

## **Reconciling the tension between the tenure and biological clocks to increase the recruitment and retention of women in academia**

Catherine D. Clark and Janeen M. Hill

Catherine D. Clark, Chapman University, Associate Dean, School of Earth and Environmental Sciences, Schmid College of Science

Janeen M. Hill, Chapman University, Senior Associate Dean, Schmid College of Science

### **Abstract**

Most women entering tenure-track positions in the sciences do so in their late twenties or early thirties after completing a graduate degree and post-doctoral training. Tenure-track positions usually span a six or seven year probationary period during which time institutions expect unlimited commitment from the tenure-track candidates to their work. Most tenure-track candidates are overwhelmed by this onerous expectation, but research shows that women are particularly affected by this expectation. Women tend to shoulder more family responsibilities than men especially if women are members of a family unit with at least one child, and women, who aspire to have children, are faced with the difficult decision to bear children and potentially compromise tenure or to delay child-bearing until tenure is achieved and face age-related risk factors associated with maternal and fetal outcomes.

Previous research has shown that women in tenure-track positions in science disciplines at research-intensive (R-1) institutions are more likely to acquire tenure if they are unmarried and/or are childless than their married peers with children, thus, the issues of family responsibilities and child-bearing have real consequences for women in science. The purpose of our study is to determine if these issues have consequences for women in academic science at masters-level institutions, which require tenure-track faculty to develop a productive research agenda as well as demonstrate excellence in teaching. We discuss the implications such consequences will have on the future of women in science in the United States unless universities grapple seriously with an environment that may unintentionally force women to choose between an academic career in science or marriage and motherhood.

### **Introduction**

Most entry-level, tenure-track science positions require the completion of a PhD and one or more years of post-doctoral training. Women and men are beginning their academic careers in their late twenties to mid-thirties and then facing an additional six to seven years probationary period before acquiring tenure. The average age for receiving a PhD is 33 and many professors do not secure tenure before they are 40. Research Intensive institutions expect probationary faculty to develop robust research agendas that are well-funded and to produce several high-quality, highly-regarded research papers. Masters level institutions expect probationary faculty to develop research agendas that are funded, to publish some high-quality research papers, each year to teach several classes that employ current pedagogy and engage students, and to mentor students through research and advising.

Regardless of the institutional type, institutional expectations for tenure require an unlimited commitment from faculty to their research or their research and teaching. Such a commitment is difficult for women who tend to shoulder more familial responsibilities than men

and for women who aspire to have children. Child-bearing is an especially critical issue. First, a decision to postpone child bearing to the post-tenure years (mid- to late-30's) increases age-related risks for infertility, pregnancy complications, and adverse outcomes (Luke and Brown 2007). Second, a decision to bear children during tenure years may compromise a positive tenure outcome, in light of the finding that unmarried and/or childless women are more likely to acquire tenure at research intensive institutions than married peers with children (Committee on Maximizing the Potential of Women in Academic Science and Engineering 2007).

Given the issues associated with child-bearing during the probationary period, tenure-track women may gamble with tenure to begin a family before they reach 35 years, gamble with pregnancy outcomes to maximize the chances for a positive tenure decision, or decide to forego motherhood altogether. A recent survey of faculty at nine campuses (PhD-granting, R-1 institutions) in the University of California state system revealed that women were more than twice as likely as men to have fewer children than desired (Mason and Goulden 2004), a finding that suggests women were paying a family price to pursue tenure and promotion. We were interested in determining if tenure and promotion expectations at masters' level institutions were compelling women, in science disciplines, to make similar choices regarding tenure, promotion, and family as women at research intensive institutions. If so, were choices between unlimited commitment to the pursuit of tenure and promotion and between shared commitments to family and career important contributors to the disproportionately small number of women holding tenured positions in science disciplines at masters level institutions?

### **Historical Trends and Recent Data**

Women have traditionally been under-represented in science disciplines, but the past 50 years has witnessed a growth in the number of women interested in and seeking careers in science. Of interest to us was the steady increase in the proportion of women doctoral recipients during this time period because doctoral recipients comprise the available pool of candidates for academic appointments. Also of interest was the increase in the proportion of academic appointments held by women because these appointments comprise the pool of tenured professors for promotion. For example, in 1958, five percent of doctoral recipients in life sciences, mathematics, physical science, and computer science were women compared to 2006 in which 52 percent of life science, 30percent of mathematics, 29 percent of physical science, and 20 percent of computer science PhDs were earned by women (Burelli 2008). Furthermore, a comparison of the net growth in PhDs earned by US citizens and permanent residents from 1989 to 2007 showed that the percentage of recipients who were women increased by 17 percent whereas the actual number of male recipients did not change i.e. their overall percentage share decreased (Burelli 2008; National Science Foundation, Division of Science Resource Statistics 2007). Additionally, in 1978, only 10 percent of academic science positions at four-year colleges and universities were held by women, but in 2006, 41 percent of postdoctoral, 39 percent of adjunct, and 31 percent of teaching and research positions at these colleges and universities were held by women

(National Science Foundation Division of Science Resource Statistics 2006). Finally, in 2006, the overall proportion of women in full-time tenure-track and tenured academic science positions equaled the proportion of women receiving PhDs in science disciplines, and women with recent doctorates represented 42 percent of the tenured/tenure track academic workforce (National Science Foundation Division of Science Resource Statistics 2006). It is apparent that more and more women are preparing for academic careers in science by pursuing and obtaining doctoral degrees, and that more and more of these women are finding tenure-track positions in university science departments.

This growth in the number of women obtaining PhDs in science disciplines and in the number of women hired as tenure-track faculty is counterbalanced by the more sobering retention numbers. Wilson reported that prestige of school was related to tenure and promotion with the more prestigious schools having fewer women holding tenured faculty positions and advancing women through faculty ranks more slowly than less prestigious schools (Wilson 2001). Similarly, the proportion of women faculty seemed to vary by institution with women comprising 48 percent of two-year college faculty, 38 percent of baccalaureate college faculty, and 28 percent of research intensive university faculty (Wilson 2004). Finally, regardless of institutional type, men were more likely than women to become tenured and to achieve the academic rank of full-professor (Wolfinger, Mason and Goulden 2008).

### **Family Formation Impacts on Retention of Women in Academia**

Interplay of multiple factors may explain the attrition of women from the academic career pipeline due in large part to negative tenure and promotion decisions. Factors reported in the literature include isolation, marginalization, subtle biases, fewer qualified candidates, and lack of mobility due to family commitments (Winkler 2000; De Wet, Ashely, and Kegel 2002). However, marital status and children are primary factors, whether actual or perceived that work against successful pursuit of tenure and promotion of women in science disciplines (Winkler 2000).

Wolfinger et al. attributed the low number of women professors to the inflexible nature of the academic workplace, configured around a male career model established in the 19<sup>th</sup> Century that does not support work and family (Wolfinger, Mason, and Goulden 2008). A recent National Science Foundation study concluded that women's share of faculty positions in science disciplines was negatively influenced by marital status and the presence of children in the home, as women were a lower percentage of full-time full professors with children and a lower percentage of married full-time professors than of all full-time professors in 2006 (Burelli 2008). This conclusion was reinforced by Mason's findings that women who have children within five years of earning a PhD were less likely to have tenure than men or women who delayed or forsook childbirth, and that men, whose wives have children within five years of earning a PhD, were 38 percent more likely to receive tenure than a woman having a child in this time frame (Mason and Goulden 2002). This conclusion was reinforced by the data showing that women academics were more likely than their male colleagues to remain single and childless or to have

fewer children (Perna 2005) and the data showing that 33 percent of women who took fast-track university positions before having children never have children (Mason and Goulden 2004).

In addition to the data that suggest marital status and motherhood have negative effects on a woman's successful pursuit of tenure and promotion, the perception exists among women in science that marriage and children are not compatible with positive tenure and promotion outcomes. Armenti concluded from interviews of 19 women in academia that women believed child-bearing and rearing prior to a tenure decision were subtle messages to male colleagues that they were not serious about their careers. Women also reported that child-bearing and rearing resulted in a lower publication rate and was overall detrimental to their career progression (Armenti 2004). O'Laughlin and Bischoff reported from their survey of 264 academics (n=85 male, n=179 women) that women felt more academic and family stress than men and less institutional support to balance work and family than men (O'Laughlin and Bischoff 2005). This effect continued beyond the tenure process to the next promotional step to full professor; many female associate professors who were raising families had their careers stall due to decreased research and writing productivity (Wilson 2001).

### **Effects of Institutional Type on Tenure and Promotion**

To determine if tenure, promotion, and retention of women in science differ by type of institution, we compared the faculty composition of science disciplines (biology, chemistry/biochemistry, computer science, mathematics, and physics) at three different types of institutions, a research intensive institution rated in the top 50 in the United States, three masters granting comprehensive universities each rated in the top 10 in the western region by US News and World Report, and one liberal arts, undergraduate college. We selected these five schools because they were in geographic proximity to each other; thereby, excluding the effects of lifestyle, cost-of-living, and cultural differences on our findings. We examined the tenure and promotion criteria to determine what institutions required of their faculty to become tenured and promoted. We determined average teaching load. Finally, we included only full-time tenured, tenure-track, and non-tenure-track (full-time) faculty in our data.

Not surprisingly, the R-1 institution's tenure and promotion criteria placed heavy emphasis on research with research accomplishments not teaching being the primary basis for promotion and tenure. On average, the faculty at these R-1 institutions was expected to teach three courses per year. The tenure and promotion criteria at three masters' level institutions emphasize excellence in three areas, teaching, research, and service, with the research excellence defined as research published in high-caliber journals and contributing to the knowledge base of the discipline. The average teaching load at these masters' level schools ranged from 6 to 7 courses per year. The liberal arts college's tenure and promotion criteria required excellence and effective teaching, research activity, and service. The average teaching load was 6 courses per year.

Table 1 displays the number and percentage of science faculty by gender and academic rank for each type of institution in our study. Overall, these numbers are in reasonable agreement with average statistics nationally. The impact of the lawsuit UC women faculty

brought in 1999 (Wilson 2004) to address low hiring rates of women appears to have had a real impact on the recruitment and hiring of female faculty here as there are almost as many women assistants at UCI as at the primarily teaching school. This is in sharp contrast to two other major research 1 top 50 schools in Southern California, CalTech and UCLA, where women make up 31 percent and 24 percent of current assistant professors in the science disciplines examined. At all schools, there was attrition through the promotional ranks so retention of women was a problem. However, at the primarily teaching school, the percentage of associates was essentially the same as the percentage of assistants suggesting no significant attrition. In 7 to 10 years, the percentage of full professors may well equal 50 percent.

Interestingly, although Wilson reported that fewer women are in tenured faculty positions and women advance more slowly at doctoral granting schools (Wilson 2004), we found the same distribution of female faculty at tenured associate and full professor ranks at the masters' level regional schools as at the R-1 top 50 school. This suggested that master's level comprehensive schools that have a high teaching load with a relatively high research expectation produced similar issues with the retention of women in academia, even though their absolute research expectation was much lower than at a top 50 primarily research school.

Table 1. Summary of institutional data by type of school, faculty rank and gender.

<i>Faculty rank</i>	<i>Gender</i>	<i>Research I institution</i>	<i>Masters Comprehensive</i>	<i>Teaching Oriented</i>
% Full	Male	84 (n=141)	83 (n=42)	77 (n=14)
	Female	16 (n=26)	17 (n=9)	23 (n=4)
% Associates	Male	72 (n=38)	75 (n=30)	50 (n=3)
	Female	28 (n=15)	25 (n=10)	50 (n=3)
% Assistants	Male	57 (n=33)	71 (n=22)	64 (n=7)
	Female	43 (n=25)	29 (n=9)	46 (n=4)
% Instructors	Male	68 (n=13)	48 (n=12)	50 (n=5)
	Female	32 (n=6)	52 (n=13)	50 (n=5)

These preliminary data supported our expectation that retention of women in academic science at masters' level institutions mimicked that of their retention at research intensive institutions. Our next step is to design and administer a survey to faculty at these institutions to assess both male and female faculty perceptions of balancing work and family, level and causes of job stress, perceived support for family by administrators and colleagues, and other factors that affect family formation choices. We are interested to see how these responses vary from R-1 to the liberal arts primarily teaching institutions to test directly the widely held hypothesis that women preferentially select and remain in academic careers at schools they perceive to have fewer research expectations because they believe these will be more family friendly environments. In

contrast, the data we list above indicate that lower research expectations alone may not be enough given other stressors like teaching loads. We plan to follow the format of the recent UC system faculty work and family survey to allow for more detailed comparisons between these different types of schools (Mason, Stacy, and Goulden 2003).

### **Potential solutions: the mommy tenure track and other family-friendly policies**

Achieving gender equity in terms of both career and family in academia will require a restructuring of the workplace and the introduction, support and implementation of several family-friendly initiatives. Suggested changes to the university environment have included improved parental leave plans (Wilson 2004), reduced teaching loads for new parents (Mason and Goulden 2004), altered or delayed tenure clocks (the “mommy tenure track”) (Draznin 2004), and affordable and accessible on-site day-care including emergency back-up child care programs and establishment of school break child care and summer camps (Mason and Goulden 2004). However, at many institutions, these changes have already been implemented, and many faculty choose not to take advantage of these opportunities due to concern over colleagues’ perceptions and the pressure to publish (Bhattacharjee 2004). Another recent study showed that using institutional leaves and/or delayed tenure clocks had no statistically significant relationship with the attainment of tenure (Quinn 2010) but that the faculty who received extensions did have higher rates of attrition. This was consistent with the anecdotal evidence given by many women faculty with children who opt out prior to tenure decisions due to stress balancing work and family obligations (Fogg 2003; Williams 2000). Although new and aspiring parents are still better-off with these types of policies in place, until tenure and promotion guidelines that promote and retain only those with a single focus on career are changed, women will continue to be faced with difficult decisions about career and family. The resultant limited representation of women in academia is a problem because disciplines need to have a variety of viewpoints and approaches to be successful. Wilson quotes a department chair about this problem, who stated that “If our faculties become small subsets of the population, in terms of personality and the way you approach science, we really have limited our ability to be creative” (Wilson 2004). Mason and Goulden noted that achieving gender equity in terms of careers and families in the academy will require a major restructuring of the workplace, including the retraining and buy-in of administrators at all levels (Mason and Goulden 2004). Such a fundamental institutional change will only occur when data begin to show that limiting the access of women to careers in academic science negatively impacts institutional success and the progress of science.

### **Conclusions**

Women who pursue careers in academic science are less successful than their male peers. One important reason lies in the dual role, scientist and mother/wife, many women play. Women who seek to play this dual role are less likely to be retained and promoted than unmarried, childless women or male peers. To date, the most significant data examining the impact of

family on retention and promotion of women in science disciplines pertain to research intensive institutions. Our goal is to determine if the findings from research intensive institutions extend to masters level comprehensive universities. At first glance, the proportion of women in science disciplines at each academic rank is almost identical to the proportion of women in science at research intensive institutions. This suggests that even though tenure and promotion criteria at master's level institutions are different, the requirement that up-and-coming faculty must demonstrate a singular commitment to an institution in order to be retained and promoted may be the same with similar consequences. Our next step, then, is to survey faculty at master's level institutions to determine if they are facing the same tensions between family and career.

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