Academic Self-Perceptions and Performance of Gifted Female Science/Engineering Undergraduates

Samantha Farro, MS, David MacPhee, PhD , Sadie Conrad, BS, Silvia Canetto, PhD, Colorado State University

Colorado State University

Knowledge to Go Places

Abstract

This study examined high-achieving, undergraduate students from underrepresented populations majoring in science or engineering upon entrance (Time 1) and graduation (Time 2) of the McNair Mentorship Program. We investigated students' self-perceived academic skills, science and math skills, creativity, and academic preparedness compared to objective measures of students' academic performance. The findings of this study indicate that females and males are similar in regard to academic performance; however, at Time 1 females were significantly more likely to have lower perceived ability than males in several domains. By graduation from the McNair Program, females' self-perceptions had increased to be on par with male peers. This suggests a positive influence of the McNair Mentorship Program specifically on women's perceived efficacy in science and engineering. Analyses also indicated that double minority status students had lower self perceptions and performance, particularly for perceived test-taking skills and on standardized tests.

Introduction

➢A predicted shortage of scientists and engineers has prompted concerns regarding the U.S.'s ability to meet future technological demands and remain competitive in a global market (Atkinson, 1990). Underrepresented populations in science represent one solution for ameliorating such shortages (NSF, 1999).

➢Women are still notably underrepresented in fields of science and engineering, despite recent gains in overall educational attainment (Babco & Bell, 2004).

➢Women's scientific talents and contributions are a conspicuous and untapped resource for the U.S. (Xie & Shauman, 2003) and so it is crucial to examine barriers that impede the entrance and persistence of women in science and engineering.

➢One potential barrier is the gender stereotype in U.S. culture that science and engineering are masculine fields (Eccles, 1994). This stereotype may undermine women's self-perceptions of efficacy in these fields, and ultimately contribute to the continued gender disparities.

Purpose

In this study, we examined self-perceived ability and actual performance of high-achieving undergraduate students from underrepresented populations majoring in science or engineering. The impact of the mentorship intervention program was also assessed.

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Method

➢Participants: McNair students from 1995 and 2006 at a large Western university (*N*=177); 61% female, 61% ethnic minorities, 80% 1st generation, and 81% low income.

➢Data were collected upon entrance (Time 1) and graduation (Time 2) of the program.

➢Measures of self-perceptions included the What I Am Like scale (WIAL; Harter, 1992) and self-reported ratings of skills. Measures of participants' ability and academic performance were assessed using scores on practice GRE tests, cumulative GPA, and with the administration of the Watson-Glaser Critical Thinking Appraisal (WGCTA; Watson & Glaser, 1994).

Results

➢ One tailed *t*-tests indicate that female students were significantly more likely to have lower self perceptions of their Academic Skills, Test Taking Skills, and Creativity levels than their male counterparts.

➢Two tailed *t*-tests found no gender differences on measures of critical thinking, the GRE, or in cumulative GPA.

➢ Results of a repeated measures ANOVA indicated that women's self-perceived Academic Skills increased significantly (by .6 *SDs)* over time, while their male peers' scores remained stable.

➢Significant differences were also found on perceptions of Test Taking Skills and the GRE practice test such that ethnic minority, low-SES students were lower than White, low-SES students. Critical Thinking measures showed significant differences between both groups and the ethnic minority, high-SES students.

Discussion

➢Consistent with past studies, the current study suggests that women and men are similar in their academic skills, yet differ in their self-perceived abilities in science and engineering.

➢These results focus our attention on females' lower confidence in their academic skills as an impediment to achieving gender equity in these fields.

➢The increase in females' self-perceived ability at Time 2 supports the efficacy of mentoring programs in helping females overcome this barrier.

➢Results also suggest that multiple risk factors such as ethnic minority status and low family income have an impact on students' self perceptions and performance.

Limitations

➢All participants in the current study were enrolled in the McNair Mentorship Program. The lack of a comparison limits causal inferences about program effects.

➢For a number of measures, missing data was problematic, ranging from 61 – 81%. Also, missingness was related to gender at Time 1 and to first generation status at Time 2.

➢Because of these limitation, the current study is offered as exploratory research, and results should be interpreted with caution.

*Contact Dr. Silvia Canetto for further information on this project at Silvia.Canetto@Colostate.Edu.