

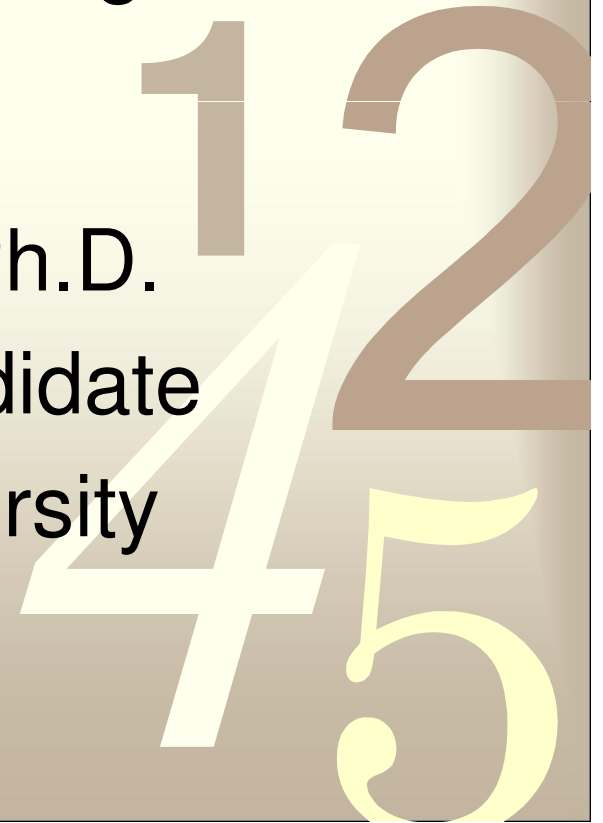
The Effects of College on Degree Attainment for Women and Underrepresented Minorities in the Sciences at Four-Year Colleges and Universities

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Definitions

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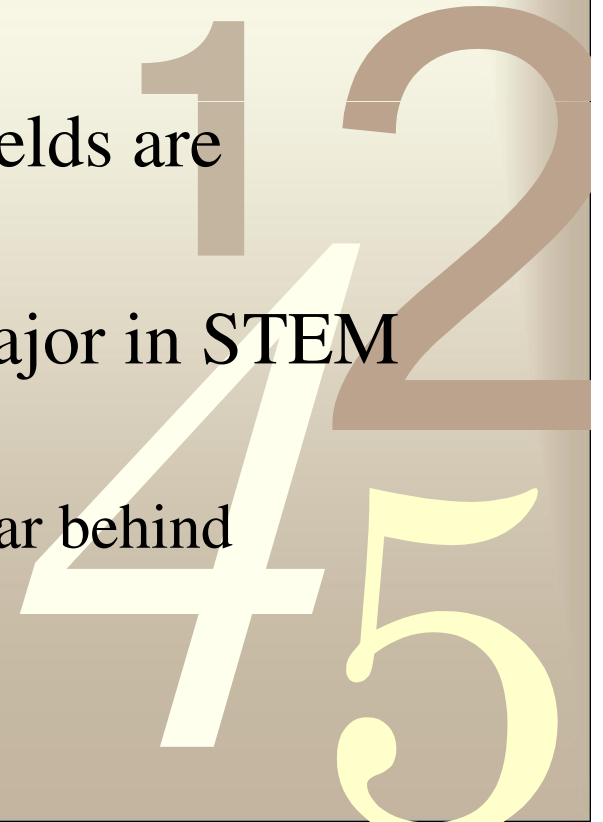
- Underrepresented Minorities
 - Incl. Black and Hispanics
 - Excl. Asians
- STEM fields
 - NCES field definitions
 - Excl. Social Sciences



Background

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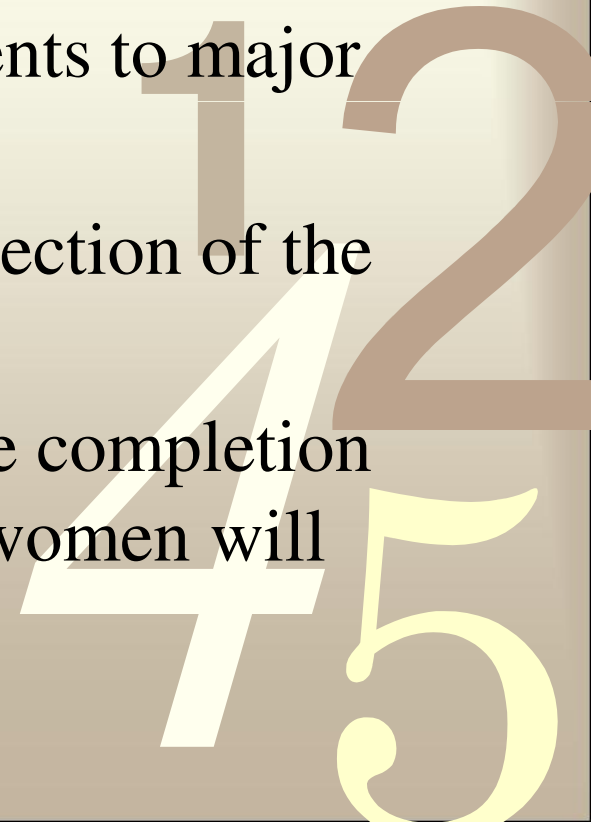
- There has been an increase in the numbers of underrepresented minority and women in the science fields.
- However, the increase in the other fields are outpacing that of the science fields.
- Minorities and women wishing to major in STEM has increased.
 - Retention and degree completion lags far behind



Problem Statement

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- STEM fields are the economic engine of the country
- There is a growing demand for students to major in the STEM fields
- Cannot afford to neglect a growing section of the population
- Understanding what increases degree completion in STEM for minority students and women will help focus policy



Purpose and Research Questions

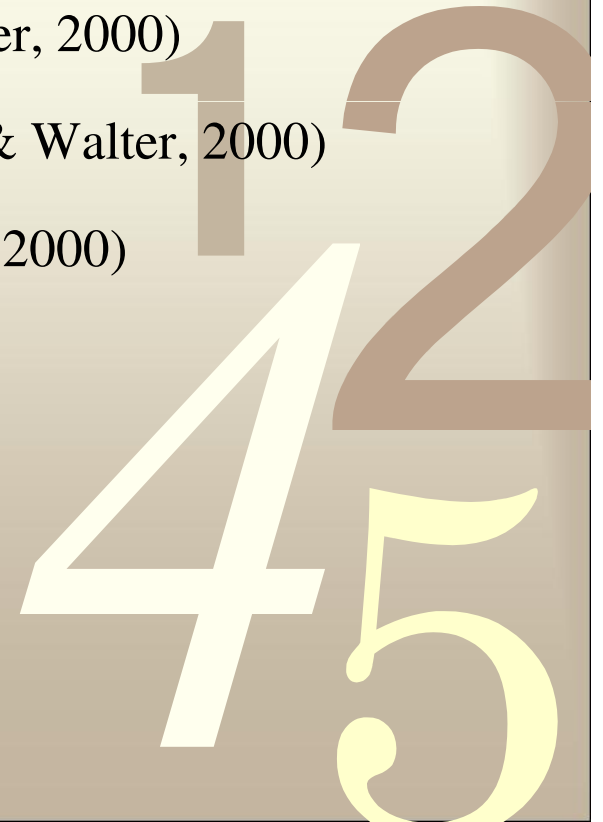
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- To assess the extent to academic and social experiences in college impact degree completion of underrepresented minorities in the sciences over the past decade.
 - 1) What background characteristics, institutional characteristics, and college experiences impact degree attainment for science majors
 - 2) To what extent are academic and other college related effects of degree completion general or conditional across race/ethnicity
 - 3) To what extent are academic and other college related effects of degree completion general or conditional across gender

Literature Review

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- Parental education (Gruca, Ethington, & Pascarella, 1988; Grandy, 1998)
- Financial support (Haung, Taddese, & Walter, 2000)
- Academic preparation (Haung, Taddese, & Walter, 2000)
- Self confidence (Haung, Taddese, & Walter, 2000)
- Environment (Meinholdt & Murray, 1999)



Conceptual Framework

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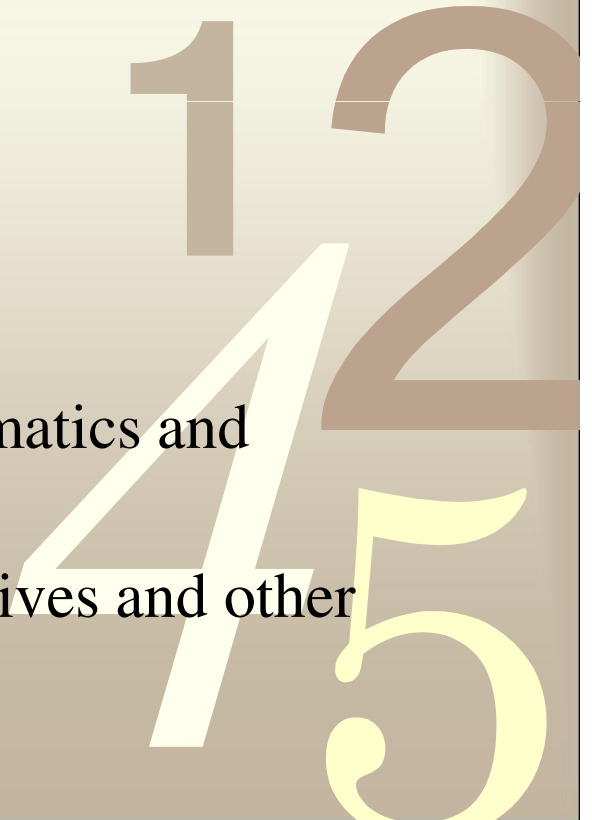
- Astin Input-Environment-Output (I-E-O)
- Input
 - Background Characteristics
- Environment
 - College Experiences
 - Institutional Characteristics
- Output
 - 6 year degree completion



Data Source and Sample

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- 1996/2001 cohort of Beginning Postsecondary Students (BPS) longitudinal study.
 - Three waves: 1996, 1998, and 2001
- Sample
 - Below the age of 30
 - enrolled in four-year institutions
 - declared a major in the Science, Mathematics and Engineering fields
 - Excluded American Indians/Alaska Natives and other race/ethnicity students



Variables

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- Output
 - Degree completion in 6 years
- Background Characteristics
 - Age, gender, parental education, income, high school grades
- Institutional Characteristics
 - Type, classification, size
- Academic Experiences and Other College Experiences
 - Interactions with faculty, social integration, attendance status, hours worked

Data Analysis

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- Pre analysis data screening
- Academic Experiences ($\alpha = 0.6$)
- Logistic regression
 - Weighted Block regression
 - 3 models
 - Full sample
 - interaction with female variable
 - interaction with minority variable



Pre Analysis Screening

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- Undeclared majors
- Outliers
 - Parental Income
- Missing data
 - Not less than 5 percent



Results

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- Descriptive Statistics

Variable	Full Sample	Minority Sample	Female Sample
	% of cell	% of cell	
Completed Degree	51.5	46.3	44.2
Parent's Educational Level			
Less than high school	2.8	5.6	2.0
High school degree	28.4	39.7	31.3
Some post secondary education	18.8	18.0	18.3
Bachelor's degree or higher	50.1	36.6	48.4
Parental Income			
Less than \$25,000	19.9	34.4	21.0
Between \$25,000 and \$50,000	22.8	30.5	21.0
Between \$50,000 and \$75,000	26.3	22.3	27.1
Between \$75,000 and \$100,000	16.0	6.4	14.7
Greater than \$100,000	15.0	6.5	16.2
Aspiration for Graduate Education	67.0	81.4	68.4
Average High School Math B or above	91.7	84.1	91.9
Average High School Science B or above	92.2	85.8	91.8

Model Statistics (full sample)

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Block Entered	Percentage of observations predicted
Background Characteristics	64.8
Institutional Characteristics	66.4
Academic Experiences	66.9
Social Experiences	73.2

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Model Statistics (with interaction terms)

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Block Entered	Minority	Female
Background Characteristics	64.6	64.8
Institutional Characteristics	66.2	66.4
Academic Experiences	67.0	66.9
Social Experiences	73.4	73.2
Interaction with Academic Experience	73.2	73.1
Interaction with Social Experience	73.2	72.9

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Results

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- Full Sample

Variable	Log odds	Odds Ratio
Female	-0.188***	0.83
Minority Student	-0.322***	0.72
Talked with faculty outside class (96/97)	0.504***	1.66
Talked with faculty outside class (98)	0.316***	1.37
Met with advisor	-0.286***	0.75
Social contact with faculty	-0.233***	0.79
Had study groups outside of class	-0.297***	1.02
Social Integration	0.002***	1.00
Satisfied with campus climate	-0.110***	0.90
Attending full-time	2.354***	10.53
Worked 15 hours or more	-0.552***	0.58



Results

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- Interactions with Minority variable

Variable	Log odds	Odds Ratio	Log odds	Odds Ratio
Female	-0.211***	0.81		
Minority Student	-0.579***	0.56		
Talked with faculty outside class (96/97)	0.834***	1.66	-0.801***	0.45
Talked with faculty outside class (98)	0.367***	1.37	-0.298***	0.74
Met with advisor	-0.349***	0.75	0.028	1.03
Social contact with faculty	0.071***	0.79	-1.121***	0.33
Had study groups outside of class	0.461***	1.02	0.841***	2.32
Social Integration	0.002***	1.00	0.015***	1.02
Attending full-time	2.126***	10.53	0.471***	1.60
Worked 15 hours or more	-0.462***	0.58	-0.915***	0.40
Lived on campus	0.204***	1.23	-0.628***	0.53

Results

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- Interactions with Female variable

Variable	Log odds	Odds Ratio	Log odds	Odds Ratio
Female	-2.592***	0.07		
Black Student	-0.174***	0.84		
Hispanic Student	-0.227***	0.80		
Talked with faculty outside class (96/97)	0.423***	1.53	0.298***	1.35
Talked with faculty outside class (98)	0.345***	1.41	-0.176***	0.84
Met with advisor	-0.238***	0.79	-0.151***	0.86
Social contact with faculty	-0.112***	0.89	-0.214***	0.81
Had study groups outside of class	-0.251***	0.78	-0.241***	0.78
Social Integration	-0.001***	0.10	0.007***	1.01
Attending full-time	2.089***	8.08	3.056***	21.2
Worked 15 hours or more	-0.682***	0.51	0.378***	1.46
Lived on campus	0.376***	1.46	-0.376***	0.69

Recommendations

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- Improvement of Faculty relations
 - Increasing the number of minority and female faculty in STEM
- Increase opportunities for meaningful peer interactions
- Reduce dependence on work income (minority students)
 - Increase financial assistance
 - Work study opportunities less than 15
 - More opportunities to attend full-time



Conclusion

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- Need to understand the differential effects for minority and female students
- Need to explore within degree completion and post baccalaureate persistence in STEM
- Need to explore major changes into and out of STEM

