Making the Implicit Explicit: An Experiment with Implicit Gender Stereotypes and College Major Choice

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Can knowing your own biases actually make you more likely to follow them? A new study reveals that telling students about their unconscious gender stereotypes didn't break the mold—it actually reinforced it for the students most at risk.

Despite comparable academic preparation and performance, women remain significantly underrepresented in many STEM fields. Recent research suggests that this persistent gender gap may be driven by implicit stereotypes (subconscious associations that link STEM fields more strongly with men than with women), which can undermine a student's confidence and sense of belonging.

While earlier research has documented a strong correlation (for example, showing that female students with high male-STEM associations are less likely to intend a STEM major), these studies could not prove that the stereotypes caused the choice. Much of the existing causal research focuses on how the biases of others, such as teachers or mentors, affect students. This study breaks new ground by using a randomized controlled trial (RCT) to test whether a student's own implicit stereotypes directly influence their educational behavior.

The researchers hypothesized that making these unconscious associations explicit would allow students to acknowledge their biases and make more objective academic choices. Rather than attempting to change the underlying biases themselves, the intervention simply informed students of their stereotypes at a critical decision-making point: the course registration period. By linking this experimental data to administrative records, the study shows how self-awareness of bias shapes actual course enrollment and major selection.

THE INTERVENTION AND STUDY

The intervention focused on increasing awareness of implicit stereotypes rather than attempting to change students' underlying biases or attitudes. It consisted of the following components:

- Implicit Association Test (IAT): Students first completed a gender-STEM IAT to measure whether and how strongly they associated STEM fields with men.
- Personalized Feedback: Treated students were randomly assigned to receive:
  - A description of their automatic association (e.g., "moderate automatic association for Male with STEM").
  - A message saying, "Research shows that making people aware of their implicit attitudes (stereotypes) may help them change their behavior to be less in line with the stereotypes. We're hoping that by seeing your results, it will help you make a more objective and unbiased decision about your own academic path, without the influence of unconscious stereotypes."
- Follow-up: In November, just before spring course registration, the researchers emailed the students the same personalized feedback again to ensure the information was top of mind at a critical decision-making point.

Over 800 undergraduates first took the IAT. The students were randomly assigned to two groups:

- The control group simply completed the test with no follow-up
- The treatment group received the individualized intervention described above

Researchers then tracked students' actual course enrollment, credits earned, and major declarations using university records to see whether this awareness changed their real behavior.

KEY FINDINGS

1 **Rather than encouraging participation, the feedback appeared to make gender stereotypes more salient and reinforced existing disparities, encouraging men to pursue STEM while discouraging women on average. This was the opposite of the intervention's intended impact.**

- This suggests that simply highlighting stereotypes can inadvertently discourage the very students such interventions are intended to help. This pattern is consistent with "stereotype threat," where awareness of stereotypes undermines confidence and reduces engagement in affected domains.

2 **Men who learned about their implicit stereotypes were more likely to enroll in any STEM course the following semester and earned more STEM credits on average than men in the control group.**

- In other words, awareness of stereotypes appeared to increase men's confidence or willingness to pursue STEM coursework. This pattern is consistent with what researchers

call "stereotype lift," where learning about stereotypes that favor one's group can boost motivation and participation.

3 **Underrepresented men who learned about their implicit stereotypes showed the largest gains in STEM participation.**
- By bringing gender stereotypes to the forefront, the researchers believe the students leaned into their identity as men (a group positively associated with STEM) rather than their racial identity, which may have otherwise served as a barrier to STEM persistence.

4 **The impact of the intervention on women was mixed. The intervention had a negative effect on women who were already facing multiple barriers to STEM entry (low income, lower test scores, or minority status). In contrast, women with more "advantaged" profiles (higher income, higher test scores, or non-minority status) were not affected by the intervention or, in some cases, even encouraged by it.**
- By Race and Ethnicity (URM vs. Non-URM)
  - URM Women (Black, Hispanic, or Native): This group experienced a significant decrease in the likelihood of taking any STEM course. The authors suggest that for these women, being reminded of their gender identity reinforced a sense of not belonging, especially when combined with existing racial stereotypes.
  - Non-URM Women (White or Asian): The intervention had no statistically significant effect on this group.
- By Socioeconomic Status (Family Income)
  - Lower-Income Women (Family income below $100,000): This subgroup saw a sharp decline in STEM participation.
  - Higher-Income Women (Family income above $100,000): The intervention did not appear to have a significant discouraging effect on this group
- By Academic Performance (SAT/ACT Math Scores)
  - Lower-Performing Women (Below-median scores): The intervention decreased their likelihood of taking STEM courses by 10.6 percentage points.
  - Higher-Performing Women (Above-median scores): The results for this group were actually positive; they showed a statistically significant increase in the total number of STEM courses taken.

POLICY AND PRACTICE IMPLICATIONS

1 **Raising awareness of implicit gender stereotypes can inadvertently worsen the very gender gaps it aims to close.**
- In this study, reminding students of stereotypes, even when the intent was to encourage them to "buck the system," reinforced a lack of belonging for those already receiving negative social signals.

2 **To effectively encourage underrepresented students to pursue STEM, policy efforts should prioritize reinforcing identities and beliefs that signal a positive 'match' with the field, while carefully avoiding stereotypes that suggest a lack of belonging**

- In this study, the intervention helped male students focus on a part of their identity that is usually linked to success in STEM. This 'male' connection was strong enough to cancel out the negative racial stereotypes they often deal with, providing a 'boost' that made them feel like they belonged in those fields and encouraged them to pursue them.

3 **Psychological responses to learning about one's own identity-linked biases are likely different from learning about biases toward others.**

- The authors note that their results differ from studies where informing teachers of their bias reduced discrimination. Practice implications should differ based on whether the target of the intervention is an authority figure or the student themselves

FULL WORKING PAPER

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