Rethinking the STEM Fields: The Importance of Definitions in Examining Women's Participation and Success in the Sciences

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Final Defense
Educational Policy Studies
Purpose of the Study

- Connection between social stratification, higher education and major field of choice
- Research undergraduate students’ choice of and persistence in majors to better understand participation in STEM
- Investigates women’s participation in STEM fields at 5 public, land-grant universities
Major Field Categories

- Physical Science, Computer Science, Math, and Engineering (PSCSME)
- Health Sciences and Psychology (HSP)
- Agricultural and Biological Sciences (ABS)
- Non-Science and Engineering (Non-STEM)
## Research Questions & Methodology

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Data

- Mellon Foundation’s *Public University Database*
- 5 public, land-grant universities
- First-time, full-time, domestic freshman who began college in Fall 1999 and completed a bachelor’s degree within 6 years (n=16,850)
- Information is examined on an academic year-basis
- Variables
  - Socio-demographic information
  - Academic preparation
  - College information
  - Financial Aid information (for FAFSA filers)
# Profile of Undergraduates

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<tr>
<td><strong>Male</strong></td>
<td>50.8%</td>
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<tr>
<td><strong>Female</strong></td>
<td>49.2%</td>
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<tr>
<td><strong>Asian</strong></td>
<td>5.9%</td>
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<tr>
<td><strong>Black</strong></td>
<td>4.1%</td>
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<tr>
<td><strong>Hispanic</strong></td>
<td>2.4%</td>
</tr>
<tr>
<td><strong>Native American, Other, Unknown</strong></td>
<td>1.5%</td>
</tr>
<tr>
<td><strong>White</strong></td>
<td>86%</td>
</tr>
<tr>
<td><strong>Out-of-State</strong></td>
<td>34.3%</td>
</tr>
<tr>
<td><strong>In-State</strong></td>
<td>65.7%</td>
</tr>
<tr>
<td><strong>Average SAT Math</strong></td>
<td>603</td>
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<tr>
<td><strong>Average SAT Verbal</strong></td>
<td>579</td>
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<tr>
<td><strong>Average SAT Total</strong></td>
<td>1181</td>
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Persistence in Major

- PSCSME- Men out-persisted women
- ABS and HSP- Women out-persisted men
- Asian women persisted at higher rates in PSCSME
- Black women have lowest levels of persistence in PSCSME and ABS
- Hispanic women persisted at the same rate as white women in PSCSME and ABS, and a higher rates than Asian and Black women in ABS
Switching Majors

- PSCSME
- ABS
- HSP
- Non-STEM

Legend:
- Orange arrows: Men
- Blue arrows: Women
Switching Majors (con’t)

• Most students switched majors in their 4th or 5th academic year
• Women tended to switch majors earlier than men
• Black women tended to switch majors later than Asian, Hispanic, and white women
• Students who persisted had higher cumulative GPAs than those who switched
• Women had higher cumulative GPAs except:
  – ABS to HSP
  – HSP to PSCSME
  – HSP to ABS
Factors that Impact Persistence

- Being female had a negative impact on persisting in PSCSME but a positive impact on HSP
- Context matters, particularly for female students
- Being an in-state resident had a negative impact on persisting in PSCSME
- Lower levels of parental income had a negative impact on persisting in HSP and Non-STEM
- Within women, race and ethnicity were non-significant (FAFSA: Hispanic had a positive impact on PSCSME)
Time-to-Degree

- Regardless of persistence status and last major category, women graduated faster than men.
- Black and Hispanic women who persisted in the three STEM categories took longer to graduate, except for Hispanic women in HSP.
- Importance of examining time-to-degree beyond 4 academic years.
- Possible costs associated with “program shopping” do not appear to be burdensome.
Limitations

• Data:
  – Secondary data
  – Limited generalizability
  – Selection bias

• Methodology
  – Inclusion criteria
  – First and last major
  – Movement between major fields
Future Research

• Larger research project
  – Investigate intervention programs on campuses
  – Survey current students

• Incorporate additional data
  – Common Core Dataset
  – U.S. Office of Civil Rights Data
  – Baccalaureate and Beyond

• Examine male students

• Examine switching within categories & by semester
Significance of the Study

- Use broad definition of STEM to better understand patterns of persistence and switching
- Examine persistence through degree completion
- Disaggregating by racial and ethnic groups revealed important differences within women’s participation in STEM
- Offer alternative perspective on women’s participation in STEM
Questions and Comments