

Whether parents' own values and encouragement directly affect either the value the children attach to math or their participation in math activities has not been established. Some researchers' work suggests rather weak relations between parents' own task value and adolescents' task value for math (Parsons et al., 1982). The relations may be stronger for younger children and when a wider range of activities are included. The relation may also be curvilinear. Work in the area of intrinsic motivation suggests that excessive attempts to influence a child's interest in a specific activity can backfire and lead to a decrease in interest and involvement (e.g. Deci & Ryan, 1985; Lepper & Green, 1978).

Specific experiences provided by parents. There is evidence that parents influence their children's motivation through the specific types of learning experiences they provide for their children. Parents expose children to different toys and activities, which provides children with the opportunity to develop different competencies. As noted above, these kinds of experiences vary greatly for boys and girls. For instance, boys get exposed to far more manipulative toys and large space play activities. This exposure likely affects the development of such basic cognitive skills as spatial facility (Casey, Nuttall, & Pezaris, 1997). Indeed, researchers have discussed the complex interplay of environmental and biological factors in influencing toy and activity preferences, and ultimately, cognitive development (see Halpern, 1995). From our perspective, having specific success experiences and acquiring specific skills likely influences motivation to engage in related activities through their influence on children's perceptions of competence for these activities, as well as their valuing of them. As discussed earlier, these motivational factors then can influence children's achievement.

Parents also provide different achievement-related experiences for sons and daughters (Eccles & Hoffman, 1984; Huston, 1983). For example, parents are less likely to nominate their daughters for gifted programs at school and to enroll their daughters in computer and competitive sports programs (see Eccles & Harold, 1992). Similarly, families with limited economic resources are more willing to invest these resources in their sons than in their daughters (Eccles & Hoffman, 1984). It is likely that the sex differences we see in children's competencies, self-perceptions, interests, and aspirations result in part from these kinds of differences in the experiences parents provide for their sons and daughters (see also Huston, 1983). Children's cognitive skills likely are affected too; for example, those in gifted programs should be more likely to gain cognitive skills more quickly.

How might parents' beliefs and their provision of specific experiences be related to one another? Eccles et al. (1993) discussed the interactions of parents' gender stereotypes, beliefs about their children, and provision of specific experiences to them. They proposed that gender stereotypes influence parents' beliefs about children's competencies and interests. Stereotypes also influence a number of mediating factors, including parents' attributions for children's performance, the importance parents attach to children acquiring skills in different areas, encouragement of involvement in different activities, and provision of toys and activities. These mediators then influence children's own sense of competence, their interest in different activities, and the amount of time they devote to different things. Eccles and her colleagues have found that parents do provide quite different achievement-related experiences to their boys and girls, and that parents' beliefs about their children's competencies and interests, rather than the child's sex per se, influences the experiences they provide children.

Parental influences on occupational interests and career choice. Parents can contribute to the development of children's cognitive schema for gender-appropriate academic and career aspirations in various ways, including direct parental suggestion (Trice, McClellan, & Hughes, 1992); cultural socialization and parental modeling of careers (Mullis, Mullis, & Gerwels, 1998), perceived parental involvement in early learning (Marjoribanks, 1995), and parental expectations for children's success in various academic domains (Eccles, 1984; Baker & Entwisle, 1987).

Trice et al. (1992) found that parents make direct verbal suggestions as a means of transmitting their own occupational preferences to children. Their study demonstrated that the number of parental career suggestions increased over time between kindergarten and the 6th grade year, while children's tendency to

list their parents' suggestions as a probable career choice decreased over the same time period. This was particularly true for girls. It is possible that as children move away from the sole influence of parents during the school years, they expand their social convoys to include teachers and peers who provide them with added social opportunities to consider as yet, unexplored possible career selves.

Mullis et al. (1998) found that gender and parental occupation were related to the stability of adolescents' career interests over a 3-year period. Females scored significantly and consistently higher than males on interest measures for careers traditionally reinforced by Western culture as appropriate for women: those with social, artistic, and conventional themes. Regardless of gender, adolescents with parents in professional careers broadened their career interests over the 3-year period, suggesting that children of professional parents were intellectually challenged to remain open to new career options.

Peer support. Adolescents begin to use the pro-social, egalitarian nature of peer relationships as an adjunct to the more authority-dominated relationships they experience with parents (who sometimes have career agendas for their children). According to Young, Antal, Basset, Post, DeVries & Valach, (1999), both male and female adolescents' conversations about career reveal a mutually beneficial, intentional, goal-directed process whereby the participants aid each other in exploring personal futures, formulating educational plans, and validating and/or challenging career selection. These organized exchanges of information favorably contribute to adolescents' growing banks of knowledge about who and what they are, where they are going, and how to get there; creating yet another mechanism for cognitively equilibrating a sense of self with important life outcomes such as career choice.

#### Effects of School Experiences

The literature on schooling's differential effects on boys and girls is quite large, and so we only can present a brief summary here (see AAUW, 1992; Beal, 1994; Eisenberg et al., 1996; Sadker & Sadker, 1994, for further discussion). Many have argued that teachers treat boys and girls quite differently, and in ways that often are not beneficial to girls' motivation and achievement. Boys demand and get more attention for both their academic and non-academic activities. They get called on more, and often are given more elaborate questions to answer, questions that may be more likely to facilitate their cognitive development. Part of the reason boys get called on more is that they often are more assertive in class, so that teachers simply respond to them more.



Sadker and Sadker (1994) argued that girls often are rewarded for compliant, quiet behaviors in the classroom, behaviors that are not necessarily associated with higher achievement. Some research has suggested that when girls' academic work is criticized they receive more comments about lacking ability, whereas the academic criticism boys receive focuses more on lack of effort, or on their poor behavioral conduct (Dweck, Davidson, Nelson, & Enna, 1978). Receiving more negative feedback about one's ability lowers individuals' sense of their own competence; thus these findings suggest that girls may be more likely to lack confidence in their abilities in different areas (see Beal, 1994, for further discussion). However, these findings have not always been replicated and so must be interpreted with some caution (see Parsons, Kaczala, & Meece, 1982).

Some teachers also appear to have different expectations for boys and girls, particularly in math and science (Beal, 1994; Jussim, Eccles, & Madon, 1996). Research on teacher expectancies shows that these expectancies can influence students' performance; thus teachers holding lower expectancies for girls in areas like math and science could negatively impact their cognitive development in these areas (see Eccles & Wigfield, 1985, for review). However, recent evidence on teacher expectancy effects suggests that such effects may be less strong than was once believed. (Jussim & Eccles, 1992; Jussim et al., 1996). Much of the association between teacher expectations for individual students and subsequent student motivation and performance reflects the "accurate" association between teacher expectations and student characteristics like prior achievement levels and behavioral patterns. However, small teacher expectancy effects over time can have a large cumulative effect on both motivation and achievement (Jussim et al., 1996) particularly if these effects begin in kindergarten and the first grade (Entwisle & Alexander, 1993).

Differences in performance in math and science between males and females used to be explained in part in terms of differential course taking patterns of males and females (e.g., see Kimball, 1989). Males were more likely to take more classes in these areas. However, these patterns have changed; at least during high school girls and boys now are taking similar numbers of math and science courses. The gender differences in math and science course taking remain strong at the college level, however (see Royer et al., 1999).

What might be more important for understanding gender differences in performance in these areas is not course taking per se but what occurs in the classes. Instructional practices can vary widely in the same content areas. Further, there are sex differences in children's preference for different types of instructional practices, which likely

interact with subject area to produce sex differences in interest in different subject areas (Casserly, 1980; Eccles, 1989; Kahle, 1984). Females appear to respond more positively to math and science instruction if it is taught in a cooperative or individualized manner rather than a competitive manner, if it is taught from an applied/ person centered perspective rather than a theoretical/abstract perspective, if it is taught using a hands-on approach rather than a "book learning" approach, and if the teacher avoids sexism in its many subtle forms. These effects likely reflect the fit between the teaching style, the instructional focus, and females' value, goals, motivational orientation, and learning styles.

The few relevant studies have found support for this idea (e.g., Eccles, 1994; Eccles & Harold, 1992). If such classroom practices are more prevalent in one subject area (e.g., physical science) than another (e.g., biological or social science), then one would expect gender differences in motivation to study these subject areas. Researchers studying classroom practices have found that math and physics are especially likely to be taught in a manner least preferred by females. Consequently, it is not surprising that many girls are less interested in these subject areas than in other subject areas that are taught in a manner more consistent with their preferences. It should also be noted that math and physical science do not have to be taught in these ways; more "girl friendly" instructional approaches can be used. And when they are, both girls and boys are more likely to continue taking courses in these fields and to consider working in these fields when they become adults.

Although it does appear that boys and girls are treated differently, Harter et al. (1997) noted a number of problems in the research on this topic. One is that a number of the studies showing these differences are not methodologically rigorous. Perhaps most important for our concerns in this chapter, Harter et al. stated that there is almost no evidence on how the differential teacher treatment actually influences important outcomes, such as students' cognitive development, performance, and motivation. This topic is a priority for future research in this area.

Teacher and school influences on career choice. Adolescent girls appear to be particularly susceptible to the impact of classroom social support systems as mediators of academic performance. Teacher support and classroom belongingness have a stronger association with expectancy and value orientations for adolescent girls than for boys (Goodenow, 1993), and females demonstrate a greater desire for approval in classroom settings than do males (Igoe & Sullivan, 1991). Farmer (1985) analyzed the

effects of background, personal, and environmental influences on the aspirations, mastery and long-range career commitment of 9th through 12th grade males and females. Females scored higher than males on measures of aspirational goals; with both aspiration and mastery being enhanced for females when they perceived support from teachers for their achievements. The mediating effect of all environmental factors (parent and teacher support, perceived support for women working) on career commitment was higher for girls than for boys, suggesting once again, that long range career planning is a more complex process for women; one that is more susceptible to the impact of opposing role priorities than for men.

#### SUMMARY AND CONCLUSIONS

We reviewed work on sex differences in motivation, self-concept, career aspirations, and career choices. Reliable sex differences in the first three of these variables emerge early on in children's lives. Career choices remain strongly sex typed, despite some change in occupational patterns observed over the last 15 years. We also reviewed work on how parents, teachers, and schools influence these sex differences. We made the case that the observed sex differences in motivation, self-concept, and career aspirations can impact sex differences in cognitive development. Based in part on their motivation and aspirations, boys and girls perform differently on different academic tasks and activities. When choices become available they will choose to continue to do certain activities, and stop doing others. The greater (or lesser) involvement in these activities impacts their developing cognitive skills in these different areas. Looking beyond the individual child or adolescent, parents and teachers provide different kinds of experiences and feedback to boys and girls that also leads them to pursue sex-differentiated activities, with ultimate effects on their cognitive development. We have learned much about these sex differences, but the complex interplay of social, biological, and personal factors influencing these differences needs further investigation. One particular reason this is the case is that sex roles, as a culturally-defined construct, always are in flux. It therefore is essential to re-visit sex differences in these various constructs, as well as their relations to outcomes such as achievement and career choice.

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