

Introduction

Gender stereotypes about academic abilities can influence how adolescents view themselves and influence the choices they make regarding school courses and extracurricular activities (Eccles, 2005; Köller, et al., 2000). These choices, in turn, may shape career aspirations and contribute to the underrepresentation of women in STEM careers (Nagy et al., 2006). Therefore, assessing stereotypes in youth is important, but difficult given the social sensitivity surrounding stereotypes. Especially as youth age, their explicit reports may increasingly reflect social desirability effects, even if their automatic associations between gender and academic ability are different.



Hypotheses

We were interested in how implicit and explicit math stereotypes differ across ages and whether or not the two types of beliefs are consistent within age and gender groups. We hypothesized that elementary school children would not endorse traditional stereotypes, but instead show an in-group bias on both explicit and implicit measures. In contrast, we predicted that, in middle school and high school, young adolescents' implicit attitudes and explicit beliefs would diverge, reflecting traditional implicit attitudes (i.e., girls favored in verbal domains; boys favored in math and sports) and egalitarian explicit beliefs.

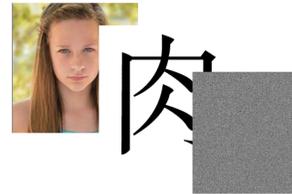
Method

Participants

A sample of 221 youth (120 girls) participated in the study. Youth were grouped into three age groups: elementary school ($N = 93$, $M_{age} = 8.9$), middle school ($N = 58$, $M_{age} = 11.4$) and high school ($N = 70$, $M_{age} = 14.5$). Approximately 52% of students were White, 26% were Black, 14% were Hispanic, 3% were Asian, and the rest marked "other" as their race.

Measures

Affect Misattribution Procedure (AMP; Implicit Stereotypes).



Good at math
or Bad at
math?

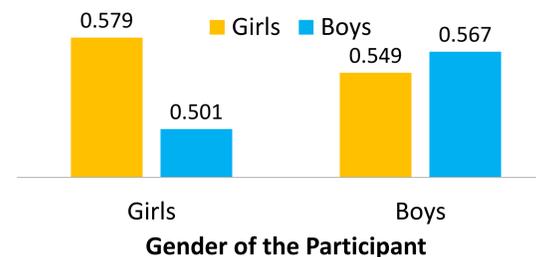
Group Competence Measure (Explicit Stereotypes).

I think that in **MATH** girls do this well:

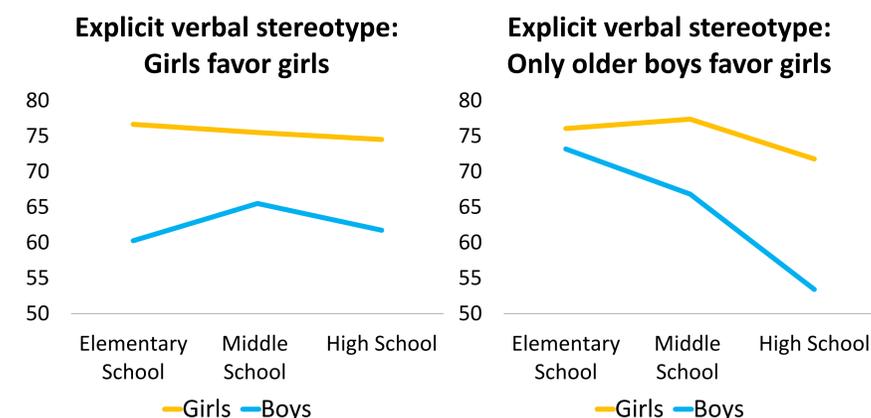
Not well at all ←-----|-----→ Very Well

Results

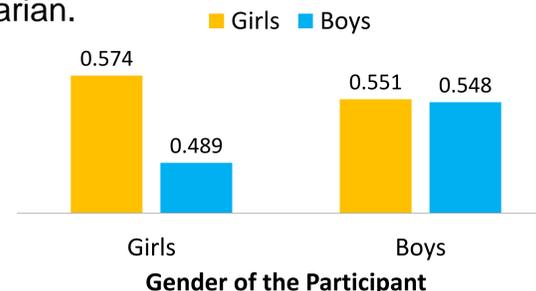
Verbal: Implicit Gender-Photo x Gender-Participant interaction, $F(1,212) = 7.01$, $p = .009$. Boys were egalitarian whereas girls favored girls.



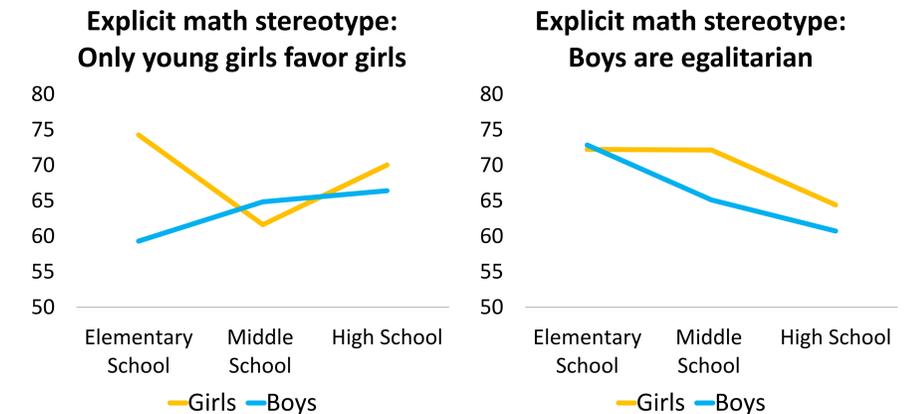
Explicit three-way interaction, $F(2, 212) = 4.89$, $p = .008$.



Math: Implicit Gender-Photo x Gender-Participant interaction, $F(1, 212) = 5.78$, $p = .017$. Girls favor girls; boys egalitarian.



Explicit three-way interaction, $F(2, 215) = 5.89$, $p = .003$.



Discussion

These findings did not support our hypotheses, but they still suggest that academic stereotypes may play an influential role in students' lives. To put these findings in context, it is important to note that girls tend to outperform boys in math and verbal domains throughout elementary, middle, and high school (Voyer & Voyer, 2014). Therefore, both girls and boys showed implicit math and verbal in-group biases across these age groups. Boys' biases manifest themselves as egalitarian implicit attitudes.

The explicit measure, on the other hand, reflects youth's awareness and endorsement of traditional stereotypes in early adolescence. Despite their implicit attitudes, boys endorsed traditional verbal stereotypes in explicit measures starting in middle school. Similarly, girls deny their math advantage on explicit measures starting in middle school despite their in-group implicit attitudes.

Gawronski, LeBel, and Peters (2007) suggest that implicit measures are a proxy for the automatic *activation* of associations, whereas self-report measures reflect the outcome of *validation* processes. Our results suggest that, as youth age, they validate or dismiss their automatic associations regarding academics based on stereotypes.

References

- Eccles, J. S. (2005). Subjective task values and the Eccles et al. model of achievement related choices. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of Competence and Motivation* (pp. 105–121). New York: Guilford.
- Gawronski, B., LeBel, E. P., & Peters, K. R. (2007). What do implicit measures tell us? Scrutinizing the validity of three common assumptions. *Perspectives On Psychological Science (Wiley-Blackwell)*, 2, 181-193. doi:10.1111/j.1745-6916.2007.00036.x
- Nagy, G., Trautwein, U., Baumert, J., Köller, O., & Garrett, J. (2006). Gender and course selection in upper secondary education: effects of academic self-concept and intrinsic value. *Educational Research And Evaluation*, 12, 323-345.
- Voyer, D., & Voyer, S.D. (2014). Gender differences in scholastic achievement: A meta-analysis. *Psychological Bulletin*, 140, 1174-1204.