Attitudes Towards Computer Programming:
An Analysis on Background Experiences

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Introduction

- Curated Pathways to Innovation (CPI) connects underrepresented minority groups (URM) to STEM+C
- Currently exists a lack of participation from groups (URM) in STEM education and careers.
- Programs dedicated to STEM+C could encourage students to pursue these careers.
- Not all students have the same opportunities, prior experiences range from student to student.

Research Question

- Will there be a moderation effect on students attitudes in CP from factors such as: access to technology, participation in extracurricular activities, or background characteristics?

Method

- Students (N=171) completed two surveys: Baseline = September 2019, Pulse = March 2020 (mean age = 12.01, 44% female, 73% URM)
- CP attitude questions internal reliability : Baseline Cronbach's Alpha = 0.91, Pulse Cronbach's Alpha = 0.85.

Descriptive of Students' Attitudes Towards Computer Programming (CP)

Item Level Descriptives for Computer Programming Attitudes

	Baseline	Pulse
Survey Questions	Mean (SD)	Mean (SD)
I am good at working with computers	3.00 (1.05)	3.00 (0.94)
I can imagine myself having a job in computer programming	2.76 (1.08)	2.51 (1.09)
I am interested in learning more about computer programming	3.00 (1.11)	3.01 (1.11)
I think it is important to learn about computer programming	3.36 (1.01)	3.36 (0.91)
I plan to take a computer programming class in the future	2.77 (1.16)	2.65 (1.08)
I wish I had more opportunities to learn how to program computers	3.00 (1.12)	2.86 (1.12)
I can imagine myself having a career in computer programming	2.71 (1.05)	3.17 (0.94)

Descriptives of Moderators

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Survey Questions	Yes	No
Access to Technology		
Is there a computer at home that you can use?	63.10%	36.90%
Is there a smartphone or tablet at home that you can use?	97.60%	2.40%
Extracurricular Activities		
Have you ever taken computer classes?	22%	78%
Are you a member of a science, math, or computer club?	4.20%	95.80%
Outside of school have you participated in a science camp?	13.70%	86.30%
Outside of school have you been to a science themed museum?	39.50%	60.50%
Outside of school have you participated in any online lessons about computer programming?	11.30%	88.70%
Outside of school have you participated in a camp where you worked with computers?	8.90%	91.10%
Outside of school have you participated in an app development class?	11.30%	88.70%
Outside of school have you participated in a robotics camp or class	15.50%	84.50%

Moderation Analysis
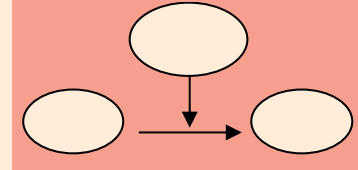
Results

- Paired T-Test for CP attitudes Baseline / Pulse
  - $t(134) = -1.24$, $p > .05$
- Main effect of students' self-perceptions measured at the baseline was statistically significant for all factors ($p < .05$)
- Background factors had no effect, nor moderate an effect, on students' self-perceptions ($p > .05$).

Conclusions

- Background experiences of students do not affect the impact CPI has on students.
- Conclusions are derived from a relatively small sample size.

References

1.Curated Pathways to Innovation (CPI), https://ywca-sv.org/curated-pathways-to-innovation/
2. Women, Minorities, and Persosn with Disabilities in Science and Engineering https://ncses.nsf.gov/pubs/nsf19304/digest/introduction
3. Encouraging Minority Students in Science Careers, https://www.usccr.gov/pubs/docs/EncouragingMinorityStudentsinScienceCareers.pdf