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9. Why Doesn't Jane Run? Sex Differences in Educational and Occupational Patterns

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Despite recent efforts to increase the participation of women in advanced educational training and high-status professional fields, women in general, and gifted women in particular, are still underrepresented in many high-level educational and occupational settings. The persistence of these patterns has attracted the interest of social scientists and public policy makers. The possibility that sex differences in educational and occupational choices may reflect differential use and development of human potential has raised special concern. In particular, social scientists and policy makers alike have worried that both the individual and society may be suffering from the underdevelopment and under-use of the intellectual talents of women. The fact that gifted women, compared to their male peers, are underrepresented at the higher levels of educational training and occupational status is especially worrisome since these women clearly have sufficient intellectual talent to participate fully in these educational and vocational settings. Many factors, ranging from outright discrimination to the subtle and not-so-subtle processes of gender role

socialization, contribute to this discrepancy in participation rates among gifted men and women.

Discussing all possible mediating variables is beyond the scope of a single chapter; thus I focus on the set of social and psychological factors that I and my colleagues have found to be important mediators of achievement-related behaviors. The chapter begins with a review of sex differences in achievement patterns among the gifted. In subsequent sections, I present a model that accounts for these differences, review the available evidence to support the hypotheses generated by the model, discuss the role of socialization in perpetuating these sex differences, suggest needed research, and suggest educational interventions that might help ameliorate the situation.

In any discussion of sex differences in achievement the problems of societal influence on the very definitions of achievement as well as on the assessment of the differential worth of various forms of achievement must be acknowledged. Defining achievement itself, much less defining appropriate or ideal ways of using one's talents, is a value-laden enterprise at best. Evaluating the meaning and consequences of sex differences on any particular criterion of achievement is equally value laden. Too many social scientists have adopted a male standard of ideal achievement when judging the value of achievements by women (see Parsons & Goff, 1980). Using this standard, they have focused on the question, "Why aren't women more like men?" As a consequence, very little systematic, quantitative information has been gathered regarding more stereotypically female-typed achievements, such as the academic accomplishments of one's offspring or of one's pupils or one's contributions to local organizations.

Even less qualitative information has been gathered regarding the meaning of various achievement-related activities to either gifted men or women. As a result, very little is known about the ways in which gifted women think they express their intellectual talents. Defining achievement in terms of typically male-typed activities inevitably leads to the question, "Why aren't the women achieving at the same levels as the men?" instead of the question, "Why do gifted women choose particular achievement arenas?" Nonetheless, while acknowledging this value bias it is still instructive to compare men and women on the set of activities assumed to be indicators of achievement by the culture at large. The reader is forewarned, however, that these indicators do favor men. To balance this bias, particular attention will be focused, whenever possible on the reasons gifted women provide to explain the achievement-related choices they make.

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Research on Sex Differences Among the Gifted

In reviewing the educational and occupational patterns of gifted men and women, I have relied heavily on two sets of data: the longitudinal data compiled on Terman's gifted population and the cross-sectional and longitudinal data being compiled by researchers at Johns Hopkins University who are studying mathematically and verbally precocious children. I have supplemented these studies with general statistics on the occupational and educational advancement of extremely bright males and females.

Terman's Gifted Population

In 1921, Terman began a longitudinal study of approximately 1,450 gifted boys and girls 7 to 15 years old. The original sample contained 831 males and 613 females. These individuals have been recontacted several times; extensive demographic, intellectual, and social-developmental data were gathered at each contact. Because the researchers have been able to relocate approximately 80 percent of the original sample at each new wave of data collection, this longitudinal study provides the richest and most complete set of data available on the life-span development of gifted males and females. Although bound by its historical period, it provides the best data available for comparing the educational and occupational patterns of gifted males and females.

Even though striking educational and vocational differences characterize this sample of gifted males and females, there are some important similarities that should also be noted (Terman 1925, 1930; Terman & Oden, 1947). First, although the girls had a slight edge over the boys on measures of social adjustment during childhood, these males and females have scored approximately the same on a variety of measures of social adjustment at each wave of testing, especially during the adult years. In addition, both the males and the females scored as well as did normative samples on measures of social adjustment and maturity. Second, the males and females received approximately the same grades during high school. When a difference emerged for either grades or teachers' ratings of academic performance, the girls performed slightly better than the boys, despite the fact that the boys scored slightly higher than the girls on timed achievement tests in math, history, and science. In college, the women did as well, if not better, than the men in all courses except science and math courses. Third, the males and females were graduated from

Table 1
Most Common Undergraduate and Graduate
Majors of Men and Women in the Terman
Study: 1940

Major	Undergraduate		Graduate	
	Female	Male	Female	Male
Biological Sciences	6%	10%	9%	17%
Education	9%	1%	19%	6%
Engineering	<1%	15%	<1%	8%
Letters	36%	9%	28%	6%
Physical Sciences	5%	17%	4%	13%
Social Sciences	37%	40%	32%	18%
Other	6%	8%	7%	32%
Total Number of Students	388	523	218	356

Note. Percentage figures are rounded to the nearest whole number. They represent the percentage of the total within each column. Some of the graduate students were in their graduate programs at the time these data were gathered. Data are derived from Terman and Oden (1947).

both high school and college at approximately the same age. And, finally, these males and females were equally likely to enter college upon leaving high school.

Sex differences in the educational patterns of Terman's sample emerged for the first time when the sample was in college. Table 1 summarizes the fields in which these men and women obtained their college degrees (not all of the original sample graduated from college). These men and women specialized in very different fields of study at both the undergraduate and graduate levels (Terman & Oden, 1947). These differences reflect sex stereotypes still held today, particularly with regard to the fields of education, engineering, and the physical sciences.

In addition to these differences in field of study, sex differences also emerged in length of study. Although the men and women were equally likely to earn bachelor's degrees (71% of the men and 67% of the women had graduated from college by 1960), the men were more likely than the women to complete graduate degrees. For example, by 1960, 40 percent of the original male sample and only 24 percent of the original female sample had obtained advanced degrees (Oden, 1968). Furthermore, the men obtained higher and more prestigious degrees than did the women. For example, by 1960, 87 men and only 20 women had obtained PhDs (Oden, 1968). Similarly, by 1945, 126 men compared to only 8 women had received either a law degree or an MD (Terman & Oden, 1947). The

women were also less likely than the men to complete graduate degrees once they had entered graduate school. For example, in 1945 only 10 percent of the male graduate students had failed to obtain a degree; in comparison, of the students who had entered graduate programs, fully 23 percent of the female graduate students had failed to obtain their graduate degrees in the same time period. Finally, although men and women were equally likely to obtain financial assistance for their first year of graduate training, a higher percentage of the male graduate students continued to receive financial support for two or more years (Terman & Oden, 1947). As a consequence, the men received three times as much financial assistance for graduate training as did the women.

Differences in occupational patterns are even more extreme. The most striking difference lies in the percentage of men and women who reported having an occupation. From 1940 to 1960, more than 99 percent of the men were either employed full time or retired from full-time employment. In contrast, during this same period, only 36 to 49 percent of the women were employed full time (Oden, 1968; Terman & Oden, 1947). Not surprisingly, the vast majority of the unemployed women were housewives, many of whom remained unemployed even after their children had grown and left home.

There are also marked sex-stereotypic differences in the occupational attainment of the fully employed men and women. The occupations of the fully employed men and women from Terman's sample in 1960 are summarized in Table 2. As was true each time the sample was surveyed, the gifted women were less likely to be employed than were the men (42% versus 97%). The men and women also differed in the occupations they held. The women were more likely than the men to be employed in traditionally female fields (education and administration below the college level, library science, social work, and high-level clerical and accounting). In contrast, the men were more likely than the women to be employed in traditionally male fields (law, science and engineering, and executive and managerial). In general, the men also held more prestigious positions than did the women. A similar pattern characterized this population of gifted men and women when they were surveyed in 1945.

In addition, the gifted men in Terman's sample earned a great deal more money than did the gifted women. For example, in 1959, the median annual income for the men was \$13,464, with a range from \$5,000 to more than \$300,000. Twenty percent of the men earned in excess of \$25,000. In contrast, the median annual income for the fully employed women was \$6,424 and ranged from \$2,800 to only \$28,000. Even the single, professional women did not match their male peers in terms of occupational attainment and income, although they generally fared better than their married counterparts (Oden, 1968).

It is clear from these data that the gifted women in the Terman sample achieved less in terms of educational and vocational attainment

Table 2
Occupations of Men and Women of the
Terman Study Who Were
Employed Full-Time in 1960

Profession	Men		Women	
	In each occupation: N	Percent	In each occupation: N	Percent
Professional and Semiprofessional				
Lawyer, Judge	77	10%	2	<1%
College or University Faculty	54	7%	21	8%
Teaching and Administration (below four-year college level)	32	4%	68	27%
Scientist, Engineer, Architect	107	15%	2	<1%
Physician, Clinical Psychologist	42	6%	8	2%
Author, Journalist	17	2%	11	4%
Nurse, Pharmacist, Lab Technician	0		6	2%
Librarian	0		15	6%
Government Work (military and federal agencies)	18	2%	0	
Social Work, Welfare Personnel	0		14	6%
Arts and Entertainment	21	3%	4	2%
Other Professional	29	4%	8	2%
Business				
Executive and Managerial Positions	179	24%	23	9%
High-level Clerical and Accountant	61	8%	54	21%
Real Estate, Insurance, Investments, Small Business	40	5%	7	3%
Public Relations, Promotions, Advertising	15	2%	5	2%
Skilled Trades and Agriculture	27	4%	0	
Miscellaneous	14	2%	5	2%
Totals	733		253	

Note. Percentages are based on the number of full-time employed individuals within each sex. Percents are rounded to the nearest whole number. Data are based on Oden (1968) and reflect employment status in 1960. Total population in 1960: males 759; females 597. Percent of the sample employed full-time: males 97%; females 42%.

than did their gifted male peers. To get a more complete picture of the achievements of this group of gifted women, it is also of interest to compare them with a more typical group of college-trained women. In 1940 at approximately the same time that Terman and Oden gathered their data, Babcock surveyed the status of American college graduates. Sixty

six percent of the female college graduates were employed; 25 percent were housewives (Babcock, 1941). In addition, 78 to 84 percent of the employed female graduates were in the professions, primarily in education. In comparison to this general sample of college-educated women, Terman's gifted women were less likely to be employed and, if employed, were more likely to be clerical and office workers. Thus, the occupational status of the gifted women in Terman's sample was lower than that of both their gifted male peers and the general population of college-educated American women at that point in history.

A somewhat different picture emerges for educational attainment. Although the gifted women in Terman's sample were less likely than their gifted male peers to have earned advanced degrees, a higher percentage of the gifted women obtained advanced graduate degrees than did female college graduates drawn from the general population (27 percent versus 12 percent; Greenleaf, 1937).

Explaining the Difference Between Men's and Women's Attainments

The results from the Terman studies clearly indicate that the gifted women achieved less than did the gifted men in terms of both educational and occupational advancement. But did they make less use of their intellectual talents? As I noted earlier, this is primarily a question of values. The accomplishments of the gifted men are easy to document. They were highly successful vocationally. Furthermore, the number of distinctions that these men had won by 1960 is quite impressive (see Table 3) and much greater than the number won by their gifted female peers. In contrast, the majority of the gifted women invested a large portion of their time and energy into their families. As a consequence, their educational and vocational attainments are less notable than those of their male peers. But have these women contributed less? The gifted men and women themselves provide one answer to this question. In 1960, they were asked to rate the extent to which they had lived up to their intellectual promise. Although the unemployed housewives gave a slightly lower rating than the professional women, both groups of gifted women were quite positive in their response to this question. In addition, as a group, the men and women were equally positive in their responses (Oden, 1968). In general, then, in 1960 these gifted women were fairly satisfied with their use of their intellectual talents. Apparently, at that point in history they viewed their contributions to their families and to their communities as positively as their male peers viewed their vocational success.

More recent interviews suggest that some of these women now have more regrets about their high levels of investment of both time and energy in their families coupled with their relatively low levels of investment in their own professional development (Sears, 1979). When asked to rate

Table 3
Numbers of Men and Women in the Terman Study Who Were Recipients of Outstanding Honors and Recognition by 1960

Honor	Men	Women
Elected to Phi Beta Kappa ¹	88	78
Elected to Sigma Xi ¹	77	17
Graduated from College with Honors	159	117
Who's Who in America	46	2
American Men of Science	81	12
Dictionary of American Scholars	10	5
International Who's Who	6	0
Elected to Political Office ²	26	3
Appointed to Political Position ²	18	4

Note. Numbers are estimates based on self-reports; relevant information was not available for all individuals. Data are derived from Oden (1968) and Terman and Oden (1947).

¹Elected at college graduation

²These figures were not tabulated by the researchers. They are estimates based on mention of position in Oden (1968).

their level of satisfaction with several areas of their lives, the gifted women were less satisfied than the gifted men with their occupational development, more satisfied than the gifted men with their friendships and the cultural richness of their lives, and equally satisfied with their family life and general joy of living. In addition, when asked how they would have structured their lives differently, substantially fewer of the gifted women would have chosen the homemaker role as primary and substantially more would have chosen a career.

This shift in satisfaction with their life decisions has undoubtedly been stimulated by the shifting cultural norms regarding women's family and occupational roles. The decision to invest time and energy in one's family rather than in an occupation was consistent with the gender role norms of the late 1930s and early 1940s. In addition, given the difficulty these women had retaining financial support for their graduate training and the probable discrimination they would have faced if they had sought out high-level professional employment, the types of jobs readily available to these women were quite limited. Investing time in one's family and community may well have seemed a more interesting alternative than working in a less than satisfying job. But, women have been reevaluating gender role norms for the past 15 years. In addition, employment and educational opportunities for gifted women have expanded substantially over the last 30 years. Consequently, when asked to reconsider the de-

cisions they made 30 to 40 years ago, the cost of these decisions in terms of their own development is likely to have become more salient since 1960. Furthermore, the direct benefits gained by their families may seem less salient now that their children have left home and most of their husbands have retired.

But what was the value to society of these women's commitments to their families and communities? To provide an objective answer to this question, it is necessary to measure these women's contributions using criteria of accomplishment that are not based on the dominant, male-typed value system. Many of these gifted women spent their lives rearing and educating children (approximately 80 percent were either teachers or homemakers or both). Comparing how these children fared intellectually, educationally, and vocationally with children reared and educated by less intellectually talented women would provide one indicator of these women's contributions. If the children of gifted mothers benefited on these criteria by their mothers' staying home, then their mothers' decision to use their intellectual talents at home would represent a substantial contribution to society and one that ought to be recognized and rewarded. Likewise, if the students of gifted teachers learned more and developed higher motivation to continue learning than did students of the average teacher, then the commitment of gifted women to educating youth would also be an important contribution to society and one that society should be willing to pay for.

In fact, society may be paying a rather heavy price now for not recognizing the contributions that gifted and talented women were making to public education. There is now a shortage of math and science teachers. In the past, a sizable percentage (10 to 12 percent of Terman's sample) of gifted women with math and science skills went into elementary and secondary education both because they wanted to teach children and because teaching fit well with their own family plans. Cultural change has encouraged these gifted women to seek out more prestigious and better paying jobs in industry and higher education.

Data relevant to some of these hypotheses may be available in the Terman data set. Many of the offspring of the original gifted sample were given the Stanford-Binet Intelligence Test. These data are summarized only briefly in the reports of the Terman study. For example, sex-of-child comparisons are reported in both Oden (1968) and Terman and Oden (1947); in each case the male and female children scored equally well. What is needed is a comparison of the children's scores broken down by the sex of the gifted parent and by the employment status of the mother. Such a comparison would provide an estimate of the benefit children of gifted mothers derive from having a gifted mother as well as from having a gifted mother who stayed at home during some or all of their childhood years.

But whatever the benefits of having a gifted mother, the influence of children on their gifted mothers' occupational achievements is quite

clear. For example, between 1940 and 1945, the percentage of gifted women employed dropped from 49 to 36 largely because of the birth of children (Terman & Oden, 1947). Furthermore, of the 30 women who had attained outstanding vocational achievements outside the home, 25 had no children (Oden, 1968).

In summary, the gifted women in Terman's sample achieved less than their gifted male peers both educationally and vocationally. In large part, this differential pattern reflects the impact of gender role socialization on these men's and women's definitions of the appropriate roles of mothers and fathers. Gifted mothers made vocational choices that meshed well with their desire to spend a lot of time with their children. It is also important to note that even the single, professional women did not attain the same levels of occupational status as their gifted male peers. Clearly, then, factors other than motherhood also limited the vocational attainments of Terman's gifted women. I discuss some of these social and psychological factors later in the chapter.

The Johns Hopkins Study of the Gifted

Over the past 15 years, Stanley and his colleagues at Johns Hopkins University have been studying mathematically and verbally precocious children. During this period, several thousand junior high school aged children drawn from regional and national talent searches have been given aptitude tests and questionnaires tapping attitudes, career plans, interests, and values. Many of these children have been or are currently being retested in order to chart their educational development.

Perhaps the most interesting aspect of the data emerging from these studies is their similarity to the findings of the Terman studies, especially given the social changes that have occurred during the last 50 years. Just as was true in the Terman study, fewer females than males have emerged as being gifted in mathematics in each of the Johns Hopkins studies. Furthermore, the boys in the Johns Hopkins samples have consistently scored higher than the females on the SAT-Math test (the test used by the Johns Hopkins team to assess mathematical talent). Finally, the girls have scored as well as the boys on the SAT-Verbal test (the test used to assess verbal talent). Thus, as was true of the Terman sample, giftedness in math is more common and more extreme among boys. In contrast, verbal precocity appears to be more equally distributed between the sexes (Benbow & Stanley, 1980, 1983; Fox & Cohn, 1980).

The pattern of sex differences in educational pursuits is also quite similar across the two studies despite the lapse of 50 years. In fact, differences that were not apparent until college in the Terman sample are evident in the Johns Hopkins samples by junior high school. This difference is best characterized in terms of the underrepresentation of girls in

"extra" educational settings, especially settings associated with math and science. The Johns Hopkins teams have consistently found gifted girls to be less likely than gifted boys to enroll in accelerated or special programs (Benbow & Stanley, 1982b; Stanley, 1976), to respond positively to an invitation to join a gifted program (George & Denham, 1976; Stanley, 1976), and to enter college early (Stanley, 1976). In addition, in follow-ups of the boys and girls who enrolled in the Johns Hopkins Summer Enrichment courses, the girls were less likely to remain on an accelerated math track (Fox & Cohn, 1980), were enrolled in fewer math and science courses (Benbow & Stanley, 1982a), and expressed less interest in majoring in science or engineering in college than did the boys (Benbow & Stanley, 1984). These differences exist despite the fact that these girls, like the girls in the Terman study, did just as well as the boys in their high school math and science courses.

Conclusions Drawn From the Johns Hopkins and the Terman Studies

As is true for the population at large (Eccles [Parsons], 1984), gifted females do not achieve as highly as do gifted males either educationally or vocationally. They are less likely to seek out advanced educational training, and, even when they do, they do not enter the same fields as do their male peers. They are overrepresented in the fields of education and literature and underrepresented in science, math, and engineering. Most importantly, they are, in fact, underrepresented in almost all advanced educational programs and in the vast majority of high-status occupations. Gifted women are less likely to have a professional career than their male peers, and even those who choose to have a profession tend to select occupations that have lower status, require less education, are more compatible with family time schedules, and make fewer demands on one's off-the-job time and on one's family.

One might argue that the underrepresentation of females in the sciences is a natural consequence of the pattern of sex differences on the aptitude measures taken by both Terman and the Johns Hopkins team. This is an unwarranted conclusion for several reasons. First, both of these studies focused on gifted children. Thus, even though the females may have less math aptitude than their male peers, they certainly have sufficient aptitude to make important contributions to science as well as to other professions. Second, although aptitude differences were positively related to the subsequent mathematical training of gifted boys in the Johns Hopkins programs, differences in aptitude were unrelated to the gifted girls' decisions regarding both enrollment in subsequent accelerated math classes (Fox & Cohn, 1980) and intended college major (Benbow & Stanley, 1984). Furthermore, the sex differences in high school math

enrollment and in intended college major were significant even with the differences in math aptitude controlled (Benbow & Stanley, 1982a, 1984).

Finally, although it is not yet known what the males and females in the Johns Hopkins study will do as adults, the Terman study certainly suggests that gifted females are not participating in the professional world as much as they could given their exceptional intellectual talents. Recent data on the ratio of men to women receiving advanced degrees indicate that this pattern of underrepresentation even in language and education fields is still evident. For example, even though education is the field most often selected by women in general, as well as by gifted women, women received only 35 percent of the doctorates in education awarded in 1977 (National Center for Educational Statistics [NCES], 1979). Similarly, women received only 39 percent of the doctorates in letters, 22 percent of the doctorates in social science, 9 percent of the doctorates in computer science, 10 percent of the doctorates in physical science, 13 percent of the doctorates in mathematics, and 3 percent of the doctorates in engineering. Although not all PhD recipients would be classified as gifted, they certainly are intellectually talented. These recent figures suggest that the pattern of sex differences in the educational development of today's intellectually talented individuals is similar to, although somewhat less extreme than, the pattern reported by Terman and Oden in 1947.

Given these results, it is quite likely that social forces and personal beliefs have a large influence on the sex-differentiated educational and vocational patterns of gifted individuals. And, although institutional barriers and discriminatory practices undoubtedly account for some of the differences (Vetter, 1981), psychological processes are also important (see Eccles [Parsons], 1984; Eccles & Hoffman, 1984). These processes are the focus of the remainder of this chapter. I discuss neither the potential causal impact of differences in aptitude on achievement patterns nor the possible causes of sex differences in performance on aptitude tests. I do not omit these topics because differences in aptitude are unimportant. Rather, although such differences may contribute, in part, to the disproportionately large numbers of men in math- and science-related fields, they do not account for the low percentages of gifted women who seek out advanced educational training of all types and who aspire to high-status, time-costly occupations.

Second, given that differences in aptitude do not account for all the variation in the educational and vocational choices of men and women, it is important that the basis of women's decisions be understood in order to advance general knowledge of achievement motivation and vocational decisions among the gifted. Third, given the instability of marriage as a primary means of financial support for women and their children, it is imperative that females prepare themselves for adult occupations that will be both rewarding and financially adequate. Finally, given the pre-

vious assumption, I wish to focus attention on those variables that are amenable to intervention so that gifted females can make wise career decisions in terms of both their personal development and their future financial autonomy.

Psychological Influences on Educational and Vocational Choices

Although few theories exist that explain sex differences in the educational and vocational choices of gifted individuals in particular, many theories have been proposed to explain such sex differences in the general population. Reviewing all of these is beyond the scope of this chapter. Instead, I explore the possible origins of the sex-differentiated achievement pattern found among the gifted within the context of a general model of achievement-related choices developed by my colleagues and me over the past several years (Eccles et al., 1983; Meece, Eccles, Kaczala, Goff, & Futterman, 1982). Given the importance attached to gender role by many investigators in this field (e.g., Fox & Cohn, 1980; Nash, 1979), special attention will be paid to the ways in which gender role socialization may be affecting gifted individuals' educational and occupational decisions.

Although the model is assumed to be general and applicable to non-gifted as well as to gifted individuals, the fact that gifted individuals have more than sufficient intellectual talent to succeed at most educational and vocational pursuits increases the potential importance of motivational and attitudinal influences on gifted students' achievement-related decisions. It also increases the probability that sex differences in these decisions are mediated by sex differences in social experiences and psychological variables.

A Model of Achievement-Related Choices

Over the past 15 years, my colleagues and I have studied the motivational and social factors that influence long- and short-range achievement goals and behaviors such as career aspirations, vocational and avocational choices, course selections, persistence on difficult tasks, and the allocation of effort across various achievement-related activities. Given the striking differences in the educational and vocational patterns of intellectually able, as well as gifted, males and females, we have been particularly interested in the motivational factors underlying their educational and vocational decisions. Frustrated with the number of seemingly disconnected theories set forth to explain sex differences in these achievement patterns, we

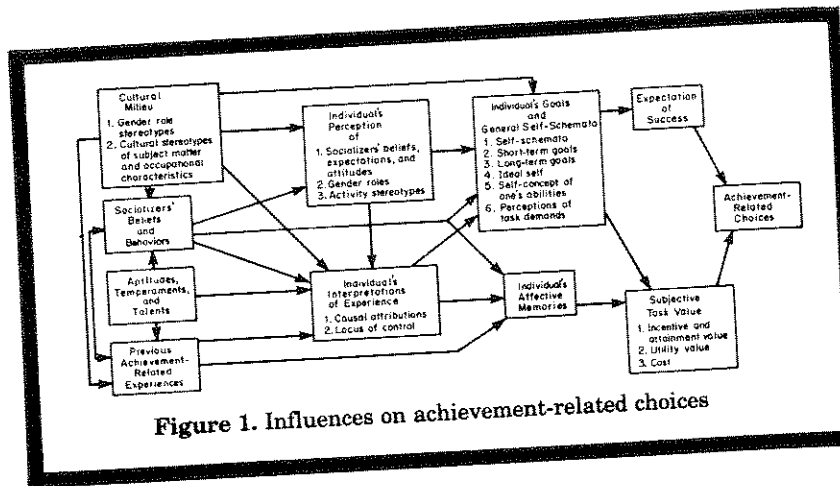


Figure 1. Influences on achievement-related choices

developed a comprehensive theoretical framework to guide our research endeavor.

Drawing upon the theoretical and empirical work associated with decision making, achievement theory, and attribution theory (see Atkinson, 1964; Crandall, 1969; Weiner, 1974), we have elaborated a model of achievement-related choices. This model, depicted in Figure 1, links educational, vocational, and other achievement-related choices most directly to two factors: the individual's expectations for success and the importance or value the individual attaches to the various options that he or she perceives as being available. The model also specifies the relations among these beliefs and cultural norms, experiences, aptitudes, and those personal beliefs and attitudes that are commonly assumed to be associated with achievement-related activities by researchers in this field (Eccles et al., 1983). In particular, the model links achievement-related beliefs, outcomes, and goals to causal attributional patterns, to the input of socializers (primarily parents and teachers), to gender role beliefs, to self-perceptions and self-concept, and to one's perceptions of the task itself. Each of these factors is assumed to influence both the expectations one holds for future success at various achievement-related tasks and the subjective value one attaches to these options. These expectations and values, in turn, are assumed to influence choice among achievement-related options.

For example, let us consider course enrollment decisions. The model predicts that people will be most likely to enroll in courses that they think they will do well in and that have high task value for them. Expectations for success depend on the confidence the individual has in his or her intellectual abilities and on the individual's estimations of the difficulty of the course. These beliefs have been shaped over time by the individual's experiences with the subject matter and by the individual's subjective

interpretation of those experiences (e.g., does the person think that her or his successes are a consequence of high ability or lots of hard work?). The value of a particular course is also influenced by several other factors: Does the person like doing the subject material? Is the course required? Is the course seen as being instrumental in meeting one of the individual's long- or short-range goals? Have the individual's parents or counselors insisted that the course be taken or, conversely, have other people tried to discourage the individual from taking the course? Does the person have fears associated with the material to be covered in the course?

Three features of our model are particularly important for understanding sex differences in the educational and vocational decisions of gifted individuals. The first of these is our focus on achievement-related choices as the outcome of interest. We believe that individuals continually make choices, both consciously and nonconsciously, regarding how they will spend their time and effort. Many of the most significant sex differences among the gifted (e.g., in vocational aspirations) occur on achievement-related behaviors that involve the element of choice, even if the outcome of that choice is heavily influenced by socialization pressures and cultural norms. Conceptualizing sex differences in achievement patterns in terms of choice takes one beyond the question "Why aren't gifted women more like gifted men?" to the question "Why do gifted women and men make the choices they do?" Asking this latter question, in turn, legitimizes the choices of both gifted men and women and suggests several new variables as possible mediators of the sex differences we observe in gifted individuals' achievement patterns. By legitimizing the choices of both men and women, we can look at sex differences from a choice perspective rather than a deficit perspective.

Conceptualizing sex differences in achievement-related behaviors in terms of choice highlights a second important component of our perspective, namely, the issue of what becomes part of an individual's field of possible choices. Although individuals do choose from among several options, they do not actively, or consciously, consider the full range of objectively available options in making their selections. Many options are never considered because the individual is unaware of their existence; others are not considered because the individual has inaccurate information regarding either the option itself or the individual's possibility of achieving the option. For example, a girl may have inaccurate information regarding the full range of activities an engineer can do or inaccurate information regarding the financial assistance available for advanced educational training. Still other options may not be seriously considered because they do not fit in well with the individual's gender role schema. Assimilating the culturally defined gender role schema can have such a powerful effect on one's view of the world that activities classified as part of the opposite sex's role are rejected, often nonconsciously, without any serious evaluation or consideration.

Research has provided some support for this hypothesis. By age five, children have clearly defined gender role stereotypes regarding appropriate behaviors and traits (Huston, 1983; Williams, Bennett, & Best, 1975). In addition, children appear to monitor their behaviors and aspirations in terms of these stereotypes (e.g., Montemayor, 1974; see Eccles & Hoffman, 1984 and Huston, 1983, for recent reviews). Consequently, it is likely that gender roles influence educational and vocational choices through their impact on individuals' perceptions of the field of viable options, as well as through their impact on expectations and subjective task value.

Understanding the processes that shape individuals' perceptions of the field of viable options is essential to understanding the dynamics leading gifted men and women to make such different achievement-related decisions. Yet there is very little evidence regarding these processes and their link to important achievement-related choices. Socialization theory provides a rich source of hypotheses, few of which have been tested in gifted populations. For example, one effect of role models may be to make people aware of novel options and options that are not generally considered by people of their sex. Parents, teachers, and school counselors can also influence students' perceptions of their field of options through the information and experiences they provide to students. Parents can directly affect both the options actually available to their children (e.g., by providing or withholding funds for a college education) and the options seriously considered (e.g., by mandating, encouraging, ignoring, and discouraging various options). Finally, peers can affect the options seriously considered by either providing or withholding support for various alternatives. The effects of peers can be both direct (e.g., laughing at a girl when she says she is considering becoming a nuclear physicist) and indirect (e.g., anticipating that one's future spouse will support one's occupational commitments).

It should be clear from these examples that social agents can either encourage or discourage gifted students from considering gender role stereotypic options. Unfortunately, social agents typically influence students to consider options that are consistent with gender role stereotypes. The possible mechanisms underlying these effects are discussed in more detail further on.

The third important feature of our perspective is the explicit assumption that achievement-related decisions, such as the decision to enroll in an accelerated math program or to major in education rather than law or engineering, are made within the context of a complex social reality that presents each individual with a wide array of choices, each of which has both long-range and immediate consequences. Furthermore, the choice is often between two or more positive options or between two or more options that each have both positive and negative components. For example, the decision to enroll in an advanced math course is typically

made in the context of other important decisions, such as whether to take advanced English or a second foreign language, whether to take a course with one's best friend or not, or whether it is more important to spend one's senior year working hard or having fun. Too often theorists have focused attention on why gifted, capable women do not select the high-status achievement options rather than asking why they select the options they do. This approach implicitly assumes that complex choices, such as career and course selection, are made independently of one another; for example, it is assumed that the decision to take advanced math is based primarily on variables related to math. We explicitly reject this assumption, arguing instead that it is essential to understand the psychological meaning of the roads taken as well as the roads not taken if we are to understand the dynamics leading to the differences in men's and women's achievement-related choices.

Consider, as an example, two junior high school students: Mary and Barbara. Both young women enjoy mathematics and have always done very well. Both have been identified as gifted in mathematics and have been offered the opportunity to participate in an accelerated math program at a local college during the next school year. Barbara hopes to major in journalism when she gets to college and has also been offered the opportunity to work part time on the city newspaper doing odd jobs and some copyediting. Mary hopes to major in biology in college and plans a career as a research scientist. Taking the accelerated math course involves driving to and from the college. Since the course is scheduled for the last period of the day, it will take the last two periods of the day as well as 1 hour of after-school time to take the course. What will the young women do?

In all likelihood, Mary will enroll in the program because she both likes math and thinks that the effort required to take the class and master the material is worthwhile and important for her long-range career goals. Barbara's decision is more complex. She may want to take the class but may also think that the time required is too costly, especially given her alternative opportunity at the city paper. Whether she takes the college course or not will depend on the advice she gets at home and from her counselors. If they stress the importance of the math course, then its subjective worth to her will increase. If its subjective worth increases sufficiently to outweigh its subjective cost, then Barbara will probably take the course despite its cost in time and effort.

In summary, we assume that achievement-related choices, whether made consciously or nonconsciously, are guided by the following: (a) one's expectations for success on the various options considered, (b) the relation of perceived options both to one's short- and long-range goals and to one's core self-identity and basic psychological needs, (c) the individual's gender role schema, and (d) the potential cost of investing time in one activity rather than another. All of these psychological variables are influenced

by one's experiences, by cultural norms, and by the behaviors and goals of one's socializers and peers. Each of these variables and their relation to the achievement-related decisions of gifted men and women are discussed in more detail in the following sections; the psychological constructs are discussed first, followed by a discussion of the socialization influences on these psychological variables. Evidence documenting both the sex differences on the variables and the link of these sex differences to the achievement-related decisions of gifted men and women is presented. It should be noted, however, that very little of this evidence exists. Although there are sound theoretical reasons for suggesting these links, much of the essential empirical work remains to be done.

Expectations for Success

Expectations for success and confidence in one's abilities to succeed have long been recognized by decision and achievement theorists as important mediators of behavioral choice (e.g., Atkinson, 1964; Bandura, 1977; Lewin, 1938; Weiner, 1974). There have been numerous studies demonstrating the link between expectations and a variety of achievement-related behaviors including educational and vocational choices among both average and gifted populations. For example, Hollinger (1983) documented a fairly strong relation between gifted girls' confidence in their math abilities and their aspirations to enter math-related vocations such as engineering and computer science. Similarly, Terman (1925) found a positive relation between gifted students' subject matter preferences and their ratings of the ease of the subject for themselves. But are expectations influenced by gender roles and do males and females differ in their expectations for success at various academic subjects and in various occupations? The answers to these questions are not clear for either average or gifted populations.

Gender Roles and Expectations

Since females are typically stereotyped as being less competent than males, incorporating gender role stereotypes into one's self-concept could lead girls to have less confidence than do boys in their general intellectual abilities. This, in turn, could lead girls to have lower expectations for success at difficult academic and vocational activities. It could also lead girls to expect to have to work harder in order to achieve success at these activities. Evidence from several sources suggests that either of these beliefs could deter girls from selecting demanding educational or vocational options, especially if these options are not perceived as being especially important or interesting. Consequently, these beliefs might account,

in part, for the relatively low numbers of gifted women in high-status occupations.

Gender stereotyping of particular occupations and academic subjects could further exacerbate the situation. Many educational programs and vocational options are gender stereotyped in this culture. Most high-status professions, especially those associated with math, science, technology, and business, are thought to be male activities. In contrast, teaching below the college level, working in clerical and related support-type jobs, and excelling in language-related courses are thought to be female activities by both children and adults (for reviews see Eccles & Hoffman, 1984; Huston, 1983). Incorporating these beliefs into one's self-concept could lead girls to have lower expectations for success in male-typed activities such as engineering and higher expectations for success in female-typed activities such as elementary school teaching. This pattern of differential expectations could lead gifted girls to select female-typed activities over male-typed activities, despite the fact that they have exceptional talent in math and science.

Evaluating these predictions is difficult. Researchers have tended to study students of average or slightly above average intellectual ability. Few relevant studies of gifted individuals exist, and those that do present a mixed picture. For example, Fox (1982) found that highly motivated gifted girls have lower self-confidence than equally highly motivated gifted boys. Similarly, Terman (1925) found that gifted girls were more likely to underestimate their intellectual skills and knowledge, whereas gifted boys were more likely to overestimate theirs. In contrast, Tidwell (1980) found no sex differences on measures of general self-concept. Tidwell (1980) and Tomlinson-Keasey and Smith-Winberry (1983) found no sex differences on measures of locus of control (a construct often linked to self-confidence and personal efficacy beliefs, e.g., Bandura, 1977).

There is also little evidence to support the hypothesis that gifted girls are less confident of their math and science ability than are gifted boys. For example, Benbow and Stanley (1982a) found no substantial sex difference in gifted students' estimates of their math and science competence. Similarly, although Terman's (1925) gifted students preferred courses that they thought were easier for them, the boys and girls did not differ in their perceptions of the ease of mathematics. Finally, Schunk and Lilly (1982) found no sex difference in gifted children's expectations for success on a laboratory math task.

Given this mixed set of results, it is not clear that gifted girls are typically less confident of their intellectual abilities than are gifted boys. Although it is true that the differences, when they are found, do support this conclusion, any differences that exist are quite small. Furthermore, the mediating role of these sex differences in explaining the discrepancy between men's and women's educational and vocational choices has not been demonstrated. Although students' expectations have been measured,

the link of these expectations to sex differences in academic and vocational choices has typically not been assessed. Furthermore, my own data (gathered on high-ability high school students) suggest that sex differences in the value attached to both math and English are more critical mediators of sex differences in course enrollment decisions than are sex differences in students' estimates of their math and English abilities (Eccles, Adler, & Meece, 1984). These results are discussed in more detail later.

It is possible, however, that researchers have been assessing the wrong expectancies. Typically, students are asked to report on their confidence about succeeding on an upcoming task or course. They are not asked how confident they are that they could succeed in particular professions or in particular advanced training programs. They are also not asked how much effort they think it will take to succeed in various professions or advanced training programs. It could be that gifted girls are less confident than gifted boys of their prospects for success in these more abstract activities. It is also possible that gifted girls are as confident as gifted boys in their ability to succeed, but that they assume that it will take more effort to succeed than do their male peers. As I noted earlier, either of these beliefs could mediate a sex difference in the educational and vocational decisions of gifted individuals, especially given the gender stereotyping of high-status occupations. Clearly, more research is needed before these hypotheses can be evaluated.

It is also possible that the critical expectancy beliefs are neither the absolute expectation one has for success in a particular field nor the perception one has of the absolute amount of effort it will take to succeed in a particular field; instead, the critical beliefs may be the relative expectations one has for success across several fields and the perceptions one has of the relative amounts of effort it will take to succeed in various fields. If gifted females think it will take more effort to succeed as an engineer or a doctor than as an elementary school teacher, journalist, or nurse, they may opt for the more female-typed occupations, especially if they place high importance on having a career that is compatible with their anticipated family roles. These hypotheses have yet to be evaluated.

Causal Attributions and Expectations

Causal attributions are often linked to self-confidence, expectations, and achievement behaviors (e.g., Dweck & Licht, 1980; Eccles et al., 1983; Weiner, 1974). The possibility that sex differences in causal attributions might mediate sex differences in achievement behaviors, especially in the motivation to persist despite difficulty and failure, has been suggested by several psychologists (e.g., Bar-Tal, 1978; Dweck & Licht, 1980; Nicholls, 1975; Parsons, Ruble, Hodges, & Small, 1976). However, as is true for expectations and self-confidence in general, the pattern of sex differences on measures of causal attributions is equivocal, the hypothesized

mediating effect of these sex differences on achievement choices is not clear, and very few studies have been done on gifted students (Cooper, Burger, & Good, 1981; Eccles Parsons, 1983; Eccles, Adler, & Meece, 1984; Frieze, Whitley, Hanusa, & McHugh, 1982; Parsons, Meece, Adler, & Kaczala, 1982).

One interesting sex difference has emerged for mathematical tests and course grades. Girls, especially girls of high ability, rank acquired skill, diligence, and effort as more important causes of their math success than do boys of equal attainment. In contrast, the boys rate natural talent as a more important cause of their math success. (Eccles et al., 1983; Eccles et al., 1984; Parsons, Meece, Adler, and Kaczala, 1982; Wolleat, Pedro, Becker, & Fennema, 1980). This pattern of differences may have important consequences for students' decisions regarding future involvement with mathematics and interest in math-related professions. People who view consistent effort (or skill and knowledge acquired through consistent effort) as the important determinant of their success in mathematics may avoid future courses if they think future courses will be more difficult, demanding even more effort for continued success. The amount of effort students can or are willing to expend on any one activity has limits, and if students already believe that they are working very hard to do well in math, they may conclude either (a) that their performance will deteriorate in the more difficult future math courses because they are trying as hard as they can at present, or (b) that the amount of effort necessary to continue performing well is just not worthwhile. As I noted earlier, either of these beliefs would be sufficient justification for avoiding both future math courses and math-related careers, especially for students who do not place high subjective value on math.

The same limits would not apply to students who view ability rather than effort as the relatively more important determinant of success in math. High levels of math ability should guarantee continued success with little or no increment in one's efforts. If this analysis is correct, then girls should be less likely than boys to enroll in advanced math courses and to aspire to math-related technical fields. This is, in fact, the case in both average and gifted populations. Unfortunately, the relevant attributional data have not been gathered on gifted students. In the one study in which causal attributions for a laboratory math task were assessed, no significant sex differences were found among the gifted subjects (Schunk & Lilly, 1982). Clearly, more research is needed before the role played by causal attributional patterns in shaping sex differences in gifted students' educational and vocational decisions can be evaluated.

Although Hollinger (1983) clearly demonstrated a link between confidence in one's math abilities and gifted girls' math-related vocational aspirations, the mediating role of expectations and self-confidence in fostering sex differences in the educational and occupational choices of the gifted has yet to be demonstrated. More studies are needed, especially

studies designed to assess the causal relations between variables related to self-concept and actual educational and vocational choices.

Values as Mediators of Achievement-Related Choices

Value is the second major component of our expectancy/value model of achievement-related choices. This component predicts that decisions regarding course enrollments, college majors, and occupation are influenced by the value individuals attach to the various achievement-related options they believe are available to them. Furthermore, subjective value is hypothesized to have at least as much influence as expectations for success on educational and vocational choices. Finally, given the probable impact of gender role socialization on the variables assumed to be associated with subjective task value, sex differences in the subjective value of various achievement-related options are predicted to be important mediators of sex differences in achievement-related choices in both typical and gifted populations. Our own data support these hypotheses.

In a longitudinal study of the math course enrollment decisions of high-aptitude, college-bound students, sex differences in students' decisions to enroll in advanced mathematics were mediated primarily by sex differences in the value the students attached to mathematics (Eccles et al., 1984). More specifically, the girls were less likely than the boys to enroll in advanced mathematics primarily because they felt that math was less important, less useful, and less enjoyable than did the boys. Similar results linking sex differences in course choice to sex differences in the subjective task value of various course or major choices have been reported by Katz, Norris, and Halpron (cited in Humphreys, 1984) and by Zerega and Walberg (1984).

Since *value* can mean many different things and since it has received so little systematic attention until recently, I would like to elaborate on our interpretation of value and its link to achievement-related choices before reviewing the empirical literature. Like others (e.g., Crandall, Crandall, Katkovsky, & Preston, 1962; Raynor, 1974; Spenner & Featherman, 1978; Stein & Bailey, 1973), we assume that task value is a quality of the task that contributes to the increasing or declining probability that an individual will select it. We have defined this quality in terms of three components: (a) the utility value of the task in facilitating one's long-range goals, (b) the incentive value of engaging in the task in terms of more immediate rewards, and (c) the cost of engaging in the activity.

Incentive and Attainment Value

Incentive value can be conceptualized in a variety of ways, two of which are particularly relevant to the issue of sex differences in the educational and vocational choices of gifted individuals. On the one hand, incentive value can be conceptualized in terms of the immediate rewards, intrinsic or extrinsic, an individual derives from performing a task. For example, studying mathematics is intrinsically rewarding to those individuals who enjoy solving mathematical problems; studying mathematics can also yield extrinsic rewards, particularly if one's parents or teachers provide praise or privileges for doing well in mathematics. To the extent that gifted boys either find mathematics and the physical sciences more enjoyable or are rewarded more by their parents and teachers for doing mathematics and science, gifted boys should place more value on mathematics and science than do gifted girls. In turn, gifted boys should be more likely to enroll in math and science courses and to enter math-related occupational fields.

Incentive value can also be conceptualized in terms of the needs and personal values that an activity fulfills. As they grow up, individuals develop an image of themselves. This image includes (a) conceptions of one's personality and capabilities, (b) long-range goals and plans, (c) schema regarding the proper roles of men and women, (d) instrumental and terminal values (Rokeach, 1973), (e) motivational sets, (f) ideal images of what one should be like, and (g) social scripts regarding proper behavior in a variety of situations. Those parts of an individual's self-image that are central or critical to self-definition should influence the value that the individual attaches to various educational and vocational options; these differential values, in turn, should influence the individual's achievement-related choices (Eccles et al., 1984; Markus, 1980; Parsons & Goff, 1980). For example, if being a good athlete is a central part of an individual's self-image, then that individual should work at being a good athlete. Similarly, if helping other people is a central part of an individual's image, then that person should place higher value on helping occupations than on nonhelping occupations.

Essentially, I am arguing that personal needs, self-images, and values operate in ways that both reduce the probability of engaging in those activities or roles perceived as inconsistent with one's central values and increase the probability of engaging in roles or activities perceived as consistent with one's definition of self. More specifically, my colleagues and I believe that individuals perceive tasks in terms of certain characteristics that can be related to their needs and values. For example, a difficult task that requires great effort for mastery may be perceived as an achievement task; if it also involves pitting one's performance against others, it may be perceived as a competitive task. Other tasks may be

perceived in terms of nurturance, power, or aesthetic pleasure. Participating in a particular task will require demonstrating the characteristics associated with the task. Whether this requirement is seen as an opportunity or a burden will depend on the individual's needs, motives, and personal values, and on the individual's desire to demonstrate these characteristics both to him- or herself and to others.

In summary, this model forms the basis for making the following propositions:

1. Individuals seek to confirm their possession of those characteristics that are central to their self-image.
2. Various tasks provide differential opportunities for such confirmation.
3. Individuals will place more value on those tasks that either provide the opportunity to fulfill their self-image or at least are consistent with their self-image and long-range goals.
4. Individuals will be more likely to select tasks with high subjective value than those with lower subjective value.

To the extent that gifted males and females have different self-images, they will place different values on various educational and vocational options, and, in turn, they will differ in their educational and vocational choices.

Perceived Cost

The value of a task also depends on a set of beliefs that can best be characterized as the cost of participating in the activity. Cost is influenced by many factors, such as anticipated anxiety, fear of failure, and, of particular importance in the discussion of long-term educational and vocational choices, the loss of time and energy for other activities. People have limited time and energy. They cannot do everything they would like; they must choose among activities. To the extent that one loses time for activity *B* by engaging in activity *A* and to the extent that activity *B* is high in one's hierarchy of importance, then the subjective cost of engaging in *A* increases. Alternately, even if the attainment value of *A* is high, the value of engaging in *A* will be reduced to the extent that the attainment value of *B* is higher and to the extent that engaging in *A* jeopardizes the probability of successfully engaging in *B*.

Gender Roles and Task Value

This analysis has a number of important implications for our understanding of sex differences in the educational and vocational choices of gifted individuals. Because socialization shapes individuals' goals and values, men and women should acquire different values and goals through the

process of gender role socialization. Through their potential impact on subjective task value, these role differences in value structure can affect educational and vocational choices in several ways.

Gender role socialization could lead men and women to have different hierarchies of core personal values (such as their terminal and instrumental values; Rokeach, 1973). Consequently, tasks embodying various characteristics should have different subjective values for men and women. For example, both boys and girls stereotype mathematicians and scientists as being loners who have little time for their families or friends, because they work long hours in a laboratory on abstract problems that typically have limited immediate social implications (Boswell, 1979). If the analysis developed in the previous section is correct, such a profession should hold little appeal to someone who rates social values highly and thinks it is very important to devote time and energy to one's family—typically a female trait (Fox & Denham, 1974). Thus, gifted females should be less likely than gifted males to aspire to a career as a mathematician or scientist.

Several studies provide support for the hypothesized link between personal values and achievement-related choices. Dunteman, Wisenbaker, and Taylor (1978), for example, studied the link between personal values and selection of one's college major using a longitudinal, correlational design. They identified two sets of values that both predicted students' subsequent choice of major and differentiated the sexes. The first set (labeled *thing-orientation*) reflected an interest in manipulating objects and understanding the physical world; the second set (labeled *person-orientation*) reflected an interest in understanding human social interaction and a concern with helping people. Students who were high on thing-orientation and low on person-orientation were more likely than other students to select a math or a science major. Not surprisingly, the females were more likely than the males to be person-oriented and to major in something other than math or science. In contrast, the males were more likely than the females both to be thing-oriented and to major in math and science.

Similarly, in a study of mathematically talented children, Fox and Denham (1974) found a relation between interest in mathematics and scores on the Allport-Vernon-Lindsey Scale of Personal Values. Interest in math and science was related to high scores on the theoretical, political, and economic scales and to low scores on the social value scale. Again, the females were less likely than the males both to endorse the math- and science-related values and to aspire to math- and science-related careers.

Men and women could also differ in the density of their goals and values. There is some evidence suggesting that men are more likely than women to exhibit a single-minded devotion to one particular goal, especially their occupational goal. In contrast, women in both gifted and

typical populations seem more likely than men to be involved in, and to value, competence in several activities simultaneously (Baruch, Barnett, & Rivers, 1983; Fox, Pasternak, & Peiser, 1976; Maines, 1983; McGinn, 1976; Terman & Oden, 1947). For example, in his study of doctoral students in mathematics, Maines (1983) asked the students what they worried about. The men were concerned most about their professional status and about their mentors' estimates of their professional potential, whereas the women were concerned most about the impact of their graduate training on their families and their other interests. They felt that graduate training was taking too much time and energy away from other activities that they valued just as much as their graduate training. This discrepancy could reflect differing density patterns for the hierarchy of goals and personal values held by these men and women. That is, the women appeared to place high attainment value on several goals and activities; in contrast, the men appeared more likely to focus on one main goal: their professional development. If this is true, then the psychological cost of engaging in their primary goal in terms of time and energy lost for other important goals would certainly be less for these men than for their female colleagues.

Gender role socialization could also lead men and women to place different values on various long-range goals and adult activities. The essence of gender roles (and of social roles in general) is that they define the activities that are central to the role. In other words, they define what one should do with one's life in order to be successful in that role. If success in one's gender role is a central component of one's identity, then activities that fulfill this role should have high value, and activities that hamper efforts at successfully fulfilling one's gender role should have lower subjective value. Gender roles mandate different primary activities for men and women. The established role of women is that of supporting their husbands' careers and raising their children; the role for men is that of competing successfully in the occupational world in order to support their families. To the extent that a gifted woman has internalized this cultural definition of the female role, she should order the importance of various adult activities differently than her gifted male peers. In particular, she should rate the parenting and the spouse-support roles as more important than a professional career role, and she should be more likely than her gifted male peers to resolve life's decisions in favor of these family roles. In contrast, gifted men, like men in general, should rate family and career roles as being equally important. In fact, since they can fulfill their family role by having a successful career, gifted men, like men in general, should expect these two sets of roles to be compatible. Consequently, aspiring to a high-status, time-consuming career should have high subjective value to gifted men, not only because of the rewards inherent in these occupations, but also because they fulfill the male gender role mandate.

Similarly, gender roles can influence the definition one has of successful performance of those activities considered to be central to one's identity

Consequently, the ways in which men and women conceptualize the requirements for successful task participation and completion may differ. If so, then men and women should approach and structure their task involvement differently even when they appear on the surface to be selecting a similar task. The parenting role provides an excellent example of this process. If males define success in the parenting role as an extension of their occupational role, then they may respond to parenthood with increased commitment to their career goals and with emphasis on encouraging competitive drive in their children. In contrast, if women define success in the parenting role as being highly involved in their children's lives, they may respond to parenthood with decreased commitment to their career goals. Furthermore, if staying home with her children and being psychologically available to them most of the time are central components of a gifted woman's gender role schema, then involvement in a demanding, high-level career should have reduced subjective value precisely because it conflicts with a more central component of her identity.

Finally, gender roles could affect the subjective value of various educational and vocational options indirectly through their influence on the behaviors and attitudes of the people gifted individuals are exposed to as they grow up. If, for example, parents, friends, teachers, or counselors provide gifted boys and girls with different feedback on their performance in various school subjects, with different advice regarding the importance of various school subjects, with different information regarding the importance of preparing to support oneself and one's family, or with different information regarding the occupational opportunities that the student should be considering, then it is likely that gifted boys and girls will develop different estimates of the value of various educational and vocational options. Similarly, if the males and females around the gifted children engage in different educational and vocational activities, then gifted boys and girls should develop different ideas regarding which activities they are best suited for.

The analysis developed in this section suggests that the educational and occupational differences between gifted men and women result, in part, from sex differences in gender role definition and in the structure of one's hierarchy of values and interests. These differences are assumed to be the result of differential socialization experiences and the internalization of culturally defined, and readily observable, gender roles. More specifically, this analysis suggests that the differential involvement of gifted men and women in math- and science-related occupations may result, in part, from differences in their interest patterns and their personal values (for example, being thing-oriented versus being person-oriented). Furthermore, this analysis suggests that the differential involvement of gifted men and women in high-status, time-consuming occupations that require long periods of preprofessional training may result, in part, from differences in men's and women's psychological in-

vestments in their family roles versus their professional roles. These gender differences in psychological investment in family versus professional roles are assumed to result from a complex set of both psychological and sociological forces including the internalization of gender roles, the individual's assessment of which jobs and roles are realistically available, and both overt and subtle forms of discrimination operating in educational and occupational institutions. Consequently, women may choose to limit their investment in the professional role because they want to maximize their investment in their family role or because they think that their opportunities in the professional role are restricted by discriminatory forces beyond their control, or both (see Astin, 1984; Callahan, 1979; Frieze & Hanusa, 1984; Sears, 1979; Vetter, 1981, for a discussion of the external barriers to success gifted women face within the professions).

An adequate test of these hypotheses not only requires demonstrating a sex difference in interest patterns and value hierarchies; it also requires demonstrating the proposed causal link between these beliefs and the educational and vocational choices gifted men and women make. By and large, these causal links have not been assessed in either gifted or more typical populations. Thus, as was true for expectations of success, the essential research has yet to be done. Even though the causal relations implicit in this analysis have not been adequately studied, however, several large-scale studies of the gifted have assessed sex differences in personal values and interests. In general, the data are consistent with the analysis in this section.

Before turning to these studies, it is important to note that the analyses outlined in this and previous sections have implications for individual differences within each sex as well as for sex differences. Thus, for example, we would predict that gifted women who enter a scientific profession will be more likely to endorse a thing-orientation than gifted women who enter other professions; similarly, gifted women who choose to become school teachers should be more person-oriented than the gifted women who go into engineering. Finally, a gifted woman who seeks out a traditional male occupation and exhibits a male-like career pattern should have less of a traditional gender role orientation than the gifted woman who seeks out a more traditional female occupation and a more traditionally female career pattern. Several studies support these predictions for both gifted and more moderately talented women (e.g., Callahan, 1979; Frieze & Hanusa, 1984; Helson, 1980; Luchins & Luchins, 1980).

Sex Differences in the Values and Interests of the Gifted

In both the Terman study and the studies being conducted at Johns Hopkins University, interests, values, and goals have been assessed for

a large number of gifted individuals. These studies suggest that differences between gifted boys and girls are evident from an early age. Although gifted boys and girls appeared more similar in their values and interests than comparison groups of boys and girls drawn from the general population, the gifted girls in both studies had more stereotypically feminine interest patterns than did the gifted boys. When asked their favorite school subjects, the girls rated English, foreign languages, composition, music, and drama higher than did the boys. In contrast, the boys rated the physical sciences, physical training, and U.S. history higher than did the girls (Benbow & Stanley, 1984; George & Denham, 1976; Terman, 1925, 1930). The sex differences in interest in mathematics were typically weak if present at all.

Similarly, when asked their occupational interests and anticipated college major, girls rated domestic, secretarial, artistic, biological science, medical, and social service occupations and training higher than did the boys. The boys expressed more interest than the girls in high-status and business-related occupations in general, and in the physical sciences, engineering, and the military in particular (Benbow & Stanley, 1984; Fox, Pasternak, & Peiser, 1976; Terman, 1925, 1930). Finally, when asked their leisure time activities and hobbies, similar differences in interest patterns emerged. At all ages, the females reported liking and spending more time than the boys reading, writing, and participating in a variety of activities related to arts and crafts, domestic skills, and drama. The males reported spending more time engaging in sports, working with machines and tools, and being involved with scientific, math-related, or electronic hobbies (Fox, 1976; McGinn, 1976; Terman, 1925, 1930; Terman & Oden, 1947).

Gender stereotypic patterns of differences also emerged on tests of personal values, occupational values, and personality traits. The Allport-Vernon-Lindsey Scale of Values was given to many of the children who participated in the studies at Johns Hopkins. The gifted girls typically scored higher than the gifted boys on scales that tapped social and aesthetic values, whereas the boys typically scored higher than the girls on scales that tapped theoretical, economic, and political values (Fox, 1976; George & Denham, 1976; McGinn, 1976). Similarly, on the Strong-Campbell Interest Inventory, the girls scored higher than the boys on social and aesthetic interests. Both boys and girls, however, scored equally high (and quite high) on investigative interests (Fox, Pasternak, & Peiser, 1976; George & Denham, 1976; McGinn, 1976).

It is also of interest to note that the boys evidenced a more unidimensional set of interests on the Strong-Campbell tests; that is, they scored high on investigative interests and low on most other interests. In contrast, the girls scored higher than average on several interest clusters (McGinn, 1976). A similar discrepancy emerged when gifted boys and girls were asked to rate several occupations on a Semantic Differ-

ential Scale. The boys gave positive ratings only to traditional male scientific and mathematical professions; they rated the female professions and the homemaker role quite negatively. The girls, on the other hand, gave both male- and female-typed professions positive ratings, and they gave the homemaker role as positive a rating as that which they gave their most preferred professional occupations.

A similar pattern emerged from the most recent data from the Terman sample (Sears, 1979). The gifted men and women were asked to rate how important each of six goals were to them in making their life plans during early adulthood. Men rated only one area (occupation) as being more important; in contrast, the women rated four areas as being more important (family, friends, richness of one's cultural life, and joy in living). These data suggest that the gifted women desired a more varied or multifaceted type of life. One other pattern characterized the responses of these gifted men and women. Consistent with our hypothesis, the men rated family and occupation as of equal importance, whereas the women rated family as more important than occupation.

Summary

There are clear differences in the interests and values of gifted males and females. Furthermore, these differences reflect gender-stereotyped patterns: females are more likely to hold social and aesthetic values, and males are more likely to hold scientific values. In addition, females rate the homemaker role as positively as they rate professional activities, and they rate a good family life as more important to their life satisfaction than a successful career. These results are consistent with the analysis linking values to sex differences in educational and vocational choices. Additional support for this hypothesis comes from a recent report by Benbow and Stanley (1982a). Gifted girls in their study were less likely than gifted boys to take advanced mathematics in part because they liked language-related courses more than they liked mathematics courses. In addition, in their gifted samples, Benbow and Stanley (1984) found weak but consistent positive relations between liking biology, chemistry, and physics and having plans to major in these areas. In their study, the possibility that sex differences in subject area interests might contribute to sex differences in anticipated college major was not assessed (or if it was assessed, the data were not presented).

Thus, although there is some support for the hypothesis that sex differences in values have an impact on gifted students' educational and vocational choices, this hypothesis has not been adequately tested. In most studies documenting sex differences in interest patterns, personal values, and goals and aspirations, the mediating role of these differences in educational and vocational decisions has not been assessed. Longitudinal studies exploring the possible causal links between values and

achievement-related choices are needed. More information is also needed on the relation between gender role schema and personal values and interests. Finally, more information is needed on the origin of sex differences, as well as individual differences, in values.

The Influences of Parents, Teachers, and Counselors on Educational and Vocational Choices

As I noted earlier, sex differences in educational and vocational choices are undoubtedly shaped in part by differential socialization experiences. Several studies have documented the importance of social support from parents, teachers, and counselors in the lives of women who make non-traditional educational and occupational choices (Barnett & Baruch, 1978; Casserly, 1980). Perhaps gifted girls make rather traditional educational and occupational choices because they receive inadequate social support for alternative choices. It is to this issue that I now turn. Before discussing specific studies, however, a general overview of the ways in which social agents can influence achievement-related choices is useful.

Social agents can influence educational and occupational choices through a variety of subtle and blatant means (for a full discussion see Eccles & Hoffman, 1984). Through their power as role models, social agents provide the information that shapes children's stereotypes of appropriate occupations for males and females as well as children's broader view of the educational and vocational options available to them. It seems reasonable to assume that gifted children, like more typical groups of children, are exposed to a gender role biased set of role models. To the extent that this is true, gifted males and females should develop gender role stereotyped beliefs regarding appropriate educational and occupational choices.

Social agents can indirectly affect educational and vocational choices through their influence on children's self-concepts, personal values, and preferences. For example, parents have ample opportunity to comment on their children's academic performance, and these comments influence their children's self-concepts. Parsons, Adler, and Kaczala (1982), for example, found that parents who attributed their children's good math grades to hard work tended to have children with lower confidence in their math ability than parents who attributed their children's good math grades to ability. Furthermore, the parents of high-ability girls were more likely than the parents of high-ability boys to make such an attribution. Not surprisingly, then, the high-ability girls in this sample had less confidence in their math ability than the high-ability boys. Whether a

similar bias characterizes parents of gifted children has yet to be determined.

Social agents can also influence children's view of the educational and vocational world through explicit and implicit messages they provide as they counsel children. Social agents, especially parents and school personnel, give children information about the occupational world and the need to prepare themselves for that world. To the extent that these messages are gender role stereotyped, boys and girls will internalize different views of the occupational world, different ideas about their potential involvement in that world, and different ideas regarding the need to be able to support themselves. Each of these differences has implications for the educational and vocational decisions of gifted, as well as more typical, males and females.

Peers also take part in this process. Students discuss with their friends the options they are considering; the opinions and reactions they receive from peers are often gender role stereotyped (see, for example, Frieze & Hanusa, 1984; Kavrell & Petersen, 1984; Tresemer, 1976). Since peer acceptance is so important during the adolescent years (Kavrell & Petersen, 1984), the gender role bias in adolescents' reactions to each other's plans may limit the educational and vocational options considered seriously by gifted females at a time when very important achievement-related decisions are being made. Fear of peer disapproval could also lead gifted girls either to drop out of or to refuse to participate in special programs for the gifted.

Social agents can influence the educational and vocational decisions of gifted individuals more directly by actively structuring the options that are offered to gifted boys and girls. For example, entry into accelerated or special programs depends on being identified as gifted by school personnel. To the extent that the process of identification is sex-biased, gifted girls and boys may differ in the opportunities they are offered to develop their skills. Parents can also either limit or broaden their children's educational and vocational options by the economic, as well as psychological, support they provide for various options. Families with limited resources are generally more willing to invest these resources in their sons than in their daughters (see Eccles & Hoffman, 1984). If a similar preference characterizes families with gifted children, then gifted males will have more opportunities for special and advanced training. Such differences, if they exist, not only limit girls' options directly, but can also limit the development of gifted girls' preferences because they restrict the range of experiences gifted girls are exposed to. Computer camps are an excellent example of this latter process; boys outnumber girls at computer camps by at least a factor of 4 (Kiesler, Sproull, & Eccles, in press). Clearly, parents are spending more money sending their sons rather than their daughters to computer camp. Why this might be so has yet to be determined. But the long-term implications of this difference for the fu-

ture educational and vocational decisions of math-talented boys and girls should be clear; since math-talented girls are having less opportunity to develop their computer skills, an interest in computing, and confidence in their ability to master the computer, they will be less likely than math-talented boys to enroll in computer courses and to enter computer science professions.

Several mechanisms of influence have been suggested in this section. Few of the hypotheses suggested have been tested directly in typical, much less gifted, populations. There is evidence, however, for differential treatment of gifted males and females by social agents, and this literature is reviewed in the next section.

Parents

In both the Terman and the Johns Hopkins studies, the parents of gifted boys and girls acknowledged their children's general intellectual talents. The sex of the gifted child did not affect the parents' estimates of the children's general intelligence; it did, however, affect parents' estimates of their children's specific skills. For example, parents in Terman's study rated the boys higher than the girls on math and mechanical ingenuity; they rated the girls higher than the boys on drama, music, and general dexterity. Since this pattern of sex differences also characterized the children's performance on standardized skill tests, the direction of causality for these data is not clear. The parents' estimates may have reflected the differences they were observing in their children, or the parents may have helped to create the behavioral differences through differential socialization practices (Terman, 1925).

Gender role bias in parental beliefs is more clear on other measures. Parents in the Johns Hopkins studies were asked their occupational aspirations for their children. The majority of the parents of girls (between 89 and 94 percent in one study) expected their daughters to follow the traditional occupational pattern for females of working for a while and then taking time out to raise their children (Brody & Fox, 1980; Fox, 1982). The parents were also more likely to expect their sons to enter math-related or scientific fields (Brody & Fox, 1980) and to provide their sons with math- and science-related toys, kits, and books (Astin, 1974). Finally, parents of daughters reported noting giftedness in their children at a later age than did parents of sons (Fox, 1982) and were often quite surprised when informed that their daughters might be gifted (Fox, personal communication). Thus, although parents have a generally positive attitude toward their daughters' intellectual talents, they do not appear to be encouraging their daughters to develop these talents in occupational pursuits. And, in many cases, they appear to underestimate their daughters' talents.

Teachers and Counselors

The data on teachers are quite mixed. On the one hand, Terman (1927, 1930) found teachers to be quite positive toward both gifted boys and girls, and to rate gifted girls more positively than gifted boys in terms of their performance and competence on most subjects and on deportment. In addition, boys were more often reported as being weak in at least one subject. On the other hand, both Terman (1927) and Fox (1982) found that teachers were less likely to identify girls as gifted or to recommend them for accelerated educational programs. Furthermore, to the extent that teachers held negative stereotypes of gifted children, their stereotypes of gifted girls were more negative than were their stereotypes of gifted boys (Solano, 1977). Finally, when teachers were found to treat boys and girls differently in the classroom, these differences were most marked among the brightest students (Brophy & Good, 1974; Parsons, Kaczala, & Meece, 1982).

Fox (1976) found evidence of active resistance on the part of some teachers to continued accelerated math training for the girls who had participated in the Johns Hopkins Summer Accelerated Math Program. Furthermore, the presence or absence of teacher and counselor support was the major factor distinguishing between the girls who continued and the girls who chose to drop back into a more traditional math program. Similarly, in their study of female mathematicians, Luchins and Luchins (1980) found that 80 percent of the females, as compared to only 9 percent of the males, had encountered active discouragement from continuing their math training; this discrepancy was especially pronounced during the college years.

Evidence regarding the role of counselors is sparse. In general, counselors have not been found to be especially encouraging of nontraditional educational and occupational choices for either boys or girls (see Eccles & Hoffman, 1984), even among gifted students. For example, counselors have been found to actively discourage gifted girls from continuing their accelerated math training programs (Fox, 1976). Likewise, more than a quarter of the gifted adults interviewed by Post-Kammer and Perrone (1983) reported that their high school counseling had been poor or inadequate. Benbow and Stanley (1982b) found that less than 12 percent of the gifted students they identified in their talent search were participating in any special programs. And girls were less likely than boys to be among the few who did receive these special opportunities: only 6 percent of the girls compared to 11 percent of the boys were in special programs.

These results are especially disturbing given the growing body of evidence that teachers and counselors can be an important source of encouragement for gifted girls. Several studies have demonstrated the positive effect of supportive teachers and of well-designed classroom in-

tervention programs on gifted and talented girls' educational and vocational plans (e.g., Brody & Fox, 1980; Callahan, 1979; Casserly, 1980; Fox, 1976; Fox, Benbow, & Perkins, 1983; Sloat, 1984; Tobin & Fox, 1980; Tomlinson-Keasey & Smith-Winberry, 1983). Casserly (1980) identified the 20 school districts in the United States that had the best record of enrollment by talented females in their advanced placement (AP) courses in math and science. She interviewed students, teachers, and counselors at these schools regarding the factors that they believed accounted for the high participation rates of the female students in these courses. Several themes emerged rather consistently across the districts: early placement in a curricular track that leads automatically to the AP courses; high proportions of females in the classes from the beginning of the tracking sequence; active efforts to allow female friends to stay together in these courses; active support of the females' interests, confidence, and, perhaps most importantly, participation in class activities; active recruitment of younger females into the courses by the AP teachers and by the older female students; active career counseling by AP teachers within their classes; and creative, noncompetitive instruction in the AP classes.

Casserly's study clearly suggests that supportive teachers can play an important role in encouraging gifted and talented females to develop their math and science skills and to consider seriously careers in math and science. Other studies provide support for this hypothesis. For example, women in nontraditional fields often cite the positive influence of a supportive teacher on their career goals (Barnett & Baruch, 1978; Boswell, 1978; Luchins & Luchins, 1980). Casserly's study also indicates that early acceleration may be important.

Several studies suggest that adolescent gifted girls are less attracted to special programs, particularly in math and science, than are adolescent gifted boys. (Fox, 1976; Fox, Benbow, & Perkins, 1983; Tobin & Fox, 1980). In contrast, accelerated programs begun in elementary school have at least as many female as male participants. Furthermore, both girls and boys enrolled in such programs retain their accelerated status throughout high school and are graduated at an earlier age than their nonaccelerated peers without any apparent deleterious effects on their intellectual and social development (cf., Callahan, 1979).

Finally, Casserly's study points to the importance of instructional strategies themselves. The AP teachers in her study were especially likely to include career counseling in their courses; to use noncompetitive teaching strategies; to include applied concerns drawn from fields such as engineering, design, medicine, and architecture; to stress the creative components of math and science rather than facts and word problem sets; and to be actively committed to nonsexist education. Observational studies of science teachers suggest that a similar set of characteristics differentiates teachers who produce high levels of interest in science among their female students from teachers who do not (Kahle, 1984).

Further support of the importance of these characteristics is provided by Fox (1976). Concerned with the low participation rates of gifted girls in the special program being offered at the Johns Hopkins University for gifted children, these researchers designed a special math class to attract females. This class incorporated many of the "girl-friendly" principles uncovered by Casserly (1980) and Kahle (1984): It was taught by women who used cooperative learning strategies and included career guidance, and all of the students were female. The class was successful in increasing the participation rates of gifted female students, but longitudinal follow-ups indicate that the long-range impact of this experience was minimal, suggesting that one-shot interventions may not be effective in producing lasting change. Girl-friendly practices may need to be a continuing part of gifted girls' educational experiences (Brody & Fox, 1980).

Studies from a variety of sources suggest that girl-friendly practices are not typical, especially in math and science classrooms. Many teachers use competitive, motivational strategies, especially in junior and senior high school math and science classes (Brush, 1980), and few include career counseling in their courses (Parsons, Kaczala, & Meece, 1982). Substantive increases in the number of teachers using girl-friendly practices will depend on incorporating sex equity instruction into teacher and counselor education programs, into educational inservice training programs, and into higher education's affirmative action programs.

Future Directions for Research

Throughout this chapter, I have noted weaknesses in the research literature on gifted females. In summary, I recommend areas in which continued research is particularly needed.

General Problems

Sparsity is the most glaring problem in the research literature on gifted females. The research base also suffers at times from the lack of a coherent theoretical framework. As a consequence, studies tend to be isolated from one another and tend to focus on limited subsets of variables, making integration of the field difficult. Systematic programs of research that are guided by a comprehensive theoretical framework are needed. I have outlined one such framework; it could be used to design systematic programs of research on the processes that influence the development and maintenance of sex differences in the educational and vocational choices of gifted individuals. As I have noted throughout this chapter, very few of the hypotheses implicit in this framework have been adequately tested.

The existing research literature also suffers from a problem common to many studies on sex differences in achievement behaviors, namely, the failure to assess the impact of the variable under study on males' and females' achievement-related behaviors. Much existing research provides descriptions of sex differences on variables assumed to influence achievement-related behaviors but fails to test whether these differences are actually responsible for the sex differences in achievement-related behaviors. For example, Benbow and Stanley (1980) reported a significant sex difference in gifted seventh-grade students' scores on the SAT and concluded that this difference is responsible for differential enrollment in advanced math courses. Such an inference is not warranted on logical grounds and has not been supported by subsequent empirical study.¹ Researchers need to exercise great caution in extrapolating beyond their data to make causal inferences regarding the possible long-range implications of sex differences obtained on putative mediating variables. Without the appropriate longitudinal studies, it is simply not known whether a particular variable mediates sex differences in achievement-related choices and behaviors or not.

Longitudinal Studies of Psychological Development and Socialization

There is a clear need for comprehensive, longitudinal, multiple-wave studies of the processes and variables that shape the educational and vocational choices of gifted males and females. Because such studies rely on multivariate regression procedures, causality cannot, strictly speaking, be determined. But by including all those variables that might have a significant longitudinal effect, such studies can be used to assess the probable relative importance of various factors as they operate in the natural setting. Furthermore, by measuring all the relevant variables at several points in time, researchers can statistically model the interrelations among the variables under study.

To accomplish this goal, a comprehensive study should include measures of the following socialization variables: parents' attitudes, parents' occupations and activities, parents' plans for their children's educational development, teachers' behaviors and attitudes, children's participation in special programs, and the attitudes and advice of both school counselors and peers. Equally important are the following attitudes and beliefs of students: perceptions of peer reactions to various educational and vocational options, gender role beliefs, self-concept, personal values, long-range goals and aspirations, career orientation versus family or community orientation, thing- versus person-orientation, stereotypes of var-

¹In a subsequent follow-up of a subset of these students, sex remained a significant predictor of course enrollment patterns even after the sexes were equated statistically for their scores on the SAT (Benbow & Stanley, 1982).

ious educational and occupational options, anxieties, and the subjective value attached to various educational and occupational options. If such measures were gathered in several waves across the secondary school and college years, researchers could begin to assess how parents and teachers influence the attitudes and beliefs of gifted students and how these beliefs, in turn, influence the early educational and vocational choices of gifted females and males. Researchers could also begin to assess how parents, teachers, counselors, and peers directly affect the educational and vocational options that are considered by gifted females and males.

Some longitudinal research efforts are currently underway. For example, the gifted students originally identified in the Johns Hopkins Talent Searches are being followed up as they move through high school and into college. Small subgroups of these students were given an extensive battery of questions tapping many of the constructs outlined in the previous paragraph, but the psychological data available on most of the students is much more limited. To date, predictive equations based on the available data have accounted for only a small portion of the variance in gifted students' course enrollment and college major decisions (between 10 and 20 percent of the variance in high school enrollment in advanced math courses, Benbow & Stanley, 1982a; and between 1 and 7 percent of the variance in anticipated college major, Benbow & Stanley, 1984). The low predictive power of these findings is cogent evidence of the need for more broad-based, theoretically oriented studies.

Studies of Adult Development

More extensive longitudinal and biographical studies are also needed to unravel the factors that influence the educational and vocational behavior patterns of the gifted across their life spans. Such studies need to focus on issues such as (a) the internal and external factors that either inhibit or facilitate gifted women's, as well as gifted men's, occupational development; (b) the shifting priority patterns of gifted men and women across their life spans; (c) the internal and external factors that lead some gifted women to change their priorities substantially in either a traditional or nontraditional direction; (d) the benefits to both gifted women and society of their committing time and energy to their families and communities; and (e) the kinds of support that are necessary to allow gifted women of various ages to move into the occupational world at levels commensurate with their talents.

Longitudinal studies of this magnitude are very expensive and require the commitment of either a team of researchers or a research institute. The Terman data bank is one source of existing data that is being used to explore some of these issues. Given the major changes that have occurred over the last 20 years in this culture's gender roles, however,

new life-span longitudinal studies focusing on the upcoming generations of gifted women need to be initiated.

Developing and Evaluating Effective Educational Programs for Gifted Girls

More information is needed on the most effective kinds of educational and counseling programs for gifted boys and girls. Gifted girls may show low participation in certain enrichment-type and accelerated programs for math and science during the secondary school years because they find such programs less appealing than do gifted boys or gifted boys' parents (Callahan, 1979). Very few studies have examined whether a particular program is more attractive to, or more effective with, boys or girls. One such study demonstrated that different types of math enrichment programs are needed to attract equal numbers of gifted boys and girls (Fox, Benbow, & Perkins, 1983). More research is needed on the types of programs that would be most effective in facilitating the development of gifted females' talents.

Effective Counseling Programs

Little is known about the most effective means of providing gifted boys and girls with sufficient information on which to base wise educational and vocational decisions. If society's goal is to get gifted women to consider a wider range of occupational options, including such traditionally male fields as math, engineering, and the physical sciences, then current counseling practices are not adequate. The forces operating to maintain gender-stereotyped decisions are ubiquitous. Effective reeducation designed to counter these forces will require comprehensive, long-term counseling programs that involve as many of the relevant social agents as possible, for example, programs that involve parents and the community as well as teachers and counselors in providing gifted girls with alternative role models, alternative educational and vocational experiences, more detailed information on the educational and vocational options available and on the prerequisites for entry into these opportunities, active encouragement to take advanced placement courses in math and science as well as in English and foreign languages, more extensive information on the need to prepare oneself for financial independence, more extensive information on the ways one can integrate family plans with various traditional and nontraditional occupations, and support for making nontraditional choices. Field-based experimental studies are needed to test the effectiveness of such alternative counseling procedures.

Identifying the Gifted

The processes involved in identifying children as gifted and talented and recommending them for either accelerated education or special programs

are not well understood. Very little is known about the criteria, other than standard IQ scores, that parents, teachers, and counselors use to judge students' giftedness. It may be that gifted females are more likely to go unnoticed than gifted males. Furthermore, the research reviewed earlier in this chapter suggests that gifted females may be more likely than gifted males to ignore or underrate their own talents, thereby participating passively in their own invisibility. Both of these processes need to be studied and alternative remediation strategies need to be evaluated.

Adult Education and Occupational Supports

The sparsity of high-quality adult education and training programs is yet another factor that may be inhibiting the occupational development of gifted women. Educational and occupational training systems are now designed to mesh well with the life patterns of men. They also tend to operate on the implicit assumptions that late entry into professions such as medicine, law, or the sciences and less than complete devotion to one's profession are bad ideas. Both of these assumptions need to be evaluated empirically because they serve to discriminate against gifted women's entry into and advancement in high-status professions. In addition, educational and occupational support programs that are specifically designed for gifted women who have life patterns different from those of gifted men need to be developed and evaluated. Such programs should be responsive to the fact that the educational and occupational patterns of many gifted women are influenced by their desire to spend significant amounts of time raising their children. This priority should be acknowledged as being legitimate and the assumption that late entry into educational or occupational training programs signifies lack of commitment should not be made.

Conclusion

As is true for all men and women, gifted men and women differ in their educational and occupational patterns in a gender-stereotypic fashion. In this chapter I have explored why this might be true and have outlined a research agenda to study these hypotheses. Gender role beliefs and schema seem to be especially important influences in that they affect both expectations for success and the subjective value individuals attach to participation in various educational, occupational, and family-related pursuits. The beliefs and behaviors of parents, teachers, counselors, and peers are also critical. These socialization agents appear to lack confidence in gifted girls' ability or motivation to succeed at demanding educational programs. They do little to foster gifted girls' perception of these programs

as valuable and important, to help gifted girls evaluate the relative importance of careers and family as well as the absolute importance of economic independence, or to provide gifted girls with accurate and detailed information about the educational and occupational options available to them. Given the omnipresence of gender role prescriptions regarding appropriate life choices for females, parents, teachers, and counselors must actively encourage gifted girls to develop nontraditional roles.

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Table 1

Motivation: The Actor's View

<u>Can I succeed?</u>	<u>Do I want to succeed?</u>	<u>What do I need to do (or know) in order to succeed?</u>
Self-Concept of Ability	Subjective Task Value	Attention
Expectations for Success	Attainment Value	Task Analysis
	Intrinsic Value	
Perceived Control	Utility Value	Mastery Orientation
Learned Helplessness	Personal needs	Ego-Involved Orientation
Personal Efficacy	Self-Schemata	Anxiety
Effectance Motivation		
	Perceived Cost of Success and Failure	
	Effort needed to Succeed	
	Loss of Valued Alternative Opportunities	
	Cost of Failure	
	Affective Experiences	
	Objective Events	
	Psychological Events	