Gaps in STEM emerge early in undergraduate education. Only about 15% of women and 33% of men begin their baccalaureate education with the intent to major in STEM fields (Sax, et al., 2005). Minority student choice of some STEM has increased, however the percentage of undergraduate engineering students who are white has remained at 70% for more than a decade (National Science Foundation, 2007). While the gender gap in math course taking and math and graduation has nearly closed, and females earn more high school credits than males in high school math and science courses (Where the Girls Are, 2008), men continue to outscore women on standardized tests of math achievement (Freeman, 2004) and low-income African American males are the least likely to complete the math courses necessary for STEM majors (Hill, 2000).

The underrepresentation of women and minorities in STEM is a complex challenge. Thus, many ways are needed to investigate gender and racial-ethnic differences in STEM students’ access and success. Broadly, this study examines the experience of first-year students in STEM. First, we explore gender and racial-ethnic differences in academic preparation, perception of difficulty, and educational expectations among students intending to major in STEM. Second, we use a longitudinal design to explore the influence of entering students’ expectations and beliefs, on their first-year engagement. We also examine the influence of these factors for students in STEM by gender, and then focus on women, by comparing women who started out in STEM and stayed to those who left at the end of their first year.

Research questions
1. For students entering college intending to major in a STEM field, do factors related with high school courses, SAT scores, and students expected first-year experiences (expected academic engagement, academic persistence, academic difficulty, academic preparation, importance of campus environment) differ by gender and race-ethnicity?
2. For those students who reported a STEM major at the end of their first year in college, what influence do the factors listed in #1 have on their engagement in educational opportunities outside of the classroom in the first year and does this differ by gender and race-ethnicity?
3. Finally, do these factors have a different influence on engagement for women who started out in STEM and stayed compared to women who started out in STEM and left STEM at the end of the first year?

First-year student engagement and STEM: Gender & racial-ethnic differences

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Method (continued)

Research Question 1
Students entering college intending a STEM major differ by gender & race-ethnicity on several pre-college measures (Tables 1-4). Females earned higher grades and were more engaged than males, while males earned higher SAT scores. Females expected to be more engaged, to persevere during difficult circumstances, and were confident in their ability more than males. Notably, females attach greater importance to supportive structures in the campus environment. For race-ethnicity, Asian students reported highest scores for HS grades & SAT scores, and Black/African Amer. reported the lowest. For HS academic engagement, Black/African Amer. students reported the lowest levels. Table 4 shows Black/African Amer. students had highest mean age for expected academic engagement, academic persistence, academic preparation, importance of campus environment, and contrastingly, the lowest expected academic difficulty.

Table 4. Adjusted mean score by ethnicity

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. Acad. Perseverance</td>
<td>6.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Exp. Acad. Engagement</td>
<td>6.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Exp. Difficulty</td>
<td>6.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Exp. Prep. for College</td>
<td>7.0</td>
<td>0.92</td>
</tr>
<tr>
<td>Imp. of Campus Env.</td>
<td>7.6</td>
<td>2.01</td>
</tr>
</tbody>
</table>

Discussion
Expanding the representation of women & students of color in STEM is critical to graduate STEM students at equal on key preregistration factors. There is a same-sex parent educ. positive effect on engagement of both female & male STEM majors. Perhaps, students are more likely to talk to their parent of the same sex to get ideas about how to be engaged in college. The most noteworthy gender difference was the influence of expected academic difficulty. Female STEM students may not get involved in educational activities because of a fear that they can only devote time to focused individual study. If females and Latinas, in particular, are more affected by perceptions of how their education needs to be done, and organize activities that alleviate this stress or facilitate female students involved in supportive practices that they value.

References
