

A growth mindset intervention increases research community belonging in underrepresented minority and first-generation undergraduates

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Background

- Growth mindset: intelligence is malleable (Dweck & Leggett, 1988)
- Enhances challenge-seeking, engagement, and performance (Richardson et al., 2023; Limeri et al., 2020; Blackwell et al., 2007; Wang et al., 2021)
- Mindset interventions may be more effective among historically underrepresented groups (Burnette et al., 2022), including students of color, women, first-generation students
- Ours is the first mindset intervention applied in a neuroscience course and a research-related skills-focused course
- **We expect the effects of a mindset intervention on research-related skills (RRS) development to be more pronounced among female, underrepresented minority (URM), and first generation students**

Methods

- 2 control and 3 intervention sections of Cellular and Molecular Neurotechnology
- Examination of sex (female/male), race (URM/non-URM), and generation status (first/continuing generation)
- Measures: RRS survey (Likert-scale), mid-semester feedback, exam performance, and growth mindset reflection

Figure 1. Growth mindset intervention key components.

A Intervention RAW
 1. Figure Facts* analysis
 2. Personal reflection with growth mindset reflection
 3. Layperson abstract (n = 94)

Control RAW
 1. Figure Facts* analysis
 2. Personal reflection without growth mindset reflection
 3. Layperson abstract (n = 64)

B Growth Mindset: Reading research articles is tough! We encourage a growth mindset. In other words, all of us can master research article analysis through hard work, good strategies and feedback. Discuss how well you are doing at applying a growth mindset as you tackle these research articles?

- Here is an inspiring video about how to use a growth mindset to succeed in STEM: [Reprogramming Your Brain to Overcome Fear†](#) (15 min)
- Here is a [practical short read‡](#) on having a growth mindset and a [recent research article§](#) on its benefits in education.

* Round and Campbell, 2013; † LePoint, 2014; ‡ Dweck, 2016; § Yeager et al., 2019

Initial Results

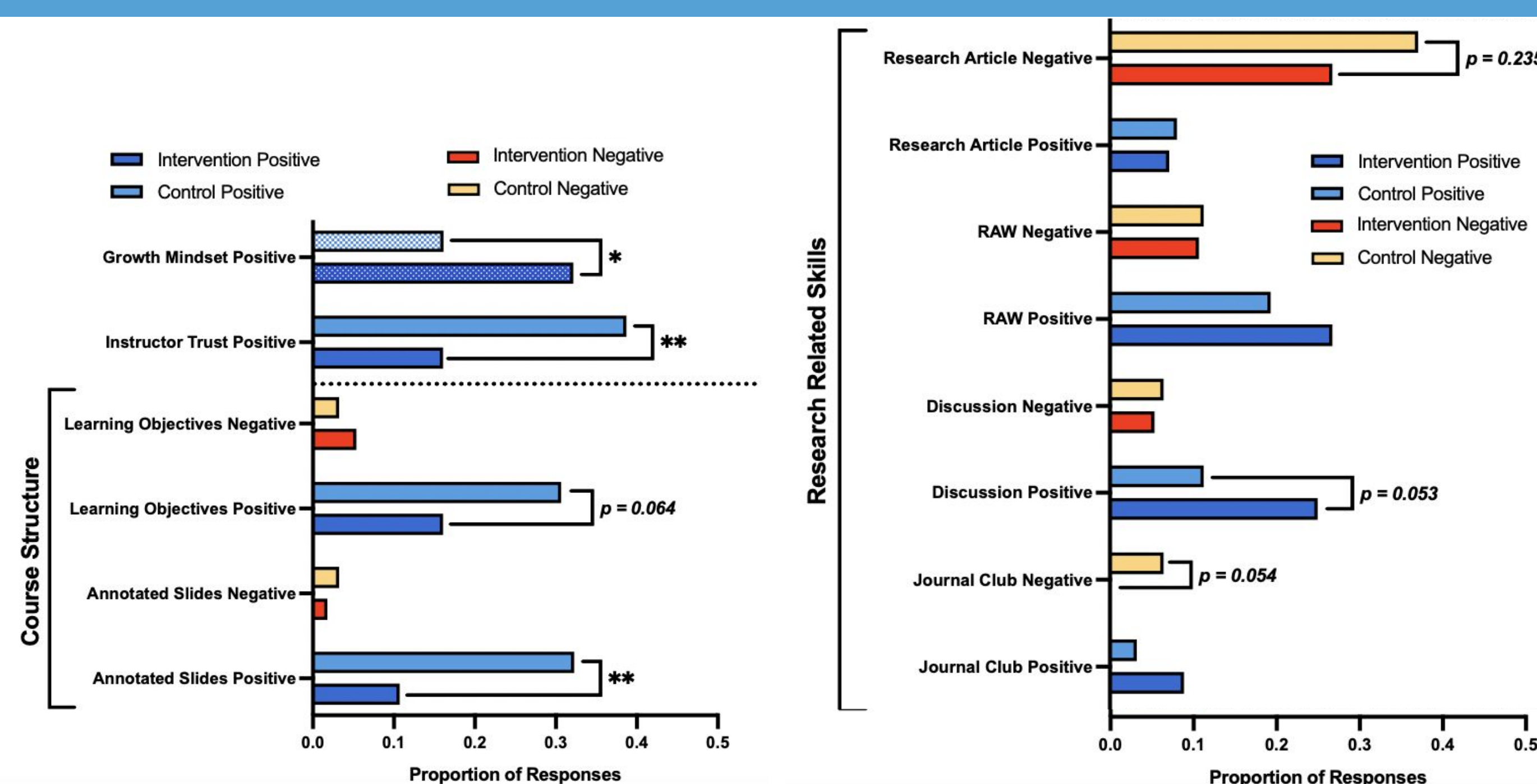


Figure 2. Mid-semester feedback reveals helpful course components.

Intervention students demonstrate a growth mindset significantly more ($p = 0.0415$) and engage more with RRS components.

Results

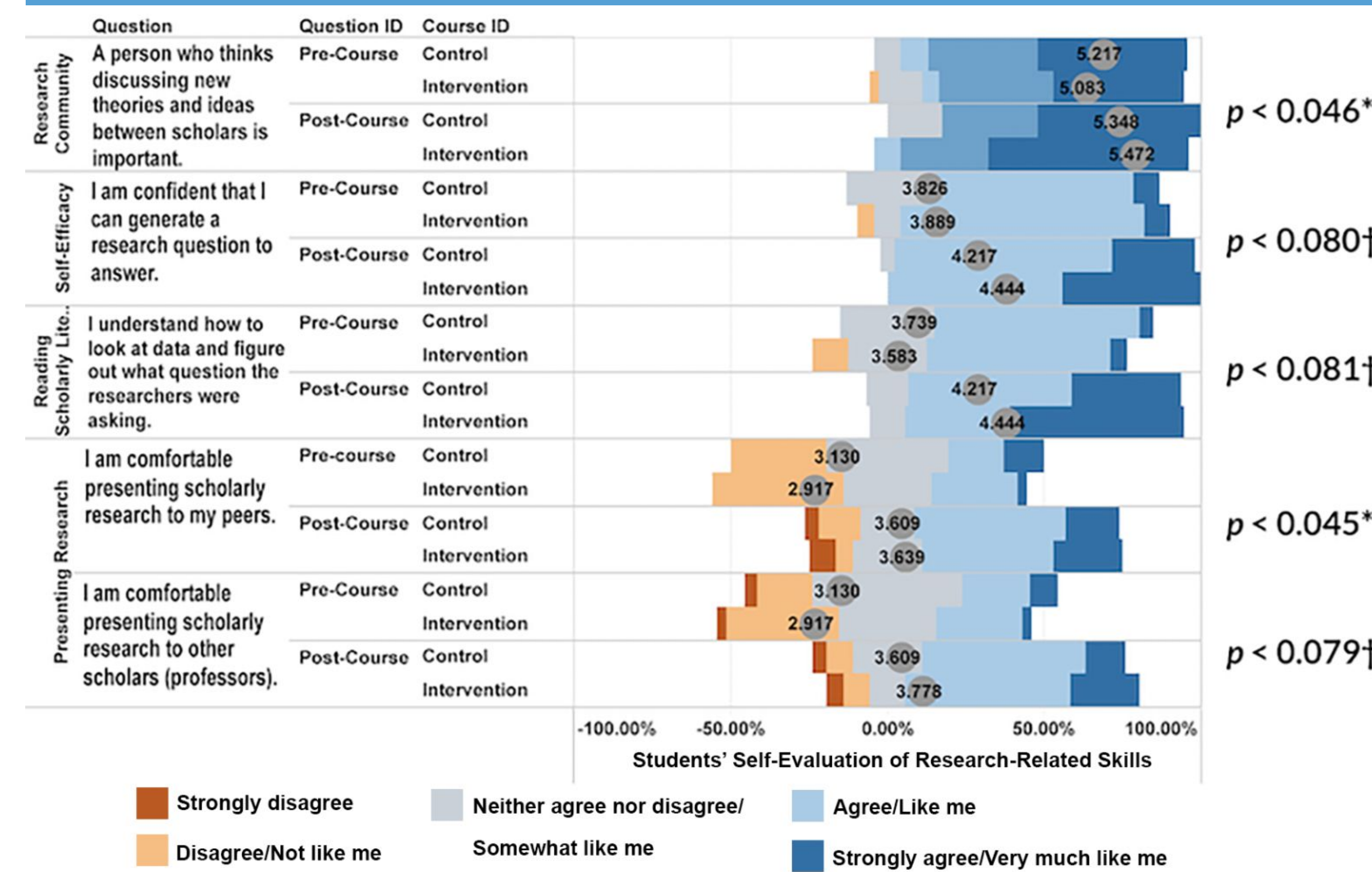


Figure 3. RRS development in general intervention and control groups

All students improve pre- to post-course, but the intervention has limited effects in **general** analysis.

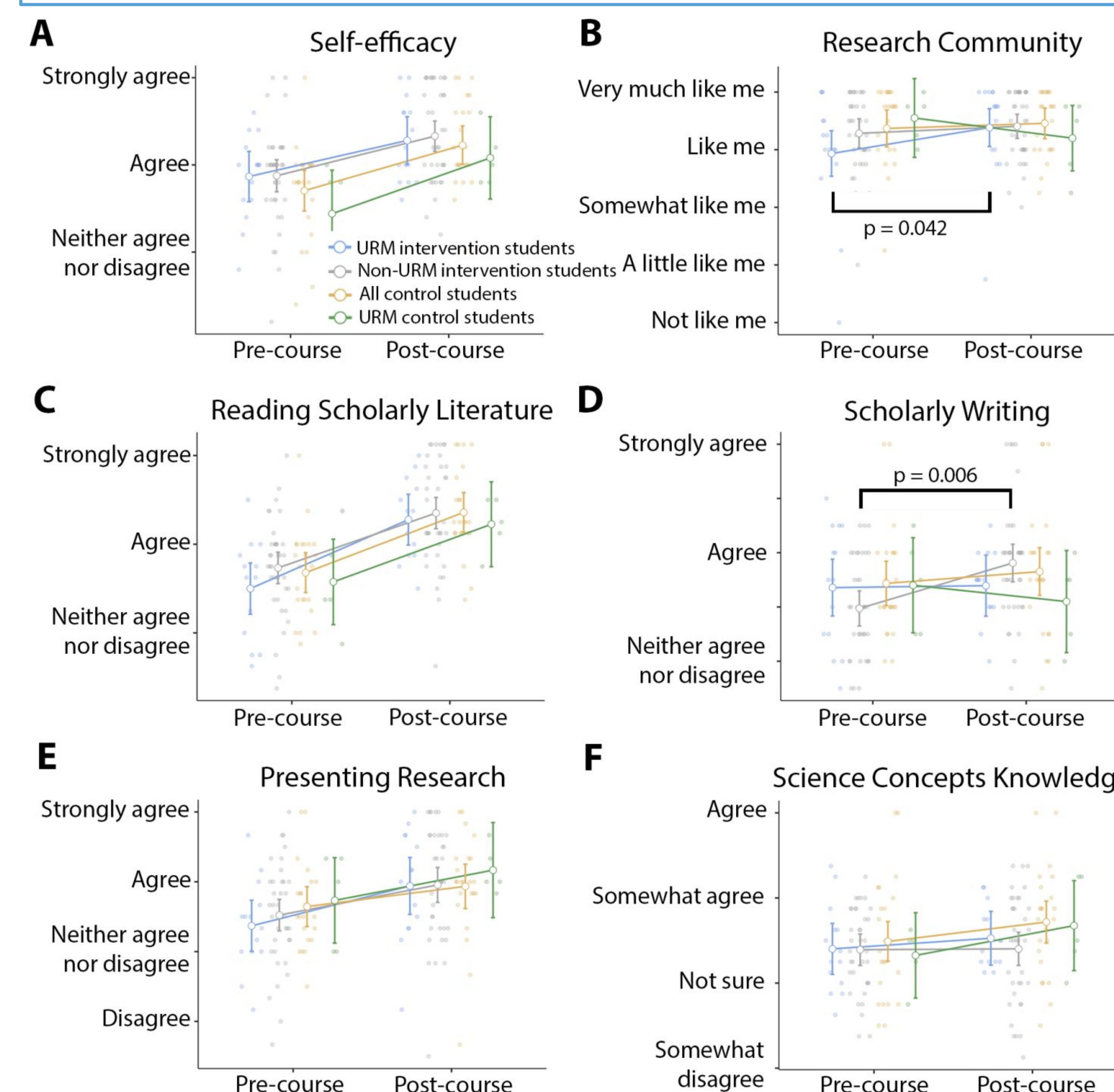


Figure 4. RRS development in URM intervention and comparison groups

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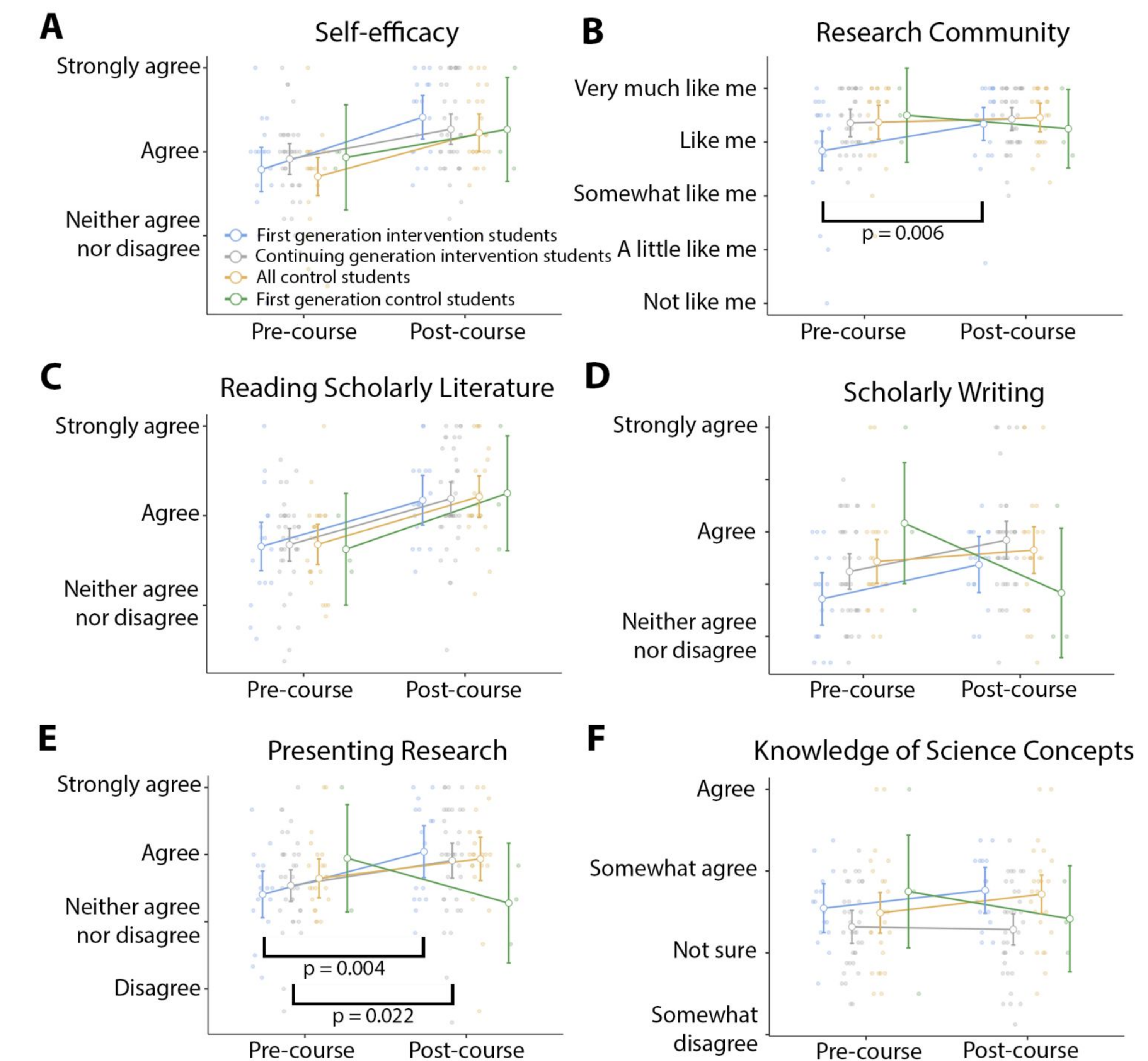


Figure 5. RRS development in FG intervention and comparison groups.

Both URM and first generation students who completed the intervention show significant increases in feelings of belonging to a research community not seen in comparison groups.

Conclusions

- First evidence of an effective mindset intervention in a neuroscience and RRS course
- Mindset interventions can help URM and first-generation students feel belonging in STEM research, with implications for persistence (Chemers et al., 2011; Hansen et al., 2023)
- Instructors can easily implement interventions to make a meaningful impact on their students

Limitations

- Small underrepresented control sample size, but still see significance
- Indirect measures with self-reported data
- Lack of explicit measure of mindset