Stereotype Threat: Antecedents, Consequences, and Solutions

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Is it true?

- Are boys actually better than girls in math and science?
  - In the U.S., gender differences in math achievement are declining (Hyde, Fennema, & Lamon, 1990)
  - Girls earn better math grades than boys through the end of high school (Gallagher & Kaufman, 2005; Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006)
  - Else-Quest, Hyde, & Smith (2010) found no significant overall gender differences internationally, but boys scored considerably higher on measures of math attitudes

- Men and women receive equal grades in college mathematics classes that are similar in terms of difficulty (Bridgeman & Lewis, 1996)
- Some theorists believe there is direct relationship between prenatal testosterone exposure and spatial reasoning skills (mental rotation ability), however, findings are inconsistent
- High school girls in Iceland outperform boys on tests of spatial ability (Levine et al., 2005)

- Thus, the belief that boys are better than girls in math and science appears to be untrue

Cultural/environmental factors

- The fact that girls equal or even outperform boys in math suggests that culture largely accounts for differences in STEM career choices
- Countries high in egalitarian values (e.g., Iceland, Norway, Sweden) generally have no gender gap in math achievement

- Proximal environment
  - Evidence of sex role bias exhibited by teachers—Kelly (1988) found that although girls raised their hands more often they boys, they received less instruction
  - Frome & Eccles (1998) found that 6th grade mothers overestimated their sons' abilities but underestimated their daughters'
  - Math abilities of HS girls were viewed less favorably than boys by parents and teachers (Hyde et al., 1990)

What is stereotype threat?

- Refers to an individual's concern that his/her performance will confirm a negative stereotyped belief about the *group's* ability to perform successfully in a given domain

- Maladaptive thoughts and emotions associated with this concern can actually lead to decreased performance
- Becomes a self-fulfilling prophecy
- Susceptibility to threat does not necessarily arise from individual doubts about ability, but rather it hinges on the individual's identification with the group (women) and domain (in this case, STEM)
- Low percentages of women in STEM adds to perceived credibility of this stereotype

Antecedents of stereotype threat

- Sex role socialization
  - Boys and girls are exposed to gender-biased attitudes, values, and expectations regarding career behavior
    - Boys are expected to be independent, strong (physically and emotionally), achievement-oriented, providers
    - Girls are traditionally expected to be dependent, focus on marriage & family, nurturing, focused on appearance, passive (not achievement-oriented)

- These sex role expectations are not always family-based
  - Media
  - Teachers
  - Peers

Consequences of Stereotype Threat

- Female test takers who indicated their gender *after* taking the SAT Advanced Calculus Test score significantly higher than those who indicated their gender before (Danaher & Crandall, 2008)
  - Directing attention to gender prior to the test likely elicited anxiety that impeded performance

- Murphy, Steele, and Gross (2007) presented undergraduate science majors videos in which actors performing laboratory tasks were either 50-50 male-female or 75%male, 25% female. The 75-25 ratio resulted in increased anxiety among female viewers as measured by heart rate and skin conductance.

- Delisle et al. (2009) found that women in undergraduate science programs with low numbers of women were more likely to endorse the stereotype of STEM as a male domain

Solutions

- Fortunately, Delisle et al. (2009) found that stereotype threat does not lead to decreased intrinsic motivation for math & science
- Teach students early on that math & science can be fun
  - enjoyment→intrinsic motivation
  - Focus on process rather than outcome

- Penner (2008) found that girls in the top 5% of math achievement score 3% worse than boys among those who say math achievement is unimportant to their parents, but girls in this group score 6% worse among those who say achievement in math is important to their parents

- Increase number of female role models—alters the socialization process in a favorable way

- Strive for a *critical mass* of women in engineering and physical sciences
  - Stereotype threat seems to be less salient in biology, where gender ratio is approximately even
  - Strength in numbers

Questions?

- Thank you!