

# **The Female Advantage in College Academic Achievements and Horizontal Sex Segregation**

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## **Introduction**

One of the most fascinating phenomena in recent decades has been the reversal of the historic male advantage in higher education. Today, a woman's chances of applying, enrolling and attaining a college degree are better than those of her male peers (Peter and Horn, 2005; Freeman, 2004; Jacobs 1996; Buchmann and DiPrete, 2006; Jacob, 2002; Sum et al., 2003; Turley, Santos and Ceja, 2007; Reynolds, 2001; Alon, 2007). The expansion of the higher education system in the U.S since the 1970's was accompanied by dramatic changes in the gender composition of both undergraduate students and bachelor degree recipients. In 2004-5 females were also the majority of degree recipients (57 percent) (National Center for Education Statistics, 2005). There is also a significant female advantage in college Grade Point Average (GPA), even after controlling for family background, pre-collegiate academic achievements and institutional characteristics (Goldin, Katz and Kuziemko, 2006; Buchmann and DiPrete, 2006; Sax and Harper, 2005; Adelman, Daniel and Berkovits (2003: table 16)).

Several macro- and micro-level explanations have been suggested to account for the emergent female advantage in college academic achievements. Notable macro forces include the spread of egalitarian norms; structural forces in higher education, like the system's expansion and greater openness; and economic forces, i.e., women's greater labor force participation and higher economic returns in the labor market (Goldin, Katz and Kuziemko, 2006; Goldin, 2006; DiPrete and Buchmann, 2006; Charles and Luoh, 2003; Jacob, 2002). Micro-level explanations focus on gender differences in cognitive and non-cognitive skills and in the effect of social background on educational attainment (Reynolds and Burge, 2007; Jacob, 2002; Goldin, Katz and Kuziemko, 2006; Buchmann and DiPrete, 2006).

In this study, I focus on another explanation to the female advantage: sex segregation by field of study. Today the main axis of gender inequality in higher education in the United States, as well as in all industrialized countries, is horizontal sex segregation across fields of study, given parity (or even an edge) in enrollment rates (Charles and Bradley, 2002; Davis and Guppy, 1997). Since students' field of study provides the immediate academic and social context for their academic performance in college, gender differences in major's distributions can contribute to the female advantage in academic achievements. I therefore consider horizontal sex segregation as an underlying structural arrangement that intensify or suppress the female advantage in college grades and degree completion. My analyses are designed to parse the relative contributions of horizontal segregation - a structural explanation - compared to behavioral effects on the female advantage in college academic achievements.

### **Data and Sample**

I use the Beginning Postsecondary Students (BPS) dataset, which is a nationally representative sample of all first-time beginning students in postsecondary education. The data contain detailed persistence information for all undergraduates. I use the 1996 BPS cohort (BPS:1996) with the second follow-up in 2001 (BPS: 1996/2001), approximately 6 years after they first entered postsecondary education. I limit the analyses to 6449 students who enrolled at any four-year institution in the fall of the 1995-6 academic year. All analyses are weighted to allow generalization to all students attending 4-year institutions in 1995.

### **Descriptive Results: Horizontal Sex Segregation by Field of Study**

I start the empirical investigation by depicting the gendered distributions of majors for the BPS students in their last year in college. Panel A Table 1 lists seven general fields of study and show that females were more likely to major in the humanities, social and life sciences, and professional fields, while males were more likely to major in engineering/computer sciences and business. Only 4 percent of females studied engineering and computer sciences in 1995 compared to 20 percent of their male classmates. Panel B presents the distributions of male and female students by segments

based on the gender composition of fields of study. Only 8.5 percent of female students studied in a male-dominated environment compared to one in three of the male students. Males also had higher share in gender-neutral fields than females (43 vs. 34 percent). 57 percent of the females in the sample chosen fields of study of which the majority (more than 60 percent) of their classmates were females. In sum, despite a substantial female presence in the student body, their distribution of majors is especially skewed.

[Table 1 about here]

In the following analyses I plan to examine how much of the female advantage in college cumulative grades and graduation likelihood, that remains after netting out the effect of social and academic background, is explained by differences between fields of study in academic demands and grading norms. Second, I will examine whether the female advantage varies by the gender composition of majors. I plan to fit several logistic regressions of 6-year graduation likelihood and OLS regressions of cumulative GPA to the sample of four-year students.

**Table 1: Field of study distribution in the last year in college, by sex  
Students who started at any four-year institutions in 1995, BPS database**

	All Students	Males	Females
<b>Panel A: by discipline</b>			
Humanities	12.7	11.7	13.6
Social sciences	16.9	14.6	18.7
Life sciences	17.0	13.4	19.9
Math and physics	2.8	3.0	2.7
Engineering and computer sciences	10.9	19.1	4.2
Business	17.8	19.0	16.8
Other vocational and professional fields	22.0	19.4	24.1
<b>Panel B: by segments based on the gender composition of fields of study</b>			
Male Dominated Fields (MDF)	19.1	32.1	8.5
Gender Neutral Fields (GNF)	38.2	43.2	34.1
Female Dominated Fields (FDF)	42.8	24.7	57.4
N	6,449	2,803	3,646

## References

- Alon, Sigal. 2007. "The Effect of Overlapping Disadvantages on the Racial/Ethnic Graduation Gap among Students Attending Selective Institutions." *Social Science Research*, 36(4) 1475–1499.
- Buchmann, Claudia and Thomas A. DiPrete. 2006. "The Growing Female Advantage in College Completion: The Role of Parental Resources and Academic Achievement." *American Sociological Review* 71:515-541.
- Charles, K. K and Luoh, M.C. (2003). "Gender Differences in Completed Schooling", *Review of Economics and Statistics*, 85: 559-77.
- Charles, Maria and Bradley Karen (2002). "Equal but Separate? A Cross-National Study of Sex Segregation in Higher Education". *American Sociological Review*, 67(4):573- 599
- Charles, Maria and David B. Grusky. Occupational Ghettos: The Worldwide Segregation of Women and Men. Stanford University Press, 2005. .
- Davies Scott and Guppy, Neil. (1997). "Fields of Study, College Selectivity, and Students Inequalities in Higher Education". In: *Social Forces* 74:4, Pp.1417-1438.
- DiPrete, Thomas A. and Buchmann, Claudia (2006). "Gender Specific Trends in the Value of Education and the Emerging Gender Gap in College Completion" *demography* 43:1-24
- Freeman, C.E. (2004). *Trends in Educational Equity of Girls & Women*. (NCES 2005–016). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
- Goldin, Claudia (2006). "The Quiet Revolution that Transformed Women's Employment, Education, and Family", Ely Lecture, American Economic Association Meetings, Boston MA (Jan. 2006).
- Goldin, Claudia, Katz, Lawrence F. and Kuziemko, Ilyana (2006). "The Homecoming of American College Women: The Reversal of the College Gender Gap," NBER Working Papers 12139, National Bureau of Economic Research, Inc
- Jacob, Brian (2002) "Where the Boys Aren't: Non-Cognitive Skills, Returns to School and the Gender Gap in Higher Education" *Economics of Education Review*, 21:589-598.
- Jacobs, Jerry A. (1996)."Gender Inequality and Higher Education". In: *Annual Review of Sociology* 22:153-185.
- Peter, K. And Horn L. (2005). Gender Differences in Participation and Completion of Undergraduate Education and How They Have Changed Over Time (NCES 2005- 169). U.S Department of Education, National Center for Education Statistics. Washington DC: U.S Government Printing Office.
- Reynolds, J. R. (2001). "The Gender Gap in College Expectations: Myth or Males Falling Behind?" American Sociological Association Annual Meeting -2001, Anaheim, CA.
- Reynolds, J. R., Burge, S. W (2007) "Educational Expectations and the Rise in Women's Post-Secondary Attainments, *Social Science. Research*.
- Sum, A., Fogg, N., Harrington P. with Ishwar Khatiwada, I. Palma,S. Pond N., Paulo Tobar P. (2003). "The Growing Gender Gaps in College Enrollment and Degree Attainment in the U.S. and Their Potential Economic and Social Consequences". Center for Labor Market Studies, Northeastern University, Boston, Massachusetts. Prepared for: The Business Roundtable, Washington, D.C.  
*The American Journal of Sociology*, Vol. 106 (6) 1691-1730.
- Turley, Ruth N., López, Martín Santos and Cecilia Ceja (2007). "Social Origin and College Opportunity Expectations across Cohorts." *Social Science Research*, 36(3):1200-1218.
- U.S. Department of Education, National Center for Education Statistics (NCES). 2004-05 Integrated Postsecondary Education Data System (IPEDS), Fall 2005 (table no.258). Full table available at [http://nces.ed.gov/programs/digest/d06/tables/dt06\\_258.asp](http://nces.ed.gov/programs/digest/d06/tables/dt06_258.asp)