Math and spatial gender stereotypes across development and relations to math and spatial anxieties

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Introduction

Gender differences in math and spatial anxiety are:
- Consistent in adulthood
- Inconsistent in childhood but have been observed by 6 years old

Math gender stereotypes have been linked to gender differences in math anxiety

Surprisingly, little is known about the assumptions that drive domain-gender associations

Stereotypes may be driven by assumptions of differences in:
- Ability: stereotypes may reflect actual gender differences in skill or the perception thereof (e.g., Kurtz-Costes et al., 2008)
- Enjoyment: could indicate advantage due to greater engagement, ease, or success (e.g., Cvencek et al., 2011)
- Confidence: could be interpreted as an ability cue, or result of success in the domain
- Effort: if one must put in a lot of effort, this may suggest difficulty or disadvantage in the domain

<u>In the current work, we explore how these assumptions may help explain common domain-gender stereotypes and how those stereotypes account for anxiety</u>

Research Questions

1. When do gender differences in math and spatial anxiety emerge?
2. Are there unique relations between specific stereotype assumptions and anxiety?
3. Does this vary across gender or domain?
4. How do this patterns compare across development?
   - In the first years of formal schooling
   - In children versus adults

Participants

181 Adults: Range: 18-45 years; M = 30.12
Self-identified gender: 101 males, 80 females

73 1st-4th grade children: Range: 6-10 years; M = 8.30
Parent-identified gender: 41 males, 32 females

Methodology

<u>Anxiety Questionnaires:</u>

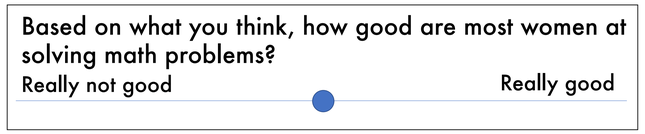
Math Anxiety:
AMAS (adults) and CMAQ (children)

Spatial Anxiety:
SAI (adults) and CSAQ (children)

<u>Stereotype Items:</u>

Participants rated men and women separately on each assumption for one domain (example below).

- DV = difference score ("men rating" – "women rating")



Discussion

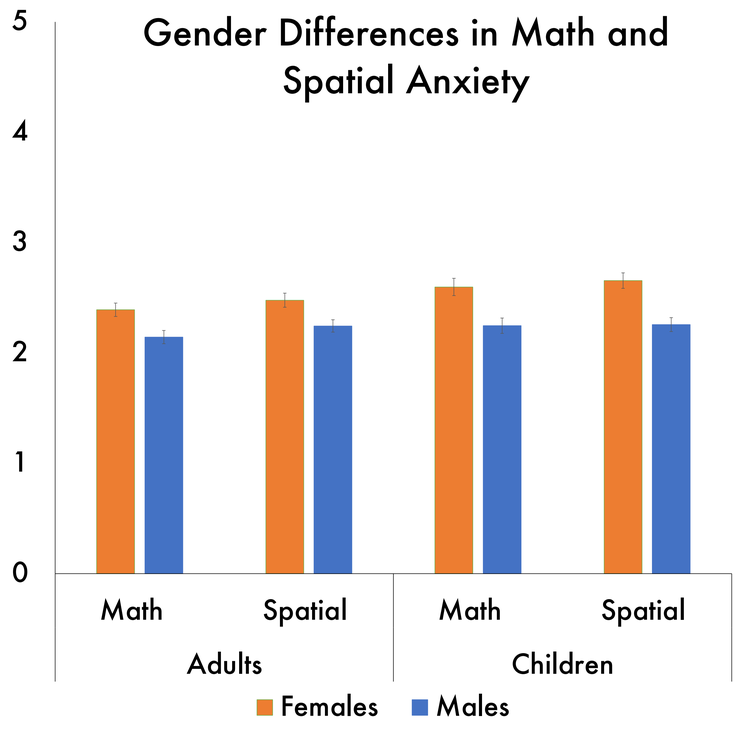
Gender plays a role in math and spatial anxieties early in development and persists into adulthood

- Only gender stereotypes about enjoyment and effort accounted for math and spatial anxiety across development
- Distinct patterns emerge for math and spatial anxiety
- Math anxiety findings were consistent across development

What leads to distinct, sometimes counterintuitive patterns for males as compared to females?
- Boys that think boys enjoy spatial activities more have HIGHER spatial anxiety
- Boys interpret effort as a good thing in the domain of math, but girls interpret this as a negative

<u>Unique opportunities for intervention</u>
- Effort-based math gender stereotypes related to math anxiety as a function of gender across development
- Future work should focus on specific assumptions in working to mitigate impacts of gender stereotypes

Results



	Adults		Children	
Factor	Math Anxiety (p-value)	Spatial Anxiety (p-value)	Math Anxiety (p-value)	Spatial Anxiety (p-value)
Ability	.986	.490	.517	.258
Enjoyment	.145	**.003**	.508	.518
Confidence	.590	.166	.734	.525
Effort	.942	.557	.190	.056
Gender	.048	.146	.979	.042
Ability x Gender	.423	.435	.980	.255
Enjoyment x Gender	.436	.499	.327	**.007**
Confidence x Gender	.842	.794	.326	.700
Effort x Gender	**.004**	.063	**.002**	.292

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