Diversifying Participation in Undergraduate STEM Research at a Hispanic Serving Institution

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Background

- Participation in undergraduate research experiences has been shown to improve STEM students' self-efficacy, degree persistence, and academic achievement for minoritized students (Carpi et al., 2017; Jones et al., 2010; Slovacek et al., 2012)
- However, these experiences could be difficult for minoritized students to access, or it could be difficult for students to participate due to financial needs (Pierszalowski et al., 2021)
- The COVID-19 pandemic changed the nature of research experiences for many in STEM; it is unclear how these changes may have influenced students' academic outcomes associated
- In addition, the COVID-19 pandemic left many unemployed, making funding an important factor for students to consider during their education

Research Questions

- RQ1: Are the students participating in a funded research experience, aimed at Latinx and female STEM students, more diverse than their unfunded research peers and representative of their non-research participating STEM peers?
- RQ2: Is participating in a funded research experience associated with graduation GPA while controlling for first semester GPA?

Methods

Participants

- Sample consisted of undergraduate STEM students from Hispanic Serving southern California state university enrolled between Fall 2020 and Spring 2023
- 109 participated in the funded undergraduate research experience
- 359 enrolled in a STEM independent study course, unfunded research experience
- 1776 did not enroll in independent study or participate in the funded research experience

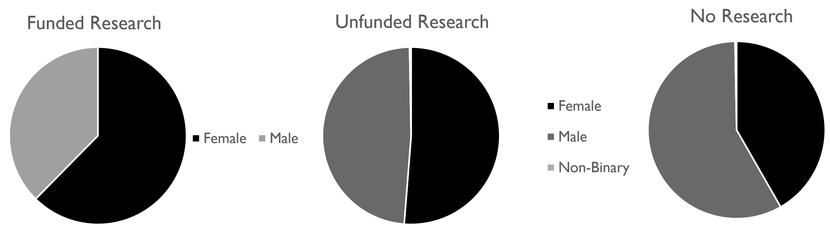
Methods for Funded Research Experience

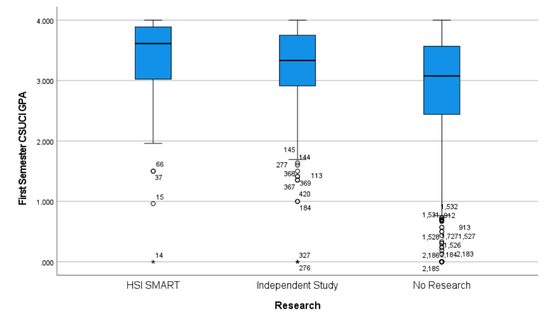
- Recruited via STEM faculty members or direct student communications
- $2100 a semester for ~10 hours a week for 15 weeks, expected to participate for at least 2 semesters
- Completed a participation agreement for each academic year which outlined expectations and deliverables (e.g. presenting at the campus undergraduate research conference)
- Were invited to a midsemester and end of term meeting for all participating in the program to share about their experiences and accomplishments

Results

Descriptives

	Funded Research	Unfunded Research	No Research
Gender (Female%, Non-binary%)	62.4%, 0%	51.3%, 0.3%	41.7%, 0.3%
Race/Ethnicity (White %)	21.1%	32.9%	26.3%
Parental Education (Graduated from 4-year %)	43.1%	41.8%	40.2%
Student Type (Transfer)	48.6%	56.8%	53%
First Semester GPA (M, SD)	3.38, 0.71	3.22, 0.69	2.84, 1.00





RQ1: Demographic Differences (Binary Logistic Regression on Full Sample)

Funded vs Unfunded Research = f(student type, gender, minoritized, other, Asian, parent's education, first semester GPA)

- χ^2 (7) = 17. 48, $p < 0.05$, Cox & Snell $R^2 = 0.04$
- Minoritized: Wald = 6.66, $p = 0.01$, Exp(B) = 2.12, 95% CI [1.20,3.74]
- First Semester GPA: Wald = 5.4, $p < 0.05$, Exp(B) = 1.53, 95% CI [1.07,2.20]

Funded vs No Research

- χ^2 (7) = 65.34, $p < 0.001$, Cox & Snell $R^2 = 0.03$
- Gender: Wald = 14.45, $p < 0.001$, Exp(B) = 2.22, 95% CI [1.47,3.34]
- Minoritized:. Wald = 3.47, $p = 0.06$, Exp(B) = 1.66, 95% CI [0.97,2.84]
- First Semester GPA: Wald = 31.14, $p < 0.001$, Exp(B) = 2.66, 95% CI [1.89,3.75]

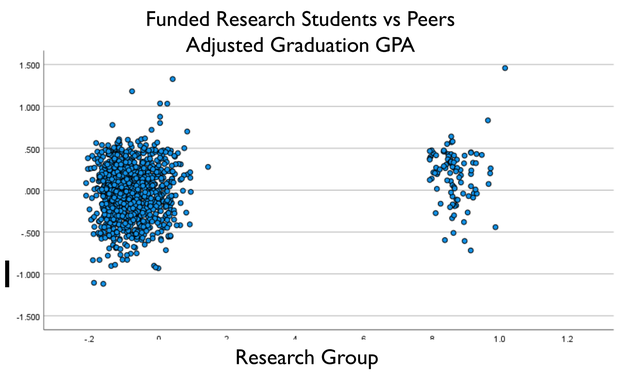
RQ2: Academic Outcomes (Linear Regression on Graduated Students*)

Graduation GPA = f(student type, parent's education, first semester GPA, Gender, Minoritized, Other, Asian, research group)

- $R^2 = 0.40$, $F(9,1109) = 81.43$, $p < 0.001$
- Student Type: $\beta = 0.06$, $t = 2.41$, $p < 0.05$
- Parent's education: $\beta = 0.07$, $t = 2.68$, $p < 0.01$
- First semester GPA: $\beta = 0.578$, $t = 24.24$, $p < 0.001$
- Minoritized: $\beta = -0.10$, $t = -3.54$, $p < 0.001$
- Funded vs No Research: $\beta = 0.13$, $t = 5.52$, $p < 0.001$
- Funded vs Unfunded: $\beta = 0.12$, $t = 4.40$, $p < 0.001$**

*95 funded, 237 unfunded, and 788 no research

**run as a separate model than the Funded vs No Research due to dummy coding



Discussion

- Funded students were more likely to be female and of minoritized race/ethnicity than STEM students who did not participate in research
- Funded students were more likely to be of minoritized race/ethnicity than their STEM counterparts who participated in unfunded research experience via an independent study course
- Although these populations were the target participants for the program, it was not clear whether faculty would follow these guidelines when recommending students for participation
- Those who participated in the funded research program were higher achieving at graduation than their unfunded and no-research peers, even when controlling for past academic achievement and demographics

Limitations & Future Directions

Limitations

- Funded research students are overall a higher academically achieving group
- Faculty vary in the types of research experiences they offer, some might provide more involvement

Future Directions

- Compare past students of faculty participating in funded research program to funded students
- Offer an alternative program for lower achieving STEM students

Works Cited

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Acknowledgements

This research would not be possible without the support of our program coordinator Yvette Cortez and the NSF award # 1928693