

# Examining Physics Identity Development Through Two High School Interventions

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## Research Questions

- What is the effect of research-based interventions on students' physics identity and future physics intentions?
- Is the effect different for female students than that observed for male students?
- How do utility value and the identity sub-constructs affect physics identity and future physics intentions?
- Implemented careers and underrepresentation lesson;
- 10 master teachers, 823 students (312 female and 511 non-female) from 9 different high schools (in 8 states);

## Methodology

### (1) Identity Development

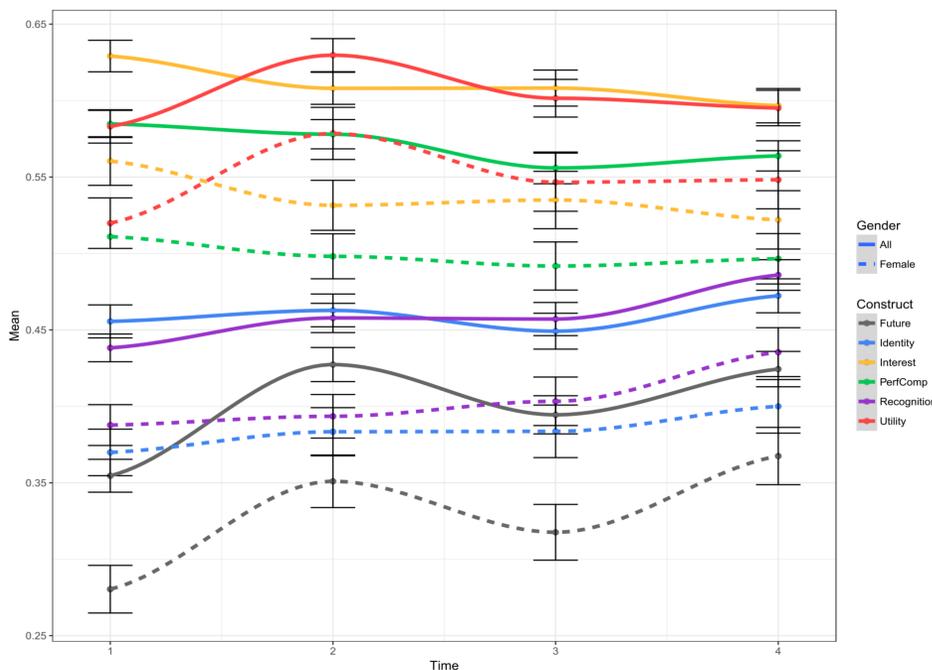


FIG.1 Identity development at pre/post interventions

- **Identity:** see themselves as physics person
- **Recognition:** feel recognized by others as physics person
- **Performance/Competence:** beliefs in one's ability to perform required physics tasks/understand physics content
- **Interest:** desire/curiosity to think about and understand physics
- **Future:** future beliefs in having a physics major or career
- **Utility:** see physics as having value in one's future

### Implication

- Students' physics identities can be impacted by being exposed to physics careers and their social impact, as well as the current condition of women in physics, unconscious bias effects, and core equity issues
- Our approach to help young women feel more recognized and see themselves as a "physics person" in the present and future is effective
- Women from non-dominant racial/ethnic groups feel more recognized during the career lesson.

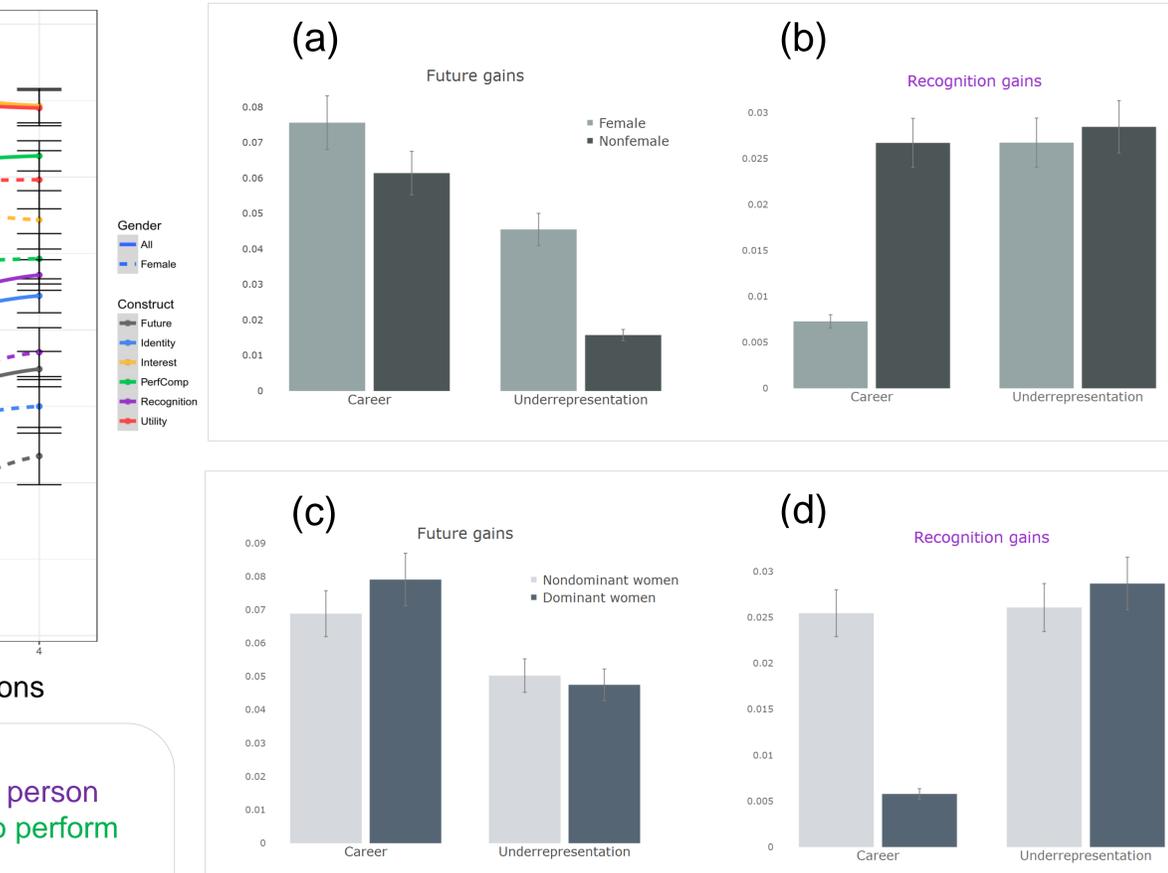


FIG.2 Gains in future career intentions and recognition beliefs for (a, b) female/non female students and (c, d) women from dominant/non-dominant racial/ethnic groups

### (2) Path Models of Identity

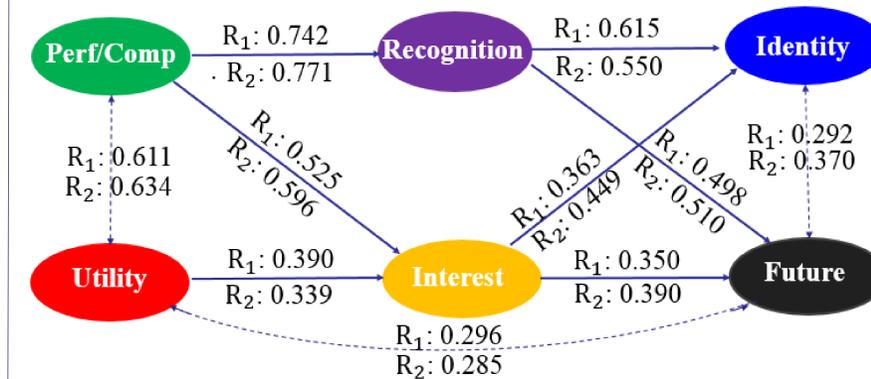


FIG.3 Diagram of the structural equation model

TABLE.1 Confirmatory factor analysis estimates for physics identity (including sub-constructs), utility value and future physics intentions

Latent Variable	Indicator variable	Standard factor loading
Identity	Q1a: I see myself as a physics person	1.000
	Q1b: My physics teacher sees me a physics person	0.727
	Q1c: My family sees me a physics person	0.869
	Q1d: My friends/classmates see me a physics person	0.905
	Q1e: Other ask for my advice/input in physics	0.716
Competence/performance	Q1f: I am confident that I can understand physics	0.888
	Q1g: I can do well on exams in physics	0.842
	Q1h: I understand concepts I have studied in physics	0.899
	Q1i: Learning physics is comfortable for me	0.917
	Q1j: I feel comfortable solving physics problems	0.920
	Q1k: I can overcome setbacks in physics	0.801
	Q1l: I am interested in learning more about physics	0.915
Interest	Q1m: Topics in physics excites my curiosity	0.932
	Q1n: I enjoy learning about physics	0.971
	Q1o: Physics is fun for me	0.927
	Q1p: I can see myself as a physicist	0.902
Future	Q1q: A future in physics is a possibility for me	0.958
	Q1r: I am likely to major in physics in college/university	0.931
	Q1s: I could see myself pursuing a physics-related career	0.915
	Q1t: The skills I learn in physics will be useful for my future	0.930
Utility	Q1u: Studying physics gives me a clear advantage in the future	0.903
	Q1v: Learning physics will be beneficial for my career	0.890

[www.stepup4women.org](http://www.stepup4women.org)

#### References

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