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# Gender Inequalities in Education

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## Abstract

The terrain of gender inequalities in education has seen much change in recent decades. This article reviews the empirical research and theoretical perspectives on gender inequalities in educational performance and attainment from early childhood to young adulthood. Much of the literature on children and adolescents attends to performance differences between girls and boys. Of course, achievement in elementary and secondary school is linked to the level of education one ultimately attains including high school completion, enrollment in post-secondary education, college completion, and graduate and professional school experiences. We recommend three directions for future research: (a) interdisciplinary efforts to understand gender differences in cognitive development and noncognitive abilities in early childhood, (b) research on the structure and practices of schooling, and (c) analyses of how gender differences might amplify other kinds of inequalities, such as racial, ethnic, class, or nativity inequalities.

## INTRODUCTION

Just over a decade ago, Jacobs (1996, p. 156) noted that the literature on gender inequalities in education “often treats all aspects of education as disadvantaging women.” This assessment is less valid today, as much research now examines the ways in which girls and women are advantaged in some aspects of education, as well as those in which they continue to trail boys and men. Although girls have long gotten better grades in school than boys, most researchers brushed aside this point because women did not translate their better performance into higher levels of educational attainment relative to men (Mickelson 1989). But as women have come to far outnumber men among new college graduates in most industrialized societies, new questions about gender inequalities in education have emerged.

This article provides a selective, cross-disciplinary review of the literature on gender inequalities in educational performance and attainment from early childhood to young adulthood. We map the terrain of current gender inequalities for a wide range of educational indicators, we discuss the theoretical perspectives that have been used or could prove useful for explaining these inequalities, and we suggest how future research could advance understanding of the complex nature of differences between males’ and females’ educational experiences.

Most research assumes that individuals progress through the educational system in a sequential mode and that early school experiences set the stage for those that follow (Pallas 2003). Research also tends to be bifurcated between that focused on educational outcomes and experiences during childhood and adolescence (corresponding with primary and secondary school) and that focused on educational attainment and higher education. Following these tendencies, we structure this review into three sections. In the first, we assess the current state of knowledge regarding gender inequalities in primary and secondary school, from children’s earliest experiences with formal schooling, as they enter kindergarten through the end of compulsory

schooling, which in most industrialized societies is the end of secondary school. This section focuses on educational achievement, as much of the literature on gender differences during childhood and adolescence attends to performance differences between girls and boys. Of course, performance in elementary and secondary school is linked to the level of schooling one ultimately attains. The second section provides an empirical overview of gender inequalities in young adulthood and beyond in terms of educational attainment, including high school completion, enrollment in postsecondary education, college completion, and graduate and professional school experiences. The pathways that individuals take from high school to college and the completion of a college degree vary greatly (Goldrick-Rab 2006). Within this apparently endless variation, however, there are gendered patterns that demand examination. In the third and final section, we offer several fruitful directions for future research.

Because we focus on formal schooling bounded by entry into kindergarten through completion of college, we do not consider research on gender differences in very early childhood and preschool (see Kraft & Nickel 1995 for a review) or continuing and adult education (Jacobs & Stoner-Eby 1998, Jacobs & King 2002). We focus on U.S.-based research but incorporate literature from other industrialized countries and cross-national research where noteworthy. Patterns of gender inequalities in developing societies are quite different from those in most industrialized societies, and space limitations preclude us from considering this important topic here (but see King & Hill 1993, Buchmann & Hannum 2001).

## FROM KINDERGARTEN THROUGH HIGH SCHOOL

In the United States, most children start formal schooling at age 5, but approximately 10% of children begin kindergarten a year later. Parents decide when their children begin school and, along with teachers, determine whether children are promoted to the next grade.

Delayed entry into kindergarten, or academic redshirting, is more common among boys and among children from families of high socioeconomic status (SES) (Graue & DiPerna 2000). Nationally representative data from the Early Childhood Longitudinal Study of the Kindergarten Cohort (ECLS-K) indicate that boys comprise about 60% of the children with delayed kindergarten entry and 66% of those who repeat kindergarten (Malone et al. 2006). Boys are also more likely than girls to be retained a grade or more during elementary school (Alexander et al. 2003, Entwisle et al. 2007).

These differences in early school trajectories are important to bear in mind when comparing boys and girls in terms of their academic performance. In age-based comparisons, girls will have attained a slightly higher average grade level than boys. In grade-based comparisons, most common in research, boys will be slightly older on average than girls. The matter is made even more confusing owing to the different developmental trajectories of girls and boys, with girls tending to mature more quickly than boys (Tanner 1978, Gullo & Burton 1992). One could argue that comparisons using chronological age ignore sex differences in maturational tempo and result in comparing more mature girls to less mature boys (Eaton & Yu 1989), yet these complexities are infrequently considered in the literature.

## Gender Differences in Academic Performance

Many researchers, educators, and politicians regard academic performance as the bottom line in K-12 education. From parent-teacher associations meetings to the national No Child Left Behind Act, the question “how are our children doing?” is usually addressed with data from standardized tests and other uniform assessments or grades and report cards. When the question turns to “who is doing better, girls or boys?” the answer depends on the age of students being compared and whether grades or test scores are used. The two measures capture different elements of academic performance

and ability, as is evident by the generalization that males tend to obtain higher scores on standardized tests, whereas females tend to get higher grades (Duckworth & Seligman 2006). Most of the literature on academic performance focuses on adolescents, but the recent availability of data for younger children (such as the ECLS-K) has stimulated research on performance earlier in childhood.

**Test scores.** Gender differences in test scores have been the subject of much research for many decades. Maccoby & Jacklin’s (1974) important book *The Psychology of Sex Differences* provided a comprehensive analysis of more than 1600 studies in the areas of achievement, personality, and social relations and served to stimulate much interest and new research on gender differences in achievement in particular. Despite the large literature in this area (see Willingham & Cole 1997 for a review), disagreement remains on several fronts, including when in the life course gender differences in math performance emerge (Leahey & Guo 2001), whether males are more variable than females on measures of achievement (Willingham & Cole 1997), and whether sex differences in test scores are declining over time. Some researchers argue that gender gaps in test scores have narrowed in recent decades (Feingold 1988, Hyde et al. 1990), but on the basis of their meta-analysis of test results for writing, math, and science, Hedges & Nowell (1995) conclude that gender gaps in test scores have remained relatively stable over the past 30 years.

Results from various national and international large-scale assessments indicate that boys have higher test scores in mathematics and girls have higher test scores in reading (Baker & Jones 1993, Beller & Gafni 1996, Nowell & Hedges 1998, Gallagher & Kaufman 2005, Marks 2007), but there is considerable cross-national variation in the size of these gaps (A.M. Penner, unpublished observations). There is also a life course component to gender differences in test scores; research consistently finds generally similar performance of girls and boys in mathematics and reading in the early grades

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### Early Childhood Longitudinal Study, Kindergarten

**Cohort:** the ECLS-K followed children who began kindergarten in 1998/1999 and their progression through eighth grade

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and a growing male advantage in math scores and growing female advantage in reading scores as they move through school (Maccoby & Jacklin 1974, Willingham & Cole 1997). These gender-based performance differences persist in standardized tests, such as the SAT, used in higher education admissions, although they tend to be small and the distributions of male and female scores overlap substantially (Hyde 2005, Kobrin et al. 2007). Inferring gender differences in math and verbal abilities from gender differences in SAT scores is problematic because the sample of SAT test takers is not representative of the general population and because more females than males take the SAT, so the sample of males is more highly selected (Spelke 2005).

Some evidence suggests that gender gaps in test scores are more pronounced among low-income children (Hinshaw 1992), but results are not definitive. For example, Entwisle et al. (2007) find that although girls and boys start first grade with similar reading scores, a female-favorable gap in reading emerges by fifth grade, but only for children from economically disadvantaged families; boys and girls from middle- and upper-class families had very similar reading scores. Conversely, with nationally representative data, T.A. DiPrete & J. Booher-Jennings (unpublished observations) find that girls have higher reading scores than boys across all levels of SES.

**Grades and behaviors related to school success.** Girls have long obtained higher grades in school than boys. Even in the 1950s and 1960s girls earned higher grades than boys and had higher class standing in high school (Alexander & Eckland 1974, Alexander & McDill 1976, Mickelson 1989). Today, from kindergarten through high school and even in college, girls get better grades in all major subjects, including math and science (Perkins et al. 2004).

As early as kindergarten, girls have more advanced reading skills than boys (West et al. 2000, Tach & Farkas 2006), and boys continue to have more problems with reading in elementary school (Trzesniewski et al. 2006).

Boys are overrepresented in populations with reading disabilities, antisocial behavior, mental retardation, attention disorders, dyslexia, stuttering, and delayed speech (Halpern 1997, Muter 2003, Rutter et al. 2004). Moffitt et al. (2001) find that males are at higher risk for antisocial behavior that is neurodevelopmental in origin, but for antisocial behavior that originates in the context of social relationships, gender differences are negligible. Trzesniewski et al. (2006) demonstrate that antisocial behavior and reading difficulties go hand in hand for boys; antisocial behavior leads to poor reading skills and vice versa. Emotional and behavioral problems early in childhood also contribute to educational outcomes later in life, such as the likelihood of repeating a grade in secondary school, completing high school, and enrolling in college (Shanahan 2000, McLeod & Kaiser 2004).

Girls also have advantages in social skills and classroom behavior. Analyses of ECLS-K data find that as early as kindergarten, “boys display more developmental disabilities, more disruptive conduct in class and less positive orientations to learning activities” (Zill & West 2001). For example, according to parent and teacher reports, twice as many boys as girls have difficulty paying attention in kindergarten, and girls more often demonstrate persistence in completing tasks and an eagerness to learn. These advantages in orientation to learning and other social skills grow during the early elementary school years and plausibly account for a portion of the more rapid reading gains that girls achieve during this period (T.A. DiPrete & J. Booher-Jennings, unpublished observations). During adolescence, high school teachers consistently rate girls as putting forth more effort and as being less disruptive than boys (Downey & Vogt Yuan 2005). Adolescent girls also possess higher levels of other noncognitive skills such as attentiveness and organizational skills (Farkas et al. 1990, Jacob 2002), self-discipline (Silverman 2003, Duckworth & Seligman 2006), leadership qualities, and interest in school, all of which facilitate academic success (Rosenbaum 2001). These gender

differences in noncognitive skills may be central in explaining why boys get higher test scores in some domains but girls generally get higher grades. Farkas et al. (1990) show that teachers' judgments of students' noncognitive characteristics are powerful determinants of course grades even when cognitive performances are controlled.

Finally, in areas where females once lagged behind males in the rigor of their high school coursework, they now outpace males. Until recently, girls trailed boys in the number and intensity of the mathematics courses they took. Now boys and girls take equally demanding math classes in high school (Catsambis 2005), and girls get better grades in those classes (Gallagher & Kaufman 2005). Female high school graduates are more likely to have taken biology and chemistry courses than males (Xie & Shauman 2003). Girls have also come to outpace boys in the number of college preparatory courses and Advanced Placement examinations they take (Bae et al. 2000, Freeman 2004). Girls are more involved in extracurricular activities, with the notable exception of participation on athletic teams (Bae et al. 2000), and they participate in more cultural activities within and outside of school (Dumais 2002). All these advantages are related to academic success in high school, to the likelihood of enrolling in college, and to ultimate educational attainment, as we discuss in detail below.

## EXPLAINING GENDER GAPS FROM KINDERGARTEN TO HIGH SCHOOL

In the search for explanations of gender inequalities, sociological research tends to ignore biological differences and focus solely on social and economic factors (Huber 2008, this volume). As Halpern and colleagues (2005, p. 53) point out: "Opponents of the idea that biology has contributed even a small part to male and female differences are quick to label biological explanations as sexist . . . [but] biological hypotheses are not necessarily sexist. There does not have to be a 'smarter sex' with

a 'better biology' to conclude that there are biological origins to any cognitive ability." Some sex differences in some cognitive tasks are well established. Spelke (2005, p. 953) summarizes the nuanced patterns of cognitive differences as follows: "Girls and women tend to excel on tests of verbal fluency, arithmetic calculation, and memory for the spatial locations of objects. Boys and men tend to excel on tests of verbal analogies, mathematical word problems, and memory for the geometric configuration of an environment." Nonetheless, compared to larger, more reliable sex differences in measures of motor behavior, sexuality, and aggression, differences in cognition are small, leading Spelke (2005) to conclude that males and females have equal aptitude for mathematics and science.

Larger sex differences in performance on complex quantitative tasks emerge during or after elementary school and grow larger with age, making it "difficult to tease apart the biological and social factors that produce them" (Spelke 2005, p. 953). Indeed, much evidence indicates that intrinsic capacities and environmental experiences play interrelated roles in the complex process of learning (Dehaene 1997, Spelke & Newport 1998, Halpern 2000). Research that focuses exclusively on social and environmental factors provides an incomplete picture of the complex nature of gender differences in educational performance. For example, T.A. DiPrete & J. Booher-Jennings (unpublished observations) show that the standard set of socioeconomic and demographic variables cannot explain gender differences in social development in kindergarten.

There are also longstanding questions of how traditional gender stereotypes and norms influence students' perceptions of their own abilities and the socialization of girls and boys within their families and schools. One interesting line of research regarding the relevance of stereotypes examines the relationship between stereotype threat, or the fear of conforming to stereotypes about a subgroup to which one belongs, and women's poorer performance on math tests. Steele and colleagues argue that

because of conventional notions that men outperform women on standardized tests, especially in mathematics, women experience a heightened anxiety during test taking that interferes with their test performance (Steele 1997, Spencer et al. 1999).

Of course, many aspects of one's family of origin are integrally related to both educational performance and attainment. Aside from the potential role of family background and educationally relevant resources, which we discuss in greater detail below, some studies find differences in parental involvement depending on the gender of the child. Stevenson & Baker (1987) found that parents are more involved in school activities with sons and more involved in home activities with daughters; as children grow older, parental involvement with boys declines, but their involvement with girls remains constant. On the one hand, Muller (1998) finds that parental involvement in children's schooling is not gender specific and further speculates that parental involvement may serve to counteract gender stereotypes about math and science as male domains. On the other hand, Entwisle et al. (2007) maintain that the large growth in the gender reading score gap between first and fifth grade among low-income students is due in part to parents' lower reading expectations of boys. Similarly, Mandara (2006) proposes that certain parenting styles, such as those lacking an authoritative component, exacerbate gender differences in education among African Americans. The empirical basis for these claims is questionable for the simple reason that parenting styles and parental expectations may be responsive to the personalities and behavior of children, and thus may be consequences as well as causes of gender differences. Research designs for measuring the causal influence of parental behavior on children uncontaminated by the responsiveness of parental behavior to the characteristics of their children are rare in this literature.

Studies of gender gaps in educational performance have also looked to teachers and the environments within schools and classrooms for possible explanations. In the past, girls and boys

were often placed in different tracks in high school (Hallinan & Sorensen 1987, Entwisle et al. 1994), but today, as noted above, girls' and boys' course taking patterns are more similar. The female advantage in grades is not due to females taking easier courses in high school (Leonard & Jiang 1999) or college (Buchmann & DiPrete 2006).

There is an ongoing, contentious debate regarding whether teachers systematically favor one gender over the other, though the identity of the putative "victim" gender has changed over time. Research based on classroom observation in the early 1990s talked about "how schools shortchange girls," with teachers calling on and praising boys more often than girls (Am. Assoc. Univ. Women 1992, Sadker & Sadker 1994) only to be followed more recently by arguments that schools favor girls and contribute to a "war against boys" (Sommers 2000).

The empirical evidence of whether and how teachers' gender plays a role in causing gender differences in educational outcomes is inconclusive. Some large-scale studies find that males perform no better when taught by male teachers than by female teachers (Sokal et al. 2007). In contrast, Dee (2005, 2006) finds that having a female teacher instead of a male teacher in the subjects of science, social studies, and English in middle school raises the achievement of girls and lowers the achievement of boys, producing an overall gender gap of 8% of a standard deviation (Dee 2006, p. 70). It is unclear whether these effects arise from gender bias in teaching or whether they demonstrate that the effectiveness of instruction is partly a matter of fit and that students learn more on average from teachers of the same gender. Moreover, because the students in Dee's sample were not randomly assigned to teachers, male students with low performance may have been assigned to male teachers as a strategy for improving their performance (Sokal et al. 2007).

## FROM HIGH SCHOOL TO COLLEGE

One of the most striking features in the terrain of higher education in recent years is the

growing gender gap in college enrollment and completion. Young women consistently outperform their male peers in high school graduation. The proportion of both men and women enrolling in college has increased since the 1970s, but the increase for women has been much more substantial. Trend statistics in the United States also reflect a striking reversal of a gender gap in college completion that once favored males. In 1960, 65% of all bachelor degrees were awarded to men. Women continued to lag behind men in college graduation rates until 1982 when they reached parity with men. From 1982 onward the percentage of bachelor's degrees awarded to women continued to climb such that by 2005 women received 58% of all bachelor's degrees (Snyder & Dillow 2007) and comprised 57% of all college students. The U.S. Department of Education predicts the "new" female-favorable gaps in college enrollment and completion will continue to widen over the next decade. The probability of completing college is contingent on many factors, including the likelihood of finishing high school, the timing of the transition to college, the type of college attended, and the course of study in college. A growing body of research demonstrates that women now gain an advantage over men from most of these contingencies.

We limit our discussion to gender inequalities in the quantity of education received, or what Charles & Bradley (2002) have termed the vertical dimension of educational stratification. Gender differences in fields of specialization (major) and type of institution (elite versus nonelite, public versus private) represent distinctions in the type of education received within a given level of education, or the horizontal dimension of segregation. Although women outnumber men overall in their college attendance and graduation rates, we still need to consider questions regarding differences in the college experiences of men and women. Despite their greater numerical representation, are women concentrated in less prestigious institutions and in less well-remunerated fields of study? Or are their growing numbers accompanied by advances into more lucrative occupa-

tions? Gerber & Cheung (2008) address these questions in detail in their review of gender differences in horizontal stratification in this volume.

## The Transition from High School to College

In the United States, completing high school is the first step to gaining access to postsecondary education. Many youth are excluded from the pool of eligible college students because they have not completed high school. The "status dropout rate" reflects the percentage of 16- to 24-year-olds who are not enrolled in high school and who have not earned a high school diploma or a Certificate of General Educational Development (GED). Since 1990, the status dropout rate of females has been lower than that of males. During the 1990s, male and female dropout rates appeared to converge, but since 1996 female dropout rates have declined further, and the gap has widened again. In 2005, almost 11% of males age 16 to 24 were dropouts, compared to 8% of females (Snyder & Dillow 2007). Dropout rates vary substantially by ethnic group, but the male disadvantage holds for all major groups. In 2005, male dropout rates for whites, blacks, and Hispanics were 6%, 12%, and 26%, respectively, compared with 5%, 9%, and 18%, respectively, for females of the same groups (Snyder & Dillow 2007). Among high school graduates, more males than females acquire a GED, which is an indicator of a lower level of college preparedness than a high school diploma (S. Dynarski, unpublished observations).

Students who enroll in college directly after high school have higher rates of overall college enrollment, persistence in college, and graduation (Bozick & DeLuca 2005, Horn & Premo 1995). Although men used to be more likely than women to enroll in college directly after high school, since 1996 males are substantially more likely than females to delay enrollment in college. Of those who enrolled in college in the year 2000, 60% of men compared to 66% of women enrolled immediately after high

school (Freeman 2004). The female advantage in immediate college enrollment holds for all SES groups, although it is smaller for those of high SES backgrounds (King 2000, Bozick & DeLuca 2005).

### Completing College

Women currently earn 58% percent of all bachelor's degrees awarded in the United States (Snyder & Dillow 2007). The female advantage in degree completion exists for all racial groups, but there are important variations by race and ethnicity in the size of the gap. It is largest for blacks, but it is also large for Hispanics and Native Americans. Women earn 66% of all bachelor's degrees awarded to blacks; the figures are 61% for Hispanics, 60% for Native Americans, 55% for Asians, and 57% for whites (Snyder & Dillow 2007). Note that the especially large gender gap for blacks does not constitute a reversal but, rather, a continuation of a long female-favorable trend. As early as 1954, when the great majority of black college students were enrolled in historically black colleges and universities (HBCUs), women comprised 58% of students enrolled in HBCUs. When the Census Bureau began tracking bachelor's degrees by race and gender in 1974, women earned 57% of all degrees awarded to blacks (*Journal of Blacks in Higher Education* 1999, p. 7).

Beyond the United States, higher proportions of females than males currently attain tertiary education in most European countries as well as in Australia, Canada, and New Zealand. Among the 30 member nations of the Organisation for Economic Cooperation and Development (OECD), the once prevalent male advantage in college completion has disappeared in all but four countries—Switzerland, Turkey, Japan, and Korea (OECD 2006).

In the United States, one major reason that women earn more degrees than men is their lower rate of dropout, once enrolled (Buchmann & DiPrete 2006). Women also earn their degrees more quickly. Freeman (2004) found that 66% of women who enrolled in college in 1995–1996 had completed a bachelor's

degree by 2001, compared with only 59% of men. Men were more likely to have no degree or not to be enrolled, but they were also more likely still to be enrolled in a bachelor's degree program than women. Whereas 50% of black and Hispanic women had completed a bachelor's degree in this period, only 37% of black men and 43% of Hispanic men had done so.

Finally, women have made substantial gains in earning graduate and professional degrees. In 1970, women earned 40% of master's degrees and a mere 14% of doctoral degrees. Currently, women are more likely than men to attend graduate school; they earn 59% of master's degrees and 49% of doctoral degrees (Snyder & Dillow 2007). Similar trends have occurred within professional degrees. In 1970, women earned 5% of law degrees, 8% of medical degrees, and 1% of dentistry degrees (Freeman 2004). Currently, women earn 49% of law degrees, 47% of medical degrees, and 44% of dentistry degrees (Snyder & Dillow 2007).

### EXPLAINING GENDER GAPS IN HIGHER EDUCATION

The reversal from a male advantage to a female one in college enrollment and completion is an important topic of study both in its own right and because of its potential impacts on labor markets, marriage markets, family formation, and other arenas. Clearly, understanding the nature, causes, and consequences of the changing gender gaps in higher education is an important task for social scientists. This section focuses on individual and institutional explanations for the rising female advantage in higher education. In addition to discussing the findings of research in this emerging area, we discuss other plausible explanations, some of which have not been assessed empirically to date but have been topics of speculation in the popular press.

#### Individual-Level Factors

Status attainment and rational choice perspectives primarily focus on family and

individual-level explanations for variations in postsecondary enrollment. Status attainment theory examines access to resources, broadly defined, related to attending and completing college. Rational choice perspectives consider how incentives and constraints shape individuals' decisions regarding whether to attain higher education. Individuals for whom benefits exceed costs, including opportunity costs, should be most likely to attain a college degree (but see Beattie 2002). These perspectives overlap, and both are useful for advancing our understanding of gender disparities in transitions into and out of higher education.

**Family resources.** Research in sociology, much of it in the status attainment tradition (Blau & Duncan 1967, Jencks 1972), and economics (Leibowitz 1977, Becker 1991) demonstrates the importance of parental education and other family-related resources for an individual's educational attainment. Resources related to family background exert their influence at each level of educational attainment, partly through academic performance and partly through educational transitions, given performance. Financial capital; social capital; access to role models, mentors, and information; individual attitudes (especially aspirations); and prior academic performance are also important determinants of inequalities in educational attainment. These resources, which are amassed from family, neighborhood, and school environments, explain in part ethnic and racial differences in educational attainment; children of different races and ethnicities come from families, neighborhoods, and schools with different average levels of resources. Girls and boys, however, are not segregated by family or neighborhood, and in the United States they are generally not segregated by school. Resources may be an important part of the explanation for the historical male advantage in educational attainment, but that explanation concerns the process by which environmentally available resources differentially flow to one gender or another. Moreover, with gender inequality changing so rapidly, it is likely that gender-specific

flows of resources have changed considerably over the past 50 years; therefore, we must treat the results of published research in this area as historically contingent.

Even when girls and boys share the same household, family resources need not be equally distributed across sons and daughters. For example, socialization arguments emphasize the importance of role modeling, such that children model their parents as they form their own educational and occupational aspirations and attainment. Some scholars argue that role modeling is sex specific; girls look more to their mothers and boys more to their fathers as they develop their educational and occupational aspirations (Rosen & Aneshensel 1978). According to this perspective, after controlling for the overall educational level of the parents, daughters should do relatively better in households with a better-educated mother than in households with a better-educated father, and sons should be affected more negatively than daughters by the absence of a father in the home.

Buchmann & DiPrete (2006) find that the relationship between family background and college completion has changed for men and women over the second half of the twentieth century. In cohorts born before the mid-1960s, the gender gap favoring males was small or nonexistent, and daughters were able to reach parity with sons only in the minority of families with two college-educated parents. Parents with a high school education or less appeared to favor sons over daughters, and the gender gap in college completion favoring males was largest among these less-educated families. For cohorts born after the mid-1960s, the male advantage declined and even reversed in households with less-educated parents or those with an absent father. This change produced a situation in which the female advantage emerged first among families with absent or less-educated fathers. It remains largest among these families, but has gradually extended to all family types. These findings offer little support for gender-role socialization; instead Buchmann & DiPrete (2006) argue that the pattern reflects a growing

vulnerability of sons of less-educated or absent fathers.

**Academic performance.** The gender differences in academic performance and behaviors during high school discussed above are likely related to the female advantage in college enrollment and completion, but research has not sorted out all the mechanisms that link performance in high school with college outcomes. Perhaps females' higher aspirations to attend college explain, in part, their greater performance in high school. In 1980, more male than female high school seniors (60% versus 54%) expected to graduate from a four-year college, but by 2001 the trend had reversed, with 82% of female high school seniors expecting a four-year degree, compared with 76% of male high school seniors (Freeman 2004, p. 66). The reversal of the gender gap in educational expectations from one favoring males to one favoring females is not limited to the United States; in nearly all OECD member countries, young women are more likely to expect to attend college than are their male counterparts (Buchmann & Dalton 2002, McDaniel 2007).

At the same time, females' higher educational aspirations and higher college graduation rates likely stem from the female advantage in academic performance that develops over the educational career. Some research finds that the female-favorable gap in postsecondary enrollment is due in part to young women's better grades and tests scores and the greater number of math and science courses they take in high school (Goldin et al. 2006, Cho 2007) as well as their tendency to spend more time on homework and avoid disciplinary problems (Jacob 2002) relative to their male counterparts. Gender differences in high school behaviors also lay the foundation for women's better academic performance in college, which in turn plays a large role in producing the female advantage in college completion (Buchmann & DiPrete 2006).

**Incentives and returns to college.** Individuals' knowledge of the returns to a college de-

gree also play an important role in their decisions regarding how much education to acquire. One plausible reason for the rising rates of women's college enrollment and completion is that the returns to college have been rising more for women than for men. Research finds that whereas women's wage returns to higher education have increased, male returns have increased even more rapidly, owing to declining opportunities for high-wage, male-dominated manufacturing jobs for high school educated workers (Averett & Burton 1996, Charles & Luoh 2003, Perna 2003). But DiPrete & Buchmann (2006) argue that wage returns comprise too narrow a basis for evaluating the relative returns to higher education for men and women. They assess whether the growing female advantage in college completion is related to changes in the returns to higher education for women and men in terms of earnings, the probability of getting married and staying married, the family standard of living, and insurance against poverty. Via a trend analysis of the value of higher education for each of these outcomes measured against the baseline value of a high school education, they find that standard-of-living and insurance-against-poverty returns to higher education have risen faster for women than for men. Thus, it is plausible that the female-favorable trend in college completion may derive at least in part from responses to gender-specific changes in the value of higher education.

DiPrete & Buchmann (2006) show that the total returns to a college degree have also risen for men, albeit not as rapidly as for women. In addition to the well-known rising return to education in the labor market for men, the earnings value of a spouse for men has grown with both the rising female earnings and the increasing financial vulnerability of men to divorce (McManus & DiPrete 2001). Arguably, one puzzling aspect of the reversal of the gender gap in college completion is the slow pace of growth in men's rates of college completion in the face of rising returns to college for men. Research suggests a socialization-based disadvantage for males that is relatively stronger in families with

low-educated or absent fathers (Buchmann & DiPrete 2006). But whether this disadvantage plays out through a lack of knowledge about the value of postsecondary education and the way to convert it into labor market success, through a lower priority placed on education relative to other short-term goals, or through some other mechanism is not yet clear.

### **Institutional Factors**

Beyond the factors that shape individuals' resources and incentives to attain a college education, institutional-level factors also shape gendered patterns of college access and success. These include sociocultural changes in gender roles and expectations about life course trajectories for women and men. Shifts in the structure of the labor market such as declining discrimination against women and changes in occupational sex segregation also impact individual incentives to attend college, as do changes in institutions of higher education themselves, such as the growth of community colleges, the rising costs of higher education, and changes in financial aid regulations. We also need to consider the role of the military, which may compete with higher education for young adults, especially young men, in shaping gender-specific patterns of participation in higher education.

**Gender-role attitudes.** In the United States, there have been large changes in gender-role attitudes in recent decades, with the clear trend of declining numbers of Americans expressing support for traditional gender roles and far greater numbers expressing more egalitarian views (Brewster & Padavic 2000, Brooks & Bolzendahl 2004). Recent research finds support for a causal relationship between gender-role attitudes and subsequent behaviors and attitudes as diverse as childbearing (Kaufman 2000), voting behavior (Brooks 2000), and marital satisfaction (Amato & Booth 1995). Changes in gender-role attitudes are also related to the growing college attendance of young women, but in complex ways and coupled

with other factors (DiPrete & Buchmann 2006, Goldin 2006). Goldin et al. (2006) show that young women's rising expectations for future employment encouraged them to attend and complete college, but the increase in the median age of first marriage among college students in recent decades also played a role. Although women's growing rates of college completion and graduate/professional education likely contributed to the rising median age of first marriage, the later age of first marriage also probably reinforced the trend in college completion; as women married later, they could take college more seriously and form their identities before getting married and having a family. The access to reliable contraception in the form of the birth control pill positively impacted women's college attendance and a host of related factors, including their age of first marriage, professional labor force participation, and age of first birth (Goldin & Katz 2002, Goldin 2006).

**Labor markets.** Between the 1970s and 1990s the gender wage gap declined, and women with high levels of human capital (in terms of education and labor force experience) saw the greatest increase in their wages (Spain & Bianchi 1996, Morris & Western 1999). Moreover, research indicates that returns to labor force experience increased by a larger amount for women than for men during this period (Blau & Kahn 1997) owing to rising levels of women's human capital, but also owing to the passage and enforcement of antidiscrimination laws (Goldin 2006). Occupational sex segregation also fell between 1970 and 1990, although the rate of decline slowed in the second decade (Morris & Western 1999). This meant that more women entered prestigious and often better-paid positions in occupational sectors such as law, business, and the sciences (Goldin 2006). All these changes in the labor market impacted women's decisions to attend college and are related to women's rapidly rising rates of college enrollment and completion from the 1980s onward.

**Educational institutions.** Changes in higher education institutions also may have altered the

access or pathways to college in gender-specific ways. The second half of the twentieth century witnessed the dramatic expansion first of the four-year college system and then of the community college system. If community college serves as a springboard to enrollment and graduation from four-year college, the expansion of the community college system may have been responsible, in part, for the female-favorable trend in college completion. But Buchmann & DiPrete (2006) find that although women enroll in two-year colleges at a slightly higher rate than men, the female advantage in two-year college attendance has little impact on their advantage in four-year college completion.

Other major changes in higher education have been the rising cost of tuition, declining levels of grant-based financial aid, and increases in student loans (Alon 2007). Cursory evidence suggests that women and men receive similar levels of financial support from their families (Jacobs 1999), but it is possible that changes in financial aid or the increasing costs of college are affecting men and women differently. Some recent research indicates that women are more responsive than men to programs that decrease college costs (Seftor & Turner 2002; S. Dynarski, unpublished observations), suggesting that policies aimed at making college more affordable will exacerbate the female advantage in college enrollment. This is an important topic for further research.

**Military service.** To what degree does the military compete with higher education for young adults, especially young men? The U.S. military recruits about 200,000 enlisted personnel each year, almost all of whom are high school graduates. The size of the military has remained stable in the past 20 years; since 1975 it has comprised less than 1% of the total population. In 2007, active duty personnel comprised almost 1.4 million people, 85% of whom were men (U.S. Dep. Defense 2007). The enlisted population is disproportionately young, with more than 50% under the age of 25, so it is possible that military service competes with col-

lege as a destination for young adults, and especially young men. But decisions to enlist in the military and to enroll in college need not be mutually exclusive. Many of the young people who enlist after high school cite the educational benefits available to them to get a college education either during or after their military service as a primary motivation to enlist (Kleykamp 2006). Thus, for some, military service may make enrolling in college possible, albeit at a later point in life. Moreover, of the 20,000 officers commissioned by the armed forces each year, nearly all are college graduates, and about 40% received their commission through participation in a university's Reserve Officer Training Program (ROTC) (Segal & Segal 2004, p. 8). For this group, military enlistment occurs after completing college.

On the whole, men who serve in the military receive less education than those who do not serve. Among high school graduates, veterans serving during the peacetime cold war period were less likely to attain a college education than were nonveterans at all levels of SES (MacLean 2005). This difference held even among those who reported plans to attend college. It is possible that merely delaying college enrollment reduces the likelihood of attending or completing college, perhaps owing to a sense that one has become "too old" for college, or perhaps because serious romantic involvement is more likely as one ages (Hogan 1981). It is not known whether military service reduces the likelihood of attaining a college degree or whether the military differentially selects young people who are less committed to postsecondary education (MacLean & Elder 2007). MacLean's (2005) findings are at least consistent with the idea that military service competes with higher education for young men. To the best of our knowledge, no research has examined the relationship between military service and educational attainment for women or whether the effects of military service found in the past remain the same for military personnel today. These are important questions for future research.

## DIRECTIONS FOR FUTURE RESEARCH

Gender inequalities in education have seen much change, with young women gaining advantages over young men in ways that could not have been anticipated just two decades ago. The future promises to bring more change than stability. Throughout this review we have highlighted some important questions for future research: How should research appropriately account for the different developmental trajectories of girls and boys when comparing their performance? Have gender differences in test scores declined over time? How can research examine the influences of parents' and teachers' perceptions and behaviors on children, when these perceptions and behaviors are themselves shaped by children's personalities and behaviors? Why are young men less likely to enroll in college immediately after graduating high school? Why have men's rates of college completion not kept pace with the rising returns to college for men? Do changes in college costs and the availability of financial aid affect men and women differently?

In addition to research designed to answer these questions, we believe there are three research agendas that would prove useful in advancing our understanding of gender inequalities in education.

1. Research needs to examine gender inequalities in education early in the life course: female-favorable trends in college enrollment and completion are likely due, in part, to gender differences in earlier behaviors and experiences. Recent important advances in biology, genetics, psychology, neuroscience, and other arenas (Kimura 1999, Halpern 2000, Cahill 2005, Spelke 2005) that shed light on gender differences in cognitive development and skills as well as noncognitive abilities in early childhood. Sociologists would do well to become more educated about these advances, or they risk becoming increasingly irrelevant in the important public and scholarly debates about the in-

tersection of biological and social factors related to gender differences that emerge early in childhood and gender differences more generally (Freese et al. 2003).

Data from new longitudinal surveys such as the ECLS-B, ECLS-K, and National Children's Study, some of which gather data on biological as well as psychosocial environmental factors, will enable researchers to advance knowledge on gender differences in development, cognition, and a wide range of other factors in the next decade. Sociologists' nearly exclusive focus on the social and economic determinants of behavior may change as an interdisciplinary group of scholars increasingly attends to the potential importance of gene-environment interactions and interactions between the social environment and a variety of psychobiological systems (Adam et al. 2007). More than ever, the study of gender differences in early childhood must be an interdisciplinary enterprise, with connected efforts in sociology, psychology, biology, neuroscience, genetics, and other disciplines.

2. There is a great need for research on how the structure and practices of schooling relate to gender differences in educational outcomes. For example, the National Association for Single-Sex Public Education reports that, as of April 2006, at least 223 public schools in the United States were offering gender-separate educational opportunities, up from just 4 in 1998. Most of these cases involved single-sex classrooms within coeducational schools, but 44 were wholly single-sex schools (Dee 2006). This rise in single-sex schooling may be developing in response to public concerns about boys' poor academic performance that have gained attention on magazine covers (e.g., "The Problem With Boys" *Newsweek* 2006) and best-selling books like *Raising Cain: Protecting the Emotional Lives of Boys* (Kindlon & Thompson 2000). Single-sex schooling

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### Early Childhood Longitudinal Study, Birth Cohort:

ECLS-B follows a cohort of children from their birth in 2001 through kindergarten entry

### National Children's Study:

this study will follow 100,000 children from birth to age 21 to study environmental and biological impacts on health and development

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may be a reasonable policy response to the underperformance of boys, but to implement such massive changes without empirically based assessments of the consequences of such changes is shortsighted. For example, recent research by Wong et al. (2002) on Hong Kong schools found that girls do better in single-sex classrooms whereas boys do better in mixed-sex classrooms. Other research shows that the performance of both boys and girls improves when the proportion of female students in the classroom increases (Hoxby 2000, Lavy & Schlosser 2007). These studies suggest that an increase in single-sex schooling could exacerbate rather than ameliorate the relative underachievement of boys.

3. Future research must investigate gender differences by race, ethnicity, SES, and immigrant status. Such research should attend to vulnerable segments of the population and to males who may be at particular risk for poor performance and low educational attainment. A rare example of such work is Lopez's (2003) ethnographic study of 66 low-income, second generation Dominican, West Indian, and Haitian young adults who grew up in New York City during the 1970s–1990s. Through her interviews, Lopez finds that gendered norms within families, including strong social controls and responsibilities for daughters and more independence and lax regulations for sons, can put sons and daughters on very different ed-

ucational pathways. Other important evidence on how gender differences may be conditioned by race and SES comes from the work of Entwisle et al. (2007), who find that the gender gap in reading at the start of elementary school is larger for children from disadvantaged backgrounds relative to middle-class children. These studies should serve as exemplars for future research that examines how gender intersects with race, ethnicity, class, and immigrant statuses in creating complex inequalities in educational experiences and outcomes.

Many of women's and girls' historical disadvantages in education have not only disappeared in the United States and other industrialized countries, they reversed. Old paradigms of comprehending gender differences in education as solely due to widespread obstacles to females' achievement no longer help guide research. A new frontier for research lies in understanding the developmental, cognitive, and environmental sources of males' and females' educational outcomes. In sum, we have much to learn about the nature, causes, and consequences of the changing gender gaps in education across the life course. This rapidly shifting terrain of gender inequalities raises important questions for researchers, policy makers, and educators who want to understand how to improve the educational performance and attainment of all youth—males and females alike—and for educational institutions striving to respond to the needs of their students. Clearly, much work remains to be done.

## DISCLOSURE STATEMENT

The authors are not aware of any biases that might be perceived as affecting the objectivity of this review.

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Summarizes literature on possible biological predispositions to math and science ability.

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Examines how test constructs, cohorts, samples, and score variability influence gender differences in test scores.

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Compares boys' and girls' school readiness, developmental difficulties, and behavior in kindergarten.

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