The Only Women in the Room: When College Peers Matter the Most

EEA-ESEM 2023

Josefa Aguirre, *PUC*
Juan Matta, *UDP*
Ana María Montoya, *U.Chile*

September, 2023

Motivation

- Literature shows that college peers can be relevant for academic performance; social outcomes and career choices (Sacerdote, 2001 and Zimmerman, 2003)
- However, we still have a long way to go in understanding how peer influence interacts with gender
  - Social interactions are stronger among same-sex peers due to homophily
  - Cross-sex interactions could affect men and women differently
  - Peers effects could vary across different environments

Motivation

- Peer effects have gained attention in the literature exploring women's underrepresentation in certain fields and occupations
  - Female peers
    - Could be a source of networks, information, and support,
    - Could provide gender-specific advice on navigating a male-dominated and often hostile environment (Hampole et al., 2021; Bostwick and Weinberg, 2022).
  - Male peers
    - Could encourage women to pursue more lucrative career paths or provide access to larger networks (Thomas, 2021).
  - High-achieving male peers
    - Could deter women from highly competitive and male-dominated fields, such as STEM (Calkins et al., 2020; Fischer, 2017).

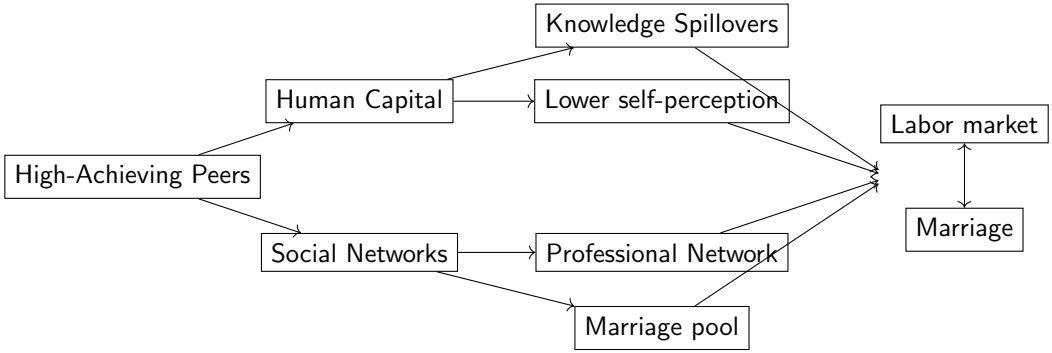
This paper

We investigate the effects of college peers on long-term outcomes of men and women, including graduation, earnings, fertility and marriage.

- Use a nationwide database covering 25 college institutions and over 100 majors in every area of study in Chile
- Exploit the fact that in Chile students enroll directly into a specific major in a particular college institution:
  - Well-defined group of peers that is likely to be relevant from academic and professional perspectives.
  - Can exploit quasi-random variation in the quality of male and female college peers (variation in peer across cohorts and within programs)
  - Are able to look at different peer characteristics (socio-demographics and performance)
  - Are able to look at multiple outcomes using administrative data

Mechanisms

- We investigate the effects of high-achieving college peers on long-term outcomes of men and women, including graduation, earnings, fertility and marriage (25 institutions and 100 majors)



Preview of results

- Peer quality is important for women, but not so for men (Fischer, 2017; Lim and Meer, 2020)
- For women in STEM
  - High achieving female-peers
    - Increase graduation
    - Increase earnings *
    - Decrease fertility
    - Improve marriage market outcomes
  - High achieving male-peers
    - Decrease graduation
    - Decrease earnings *
    - No impact on the probability of working at a firm affiliated with other program alumni, male program alumni, or high-performing male program alumni.
    - Increase fertility

College Admission in Chile

1. Prospective students take a standardized test (PSU) and get results
2. Students submit an application to a centralized system using an online platform (25 universities participate in the system)
   - Students apply directly to specific majors within postsecondary institutions
   - They submit their applications to the system using an online platform. Up to 8 programs ranked from most to least preferred
3. The system implements a deferred acceptance assignment algorithm to determine admission (Gale and Shapley, 1962)

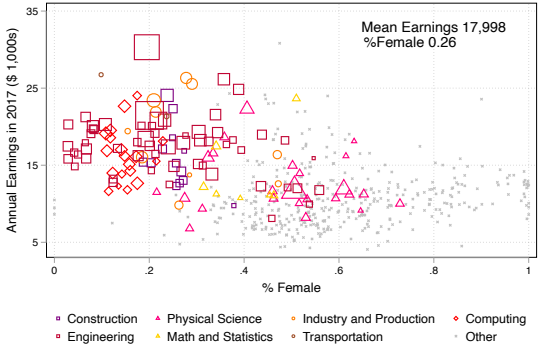
Data

- Focus on students who enrolled in a university participating in SUA between 2000 and 2012
- For students and their peers we have:
  - **Educational records**: socioeconomic information that students provide when signing up to take admission tests, admission test scores, high school GPA, and university enrollment.
  - **Graduation records** for all higher institutions in the country for the 2007 to 2021 period
  - **Labor earnings** data 2000-2017 (ages 30 to 36):
    - Chile's Unemployment Insurance (all private sector, except the self-employed ($\approx$ 15%) and public sector ($\approx$ 20%))
  - **Fertility** and **marriage** records from the civil registration system.

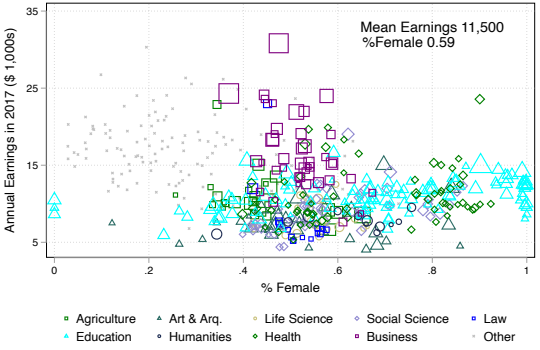
Sample Description

	2003-2012 Cohorts				2000-2008 Cohorts			
	Women		Men		Women		Men	
	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
Cohort Characteristics								
Cohort Size	85.652	78.156	111.012	121.067	86.357	77.110	115.903	115.879
Socioeconomic Characteristics								
Mother tertiary ed	0.389	0.488	0.392	0.488	0.395	0.489	0.392	0.488
Private school	0.188	0.391	0.215	0.411	0.219	0.414	0.244	0.430
Academic Performance								
Math rank	0.774	0.168	0.831	0.150	0.777	0.166	0.831	0.148
GPA rank	0.785	0.196	0.704	0.237	0.780	0.201	0.685	0.247
Language rank	0.793	0.170	0.787	0.179	0.788	0.174	0.784	0.183
Graduation (10 years after HS)								
Graduates Univ	0.715	0.452	0.579	0.494				
Graduates Program	0.553	0.497	0.401	0.490				
Earnings and Employment (10 years after HS)								
Annual Earnings					8,923	11,637	10,600	13,308
Months worked a year					0.588	0.492	0.628	0.483
Fertility and Marriage (10 years after HS)								
Has child					0.275	0.447	0.219	0.414
Married					0.186	0.389	0.136	0.343
Obs	161,007		176,140		133,951		148,006	

STEM and non-STEM Programs



Stem



Non-Stem

Main Variable

	Women						Men					
	(1) Grad. Univ	(2) Grad Program	(3) Annual Earnings	(4) Months Worked	(5) Has Child	(6) Married	(7) Grad. Univ	(8) Grad Program	(9) Annual Earnings	(10) Months Worked	(11) Has Child	(12) Married
					All							
Math rank	0.35***	0.43***	4,341***	0.07***	−0.06***	0.03***	0.45***	0.53***	5,370***	0.04***	0.02	0.06***
	(0.01)	(0.01)	(299.0)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(363.7)	(0.01)	(0.01)	(0.01)
GPA rank	0.34***	0.34***	3,626***	0.04***	−0.12***	0.02***	0.36***	0.32***	4,022***	0.02***	−0.06***	0.03***
	(0.01)	(0.01)	(183.1)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(161.3)	(0.01)	(0.01)	(0.00)
Lang rank	0.00	0.01	−379.4	−0.04***	−0.06***	0.01	−0.00	−0.00	−971.1***	−0.06***	−0.07***	0.02**
	(0.01)	(0.01)	(270.6)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(268.1)	(0.01)	(0.01)	(0.01)
Mean dependent variable	0.71	0.55	8,923	0.59	0.28	0.19	0.58	0.40	10,600	0.63	0.22	0.14
N. Obs.	161,007	161,007	131,700	133,951	131,700	131,700	176,140	176,140	145,426	148,006	145,426	145,426

Empirical Strategy

- We identify peer effects by exploiting variation across-years and within-program in male and female peers' test scores
- Our base econometric specification is:

$$y_{ijt} = \alpha + \beta_f \cdot \overline{s}^f_{ijt} + \beta_m \cdot \overline{s}^m_{ijt} + \gamma \cdot s_{ijt} + \lambda X_{ijt} + \delta_j \cdot t + \mu_j + \eta_t + \varepsilon_{ijt}$$

  - y_{ijt} is the outcome of interest for student i in program j and cohort t observed ten years after college enrollment
  - s_{ijt} individual ability for student i
  - $\overline{s}^f_{ijt}$ ($\overline{s}^m_{ijt}$,) average of s_{kjt} for every female (male) student k in program-cohort jt, excluding i.
  - X_{ijt} individual characteristics

Empirical Strategy

- Balance Test Balance Test
- Constancy of the treatment effect between groups Weights
- Residual variation in the main variable Residual Variation
- Robustness check: Leveraging centralized program assignment Alternative Specification

Results: Graduation

	Women			Men		
	(1)	(2)	(3)	(4)	(5)	(6)
	Grad Univ	Grad Univ on Time	Grad Program	Grad Univ	Grad Univ on Time	Grad Program
Panel A: All						
Mean rank of female peers	0.14***	0.07	0.02	0.03	−0.00	0.03
	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)
Mean rank of male peers	−0.01	−0.07	−0.06	−0.02	−0.06	−0.07
	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)
N. Clus.	566	566	566	560	560	560
N. Obs.	161,007	161,007	161,007	176,140	176,140	176,140
Mean dependent variable	0.71	0.48	0.55	0.58	0.30	0.40
Panel B: STEM						
Mean rank of female peers	0.29**	0.01	0.18	0.09	0.03	0.09
	(0.12)	(0.12)	(0.12)	(0.08)	(0.07)	(0.07)
Mean rank of male peers	−0.18	−0.35**	−0.39**	−0.11	−0.06	−0.15
	(0.18)	(0.16)	(0.16)	(0.11)	(0.10)	(0.12)
N. Clus.	163	163	163	163	163	163
N. Obs.	28,088	28,088	28,088	82,068	82,068	82,068
Mean dependent variable	0.64	0.29	0.32	0.55	0.23	0.29
Panel C: non-STEM						
Mean rank of female peers	0.10	0.10	−0.01	−0.06	−0.05	−0.06
	(0.06)	(0.07)	(0.08)	(0.07)	(0.07)	(0.08)
Mean rank of male peers	−0.01	−0.05	−0.05	0.01	−0.06	−0.05
	(0.05)	(0.06)	(0.06)	(0.07)	(0.07)	(0.08)
N. Clus.	403	403	403	397	397	397
N. Obs.	132,919	132,919	132,919	94,072	94,072	94,072
Mean dependent variable	0.73	0.52	0.60	0.61	0.37	0.49

Results: Graduation

	Women			Men		
	(1)	(2)	(3)	(4)	(5)	(6)
	Grad Univ	Grad Univ on Time	Grad Program	Grad Univ	Grad Univ on Time	Grad Program
Panel A: All						
Mean rank of female peers	0.14***	0.07	0.02	0.03	−0.00	0.03
	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)
Mean rank of male peers	−0.01	−0.07	−0.06	−0.02	−0.06	−0.07
	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)
N. Clus.	566	566	566	560	560	560
N. Obs.	161,007	161,007	161,007	176,140	176,140	176,140
Mean dependent variable	0.71	0.48	0.55	0.58	0.30	0.40
Panel B: STEM						
Mean rank of female peers	0.29**	0.01	0.18	0.09	0.03	0.09
	(0.12)	(0.12)	(0.12)	(0.08)	(0.07)	(0.07)
Mean rank of male peers	−0.18	−0.35**	−0.39**	−0.11	−0.06	−0.15
	(0.18)	(0.16)	(0.16)	(0.11)	(0.10)	(0.12)
N. Clus.	163	163	163	163	163	163
N. Obs.	28,088	28,088	28,088	82,068	82,068	82,068
Mean dependent variable	0.64	0.29	0.32	0.55	0.23	0.29

Results: Labor Market Outcomes

	Women				Men			
	(1) Works at least 1 month	(2) Earnings	(3) N of months of experience	(4) N of employers	(5) Works at least 1 month	(6) Earnings	(7) N of months of experience	(8) N of employers
All								
Mean rank of female peers	0.08	1,736	0.79	0.11	−0.04	−397.2	−3.60	−0.76
	(0.06)	(1,356)	(3.07)	(0.53)	(0.05)	(1,546)	(3.10)	(0.54)
Mean rank of male peers	−0.05	−1,896**	−1.11	0.08	−0.02	−1,701	−3.49	−0.62
	(0.05)	(954.1)	(2.32)	(0.44)	(0.07)	(1,531)	(3.59)	(0.63)
Mean dependent variable	0.58	8,918	24.22	4.37	0.62	10,595	25.49	4.70
N. Clus.	522	522	522	522	515	515	515	515
N. Obs.	131,411	131,411	131,411	131,411	145,240	145,240	145,240	145,240
STEM								
Mean rank of female peers	0.17	2,194	3.60	0.42	−0.01	−682.8	0.06	−0.34
	(0.14)	(3,910)	(6.34)	(1.06)	(0.07)	(2,238)	(4.17)	(0.72)
Mean rank of male peers	−0.07	−4,456	−2.18	−1.00	−0.07	−4,790	−3.54	−0.60
	(0.19)	(4,927)	(8.46)	(1.61)	(0.11)	(3,807)	(7.19)	(1.22)
Mean dependent variable	0.64	11,546	24.21	4.38	0.70	13,810	27.87	4.98
N. Clus.	133	133	133	133	133	133	133	133
N. Obs.	21,860	21,860	21,860	21,860	63,598	63,598	63,598	63,598
non-STEM								
Mean rank of female peers	0.06	1,789	0.73	0.20	−0.07	636.6	−8.09*	−1.29*
	(0.07)	(1,414)	(3.51)	(0.60)	(0.08)	(1,616)	(4.31)	(0.77)
Mean rank of male peers	−0.04	−1,543	−0.83	0.17	0.00	−656.8	−2.00	−0.38
	(0.05)	(953.6)	(2.43)	(0.46)	(0.08)	(1,502)	(4.29)	(0.76)
Mean dependent variable	0.57	8,394	24.22	4.36	0.56	8,091	23.63	4.49
N. Clus.	389	389	389	389	382	382	382	382
N. Obs.	109,551	109,551	109,551	109,551	81,642	81,642	81,642	81,642

Results: Labor Market Outcomes

	Women				Men			
	(1) Works at least 1 month	(2) Earnings	(3) N of months of experience	(4) N of employers	(5) Works at least 1 month	(6) Earnings	(7) N of months of experience	(8) N of employers
All								
Mean rank of female peers	0.08	1,736	0.79	0.11	−0.04	−397.2	−3.60	−0.76
	(0.06)	(1,356)	(3.07)	(0.53)	(0.05)	(1,546)	(3.10)	(0.54)
Mean rank of male peers	−0.05	−1,896**	−1.11	0.08	−0.02	−1,701	−3.49	−0.62
	(0.05)	(954.1)	(2.32)	(0.44)	(0.07)	(1,531)	(3.59)	(0.63)
Mean dependent variable	0.58	8,918	24.22	4.37	0.62	10,595	25.49	4.70
N. Clus.	522	522	522	522	515	515	515	515
N. Obs.	131,411	131,411	131,411	131,411	145,240	145,240	145,240	145,240
STEM								
Mean rank of female peers	0.17	2,194	3.60	0.42	−0.01	−682.8	0.06	−0.34
	(0.14)	(3,910)	(6.34)	(1.06)	(0.07)	(2,238)	(4.17)	(0.72)
Mean rank of male peers	−0.07	−4,456	−2.18	−1.00	−0.07	−4,790	−3.54	−0.60
	(0.19)	(4,927)	(8.46)	(1.61)	(0.11)	(3,807)	(7.19)	(1.22)
Mean dependent variable	0.64	11,546	24.21	4.38	0.70	13,810	27.87	4.98
N. Clus.	133	133	133	133	133	133	133	133
N. Obs.	21,860	21,860	21,860	21,860	63,598	63,598	63,598	63,598

Results: Effects of Networks on Labor Market Outcomes

	Women					Men				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Employed at firm with any					Employed at firm with any				
	Alumn	Female Alumn	Male Alumn	High Perf. Female Alumn	High Perf. Male Alumn	Alumn	Female Alumn	Male Alumn	High Perf. Female Alumn	High Perf. Male Alumn
All										
Mean rank of female peers	0.06	0.04	0.03	0.05	0.03	−0.01	0.04	−0.01	0.06*	0.03
	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)	(0.03)	(0.05)	(0.03)	(0.04)
Mean rank of male peers	0.01	0.00	0.01	0.05	0.02	−0.09	−0.05	−0.11**	−0.05	−0.09*
	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.06)	(0.05)	(0.05)	(0.04)	(0.05)
Mean dependent variable	0.27	0.23	0.18	0.18	0.15	0.26	0.16	0.22	0.12	0.19
N. Clus.	524	524	524	524	524	517	517	517	517	517
N. Obs.	131,700	131,700	131,700	131,700	131,700	145,426	145,426	145,426	145,426	145,426
STEM										
Mean rank of female peers	0.11	0.04	0.11	0.06	0.05	−0.07	0.00	−0.05	0.00	0.04
	(0.12)	(0.11)	(0.12)	(0.09)	(0.12)	(0.07)	(0.04)	(0.07)	(0.04)	(0.06)
Mean rank of male peers	0.10	0.02	0.04	0.06	0.02	−0.17	−0.06	−0.21*	−0.05	−0.22**
	(0.17)	(0.14)	(0.17)	(0.12)	(0.16)	(0.12)	(0.09)	(0.12)	(0.09)	(0.10)
Mean dependent variable	0.26	0.17	0.22	0.13	0.19	0.29	0.14	0.27	0.10	0.23
N. Clus.	133	133	133	133	133	133	133	133	133	133
N. Obs.	21,860	21,860	21,860	21,860	21,860	63,598	63,598	63,598	63,598	63,598
non-STEM										
Mean rank of female peers	0.04	0.03	0.01	0.04	0.01	0.07	0.09*	0.06	0.13**	0.04
	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)
Mean rank of male peers	0.00	0.00	0.01	0.05	0.02	−0.09	−0.05	−0.09*	−0.06	−0.06
	(0.05)	(0.04)	(0.03)	(0.04)	(0.03)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)
Mean dependent variable	0.27	0.24	0.17	0.20	0.14	0.23	0.18	0.18	0.14	0.15
N. Clus.	391	391	391	391	391	384	384	384	384	384
N. Obs.	109,840	109,840	109,840	109,840	109,840	81,828	81,828	81,828	81,828	81,828

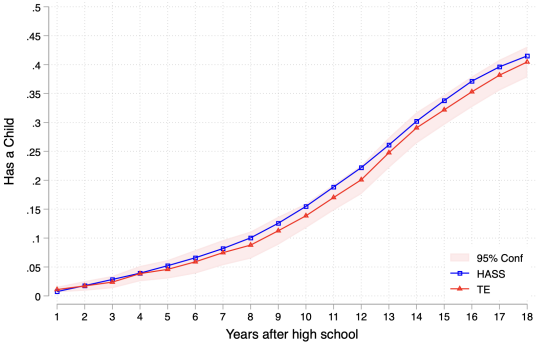
Results: Effects of Networks on Labor Market Outcomes

	Women					Men				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Employed at firm with any					Employed at firm with any				
	Alumn	Female Alumn	Male Alumn	High Perf. Female Alumn	High Perf. Male Alumn	Alumn	Female Alumn	Male Alumn	High Perf. Female Alumn	High Perf. Male Alumn
All										
Mean rank of female peers	0.06	0.04	0.03	0.05	0.03	−0.01	0.04	−0.01	0.06*	0.03
	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)	(0.03)	(0.05)	(0.03)	(0.04)
Mean rank of male peers	0.01	0.00	0.01	0.05	0.02	−0.09	−0.05	−0.11**	−0.05	−0.09*
	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.06)	(0.05)	(0.05)	(0.04)	(0.05)
Mean dependent variable	0.27	0.23	0.18	0.18	0.15	0.26	0.16	0.22	0.12	0.19
N. Clus.	524	524	524	524	524	517	517	517	517	517
N. Obs.	131,700	131,700	131,700	131,700	131,700	145,426	145,426	145,426	145,426	145,426
STEM										
Mean rank of female peers	0.11	0.04	0.11	0.06	0.05	−0.07	0.00	−0.05	0.00	0.04
	(0.12)	(0.11)	(0.12)	(0.09)	(0.12)	(0.07)	(0.04)	(0.07)	(0.04)	(0.06)
Mean rank of male peers	0.10	0.02	0.04	0.06	0.02	−0.17	−0.06	−0.21*	−0.05	−0.22**
	(0.17)	(0.14)	(0.17)	(0.12)	(0.16)	(0.12)	(0.09)	(0.12)	(0.09)	(0.10)
Mean dependent variable	0.26	0.17	0.22	0.13	0.19	0.29	0.14	0.27	0.10	0.23
N. Clus.	133	133	133	133	133	133	133	133	133	133
N. Obs.	21,860	21,860	21,860	21,860	21,860	63,598	63,598	63,598	63,598	63,598

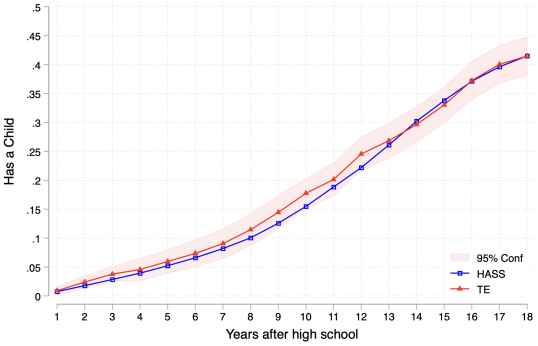
Results: Fertility

	Women		Men	
	Child Born	N of Children	Child Born	N of Children
All				
Mean rank of female peers	0.027	−0.039	0.062*	0.018
	(0.04)	(0.07)	(0.03)	(0.05)
Mean rank of male peers	0.002	−0.024	0.009	−0.021
	(0.03)	(0.06)	(0.04)	(0.06)
Mean dependent variable	0.17	0.27	0.13	0.21
N. Clus.	506	506	499	499
N. Obs.	156,761	156,761	171,687	171,687
STEM				
Mean rank of female peers	−0.163	−0.347**	0.067	−0.020
	(0.11)	(0.16)	(0.05)	(0.08)
Mean rank of male peers	0.226*	0.408**	−0.009	0.033
	(0.13)	(0.19)	(0.08)	(0.12)
Mean dependent variable	0.15	0.26	0.13	0.22
N. Clus.	130	130	130	130
N. Obs.	25,014	25,014	75,158	75,158
non-STEM				
Mean rank of female peers	0.072	0.023	0.065	0.062
	(0.05)	(0.08)	(0.05)	(0.07)
Mean rank of male peers	−0.010	−0.053	0.032	−0.020
	(0.03)	(0.06)	(0.05)	(0.08)
Mean dependent variable	0.17	0.28	0.13	0.21
N. Clus.	376	376	369	369
N. Obs.	131,747	131,747	96,529	96,529

Results: Fertility Women



High-achieving female peers



High-achieving male peers

Results: Marriage

	Women						Men					
	Married	Has Spouse	Spouse from program	Spouse GPA rank	Spouse Math rank	Spouse annual earnings	Married	Has Spouse	Spouse from program	Spouse GPA rank	Spouse Math rank	Spouse annual earnings
All												
Mean rank of female peers	−0.044	−0.017	−0.016	−0.003	0.101	8,461***	−0.028	0.019	0.026*	0.080	0.120**	3,850
	(0.05)	(0.05)	(0.02)	(0.07)	(0.07)	(2,755)	(0.04)	(0.05)	(0.01)	(0.05)	(0.05)	(2,364)
Mean rank of male peers	−0.021	−0.052	−0.013	−0.024	0.040	−1,187	−0.010	−0.010	−0.064***	−0.059	−0.055	123.4
	(0.05)	(0.04)	(0.01)	(0.06)	(0.05)	(1,961)	(0.04)	(0.06)	(0.02)	(0.07)	(0.06)	(2,761)
Mean dependent variable	0.26	0.41	0.04	0.57	0.67	18,964.23	0.20	0.33	0.03	0.64	0.59	12,742.93
N. Clus.	523	523	523	521	521	523	516	516	516	508	508	509
N. Obs.	131,990	131,990	131,990	32,028	32,047	54,645	145,559	145,559	145,559	36,003	35,781	47,925
STEM												
Mean rank of female peers	0.057	−0.027	0.021	0.021	0.292*	10,510	−0.014	0.039	0.026*	0.123*	0.170***	3,781
	(0.12)	(0.14)	(0.06)	(0.17)	(0.17)	(7,211)	(0.06)	(0.07)	(0.01)	(0.06)	(0.06)	(3,581)
Mean rank of male peers	−0.142	−0.089	0.048	0.109	−0.027	3,755	0.032	0.052	0.004	0.126	0.155	838.6
	(0.14)	(0.20)	(0.06)	(0.23)	(0.25)	(9,276)	(0.10)	(0.12)	(0.03)	(0.12)	(0.11)	(5,447)
Mean dependent variable	0.25	0.39	0.05	0.60	0.71	21,414.86	0.20	0.34	0.02	0.63	0.59	12,345.07
N. Clus.	135	135	135	133	133	135	135	135	135	135	135	135
N. Obs.	21,117	21,117	21,117	4,892	4,888	8,227	62,807	62,807	62,807	15,945	15,850	21,305
non-STEM												
Mean rank of female peers	−0.067	−0.006	−0.029	−0.017	0.065	7,162**	−0.052	−0.015	0.016	−0.005	0.019	4,947
	(0.06)	(0.06)	(0.02)	(0.08)	(0.08)	(3,023)	(0.05)	(0.07)	(0.03)	(0.08)	(0.08)	(3,300)
Mean rank of male peers	−0.010	−0.045	−0.016	−0.035	0.042	−1,875	−0.021	−0.017	−0.087***	−0.117	−0.142*	350.2
	(0.05)	(0.04)	(0.01)	(0.06)	(0.05)	(2,021)	(0.05)	(0.07)	(0.03)	(0.08)	(0.07)	(3,175)
Mean dependent variable	0.26	0.42	0.03	0.57	0.67	18,529.89	0.19	0.32	0.05	0.65	0.60	13,061.35
N. Clus.	388	388	388	388	388	388	381	381	381	373	373	374
N. Obs.	110,873	110,873	110,873	27,136	27,159	46,418	82,752	82,752	82,752	20,058	19,931	26,620

Results: Marriage

	Women						Men					
	Married	Has Spouse	Spouse from program	Spouse GPA rank	Spouse Math rank	Spouse annual earnings	Married	Has Spouse	Spouse from program	Spouse GPA rank	Spouse Math rank	Spouse annual earnings
All												
Mean rank of female peers	−0.044	−0.017	−0.016	−0.003	0.101	8,461***	−0.028	0.019	0.026*	0.080	0.120**	3,850
	(0.05)	(0.05)	(0.02)	(0.07)	(0.07)	(2,755)	(0.04)	(0.05)	(0.01)	(0.05)	(0.05)	(2,364)
Mean rank of male peers	−0.021	−0.052	−0.013	−0.024	0.040	−1,187	−0.010	−0.010	−0.064***	−0.059	−0.055	123.4
	(0.05)	(0.04)	(0.01)	(0.06)	(0.05)	(1,961)	(0.04)	(0.06)	(0.02)	(0.07)	(0.06)	(2,761)
Mean dependent variable	0.26	0.41	0.04	0.57	0.67	18,964.23	0.20	0.33	0.03	0.64	0.59	12,742.93
N. Clus.	523	523	523	521	521	523	516	516	516	508	508	509
N. Obs.	131,990	131,990	131,990	32,028	32,047	54,645	145,559	145,559	145,559	36,003	35,781	47,925
STEM												
Mean rank of female peers	0.057	−0.027	0.021	0.021	0.292*	10,510	−0.014	0.039	0.026*	0.123*	0.170***	3,781
	(0.12)	(0.14)	(0.06)	(0.17)	(0.17)	(7,211)	(0.06)	(0.07)	(0.01)	(0.06)	(0.06)	(3,581)
Mean rank of male peers	−0.142	−0.089	0.048	0.109	−0.027	3,755	0.032	0.052	0.004	0.126	0.155	838.6
	(0.14)	(0.20)	(0.06)	(0.23)	(0.25)	(9,276)	(0.10)	(0.12)	(0.03)	(0.12)	(0.11)	(5,447)
Mean dependent variable	0.25	0.39	0.05	0.60	0.71	21,414.86	0.20	0.34	0.02	0.63	0.59	12,345.07
N. Clus.	135	135	135	133	133	135	135	135	135	135	135	135
N. Obs.	21,117	21,117	21,117	4,892	4,888	8,227	62,807	62,807	62,807	15,945	15,850	21,305

Results: Is it STEM that makes a difference?

- Female vs Male-dominated program (19% of male-dominated are non-STEM, 21% of STEM are not male dominated)
- Program selectivity (60% of selective programs are non-STEM, 34% of STEM are non-selective)
- Dropout rates (46% of high-dropout rates programs are non-STEM, 26% of STEM not high-dropout rates)

Heterogeneous results by program characteristics

Conclusion

- We find that peer ability is particularly relevant for women in STEM programs
- For women in STEM having better female peers increases women's graduation outcomes, decreases fertility and increases marriage market outcomes
- Having better male peers decreases women's graduation outcomes and increases fertility
- Peers are important in understanding women's underrepresentation in STEM

Balance Test

Back

	2003-2013 Cohorts				2000-2008 Cohorts			
	Women		Men		Women		Men	
Variable	Mean rank of female peers (1)	Mean rank of male peers (2)	Mean rank of female peers (3)	Mean rank of male peers (4)	Mean rank of female peers (5)	Mean rank of male peers (6)	Mean rank of female peers (7)	Mean rank of male peers (8)
Mother primary ed	−0.04	−0.02	0.04	0.06	−0.07	0.01	0.01	0.04
	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
	[153,664]	[153,664]	[166,906]	[166,906]	[130,692]	[130,692]	[143,900]	[143,900]
Mother secondary ed	−0.04	0.08**	0.00	0.00	0.04	0.05	−0.03	0.03
	(0.05)	(0.04)	(0.05)	(0.06)	(0.06)	(0.04)	(0.05)	(0.06)
	[153,664]	[153,664]	[166,906]	[166,906]	[130,692]	[130,692]	[143,900]	[143,900]
Mother tertiary ed	0.06	−0.07*	−0.06	−0.04	0.03	−0.07	0.01	−0.06
	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)	(0.06)
	[153,664]	[153,664]	[166,906]	[166,906]	[130,692]	[130,692]	[143,900]	[143,900]
Father primary ed	−0.04	−0.01	0.04	0.00	−0.02	−0.01	0.02	0.03
	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)
	[153,664]	[153,664]	[166,906]	[166,906]	[130,692]	[130,692]	[143,900]	[143,900]
Father secondary ed	−0.01	0.06	−0.03	−0.02	−0.04	0.08	−0.02	−0.04
	(0.05)	(0.04)	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.07)
	[146,486]	[146,486]	[160,610]	[160,610]	[123,703]	[123,703]	[137,549]	[137,549]
Father tertiary ed	0.01	−0.03	−0.02	0.00	0.05	−0.08	−0.00	−0.06
	(0.05)	(0.04)	(0.04)	(0.05)	(0.06)	(0.05)	(0.05)	(0.07)
	[146,486]	[146,486]	[160,610]	[160,610]	[123,703]	[123,703]	[137,549]	[137,549]
Mother works	0.01	0.03	−0.03	−0.02	−0.03	0.01	−0.04	0.01
	(0.05)	(0.05)	(0.04)	(0.06)	(0.06)	(0.05)	(0.05)	(0.07)
	[153,163]	[153,163]	[166,437]	[166,437]	[130,167]	[130,167]	[143,406]	[143,406]
Father works	−0.01	0.01	−0.02	0.03	0.04	−0.01	0.01	−0.01
	(0.04)	(0.03)	(0.03)	(0.04)	(0.05)	(0.03)	(0.04)	(0.05)
	[142,880]	[142,880]	[157,312]	[157,312]	[121,035]	[121,035]	[135,111]	[135,111]
Mother works fulltime	0.01	0.03	−0.04	−0.02	−0.05	0.01	0.00	−0.02
	(0.05)	(0.05)	(0.04)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)
	[153,163]	[153,163]	[166,437]	[166,437]	[130,167]	[130,167]	[143,406]	[143,406]
Father works fulltime	0.01	0.01	−0.05*	0.04	−0.01	−0.01	−0.02	−0.06
	(0.05)	(0.05)	(0.04)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)
	[142,880]	[142,880]	[157,312]	[157,312]	[121,035]	[121,035]	[135,111]	[135,111]
Public school	−0.00	0.06	0.05	0.12**	0.03	0.06	−0.00	0.08
	(0.06)	(0.04)	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)
	[159,046]	[159,046]	[173,523]	[173,523]	[132,054]	[132,054]	[145,918]	[145,918]
Voucher school	0.02	−0.06	−0.02	−0.09	−0.02	−0.07	0.04	−0.08
	(0.06)	(0.05)	(0.05)	(0.06)	(0.07)	(0.06)	(0.06)	(0.06)
	[159,046]	[159,046]	[173,523]	[173,523]	[132,054]	[132,054]	[145,918]	[145,918]
Private school	−0.02	−0.02	−0.03	−0.02	−0.03	0.00	−0.03	−0.02
	(0.03)	(0.02)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)
	[159,046]	[159,046]	[173,523]	[173,523]	[132,054]	[132,054]	[145,918]	[145,918]

Correlation between weights attached to two-way fixed effects regressions and program characteristics

	Women		Men	
	Mean rank female peers	Mean rank male peers	Mean rank female peers	Mean rank male peers
Program characteristics				
% Enrolled in program that are male	.0032	-.0249	.0099	-.0148
Program size	-.0140	-.0173	-.017	-.0138
Math focused	-.0076	-.0186	-.0069	-.0160
Program dropout rate	.0108	-.0020	.0100	.0004

Residual variation in the main variable

	2003-2013 Cohorts				2000-2008 Cohorts			
	Women		Men		Women		Men	
	MP	FP	MP	FP	MP	FP	MP	FP
Raw Variation								
Mean	0.774	0.798	0.831	0.807	0.777	0.801	0.831	0.808
SD	0.134	0.130	0.121	0.131	0.133	0.128	0.119	0.129
Min	0.225	0.270	0.135	0.292	0.274	0.218	0.164	0.301
Max	0.997	0.999	0.998	0.996	0.997	0.999	0.997	0.996
Net of Program and Cohort Fixed Effects								
Mean	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000
SD	0.026	0.032	0.024	0.030	0.025	0.031	0.023	0.028
Min	-0.371	-0.290	-0.395	-0.202	-0.280	-0.240	-0.366	-0.224
Max	0.293	0.219	0.349	0.210	0.287	0.269	0.285	0.436

Alternative Specification

- System:
  - Set of individuals $i \in I = \{1, ..., n\}$
  - Set of programs $J = \{1, ...J\}$
  - Students have preferences $\succ_i$
  - A student is fully characterized by their type $\theta_i = (\succ_i, s_i)$, $\Theta_t = \bigcup_{i \in I} \theta_i$
  - Programs also have preferences over applicants based on students' composite score scores sijt
  - Programs are characterized by capacity $q_t = \{q_{1t}, ..., q_{tJ}\}$ and weights they assign to the different sections of the test $w_t = \{w_{1t}, ..., w_{Jt}\}$
- The benefit of having a centralized admission system is that it takes the mystery out of treatment assignments. In our setting, we know that peer characteristics $\overline{s}^f_{ijt}$ $(\overline{s}^m_{ijt})$ are fully determined by the arguments Θ_t, q_t, w_t.

Alternative Specification

- Conditional independence assumption
- We propose two alternative models that account for θ_i and Θ_t.
- Conditioning on a students' type is impractical, since there are almost as many types as students.

$$E(\bar{s}^g|\theta_i) = \frac{\sum_{t=1}^{T} E(\bar{s}^g_{ijt}|\mu_t(\theta_i, \Theta_t, q_t, w_t))}{T} \forall g \in f, m \quad (1)$$

$$E(\bar{s}^g|\Theta_i) = \frac{\sum_{t=1}^{T} E(\bar{s}^g_{ijt}|\mu_t(\Theta_i, q_t, w_t))}{T} \forall g \in f, m \quad (2)$$

Alternative Specification

	Women						Men					
	Grad Univ			Grad Program			Grad Univ			Grad Program		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel B: STEM												
Mean rank of female peers	0.22*	0.18	0.18	0.20	0.16	0.22	0.01	0.00	0.02	0.03	0.01	0.00
	(0.13)	(0.13)	(0.17)	(0.12)	(0.12)	(0.15)	(0.06)	(0.07)	(0.09)	(0.06)	(0.06)	(0.08)
Mean rank of male peers	−0.20	−0.22	−0.23	−0.31**	−0.27*	−0.31*	−0.07	−0.06	0.07	−0.20*	−0.20	−0.05
	(0.16)	(0.17)	(0.21)	(0.15)	(0.15)	(0.17)	(0.11)	(0.11)	(0.14)	(0.12)	(0.12)	(0.13)
N. Clus.	163	163	163	163	163	163	163	163	163	163	163	163
N. Obs.	25,338	25,227	25,017	25,338	25,227	25,017	73,967	73,652	73,054	73,967	73,652	73,054
Mean dependent variable	0.6	0.6	0.6	0.3	0.3	0.3	0.6	0.6	0.6	0.3	0.3	0.3
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Program FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year x Program FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Program FE x $E(p_i\|\theta_i)$		✓			✓			✓			✓	
Program FE x $E(p_i\|\Theta_i)$			✓			✓			✓			✓

Heterogeneous results by program characteristics

	Women				Men			
	Grad Univ	Grad Program	Earnings	Has a Child	Grad Univ	Grad Program	Earnings	Has a Child
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Male dominated program ($>60\%$ Men)								
Mean rank of female peers	0.23**	0.18	7,828**	−0.09	0.04	0.08	−1,378	−0.10
	(0.12)	(0.12)	(3,661)	(0.12)	(0.07)	(0.07)	(2,065)	(0.07)
Mean rank of male peers	−0.03	0.03	−3,004	−0.19	−0.05	−0.05	−3,756	0.04
	(0.17)	(0.16)	(5,891)	(0.19)	(0.11)	(0.12)	(3,611)	(0.09)
Mean	0.7	0.4	11,950	0.3	0.6	0.3	13,585	0.2
N. Clus	156	156	132	132	156	156	132	132
N. Obs	23,741	23,741	19,075	19,075	82,336	82,336	65,595	65,595
Selective program (Rank >0.77)								
Mean rank of female peers	0.15	0.03	7,097**	−0.18*	0.09	0.09	2,861	−0.05
	(0.10)	(0.11)	(3,430)	(0.10)	(0.07)	(0.07)	(2,389)	(0.07)
Mean rank of male peers	0.17*	0.09	−2,001	−0.09	−0.05	−0.09	−1,838	−0.11
	(0.09)	(0.14)	(2,946)	(0.10)	(0.11)	(0.13)	(3,411)	(0.09)
Mean	0.8	0.6	10,153	0.2	0.6	0.4	12,006	0.2
N. Clus	269	269	245	245	269	269	245	245
N. Obs	85,425	85,425	69,285	69,285	111,495	111,495	90,411	90,411
High Dropout rates (Dropout $>56\%$)								
Mean rank of female peers	0.15*	−0.01	2,628	0.00	−0.02	−0.00	−676.0	−0.04
	(0.07)	(0.07)	(1,845)	(0.08)	(0.05)	(0.05)	(1,773)	(0.06)
Mean rank of male peers	0.04	−0.00	−1,097	−0.16*	0.07	0.06	−1,059	−0.02
	(0.09)	(0.08)	(1,777)	(0.08)	(0.07)	(0.08)	(2,028)	(0.07)
Mean	0.6	0.3	8,039	0.3	0.5	0.2	10,600	0.2
N. Clus	283	283	285	285	283	283	284	284
N. Obs	61,099	61,099	56,847	56,847	100,530	100,530	89,853	89,853