

AC 2010-1074: AN INTEGRATED APPROACH TO CHOOSING TECHNICAL CAREERS

Joan Barth, University of Alabama

Beth Todd, University of Alabama

Dee Goldston, University of Alabama

R.E. Guadagno, University of Alabama

An Integrated Approach to Choosing Technical Careers: Gender Differences in Life Goals for College Students

Abstract

Life goals include values and lifestyle choices related to work, marriage, family, and making a positive impact on society. Recent research suggests that men and women differ in the importance they place on these goals, and this might partially explain why capable women fall away from science, technology, engineering and mathematics (STEM) careers at rates relatively higher than men. This paper presents an empirical study that examines gender differences in life goals for first year college students in STEM courses. When asked to rate the importance of different life goals, there were few differences between men and women. However, when students were asked to choose their *most important* life goal, women more often chose "helping other people." The most commonly selected life goal for both men and women was to have a "happy marriage and family life." Implications for educators are discussed.

Introduction

The debate on the causes of the gender gap in engineering and other math-science intensive occupations has been ongoing for at least three decades. Explanatory mechanisms have included biological, educational, and socialization factors. Although biological explanations are pervasive, reviews consistently show that such gender differences alone are not sufficient to explain differences in occupation choices.² School experiences, especially enrollment in math and science classes, are important determinants of women's college major and career choices. In the last decade there has been an increase in female students taking college preparatory math and science courses. Yet, at entrance to college these science and math career-ready women do not enroll as majors in engineering, computer science, math, and science at a rate proportional to their numbers.¹¹ The exception is in biology and medical fields where women have been well represented in recent years.¹² A recent review of the factors that contribute to the gender gap concluded that lifestyle choices, career preferences, and social pressures primarily account for the under-representation of women in science, technology, engineering and mathematics (STEM) occupations.²

In this paper we focus on lifestyle choices and values in the form of life goals. Life goals include goals and values related to work (e.g., satisfaction, making money), but also those related to marriage, family, and social impact (helping others, making a difference in the world). Ferriman, Lubinski, and Benbow⁴ note that this is one of the least studied areas in this field, yet it may account for some of the most pervasive gender differences observed in STEM occupations.

The most often studied life goals are family related goals: marriage and having children. It has been proposed that career development may be more complex for girls than boys because they must consider family and work roles to a greater degree.³ Some theorists have proposed that career choices by girls and women are the rational consequence of a decision making process that attempts to maximize earning potential while allowing for time to have children and raise families.⁵ Consistent with this perspective, Farmer et al.³ found that high school-aged girls were less likely to choose science and engineering careers because they saw the extended years of education needed for these occupations as competing with marriage and having children. Young women are reported

to be wary of choosing science as a career because of what they perceive as the “superwoman” role required to balance a science career with having a family.^{7,9,13} Indeed, a great deal of evidence suggests that in *all* professional careers the decision to have children and the timing of starting a family are powerful predictors of women’s career success.^{2,5} In young adulthood gender differences in retention and career status are often attributed to the value placed on having children and the impact that raising children imposes on women.^{2,4} However, not all research supports the idea that men and women differ in their value of marriage and family. Ferriman et al.⁴ studied the life and work values of promising math and science graduate students at age 25 when most were in graduate school, and then again ten years later. They observed that at age 25 the men and women in their study agreed on the importance of having children, the availability of leisure time outside of work and making a contribution toward the “greater good” of society. However, ten years later, women with children placed greater value in having flexible schedules. Valuing a flexible work schedule relates to a second life goal that we investigated, which is work satisfaction.

Work satisfaction has many components, but two of the chief characteristics are career success (e.g., promotions, acknowledgement in the chosen field) and making money. Generally speaking men and women who enter into science fields are often reported as having higher career aspirations as young adults than others.³ However, many researchers have concluded that men are more focused on succeeding at work than women.^{2,4,5} In the Ferriman et al.⁴ study men placed more value on career success and money, while women placed more value on maintaining relationships with friends and family and giving back to the community. These differences were stable over a ten year time period. Lubinski, Benbow, Shea, Eftekhari-Sanjani, and Halvorson⁸ found that more women compared to men see the option of holding a part time job at some point in their lives as important. Hakim⁵ summarizes many of the research findings by stating that on average men and women differ in “work orientation and labour market behavior,” and “these differences are linked to broader differences in life goals and the relative importance of competitiveness versus consensus seeking values and the relative importance of family life and careers.”

One aspect of work that has received special attention is its social impact, or how work might benefit or help others. Many young women hold life-goals that include helping other people or benefiting society, and their perceptions of STEM careers might not encompass these goals. Gender differences in choosing and preferring occupations that help others are evident in pre-adolescent children.^{1,6} For example, in the Bandura et al. study¹ of 11 to 15 year old children, he reported that girls expressed higher efficacy for occupations in education, health and social service fields compared to boys. VanLeuvan¹³ cites evidence that women are attracted to science fields when they are associated with helping people. In support of this notion, girls who continue in science often express a desire to use their knowledge in socially relevant ways⁶, and women tend to enter scientific fields with a focus on helping people, rather than doing pure research.¹⁰ Gender differences in the desire to help others emerge before children enter high school. Jones et al.⁶ found that 30% of boys, but only 14% of girls, believed that science helps others. One reason women more often choose careers in the biological-medical area may be that it is more readily apparent to them that these fields provide a social benefit by helping people who are sick or researching the causes of disease.¹³

Rationale for the Current Study

The research reviewed suggests that gender differences in life goals in three broad areas could account for career choices and retention in STEM careers. Generally, this research implies that girls and women attach greater importance than do boys and men to life goals related to having a family and benefiting society. Boys and men on the other hand attach greater importance to succeeding in their careers.

A problem with this research is that it has not systematically considered how life goals and values might change at different points in career development. The exception is the work by Ferriman et al.,⁴ but this study focused on 25 to 35 year-old adults. Similarly, the most strident claims about the derailing effects of child rearing for women's careers^{2,5} have focused on women after they have left college and entered (and dropped away from) the workforce. Although there is a clear need to address these issues for young women, for educators looking to increase the numbers of women in STEM areas, there needs to be a clearer understanding of life goal factors at earlier stages of development.

In this paper we focus on life goals during a particularly critical time period, the first year in college. During the first year of college, students are pressured to formally identify an academic focus and career path. First year students are more likely than other college students to change majors and career paths. Similar to many of the seminal works in this area, we targeted students who had already shown an academic aptitude and interest in STEM by virtue of their placement and enrollment in math, engineering and science courses required for majoring in these areas. These students are likely to have the science and math background that would allow them to pursue a major in engineering, computer science, mathematics, chemistry, and other STEM areas. Consequently, it is important to not only look at gender differences in life goals, but to examine how the selection of a future career is also related to life goals. Because biology and medical careers have shown greater gender equity¹² and are reported to be viewed as the "more caring branch of science,"⁶ we make comparisons between students pursuing these careers and those in other areas of engineering, science, and math. Finally, we examine if there are changes during the first year of college in students' perception of the importance of different life goals.

Method

Our research design was a short-term longitudinal study of college students enrolled in entry level courses designed for majors in Engineering, Chemistry, Geology, Physics, Computer Science or Mathematics (although not all students had selected a major in one of these fields). The first data collection time point was at the start of the fall term and the second was approximately 8 months later at the end of the spring term of that same academic year. Two surveys were completed at each time point. The *Math, Science and Technology* (MST) survey consisted of close-ended rating scale items about attitudes, beliefs, abilities and experiences in STEM courses and careers. In this report we focus on a subset of the questions that concern life goals related to career, family/marriage, and social impact (helping others). The other survey, *Factors in Career Decision Making* (FCD) consisted of several measures that explored factors that might influence career choices including science and math abilities, stereotypes, and life goals. The measures related to life goals are incorporated into this paper. Each measure will be described in detail as the findings are presented.

Students were approached on the first day of class in the fall term after instructors provided a short course introduction and reviewed the syllabus. Over 1000 students participated in the first *Math, Science and Technology* (MST) survey. From this sample a second group of 187 students (88 female) were recruited from those who expressed an interest in completing a second questionnaire (FCD) for \$20. In recruiting this smaller sample we targeted first year students and attempted to include approximately 50% women. Because we wanted to solicit information from students before they had much STEM class experience, we stopped recruiting students three weeks into the fall term. Approximately one month prior to the end of the spring term, we re-contacted the 187 students and asked if they would again complete the two questionnaires for a payment of \$20. Of the original sample, 146 (78%) were still enrolled and agreed to participate. To make up for the first semester attrition, additional students were recruited at the end of the spring semester who had only completed the MST at the beginning of the year. To summarize, we report on a total of 239 students (121 female) who completed the first time point MST and at least one FCD. Of these students, 187 had fall semester FCD data (88 female) and 200 (103 female) had spring semester data (both MST and FCD). There were 146 students with complete data across both time points. It should be noted that the sample sizes for the analyses below vary slightly due to students' failure to complete some items on the questionnaires.

Results

Analyses examined differences between men and women, STEM and non-STEM majors, and changes over time. The significance level for all statistical tests was set at $p < .05$.

Importance of Life Goals: Gender and Future Career Differences

At each time point on the MST survey, students were asked to rate the importance of 10 life goals for their future from 1, "not very important," to 5, "very important." Table 1 presents the mean ratings and standard deviations for these goals for men and women at each time point. Examining the means in Table 1 revealed that nearly all of the life goals were rated on average above a 4. Exceptions were "have lots of money" and "be a leader in my community" for males (spring term only). Furthermore, with the exception of "have children" and men's ratings for "helping people" (spring term only), the remaining goals were all rated on average 4.5 or greater. This suggests that the men and women in our college sample appear to want success in all facets of life. Repeated measures ANOVA were performed for each goal to assess gender differences or changes over time in students' mean ratings. For each of the goals except "helping people," there was a significant effect for time point indicating that ratings generally dropped over the academic year. For two of these goals, "get a job" and "graduate from college" the drop was greater for men than for women, resulting in lower ratings for men than women at the end of the spring term for these goals.

Table 1

Means and Standard Deviations for Life Goal Ratings at Each Time Point

Life Goal: In the future how important is it for you to....	Beginning of Fall Term		End of Spring Term	
	Female N = 99	Male N = 90	Female N = 99	Male N = 90
1. Have a good career ¹	4.93 (.457)	4.91 (.286)	4.89 (.316)	4.72 (.779)
2. Find the right person to marry ¹	4.77 (.697)	4.79 (.679)	4.73 (.806)	4.58 (1.005)
3. Have children ¹	4.29 (1.118)	4.40 (1.074)	4.28 (1.152)	4.17 (1.254)
4. Have lots of money ¹	3.74 (1.121)	3.87 (1.153)	3.63 (.996)	3.61 (1.206)
5. Make a difference in the world by helping people	4.58 (.686)	4.47 (.902)	4.54 (.540)	4.28 (1.039)
6. Get a job ^{1,2}	4.90 (.484)	4.93 (.292)	4.91 (.322)	4.77 (.720)
7. Graduate from college ^{1,2}	4.96 (.402)	4.91 (.356)	4.96 (.198)	4.73 (.761)
8. Leisure time to enjoy my own interests ¹	4.71 (.610)	4.72 (.561)	4.60 (.638)	4.52 (.851)
9. Be successful in my line of work ¹	4.89 (.471)	4.86 (.354)	4.73 (.531)	4.62 (.773)
10. Be a leader in my community ¹	4.24 (.858)	4.09 (.944)	4.01 (.974)	3.80 (1.093)

Note. Goals were rated on a five-point scale, 1=Not very important, 5= Very important. Standard deviations are in parentheses.

¹ Significant difference for time point

² Significant time point X gender interaction

Additional analyses examined if students' planning for different careers rated the importance of life goals differently. At the second time point students wrote down their expected future career. These open-ended responses were coded into three categories: STEM (e.g., computer science,

mathematics, engineering, chemistry, and other non-biological sciences), Biology/Medical (e.g., physician, nurses, physical therapists, biologists), and Other (e.g., business, social sciences). The decision to not include Biology/Medical with the other STEM careers was based on the research reviewed earlier that suggests that women in Biology/Medical fields may differ in some life goals compared to those in other STEM fields. An ANOVA was conducted to assess differences in goal ratings for male and female students with different career choices at each time point. There were no differences in the fall term goal ratings. For the spring term there were no significant effects for gender, but there were several significant effects ($p < .05$) for career choice (Table 2). These differences were primarily explained by the “other” career category being lower than STEM and/or Biology/Medical. The exception was that the students expecting a future career in the Biology/Medical areas had higher ratings for “helping people” than those choosing STEM and Other occupations.

Table 2
Significantly Different Mean Goal Ratings for Career Choices at Time 2--End of Spring Term

Goal	Career Choice		
	STEM N = 74	Biology/ Medical N = 59	Other N = 67
1. Have a good career ¹	4.88 (.329)	4.90 (.305)	4.67 (.877)
2. Make a difference in the world by helping people ²	4.27 (.708)	4.71 (.559)	4.30 (1.015)
3. Get a job ¹	4.93 (.253)	4.95 (.222)	4.66 (.845)
4. Graduate from college ¹	4.89 (.391)	4.93 (.254)	4.70 (.835)
5. Be successful in my line of work ¹	4.76 (.491)	4.81 (.434)	4.46 (.876)

Note. Ratings range from 1= not very important to 5 = very important. Standard deviations are in parentheses.

¹ STEM is significantly higher than Other

² STEM is significantly lower than Biology/Medical

To summarize, both male and female students viewed the importance of most life goals similarly. The high ratings across both the fall and spring terms suggest that students seemed to “want it all.” Such high ratings for all goals may in part be due to first year college students’ place in the developmental time course of choosing a future career. Nearly all of the students were single, without children, and not living on their own. The significant drop in ratings over time suggests that some adjustment was occurring in students’ life goals. Notably, men more than women

lowered their ratings on the importance of getting a job and graduating from college. Nevertheless, men's ratings were still quite high for these life goals. Future career choice had a greater impact than gender on ratings, although only at the end of the academic year. Students anticipating a future STEM or Biology/Medical career were more similar than different in their ratings. These students had higher ratings for goals related to education and future work suggesting that they might have higher career aspirations than others, supporting previous research findings.³ The one difference that emerged between STEM and Biology/Medical was for "make a difference in the world by helping people," which is consistent with previous research findings. However, this prosocial goal was held in equally high regard by women and men. Interestingly, three of the goals, getting married, having children, and helping others, have often been used to explain the gender gap in STEM, and our findings suggest that this may not hold for students entering into a major. A criticism of this conclusion is that although both genders desire to achieve these goals, women may be more likely to believe that having children and getting married should occur at an earlier time point in the life course than men. We next examined this issue.

Timing of Life Goals: Gender and Future Career Differences

At the second time point only, students were asked to indicate when they expected to achieve or experience five different life events: marry, finish college, have a first child, live on your own, and start a career. They were given 13 possible responses: Each year from age 16 to age 24; three age spans, 25-29; 30-35; and 36 or older; and an option of indicating that the event was not a goal. If the student had already experienced an event (e.g., getting married) he or she was asked to indicate the age at which the event happened. Due to the low percentage of students choosing some age categories we combined ages into four ranges for our analyses: 22 or younger, 23-24; 25-29 and 30 and older. Chi square analyses revealed only one significant effect for gender: Women indicated that they would live on their own at an earlier age than men. Because the life goals of marriage and children are so often offered as explanations for the gender gap in STEM careers, we present more detailed information on these goals below in Table 3. Most women and men believe that they will get married after age 22 and have their first child between 25 and 29 years. We also examined if the timing of marriage and having children differed for men and women with different career choices (Table 3). Again we found no significant differences among the different careers or between men and women within a future career.

Taken together with the life goal rating results, the information presented on timing of life goals presents a consistent picture of men and women at entrance to college having very similar life goal priorities. Furthermore, they expect to experience many significant life events at about the same time in their lives. It is important to remember that our data captures students' thought processes at a particularly early point in their college experience. Gender and career choice differences may emerge over time, especially as the end of college approaches.

One criticism of the approach we have used thus far is that rating scales may not be sensitive to actual differences in students' life goals. Our approach is very similar to those used with older students⁴ and so differences in our findings compared to other researchers cannot be attributed to differences in methodology. Nevertheless we attempted to develop a measure that might better capture gender differences by asking students to identify one "most important" life goal.

Table 3
Anticipated Age for Marriage and First Child

Life Goal/ Age	All Students		Career Choice					
			STEM		Biology/ Medical		Other	
	Females N = 98 %	Males N = 90 %	Females N = 33 %	Males N = 38 %	Females N = 25 %	Males N = 17 %	Females N = 40 %	Males N = 35 %
<i>Marriage</i>								
22 or less	12.2	8.9	12.1	7.9	12.5	5.9	12.0	11.4
23 - 24	31.6	35.6	39.4	28.9	30.0	35.3	24.0	42.9
25-29	52.0	50.0	48.5	60.5	55.0	52.9	52.0	37.1
30 or older	4.1	5.6	0	2.6	2.5	5.9	12.0	8.6
<i>First child</i>								
22 or less	1.0	0	0	0	2.5	0	0	0
23 - 24	4.2	4.5	6.2	5.6	5.0	5.9	0	2.9
25-29	75.0	71.6	87.5	72.2	70.0	64.7	66.7	74.3
30 or older	19.8	23.9	6.2	22.2	22.5	29.4	33.3	22.9

“Most Important” Life Goals: Gender and Future Career Differences

At the end of the spring term students were asked to select which of four life goals was “most important” to them. In describing the life goals to students, we clustered together several of the individual life goals presented earlier because responses among the clustered items were highly correlated. The five life goals were: a) “have a good career and be successful in my line of work,” b) “have a happy marriage and family life with lots of time for leisure activities,” c) “make a difference in the world by helping people,” and d) “make a lot of money.” Table 4 presents the percentage of men and women selecting each goal overall and within each of the career choice categories. Examining the percentages in the table indicated that marriage-family-leisure was most often selected as the “most important” goal, with the exception of females anticipating “other” careers. Chi Square analyses were conducted to assess gender or career differences. Due to the low percentage of students selecting “make money,” this goal was not included in the analyses. Regardless of career choice, men and women differed in their selection of “most important” life goal: Men more often selected “marriage-family-leisure” goals as “most important” (53.6%) than did women (37.9%); Women more often selected “helping people” (32%) than did men (16.5%).

Women and men selecting STEM careers differed from those choosing Biology/Medical careers by more often selecting “good career” and less often selecting “helping people.”

Table 4
Percentage of Students Selecting Important Goals: Gender and Career Choice

Most Important Goal	All Students		Career Choice					
			STEM		Biology/ Medical		Other	
	Females N = 103 %	Males N = 97 %	Females N = 35 %	Males N = 39 %	Females N = 41 %	Males N = 18 %	Females N = 27 %	Males N = 40 %
Good career	28.2	27.8	37.1	38.5	17.1	5.6	33.3	27.5
Marriage, family, leisure	37.9	53.6	40.0	46.2	41.5	66.7	29.6	55.0
Helping people	32.0	16.5	22.9	10.3	41.5	27.8	29.6	17.5
Make money	1.9	2.1	0	5.1	0	0	7.4	0

Note. Numbers are percentage of students within a major selecting each goal.

To summarize, when men and women were forced to select one life goal as “most important,” gender differences were apparent where they had not been earlier. For all students, the most commonly selected “most important” goal was “have a happy marriage and family life with lots of time for leisure activities.” Surprisingly, men selected this goal more often than did women. On the other hand, it has often been suggested that women are more interested in helping others than men, and these results support this claim. However, the endorsement of “helping others” varied by future career choice: Those choosing a career in the Biology/Medical area most often selected “helping” as “most important.” Similar to other research findings,³ students favoring a career in STEM more often rated career success as a top priority than those anticipating careers in other areas.

Conclusions

Previous research on life goals and values has characterized gender differences in STEM career paths as being chiefly due to differences in three life goal factors: women’s desire to raise a family, the greater value that women place on social impact goals, and the greater importance men give to career goals. Our findings lend only mixed support for these broad claims.

When asked to simply rate the importance of different life goals, we saw few differences between men and women. On average, first year college students rated nearly all of the life goals presented highly except for having lots of money. Overall, students anticipating a future career in STEM and biology/medicine were more similar than different. We did support the previous research findings that students planning a career in biology or medicine placed higher value on “making a difference in the world by helping people” compared to other STEM career oriented students. The decrease in ratings over the academic year suggests that the importance of different life goals may shift as time passes. The greater drop for men than women in some goals may further signal that additional gender differences might emerge over the course of college.

Students’ selection of their “most important” life goal showed greater sensitivity to differences related to gender and anticipated careers. The most surprising findings were for the importance of the marriage-children-leisure time goal. This was the most commonly chosen life goal for both male and female students. STEM and biology/medical career students did not differ in the rates at which they chose this goal as “most important.” However, a completely unanticipated finding was that more men than women chose this as a top goal. Although previous research has sometimes found that men and women do not differ in their value of family life and children⁴, we are unaware of other research findings in which men placed a higher value on these goals than women. It is possible that our inclusion of “leisure time” in this goal contributed to this difference. Nevertheless, our findings suggest that it would be erroneous to assume that family-leisure time values and goals are primarily a women’s concern.

The “most important goal” analyses did replicate some previous findings in that more women than men selected “making a difference in the world” as their top goal. Furthermore, women anticipating careers in biology/medicine chose this at greater rates than all other students.

This study examined life goals at a particular point in career development, at entrance to college. An emphasis on this time period is warranted because the first year in college is a time at which students make major decisions about their career paths. The degree to which our findings differ from other researchers may be due to our selection of this age group. Our research makes a methodological contribution by showing that different measurement techniques (ratings vs. rankings of goals) might yield different results.

Educational implications

How can these findings help college educators encourage students to pursue STEM careers? Our results suggest that most students place a high value on a wide range of life goals. At entrance to college students may not feel the need to choose among different life goals, but that may change as they mature. An implication of our findings is that educators need to take a broad approach in discussing family, social impact, and work related values with students entering STEM majors. Interestingly, compared to other life goals, monetary values were rated relatively low, suggesting that it may be less important to emphasize this aspect of STEM careers.

Our results support the observations of other researchers that many young women place a high value on helping others. Nearly a third of the women in our sample listed this as their top goal. If an objective were to encourage women initially heading into biology/medical careers to reconsider

other STEM fields, it might be beneficial to show how Engineering and other non-biology sciences provide benefits to individuals and society. Elaborating on the prosocial use of science by illustrating the people-helping and society-advancing aspects of science and technology might encourage more girls to consider scientific career goals.^{10,14}

Future Research

Life goal factors have been identified as key contributors in retaining men and women in STEM careers. It will be critical for future research to take a more systematic approach in assessing life goals over the lifespan. Our sample consisted of students enrolled in courses that could potentially lead to a major and career in STEM, and consequently gender differences (or lack thereof) may not generalize to other college samples. Nevertheless, the overall similarity that we find between men and women in their life goals suggests that gender differences noted by others might emerge as students move closer to entering the workforce. Future research that compares the life goals of college students who fall away from STEM majors to those who stay in the field will help educators better understand how to promote STEM majors and careers.

References

1. Bandura, A., Barbaranelli, C., Caprara, G.V., & Pastorelli, C. (2001). Self-efficacy beliefs as shapers of children's aspirations and career trajectories. *Child Development, 72*, 187-206.
2. Ceci, S.J., Williams, W.M., & Burnett, S.M. (2009). Women's underrepresentation in science: Sociocultural and biological considerations. *Psychological Bulletin, 135*, 218-261.
3. Farmer, H.S., Wardrop, J.L., & Rotella, S.C. (1999). Antecedent factors differentiating women and men in science/nonscience careers. *Psychology of Women Quarterly, 23*, 763-780.
4. Ferriman, K., Lubinski, D., & Benbow, C.P. (2009). Work preferences, life values, and personal views of top math/science graduate students and the profoundly gifted: Developmental changes and gender difference during emerging adulthood and parenthood. *Journal of Personality and Social Psychology, 97*, 517-532.
5. Hakim, C. (2006). Women, careers, and work-life preferences. *British Journal of Guidance and Counseling, 34*, 279-294.
6. Jones, M.G., Howe, A., & Rua, M.J. (2000). Gender differences in students' experiences, interests, and attitudes toward science and scientists. *Science Education, 84*, 180-192.
7. Kubanek, A., & Waller, M. (1995). Career and family for women scientists. *Journal of College Science Teaching, 25*, 126-133.
8. Lubinski, D., Benbow, C.P., Shea, D.L., Eftekhari-Sanjani, H., & Halvorson, M.B.J (2001). Men and women show promise for scientific excellence: Similarity not dissimilarity. *Psychological Bulletin, 127*, 309-317.
9. Miller, A., & Silver, C. B. (1992). The limits of intervention: Lesson from Eureka, a program to retain students in science and mathematics related majors. *Initiatives, 55*, 21-29. Cited in VanLeuvan (2004).
10. National Council for Research on Women. (2001). *Balancing the equation: Where are women & girls in science, engineering & technology?* New York.
11. National Research Council. (2006). *To recruit and advance: Women students and faculty in science and engineering.* Washington DC: National Academy Press.
12. National Science Foundation, Division of Science Resources Statistics, *Special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 1998-2007.*
13. VanLeuvan, P. (2004). Young women's science/mathematics career goals from seventh grade to high school graduation. *Journal of Educational Research, 97*, 248-267.
14. Yanowitz, K.L. (2004). Do scientists help people? Beliefs about scientists and the influence of prosocial context on girls' attitudes towards physics. *Journal of Women and Minorities in Science and Engineering, 10*, 393-399.

Acknowledgements

This research was supported by a grant from the Gender and Science Education program of the National Science Foundation.