Implicit predictors of STEM engagement

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Implicit Associations between Gender and Career vs Family

Men

Women

71%

77%
<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Science</th>
<th>Arts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daniel</td>
<td>Anna</td>
<td>Math</td>
<td>History</td>
</tr>
<tr>
<td>John</td>
<td>Rebecca</td>
<td>Physics</td>
<td>Languages</td>
</tr>
<tr>
<td>Paul</td>
<td>Michelle</td>
<td>Chemistry</td>
<td>English</td>
</tr>
<tr>
<td>Michael</td>
<td>Emily</td>
<td>Biology</td>
<td>Poetry</td>
</tr>
<tr>
<td>Jeffrey</td>
<td>Julia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Implicit Gender-Science Stereotypes

**Male Respondents**
- Implicit Science=Male / Arts=Female Stereotyping
  - Number of Respondents:
    - Male: 70%
    - Female: 11%

**Female Respondents**
- Implicit Science=Male / Arts=Female Stereotyping
  - Number of Respondents:
    - Male: 10%
    - Female: 71%
Women are not being kept out of science by force so “they must be choosing not to enter, presumably because they don’t want to; presumably because (by and large) they don’t like these fields or (on average) don’t tend to excel in them, which is nearly the same thing.”

(David Gelernter, Department of Computer Science, Yale University, 1999, italics in original)
Science faculty assessment of resumes

Male
John

Female
Jennifer

Less competent (d = .71)
Less hireable (d = .75)
$4,000 less starting salary (d = .60)

Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012, PNAS
Male Advantage TIMSS (8th Grade Science)

Male = Science & Female = Liberal arts
Implicit Associations (IAT D)

Nosek, Smyth, et al., 2009, PNAS
Estimated probability of majoring in science as a function of sex and implicit gender-science stereotype

Smyth, Nosek, & Greenwald, 2010
<table>
<thead>
<tr>
<th>Women</th>
<th>Implicit Stereotype</th>
<th>Explicit Stereotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicit Attitude</td>
<td>-.34</td>
<td>-.09</td>
</tr>
<tr>
<td>Explicit Identity</td>
<td>-.33</td>
<td>-.08</td>
</tr>
<tr>
<td>Explicit Confidence</td>
<td>-.19</td>
<td>-.07</td>
</tr>
<tr>
<td>Expect to Participate</td>
<td>-.18</td>
<td>-.05</td>
</tr>
<tr>
<td>Self-ascribed skill</td>
<td>-.24</td>
<td>-.04</td>
</tr>
<tr>
<td>SAT performance</td>
<td>-.17</td>
<td>-.05</td>
</tr>
<tr>
<td>Average</td>
<td>-.24</td>
<td>-.06</td>
</tr>
</tbody>
</table>

Nosek & Smyth, 2011, AERJ
What can we do about it?
(examples)

Role Models
Affirmation to counter identity threats:
Negative expectations, lack of belonging

Education about bias
Blinding
Comparative assessment
Instructor as role model

Stout, Dasgupta et al., 2011
Instructor as role model

Stout, Dasgupta et al., 2011
Instructor as role model

Stout, Dasgupta et al., 2011
Benefits of Self-Affirmation

Artistic expression
Athletic participation
Belonging to a social group (e.g., community, racial, professional)
Creativity
Government or politics
Independence
Learning and gaining knowledge
Music
Relationships with family and friends
Sense of humor
Spiritual or religious values
College Physics

Mean Exam Score (%)

Control

Condition

Men

Women

Miyake, et al., Science, 2010