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### Cover Page Footnote

I wish to thank AnnJanette Rosga, Christina Hart, and two anonymous reviewers for comments on previous drafts of this essay.

## VIEWPOINT

# Caught between a Rock and a Hard Place: The Title IX Generation, Mathematics, and the State of Feminist Quantitative Social Science Research

Jill R. Williams, University of Colorado Boulder

**Abstract:** In this essay I reflect on the fortieth anniversary of the Mink Equal Opportunity in Education Act of 1972 (Title IX), which prohibited discrimination based on sex in federally funded education programs in the United States and inspired educational programs that encourage girls to pursue math and science careers. I argue that despite the feminist underpinnings of Title IX, in recent years feminism has discouraged the advancement of women in math and science by excluding quantitative research from its publications, quantitative researchers from women's and gender studies programs, and quantitative training from its curriculum. I examine my own experience of growing up with Title IX programs, the long-term ramifications of those programs, and my recent struggles to do feminist demography to show how the relationship of feminism to the promotion of quantitative sciences has changed over time. I argue that there is an unfinished revolution in feminism and a stall in the development of feminist quantitative social science research that can only be resolved by creating intellectual space for feminist quantitative work in the academy.

**Keywords:** feminist quantitative research, Title IX, women and mathematics, women and science, feminist demography, feminist scholarship

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### Introduction

No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance.

—*Title IX of the Educational Amendments of 1972 to the 1964 Civil Rights Act*

Title IX, also known as the Mink Equal Opportunity in Education Act, first became law on June 23, 1972. The fortieth anniversary of Title IX this year encourages reflections on its impact: the gains we have made and the challenges we still face. Title IX is closely associated with achievements in girls' sports, an arena where there have been many legal battles over Title IX and a great deal of success. As Tables 1 and 2 below demonstrate, girls' participation in high school and collegiate varsity athletics has grown enormously since 1971. Title IX undoubtedly enabled this growth by providing a legal basis from which to argue for equal funding and support of girls' athletic and educational programs.

**Table 1.** Participation in high school athletics since Title IX

	<b>1971–72</b>	<b>2007–08</b>	<b>Increase</b>
<b>Female</b>	294,015	3,057,266	940%
<b>Male</b>	3,666,917	4,372,115	19%

Source: National Coalition for Women and Girls in Education (2008).

**Table 2.** Participation in NCAA varsity athletics since Title IX

	<b>1971–72</b>	<b>2004–05</b>	<b>Increase</b>
<b>Female</b>	29,972	166,728	456%
<b>Male</b>	170,384	222,838	31%

Source: National Coalition for Women and Girls in Education (2008).

Although athletics has been the primary area of emphasis and debate surrounding Title IX, the wording of Title IX does not restrict its use to athletics. Title IX, therefore, has been used to successfully argue for girls’ inclusion in traditionally male-dominated academic fields such as science, technology, engineering, and mathematics (STEM). Since 1972, girls’ participation in high school science and math courses has increased, in some cases surpassing boys’ participation (NCWGE 2008). Additionally, the gender gap between boys’ and girls’ scores on math and science assessments in high school has dropped significantly (NCWGE 2008). Women have also made great strides in their participation in higher education, including in STEM fields. In 2004, for example, women received more than 50 percent of the undergraduate degrees in biological and agricultural sciences (NCWGE 2008).

While women’s progress in many STEM fields has been remarkable, in some STEM disciplines such as engineering, physics, computer science, and mathematics it has been slow or has stalled. In 2004, women earned only 20 percent of the bachelor’s degrees granted in engineering and physics. Women’s share of mathematics degrees was around 47 percent in the early 1990s, but has been decreasing since 1994 (NCWGE 2008).

Furthermore, significant gains in participation in higher education have not translated into proportional gains in employment. In 2009, women were just 25 percent of workers in computer and mathematical occupations (US Department of Labor 2010). A steady 6 percent increase per year in the number of women earning doctorates in the “hard sciences” between 1993 and 2001 has not led to a proportional increase in the number of women hired onto faculties. The percentage of full professors in engineering and science departments ranges from only 3 percent to 15 percent, despite significant overall gains in female faculty (NCWGE 2008). Research has found that women have higher attrition rates than men in STEM fields or women in other occupations (Hill, Corbett, and St. Rose 2010) and that women earning PhDs in STEM fields don’t apply for academic positions because they don’t want to remain in an environment that is hostile to women (NCWGE 2008).

This situation affects women’s overall status in society. Because STEM fields are among the highest-paying scientific professions, women’s exclusion from these fields reinforces occupational sex segregation, which in turn contributes to the persistent pay gap between men and women. For example, pay parity in

higher education has been elusive, as the average salary of faculty women has been 81 percent of that of men since the late 1970s (NCWGE 2008).

Importantly, research suggests that some of the differences in participation in STEM fields can be attributed to the lack of interest in the subject matter on the part of girls. Female undergraduates report that technical majors are not interesting, and research has shown that high school girls who are good at math and science are not as likely as less qualified boys to major in STEM fields (Hill, Corbett, and St. Rose 2010). Some of this reported lack of interest may be due to socialization, discrimination, a lack of role models, or a lack of what might be called “math-esteem.” Research has shown, for example, that boys make higher assessments of their mathematical abilities than girls, and that these self-assessments influence enrollment and success in mathematics (Correll 2004). Research also suggests that girls are more likely to pursue careers that are intrinsically rewarding, while boys are more likely to pursue careers that result in extrinsic rewards such as money and power (Shauman 2006). This, again, may be due to socialization and other related factors, but it may also explain why women are better represented in such STEM fields as medicine and psychology, since working directly with people may be more intrinsically rewarding.

In sum, this research suggests that if we give girls and women more intrinsically rewarding applications for math and science training, they will be more likely to pursue it. This leads me to the position that I wish to take in this Viewpoint, which is that feminism as a disciplinary pursuit has contributed to the lack of interesting applications for STEM research and reinforced the message that girls and women should remain innumerate by excluding quantitative research from its publications, quantitative researchers from women’s and gender studies programs and departments, and quantitative training from its curriculum. Whereas one would assume that Title IX and the growth of feminist studies would be synergistic, I argue below that they have at times been antagonistic. In other words, the integration of girls in mathematics and science may have fallen short in part because we haven’t given girls the opportunity to pursue quantitative avenues in areas that matter to them, such as within the discipline of feminist studies. Furthermore, we have undermined the potential for fully developing and gaining insight from feminist quantitative social science research by discouraging feminist scholars from pursuing quantitative projects.

### **Caught between a Rock and a Hard Place: Becoming a Feminist Demographer**

Having been born in 1969, I consider myself part of what I call the Title IX generation: girls who have grown up with the legal protection of Title IX in place and have therefore been influenced by the educational environment that it helped to create. Where I went to school and later taught seventh-grade mathematics there was a strong push to include girls in advanced math and science classes. My generation was also influenced, of course, by growing up with the feminist movement writ large in the United States, and we entered college with access to women’s studies courses and degrees. As Table 3 shows below, by the time I went to college in 1987 there were around 500 women’s studies programs in the United States, and even at the small liberal arts college I attended in Iowa feminism had a profound effect on my collegiate experience.

**Table 3.** Growth of women’s studies programs in the US, 1977–2007

<b>1977:</b> 276 women’s studies programs
<b>1989:</b> 525 women’s studies programs
<b>2007:</b> 650 women’s and gender studies programs

Source: Reynolds, Shagle, and Venkataraman (2007).

I write this reflection from the position of a feminist demographer. This is a term I use to define my scholarly position, which is meant to reflect the contradiction I write about here, between my quantitative social science training in demography and my feminist training. At this point, in academia, the term “feminist demographer” remains almost an oxymoron, as it is very difficult to publish either self-avowed feminist work in demographic journals or overtly demographic work in feminist journals. In fact, the combined influence of Title IX and academic feminism has led me to be caught between a rock and a hard place. On the one hand, I was encouraged to pursue an advanced degree in mathematics through Title IX programs. On the other hand, I have been penalized within the feminist academy for being a quantitative social scientist. This positioning is admittedly personally frustrating, but I reflect on it mainly to point out how the current scarcity of feminist quantitative research and absence of quantitative training in gender studies undermine both our efforts to encourage girls to be mathematicians and scientists and our efforts to fully transform the academy, particularly the production of knowledge about gender and gender inequality.

I make this argument below by examining my own experience from elementary school to graduate school and beyond. The purpose of examining the experience of growing up under Title IX while developing a feminist consciousness and then training as a feminist scholar is to examine the ways in which feminism has at times supported and at other times thwarted my development as a quantitative social science researcher. By illuminating the tensions and synergisms I hope to suggest a way forward or a way to imagine the development of feminist quantitative social science. This essay is a reflection of my own experience and is meant to show how academic feminism both encourages and discourages feminist quantitative research.

I have first-hand experience with many of the efforts to encourage girls to stay involved in math and science since Title IX was passed. I was put in advanced math in seventh grade (1981), completed Calculus I by the end of high school (1987), majored in mathematics in college (1987–1991), and taught middle school mathematics for five years (1992–1997) before entering graduate school in 1997. In graduate school I studied both feminism and demography and wrote an interdisciplinary dissertation bridging the two fields. Since completing my dissertation in 2004, I have struggled to find a comfortable intellectual home in academia. I believe my experience illuminates important opportunities for growth in the feminist academy and I conclude by suggesting new types of questions feminist quantitative social science should be asking and training our students to pursue.

### *Elementary School to High School (1974–87)*

My early feminist consciousness developed from issues that are very much related to Title IX. This section describes the discrimination my mother faced as a woman interested in math and computer programming, as well as both discrimination and redress (the latter thanks to Title IX) I faced in sports. I also describe the experience I had as a girl placed in advanced math classes in junior high and high school.

I was born in 1969 in Boulder, Colorado, where some of my earliest memories are of telling everyone that I wanted to be a boy. This proclamation was usually uttered following a statement by someone else that I shouldn't do something because I was a girl. In my little-girl logic, I figured that if they knew I wanted to be a boy, I would be exempt from the rules about what girls can and can't do. What I really meant was, “I want to be able to do what boys do.” I wanted to play football, sleep in my Broncos pajamas every night, and I wanted (according to my first-grade *All About Me* book) to be a professional football or baseball player when I grew up.

Although my family and friends were incredibly supportive, many of these early desires were eventually thwarted. In seventh grade I was forced to switch from baseball to softball, and in eighth grade the assistant

principal of my junior high school told me I could not play football for my school. This effectively ended my dream of playing organized tackle football and is representative of a host of experiences that stemmed from being a tomboy and that provided the basis for the development of a feminist consciousness early in my life.

My disappointment in being denied the opportunity to play football was muted, however, thanks to Title IX. As I remember it, soon after I asked my assistant principal if I could play football, it was announced that we would be adding girls' field hockey to the lineup of sports teams that year. So, because Title IX required equal opportunity for girls' participation in sports, I did play volleyball, basketball, softball, and field hockey in school, and was able to secure college scholarships for softball and volleyball. After college, I had the opportunity to coach high school girls' softball, volleyball, and basketball during my five-year stint as a middle school teacher. In relation to sports, then, Title IX helped provide positive experiences, opportunities, and even a career that enabled me to quit saying that I wanted to be a boy and enabled me to be happy being a girl. This shift was significant and is exemplified by my declaration, in junior high school, that I wanted to be the first female president of the United States. Title IX helped to replace the wish to be a boy with the belief that I could be proud to be a girl and strive to be the "first girl" to do things such as become the first female president.

Because I grew up wanting to do "boy things" and was aware at some level that math was supposedly for boys, my own personality is partly responsible for my later pursuit of a degree in mathematics. However, some of my mother's experiences also provided motivation. My mother was not encouraged to go to college, but did attend two years of nurses training. After leaving nursing to raise three children, she enjoyed taking night classes in accounting and computer programming in the late 1970s and early 1980s. However, when she finished these classes and considered getting a job to use her training, I remember her crying and saying, "No one will want to hire an overweight, middle-aged woman with no experience and three kids." Instead, she busied herself for several years typing and editing my father's dissertation, overseeing the family budget, and teaching my brother and myself how to use computers.

Despite my mother's continuous tinkering with numbers and computers, I grew to feel insecure about my own math abilities. I think my own insecurity with math started because of grades. I remember that in elementary school my math grades seemed lower than my other grades. I have a vivid memory of my first-grade teacher talking to me about my report card and pointing out that my math grade could improve. Indeed, my first-grade report card shows I got an E (excellent) in Penmanship and Written Language but an S+ (satisfactory plus) in Mathematics. Since I was better at something else, I believed that I wasn't good at math.

I know that I decided early on I wasn't as good at math as at other things, but I don't believe I identified it as a big problem. Ironically, my conscious struggle with my own math-esteem began exactly at the point when my sixth-grade teacher told me he was placing me in an advanced math class in seventh grade, my first year of junior high school. I remember I had just received a B in math on something—an assignment, a test, or perhaps even the end-of-the-year report card—and my teacher called me up to his desk and said he was putting me in advanced math. He said that even though I had a B, he thought I could do it. I'm not sure if I ended up in advanced math because of my aptitude, my general academic success, a desire to encourage girls to take advanced math, or a combination of all of the above. But I do know that being placed in advanced math has had a profound impact on my life and perhaps the opposite impact than it should have had on my math-esteem.

First of all, it was challenging and almost more of a confidence killer than a booster. There were many times in my advanced-level math classes where I was frustrated because I knew the process of getting the

right answer but didn't really know why. I wanted to understand things completely and often did not. At the time, I interpreted these moments as my own lack of intelligence, but looking back I have to wonder if being in advanced math didn't perhaps require me to learn some things I wasn't developmentally ready to learn. And if this was the case, then being in advanced math actually set me up to learn more, but understand less, about mathematical concepts.

Being in advanced math also damaged my grade point average. The only class in junior high or high school I ever got a B in was an advanced math class in tenth grade. After that B, I took a step off the advanced math track and adjusted my classes so that I would finish Calculus I in high school, not Calculus II. At the end of my senior year, I refused to take the AP math test, not feeling at all confident that I could score well or that I should be skipping calculus in college. I was sure, in fact, that the AP test would be the thing that finally revealed I was a fraud—that I didn't belong in advanced math and didn't deserve the grades I was getting in my math classes.

I am not suggesting, of course, that girls should not be encouraged to take advanced math classes. Not all girls are perfectionists like I was or place as much importance on grades as I did, but some are and many do, and I think this is still a point that needs to be addressed when thinking about mathematics education. Girls need to know that they can be good at math even if it isn't their best subject and even if others are better. Being good at math doesn't mean always getting As. Putting students into different levels of math (or "tracking" them) has always been controversial, generally because of the presumed disadvantage of those in the lower levels. But it is important to reflect on how it might also unintentionally affect a girl's "math-esteem" in a negative way. Pushing girls to take advanced math classes needs to be coupled with listening to their concerns, giving them opportunities to take risks that don't impact their grades, and teaching them how to evaluate success differently.

What I note from my experience in elementary and secondary school is that Title IX provided opportunities to play sports and to take advanced math classes. In this sense, Title IX and my experiences as a young feminist were very much aligned.

### *Majoring in Mathematics in College (1987–91)*

Although I clearly struggled in advanced math, had doubts about my abilities, and even opted off the fastest math track, I didn't give up or quit math. This was at least in part because I was aware it was something girls weren't supposed to be good at, and that because I could do math I should do it. Doing advanced math fit well with my tendency to defy gender norms and do what girls weren't supposed to do. Of course, even if it was somewhat of a confidence killer, it was also a status symbol among my peers and teachers, and the struggles were often balanced with praise for being in advanced math.

Doing math also fit well with my career goals. In ninth grade (1983–84) I took a career aptitude test in English class, which I believe told me I was suited to be, among many other things, a garbage collector or a teacher. Although this was also the time I told my friends I wanted to be president (likely following my successful run as minority whip in our government class), I focused my paper for English on plans to be a teacher and a coach. When I consulted my father on the issue, he told me that if I wanted to be a teacher I should teach math because schools needed math teachers and especially female math teachers. His point was well taken for several reasons. First, he was the director of personnel for our school district, so he would actually know this information. And second, I had zero female math teachers in junior high, and would only have one in high school and none in college.<sup>1</sup> So, my father's advice suggested that I could both be what I wanted and advance the cause of women by being a math teacher.



I went to a small college in Iowa where I majored in mathematics. I wish I could report that I enjoyed the experience of majoring in math, but I can't. I was relieved to not be in "advanced math" anymore and glad to be starting afresh in Calculus I. But there were certainly new disadvantages and obstacles in college. In high school I counted a great deal on friends, mainly other girls in my class, to work on homework or ask for help when I didn't understand the teacher. In my small college, however, there was only one other female math major and, because she was older, she was only in a few of my upper-division math classes. That math was still very much a "boys' club" might not have been a big deal, but the dorms on my campus were sex-segregated. So, whereas the guys could meet easily with each other to do homework in their study lounges or rooms, I could not do so readily. To join their homework sessions, I had to first ask, then go to their dorm, call up, and sign in, and one of them had to come get me. Or, they had to leave the comfort of their normal study areas and come do homework with me in the main lounge (where there were lots of people coming and going) or in the library. I wasn't really comfortable bothering the men in my classes in this way, especially the guys who were good at math, so the only study sessions I really had were with those that wanted my help.

Adding to this, my primary math professor was very religious, and I knew he had left his congregation in protest when it started officially ordaining women into the ministry sometime after 1985. I went to his office for help, but I certainly didn't hang out and talk with him before and after class, or during his office hours, like many of the male math majors. So, being a math major in college became a fairly lonely endeavor, and I depended heavily on learning on my own from examples in books. When independent learning didn't work well, my grades again suffered. In fact, I repeated Calculus III because I got a C in it the first time. I left college with a 3.7 GPA, with most of my lower grades coming from math classes.

During this time, I took a great deal of solace and was greatly inspired by a book I found doing research for my History of Mathematics class. *Women in Mathematics* by Lynn M. Osen (1974) described the lives and works of important female mathematicians such as Hypatia (AD 370–415), who was stripped, beaten, dismembered and burned to death by a Christian mob in part for her propensity to wear men's clothes and inhabit men's intellectual and physical spaces; Sophie Germain (1776–1831), who overcame her parents' opposition and women's exclusion from studying at École polytechnique, and taught herself differential calculus; and Amalie Noether (1882–1935), to whom much of modern algebraic theory can be traced. Osen (1974) described the obstacles to acquiring any education many women faced and the additional obstacles they faced doing mathematics:

In almost any age, it has taken a passionate determination, as well as a certain insouciance, for a female to circumvent the crippling prohibitions against education for women, particularly in a field that is considered to be a male province. In mathematics, the wonder is not that so few have attained proficiency in the field, but that so many have overcome the obstacles to doing so. (163)

I wrote an essay based on this book, called "Running Twice as Fast to Get Just as Far: An Overview of *Women in Mathematics* by Lynn M. Osen." My male professor gave me full credit for the essay, but made no comment whatsoever on my thesis or the content of the paper. My own conclusion was that I should be grateful I didn't have to study in secrecy, use pseudonyms for my work, or fear for my life just because I was studying math, and that I should take advantage of the opportunity I had to study mathematics in college despite the apparent indifference and possible opposition of my professors.

I struggled through and survived my math classes, shedding many tears along the way. Being a female mathematics major during this period of transition, fifteen years after Title IX, was still difficult and lonely. However, it was somewhat balanced by the opportunities provided by a liberal arts education at a small

school, opportunities ensured by Title IX. I loved playing softball and volleyball at the college level, and this allowed me to maintain important connections to other women. Even though there was no women's studies department at my school, I found feminism in my Literature by Women class, where I read feminist writers such as Adrienne Rich and Toni Morrison. Some friends and I started a Women's Club and ran our meeting using a consciousness-raising book published by the National Organization for Women that was given to us by a professor.

In college, then, feminism and the feminist consciousness I was formally developing were compatible with and helped support my pursuit of mathematics. Sports and feminism balanced out the isolation I faced in the math department and helped me graduate happy and confident that I could make a difference in the world by teaching math and coaching girls' sports.

### *Teaching Seventh-Grade Mathematics (1992–97)*

I was a seventh-grade math teacher at a middle school in Colorado from 1992 to 1997, during a time when there was a particular push to reduce gender bias and encourage girls' interest in math and science. As educators, we became much more aware of both overt and more subtle gender bias that girls were facing in the classroom, not only in math but more generally. For example, more and more schools were facing lawsuits based on Title IX for allowing sexual harassment to disrupt the educational environment of girls, and I was one of the teachers who rewrote the sexual harassment policy for our school in response to those suits.

In 1994, Myra and David Sadker released the book *Failing at Fairness: How America's Schools Cheat Girls*. The Sadkers, education professors at American University in Washington, DC, noted that girls begin school equal to or ahead of boys on most standardized tests but that by high school they score lower than boys on SAT and ACT exams, with the biggest gender gaps occurring in math and science. They connected girls' relative loss of achievement to their loss of self-esteem and explained this loss as a result of classroom climates. They argued that boys get a "lion's share of teachers' time and attention" (Sadker and Sadker 1994, 4). Boys, they found, called out in class eight times more than girls and got more useful feedback from teachers. Teachers (regardless of gender) were more likely to do a problem for a girl that asked for help and more likely to help a boy do it himself. I did notice this tendency in myself because I assumed that girls would pay better attention and be able to replicate what I showed them. I also noticed that, being generally shy myself, I was reluctant to call on shy girls because I didn't want to make them uncomfortable. This, of course, was exactly the Sadkers' point: that schools were failing girls because they were failing to engage them in the classroom as much as boys.

This type of research fueled an interest in girls' educational needs across our school district. Teachers attended trainings on diversity and gender bias. We adjusted our teaching practices, set up special projects or opportunities aimed at involving girls in math and science, and even engaged students directly in discussions about gender bias in the classroom. I attended one training, for example, on identifying students for the Talented and Gifted (TAG) program. In this training, it was noted that girls were less likely to be identified for TAG programs because gender norms may keep them from being regarded as needing TAG services. The argument was that girls who are bored in class will not call attention to themselves in the same way that boys might. As a result, we were encouraged to do things like provide self-referral opportunities to help improve our identification of girls and boys for TAG services.

I took girls to the "Expanding Your Horizons in Math, Science and Technology Conference for Girls" at the University of Colorado, where they could learn more about jobs they might get if they took math and

science in college. While the girls learned about math and science careers and participated in hands-on demonstrations, teachers and parents attended sessions on financial aid and on how to encourage girls to pursue math and science. We received a packet that included handouts for teachers (“Tips for Teaching Girls” and “Characteristics of Classrooms Where Girls Succeed in Math and Science”) and for parents (“Encouraging Your Daughter in Mathematics and Science,” “Doing Science with Your Children,” and “Family Math”). These programs taught teachers to change pedagogical practices and use strategies such as group problem solving where there was less emphasis on competition and more on social interaction. During this time, I did the best I could to encourage all students to enjoy math and understand how useful math training would be later in life.

This part of my career was one of the most personally rewarding times for me, as my job as a math teacher was in perfect alignment with my feminist consciousness, and I felt my struggles to stay in mathematics were making a difference. The educational climate in the school district encouraged action against gender inequality in education. The trainings and teaching activities described above fueled a desire to learn more about gender and about feminism. I decided to take some sociology and women’s studies courses at night and in the summer. I loved these courses and applied to graduate schools in sociology and women’s studies. My new goal in life was to become a professor of women’s studies. So, after five years of teaching math and coaching high school girls’ sports, I took a leave of absence and returned to graduate school in 1997.

#### *Graduate School (1997–2004)*

I applied to two programs in women’s or feminist studies and three programs in sociology. Perhaps because as a math major I had very little formal training in women’s studies (two classes only), I didn’t get into a women’s studies or feminist studies program. I did get into two sociology programs and chose to go to the University of Colorado because they had a concentration in gender studies. Although deciding to study gender from a sociological perspective might have taken me away from math and science, my background in mathematics ended up being very influential on the direction of my training and dissertation research.

My first year at CU I met my first female mentor in mathematics. Jane Menken is a renowned demographer and was a pioneer in the area of biostatistics in the 1960s and 70s. I volunteered to help her with her undergraduate class on women, development, and fertility, and she later asked me to become her research assistant, because (as she tells it) my first-year statistics teacher suggested I was near the top of the class. Through Jane, I became interested in international women’s issues, particularly the relationship of reproduction to women’s status. This was, of course, a time when enthusiasm for international research on gender and women’s empowerment was fueled by feminist international activism and global policy conferences such as the 1995 United Nations Fourth World Conference on Women in Beijing. My association with Jane within this environment led me to focus my training in part on quantitative methods geared towards answering demographic questions about the relationship between women’s empowerment and health in rural Bangladesh.

During graduate school, I was also fortunate in that the Women’s Studies department at CU began offering a graduate certificate that provided training in feminist theory and methods. This training taught me to question quantitative research—its subjects, its questions, its presumed objectivity, and therefore also its findings. Coupled with theoretical training in sociology, my feminist training transformed my concern with getting girls to do math to getting everyone to do math (or, more accurately, quantitative research) differently. This meant including women in research both as researchers and as subjects, formulating different questions or examining the bias within questions, and incorporating various techniques to answer questions appropriately.

I did the best I could to apply what I learned through feminist methods to my work on women's empowerment in Bangladesh. I felt I was in a good position to do feminist research on the issue because the data I was using had a whole battery of direct questions on women's empowerment, which was unusual for that time. Furthermore, the questions were based on previous qualitative research done only three years before the survey. This qualitative research used women's narratives about their interactions with family and in the community, participant observation, and interviews with key informants to identify six domains of empowerment that were described by women as important to their everyday interactions (Sense of Self and Vision of the Future; Mobility and Visibility; Economic Security; Decision-Making Power in the Household; Interacting Effectively in the Public Sphere; Participation in Non-Family Groups). So, through the survey I had quantitative data that could be used to measure women's level of power in the areas of life that women themselves defined as important.

Jane and I decided it was best to construct measures of empowerment using a process called confirmatory factor analysis. Unlike other methods for constructing scales, confirmatory factor analysis uses a hypothesis-testing approach that let me "interact" with the data. I would specify a relationship between the various questions across the dimensions and a relationship between the dimensions. Confirmatory factor analysis would tell me how well the covariance structure of the data (the patterns of answers) fit the hypothesized relationships, and I could adjust the model to improve the fit. This technique, I thought, was "more feminist" than other techniques because it allowed the data structure (women's answers) to drive the model development. It also allowed me to test the theory that women's empowerment was multidimensional and that the dimensions were interrelated.

After I presented my first paper on this research to my methods classes, both of my feminist methods professors told me there was "just something wrong" with my project. It sounds like amazingly vague feedback as I recount it here, but as a feminist I got it. Feminist reactions often come at the gut level—and they range from a vague discomfort to a blinding rage. In my experience, the blinding rage comes most often when the offense to feminist sensibilities is either most blatant or most hidden and difficult to articulate. It is these moments of discomfort that make being feminist in academia difficult; however, finding a resolution to them is key to maintaining sanity as a feminist in academia.

I did understand, therefore, the idea that something was missing from my project and I worked hard to figure out what it was. I took extra classes, studying postcolonial and transnational feminist theory and looking for ways to address the Western bias inherent in my quantitative analysis of a survey in Bangladesh. The result was a poststructuralist analysis of the international development discourse on women's empowerment, where I traced the circulation of "women's empowerment," showing both its roots in radical (non-Western) and liberal (Western) feminist theory and its recent co-optation by the development industry. I argued that accurate measurement of women's empowerment was necessary to maintain its radical functioning, but particularly that gender equality needed to be conceptualized and measured with other forms of inequality such as race, class, ethnicity, and nationality. Otherwise, "women's empowerment" serves as a liberationist discourse that masks other forms of domination, especially postcolonial domination enacted through the development industry of the global North over the global South. I also argued that unless women's empowerment was treated as intrinsically important and therefore as a dependent variable in demographic models, the discourse of empowerment would maintain this position (Williams 2004).

In my dissertation, I first built the epistemological foundation for what I called "feminist demography" in order to generate intellectual space for feminist demographic research on women's empowerment. I then attended to the politics of location, mainly through the discourse analysis discussed above. I reconceptualized

women's empowerment to include an understanding of gender as socially constructed and context-specific. After testing the qualitative hypothesis and finding that empowerment was in fact multidimensional, and building scales to measure each dimension, I analyzed the determinants of empowerment to show that it was related to, but not the same as, women's status or women's household socioeconomic status.

My background in mathematics, facilitated by Title IX and combined with subsequent training in feminism, helped me produce a dissertation on women's empowerment that I felt was truly feminist. My dissertation incorporated what some call dual-vision or "double(d) science," which is "both complicit with and a critique of its methodology" (Langsdorf 2009, 197). Even though it took extra time and effort, my work satisfied my own feminist ethics and my intellectual curiosity; it was interdisciplinary and it advanced the knowledge about women's empowerment.

My dissertation wasn't, however, well suited for publication. At my dissertation defense, when I asked my committee for suggestions on where or how to publish my work, there was marked silence. One member suggested that I could write a demographic article for demographers and a separate article for feminist journals, but no one could think of a place to publish where I could keep the integration of feminism and demography intact. There was a suggestion that I could turn it into a book, but coupled with an acknowledgment that one should always publish an article or two first. Although I had a great interdisciplinary committee, I came away from my defense feeling frustrated and confused about what exactly to do with my research.

Attending graduate school in the late 1990s and early 2000s, then, meant being trained at a time when the global feminist movement had mounted a significant challenge to Western development discourses in part by challenging the epistemological underpinning of science, including quantitative social science. The global academic and development community was responding to and co-opting feminist discourses through a seemingly serious commitment to redressing important gender inequalities throughout the world. In this context, I had blended demographic and feminist epistemologies and methodologies within my dissertation only to find myself without a forum to share the work, and therefore without a clear way forward in my research. This intellectual conundrum demonstrates the surprising tension in the academy between feminism and the push to encourage girls to do math. Although the recent acceptance of mixed-methods work and continued growth of interdisciplinary studies have provided reason to be optimistic, in my own experience the overall failure to fully develop feminist quantitative social science has remained a serious obstacle to my work and advancement.

#### *Post-Doctoral Fellowship (2004–present)*

After graduate school, I began a post-doctoral fellowship at the University of Colorado, funded by the William and Flora Hewlett Foundation working to improve demographic training in Africa. I spent a year on the ground in South Africa, teaching and contributing to the establishment of a new program in population studies and demography at the University of the Witwatersrand in Johannesburg. This work was very appealing to me because the apartheid government had discouraged quantitative social sciences. South Africa, in fact, provides a salient example of how the lack of numeracy can be as devastating as the lack of literacy, and how populations that lack numeracy are deprived of an important tool for documenting oppression and inequality. My post-doctoral work has again tapped into the mathematical skills I acquired due to Title IX. This work has been very meaningful to me because it helps train African scholars to be able to measure and redress the damage done by apartheid policies; to quantify the astounding impact of the HIV/AIDS epidemic; and to find effective ways to combat disease and poverty.

During my post-doc in South Africa, I did complete a qualitative research project (Williams 2008). But my efforts to do feminist demography since graduating have generally been stymied by several issues, which include a lack of publishing options for my dissertation and the realization that my research on women's empowerment was still not acceptable to feminist scholars because of its quantitative nature. I did try to publish work from my dissertation in the field of demography, but I was rejected (in part) for presenting results that were not generalizable to other contexts.

This, in fact, is a major obstacle to work on gender in demography. Demographers are wed to comparative analysis, and surveys are expected to measure women's empowerment in uniform ways so that results can be compared across contexts. This is in direct contradiction to feminist theory, which has concentrated on showing how gender is culturally constructed and has prioritized contextual specificity and local knowledge. I have, therefore, found myself between a rock and a hard place—unable to publish in demography because my work defines gender as context-specific and unlikely to be able to publish in feminist journals because of their strong critiques of quantitative research (Hughes and Cohen 2010; Williams 2006).

Still, it didn't really occur to me that quantitative research on women's empowerment might never be acceptable to women's studies departments until I went on the job market in 2007. When I didn't get interviewed for a job in a women's studies department, I asked for feedback and advice on my application. A very kind professor on the search committee wrote me the following e-mail:

My sense re. women/gender studies programs is that there is a tendency to be more interested in qualitative research and fieldwork (vs. stats/surveys). So keeping in mind that search committees read through cvs and cover letters quickly in making their first cuts, I would suggest that you not forefront the discussion of the demographic aspects of your work but rather discuss it after you emphasize the feminist theory/fem epistemology/discourse analysis aspects. Also highlight your on-the-ground experiences (eg. fieldwork) in various regions of the world... Keep in mind that WMST/WGST committees are interdisciplinary, and people from the humanities especially are sometimes alienated from the stats/demographics.

This is not harsh feedback in any sense of the word and is probably something I should have expected by that point, but I was devastated. I can only liken my reaction to what my almost two-year-old son does when he doesn't understand why I'm telling him "no"—for example, why it is fine to throw a ball to people but not to throw a rock at the dog. He immediately plops down on his bottom and covers his head with his hands as if it hurts. His face turns beet-red while he holds his breath and pushes out his lower lip. The first sounds that finally escape are like the howls of an injured animal. He will then settle in to a good cry with crocodile tears that convey a deep sense of confusion and betrayal. My son moves from tantrum to acceptance in a matter of moments; however, my own process of recovery has been much slower. In fact, it took writing the first draft of this paper almost a year later to realize that the tantrum came from the little girl within that wanted to be able to do boy things and did some of them, such as math, because my mother couldn't, Title IX enabled it, and feminism encouraged it. The e-mail seemed to suggest that simply being a quantitative researcher meant I was likely to be tossed out in the first round by search committees and that I should in fact hide the quantitative nature of my work. After all I have gone through to be trained in mathematics and develop feminist demography, I did not want to be told, even nicely, to hide it.

I have recovered from my tantrum and accepted that women's studies as a discipline cannot be all things to everyone and every feminist scholar cannot be a professor of women's studies. In fact, a majority of feminist scholars still reside in other disciplinary homes. What I remain concerned with is feminism's lack of engagement with quantitative research. Hughes and Cohen (2010) suggest in their editorial, "Feminists Really Do Count: The Complexity of Feminist Methodologies," that feminist scholars in primarily

quantitative fields have enacted a certain “practical pragmatism” whereby they “have negotiated their own compromises between disciplinary norms and practices and the feminist critical project,” but that there has been “little public discussion or methodological consideration of how this has occurred” (191). I agree that we need to reveal and examine the many compromises feminists make in their home disciplines and their consequences for knowledge production. In demography, I know these compromises often require muting our criticisms and altering our research agendas.

I would add to Hughes and Cohen’s statement that although some work has reflected on the issue, not enough has been done to prepare graduate students or young faculty for the psychological impact of those compromises. I’ve written elsewhere about some of the epistemological and methodological barriers to doing feminist demography (Williams 2010), but there are also institutional and psychological barriers to be overcome. Along these lines, I have begun to pay more attention to my own experience as a feminist within a demographic setting. In my day-to-day functioning inside a population program, surrounded by demographers from various disciplines, I retain many of my mathematical insecurities and have continued to learn the hard way how much extra work it takes to address feminist epistemological concerns. It is not only an extra step that my colleagues do not have to take; feminist theory shifts the whole research process, making it, in my mind, more complex and challenging to accomplish.

While my colleagues are blissfully unaware and unaffected by the vast amount of knowledge about feminist theory and epistemology that they lack, I face a continuous cycle of self-doubt, of always having to defend my own work and to articulate and even reformulate feminist critiques of other work. After more than ten years of struggling to do feminist demography, I question whether it can be done within current institutional structures. While my colleagues remain secure in their idea of “truth,” my feminist consciousness can be debilitating and stall productivity. Feminism compounds those worries about being a mathematical fraud in the first place with additional theoretical, methodological, and ethical critiques. When these issues are combined with a lack of feminist community, such psychological barriers are very difficult to overcome.

### **The State of Feminist Quantitative Social Science Research**

Emily Martin made it look easy. If one considers the typical curriculum for feminist methods classes, there is always a plethora of examples of feminist interventions into other disciplines, such as Martin’s 1991 “The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles.” These interventions go beyond feminist empiricism to demonstrate the masculine bias embedded in research and knowledge. These interventions are the bedrock of feminist studies; they open our students’ minds to alternate ways of seeing and knowing and illuminate inequalities that were previously shrouded by science.

Looking back, it is easy to see how I came away from my feminist training with the idea that feminist interventions into disciplines much like demography were the most laudable form of feminist work. In my heart, I believed that even if demography never accepted or published my work, I would have a home in feminist studies. Instead, I find myself in a similar situation as my mom in the early 1980s, wondering if anyone wants to hire a middle-aged feminist demographer with a limited amount of publications.

There is certainly much more at stake here than one person’s or a generation of women’s career paths. My own lack of publications could just be a personal failure. But there is evidence of an institutional bias in overtly feminist journals against quantitative work. Cohen, Hughes, and Lampard (2011) analyzed methodological patterns of articles published in nineteen journals in “gender, women’s studies, feminist, and

other women-oriented journals” in 2007. Their findings were that although 51% of articles used some form of quantitative methods, articles with explicit “feminist self-positioning” as the methodological justification were overwhelmingly qualitative. This is further recognition of the difficulty of using feminist methodology and epistemology to motivate quantitative work and publish successfully. Quantitative work may focus on women but not with a truly feminist underpinning. This type of quantitative work does little to resolve the epistemological tensions between feminism and positivism and encourages quantitative work on women that is devoid of feminist methodology. This creates an illusion of moving forward in our development of feminist quantitative social science. As Cohen, Hughes, and Lampard (2011) point out, there is “relatively little overt evidence of the methodological influences of feminism ... even within feminist studies journals” (576).

These findings, along with my own experience, suggest we need to reignite a discussion of feminist methodology. Feminists have successfully transformed quantitative research, but only to a point. They have challenged the notion of the objective observer, exposed the masculine bias of past quantitative research, and ensured that women are included as subjects of research and that results from studies of men are not generalized to women. Title IX has helped ensure that women get training in math and science, so that more women can be the ones asking the questions, designing the studies, and collecting and analyzing the data. This in and of itself is revolutionary.

But feminists seem to have won the battle and abandoned the war. Just as a generation of girls (like myself) growing up under Title IX and fighting their way through math and science programs finished college and entered graduate school, the postmodern turn in feminism took hold. And it was suddenly not in vogue for feminists to do quantitative research. Individual women have been left to fight on their own, in sometimes hostile disciplines, for feminist causes. In my dissertation, I proudly wrote that while postmodern theorists dismantle objectivity, feminists also constructed new grounds for building and assessing knowledge through such concepts as strong reflexivity. Instead, the last ten to fifteen years suggest that feminism has deconstructed “science” and reconstructed it as a qualitative endeavor. We have become complicit with the idea, for example, that methods themselves are neutral, rather than continuing to analyze ways in which they may not be. As a result, we have, in fact, left quantitative social sciences only partially transformed by feminist critiques, and disciplines such as demography therefore remain relatively unaffected by feminist theory.

Even though feminism has disengaged from numbers, they still hold power in our society and to most, including policymakers, represent objective knowledge. To ensure that the feminist challenge to objectivity endures we must reengage with quantitative research. We must train feminists in social statistics so that they can ask the difficult questions such as, Are certain statistical techniques more feminist? What is the best way to quantitatively measure gender or changes in women’s power? And we must recognize that, as in the past, our best chance of working out these answers is in collaboration with each other, so we must create rather than discourage communities of feminist quantitative researchers. Feminists fought hard to institute and maintain Title IX, and at this historical juncture it is important to remember that we have girls out there, good at math and science but not interested in technical careers. Like Title IX did for us, we can create a whole new world of possibility for girls if we give them a chance to apply mathematics and statistics to something intrinsically rewarding in their women’s studies classes—to social problems identified by feminist theory as important.



## Concluding Thoughts

Recently I've observed that in demography, forty years after Title IX, the pendulum is starting to swing from critiques of demography back towards questions about feminism and the lack of feminist training in quantitative research methods. Feminist scholars in demography, who have worked hard to try to transform demographic work, are starting to question the absence of concern and support from women's studies departments (see, for example, Desai, Greenhalgh, and Riley 2007). Their arguments are often pragmatic. It is hard to see the wealth of resources in disciplines like demography and not suggest that women's studies programs would benefit from some of them. It is hard to watch researchers without feminist training do research on women and without concern for its impact on women or on feminism. But these arguments go beyond pragmatism as well (Hughes and Cohen 2010).

What I hope to have shown by sharing my own experience of growing up with Title IX is that questioning of the exclusion of quantification in feminism is a cry for help and a plea for community. We want an opportunity to create new coalitions within feminism and to work under the umbrella of women's and gender studies departments. Yes, we know that new coalitions will be uncomfortable, as Bernice Johnson Reagan (1983) and others have pointed out, but they are bound to produce knowledge not possible otherwise. In another staple of the feminist curriculum, "The Master's Tools Will Never Dismantle the Master's House," Audre Lorde (1984) wrote:

Difference must be not merely tolerated, but seen as a fund of necessary polarities between which our creativity can spark like a dialectic. Only then does the necessity for interdependency become unthreatening. Only within that interdependency of *different strengths*, acknowledged and equal, can the power to seek new ways of being in the world generate, as well as the courage and sustenance to act where there are no charters. (111; emphasis added)

Title IX can surely only be considered a resounding success. Because of it, girls and women have had access to disciplines previously identified as strictly masculine endeavors. Access to these fields means we have the personnel, tools, and training to renew our challenge to objectivity and to further develop feminist quantitative social science research. We simply have to figure out how to create the intellectual space in the academy to further utilize our different strengths as feminists.

## Notes

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1. Women are still less likely to teach mathematics and science than other subjects in K–12 schools. According to the National Center for Education Statistics' Schools and Staffing Survey, in 2003–2004 women constituted 75.6% of all elementary and secondary school teachers, but only 60.8% of science and math teachers (Institute of Education Sciences 2008).

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