Undergraduate Research Participation: Predictors and Relationship with Research Career Pursuits

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Topics Covered

Background--research purpose and previous research

Research questions

Method--data sources, population, and data definitions

Results

Conclusions

Background

Relationship between Undergraduate Research Participation (UGRP) and the Choice of a Research Career

Existing research shows that UGRP:

- Helps clarify students' interest in research careers and increases students' expectations of obtaining a PhD (Russell, Hancock, & McCullough, 2007)

- Increases likelihood of pursuing doctoral, medical, and law degrees and increases likelihood of engaging in post-undergraduate research activity (Hathaway, Nagda, & Gregerman, 2002)

Background (continued)

- Retains talented students in the pipeline toward postgraduate science education (Lopatto, 2007)
- Linked to improved graduate school performance in key skill areas (Gilmore, 2015)
- Enhance interest of minority students in pursuing graduate studies in the Life Sciences (Villarejo, 2008) (Lopatto, ibid)

Background

Relationship between student characteristics and participating in undergraduate research?

- Positive outcomes were associated with age and class level (Willis, 2013)
- Differences in perceived value and ROI of UGRP for URM participants (Walker, 2013)
- Research review found a relative paucity and gaps in prior research on student characteristics, post-baccalaureate employment, graduate education and UGRP
- ***A primary goal of the present study is to provide new data and evidence on the relation between selected student characteristics, outcomes, and UGRP***

Research Questions

1. What are the predictors of undergraduate student research participation?
2. Is undergraduate research participation associated with obtaining an advanced (graduate) degree?
3. Is undergraduate research participation associated with pursuing a career in a research-related field?

Data Sources--Research Participation

- Measure of research participation: assisted faculty in research
- University of California Undergraduate Experience Survey (UCUES)
  - UCUES instrument: academic experience, globalization skills,civic & community engagement, and student development.
  - Administered once every two years
  - Response rate: around 40%, around 60,000 responses

Data Sources--Research Participation

- Research related- questions

Expectations	Experience	Aspirations
• Having **courses** with faculty members who refer to their own research • Learning research **methods** • Assisting faculty members in their research • Pursuing your own **research**	• **Participated** in a small research-oriented seminar with faculty, research or creative project outside of regular course, a research project or research paper as part of your course work • **Assisted** faculty in conducting research • **Satisfied** with opportunities for research experience, library research resources, library and online information research skills	• Highest **degree:** doctorate (Ph.D., Ed.D., etc.), etc. • **Career** plan after graduation: enroll in graduate or professional school, educator, researcher, scientist, etc.

Data Sources--Graduate Degrees

- Measure of graduate degrees: doctorate or professional doctorate
- The National Student Clearinghouse (NSC)
  - Submitted student's name and birthdate to NSC to identify graduate degree information
  - Master’s, doctoral, professional doctoral, or non-graduate degree

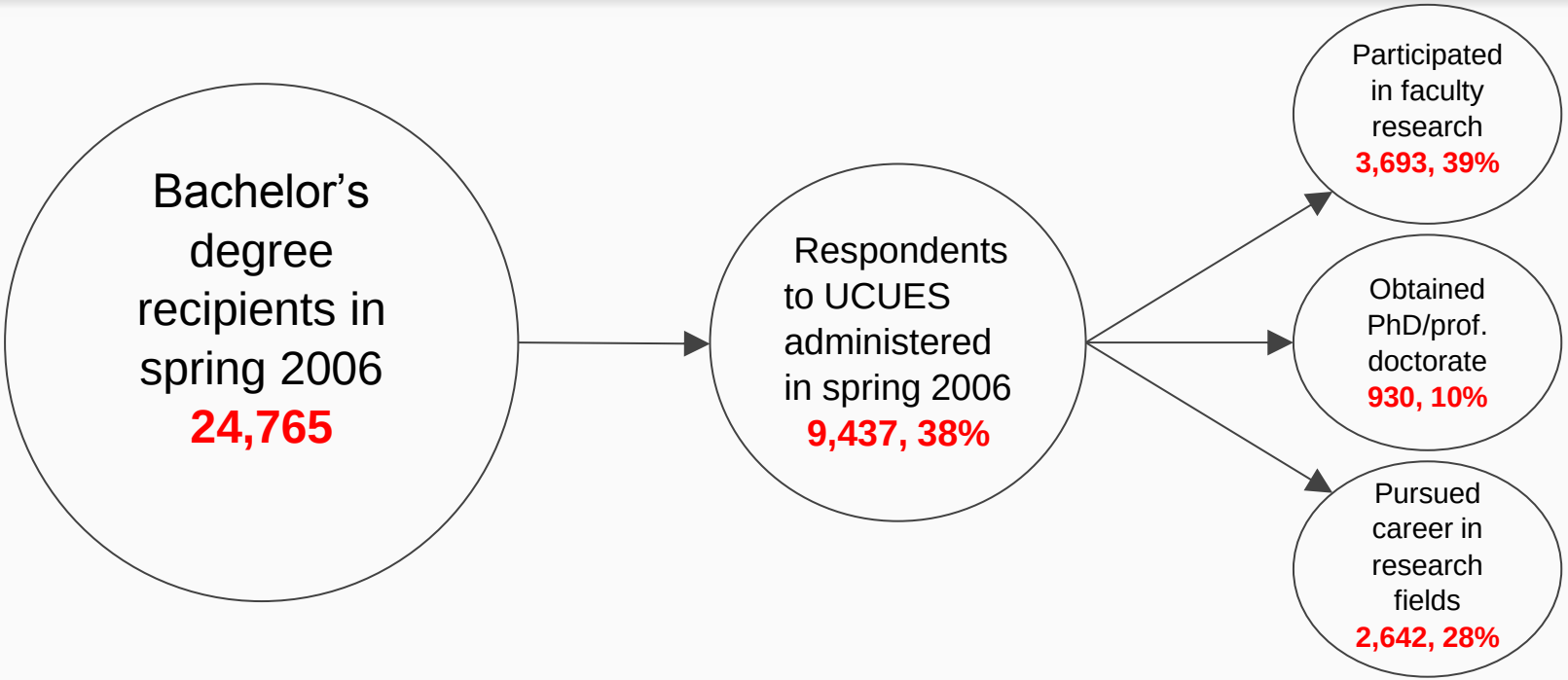
Data Sources--Employment

- Measure of research-related fields: Higher Education, other Education, R&D Social Science, or other Professional/Science areas
- The California Employment Development Department (EDD)
  - Submitted students' SSNs to EDD to identify alumni's employment
  - Research-related fields: Higher Education, other Education, R&D Social Science, other Professional/Science areas

Data Sources--Demographics/Background

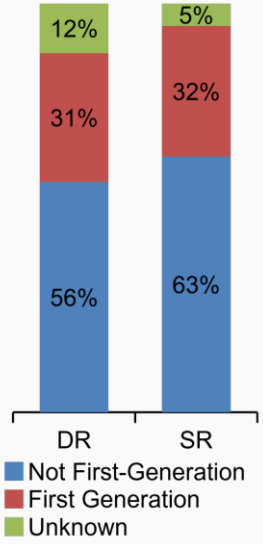
- University of California Data Warehouse (UCDW) at UC Office of the President
  - Ethnicity: African American, American Indian, Asian, Chicano/Latino, International, White, and Unknown/Other
  - First generation: no parents received a bachelor's degree
  - Student level when started at UC: freshman vs. transfer
  - Pell grant status: ever received a Pell grant at UC
  - Major: Intended major and degree major
  - First year GPA at UC
  - Graduation GPA at UC

Population

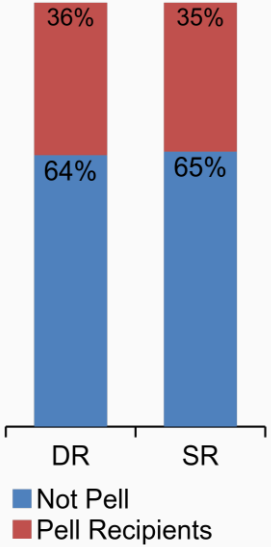

Bachelor's degree recipients in spring 2006
24,765
Respondents to UCUES administered in spring 2006
9,437, 38%
Participated in faculty research
3,693, 39%
Obtained PhD/prof. doctorate
930, 10%
Pursued career in research fields
2,642, 28%

Population and Survey Respondents by Selected Demographics

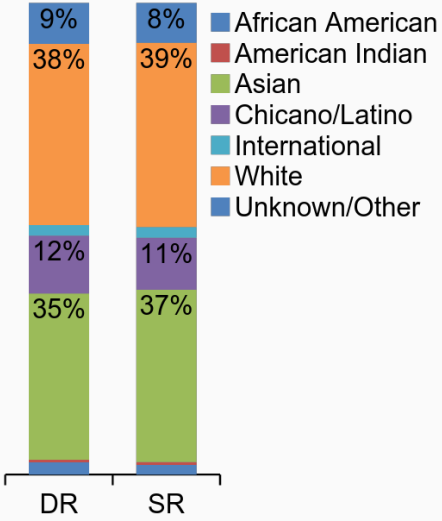
First Generation Status



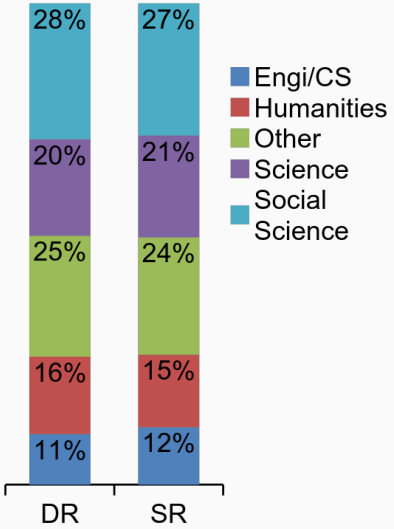
Pell Grant Status



Race/Ethnicity



Degree Discipline



DR=degree recipients in spring 2006 SR = survey respondents to UCUES

Analytic Strategy

Used logistic regression to examine predictors of each of our three outcomes:

1. Participated in research with a faculty member
2. Obtained a PhD/Professional Doctorate
3. Pursued a career in a research-related field

Results-Predictors of Research Participation

Predictor	Odds ratio and significance
	R-square: 14-18%
First year GPA at UC	OR=1.44, p < .001
Plan to Pursue PhD/Professional Doctorate (0 = no, 1 = yes)	OR=2.88, p < .001
Plan to Enroll in Graduate School (0 = no, 1 = yes)	OR=1.48, p < .001
Declared/Intended Field: Science (ref) vs. Humanities	OR=.27, p < .001
Declared/Intended Field: Science (ref) vs. Social Science	OR=.67, p < .001
Declared/Intended Field: Science (ref) vs. Other Discipline	OR=.62, p < .001
Applicant level: Transfer (0) vs. Frosh (1)	OR=1.18, p < 0.01
Race/ethnicity: White (ref) vs. International	OR = 1.77, p < .001
Race/ethnicity: White (ref) vs. Unknown	OR = .83, p < .04
First generation students (1) vs. others	OR = .87, p < .02

Notes:

- n=9,104
- **Non-significant predictors**: reading/writing skills; Engineering discipline; research skills; Pell Grant eligibility status; American Indian race/ethnicity; Asian race/ethnicity

Results- Predictors of Earning a PhD or Other Professional Doctorate

Predictor	Odds ratio and significance
R-squared	19-41%
Assisted Faculty in Research (0 = no, 1 = yes)	OR = 1.82, p < .001
Plan to Pursue PhD/Professional Doctorate (0 = no, 1 = yes)	OR = 12.42, p < .001
Plan to Enroll in Graduate School (0 = no, 1 = yes)	OR = 2.27, p < .001
Baccalaureate Degree: Science (ref) vs. Engineering/Computer Science	OR = .48, p < .001
Baccalaureate Degree: Science (ref) vs. Humanities	OR = .23, p < .001
Baccalaureate Degree: Science (ref) vs. Social Sciences	OR = .39, p < .001
Baccalaureate Degree: Science (ref) vs. Other	OR = .34, p < .001
Undergraduate GPA at Graduation	OR = 1.68, p < .001
Applicant level: Transfer (0) vs. Frosh (1)	OR = 1.38, p < .01
First Generation Status: Not First Generation (0) vs. First Generation(1)	OR = 1.23, p = .03
Race/ethnicity: White (ref) vs. International	OR = .39, p < .01
Race/ethnicity: White (ref) vs. Hispanic	OR = 62, p < .01
Race/ethnicity: White (ref) vs. African American	OR = .45, p = .02

Notes:

- n=8,602
- **Non-significant predictors**: reading/analytic skills; research skills; Pell Grant eligibility status; American Indian, Asian, Unknown race/ethnicity

Results- Predictors of Employment in a Research-Related Field

Predictor	Odds ratio and significance
R-squared	2-3%
Assisted Faculty in Research (0 = no, 1 = yes)	OR = 1.20, p = .01
Plan to Pursue PhD/Professional Doctorate (0 = no, 1 = yes)	OR = 1.61, p < .001
Reading/Analytic Skills at Graduation from UC	OR = 1.13, p < .04
Baccalaureate Degree: Science (ref) vs. Engineering/Computer Science	OR = .69, p < .01
First Generation Status: Not First Generation (0) vs. First Generation(1)	OR = 1.18, p = .03

Notes:
•n=4,690
•**Non-significant predictors**: research skills at Graduation from UC; applicant level; Pell Grant eligibility status; race/ethnicity; humanities, social science, other degree discipline; plans to enroll in graduate school; undergraduate GPA at graduation

Conclusions – Research Questions

1. What are the predictors of undergraduate student research participation?

   Intent to pursue further education
   Science major
   High-achieving student
   Generation status

2. Is undergraduate research participation associated with obtaining an advanced (graduate) degree?

   Yes

3. Is undergraduate research participation associated with pursuing a career in a research-related field?

   Yes

Conclusions – Limitations and Next Steps

Chicken and egg?

- Combine into a single model to better view determinants

Challenge of identifying “research fields” in employment data

- Potential other sources for data?

Remaining questions regarding opportunity to participate

Questions?

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