

The Impact of a Peer-to-Peer Mentoring Program on University Choices and Performance

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Motivation

- ▶ **Tertiary education** improves future labor market and life outcomes
- ▶ Overwhelming evidence **against strict income maximization**
 - ▶ inadequate information (*Dynarski et al. 2021; Hoxby and Avery, 2013*)
 - ▶ misperception of ability (*Avery et al., 2018; Bobba and Frisancho, 2022*)
 - ▶ non pecuniary motives (*Wiswall and Zafar, 2015; Boneva and Rauh, 2017*)

Motivation

- ▶ A critical aspect in the transition from high school to university is **the selection of the field of study**
- ▶ Consequential for the **labour** market outcomes
- ▶ As well as for **academic success and satisfaction**
 - ▶ **satisfaction:** 30% of Italian graduates would enroll in a different program if they could choose again (AlmaLaurea survey)
 - ▶ **dropout:** about 35% (Italy: ISTAT; US: NCES)

How to reduce frictions?

- ▶ **Contributing factors:** lack of centralized system; complex enrollment procedures; large number of options; lack of counseling
- ▶ **Possible interventions**
 - ▶ **structural reforms:** structure of the curricula, enrollment process etc.
 - ▶ **comprehensive educational programs:** including incentives, tutoring, mentoring etc (*e.g., Rodriguez-Planas, 2012; Oreopoulos et al., 2017; Lavecchia et al., 2020*)
 - ▶ **mentoring and role model programs:** decentralized programs involving peers
- ▶ We study the causal impact of a **peer-to-peer mentoring program**

The paper in a nutshell

- ▶ We design and implement **RCT** targeting high school students in their final year, matched with university students (STEM, Economics, Business)

▶ Fields

- ▶ Impact on **university choices**
 - ▶ likelihood of choosing the field of the mentor increases by 22 p.p. (+45% increase from the baseline)
- ▶ Impact on **labor prospects** and university **performance**
 - ▶ increase of 3.1-3.7% in the average prospective wage
 - ▶ intervention clearly did not negatively affect university performance, as measured by the end of the first year

Related literature

- ▶ **Mentoring programs:** one-on-one meetings between mentor and mentee to discuss a variety of topics in an unstructured way
- ▶ Transition to the labour market
 - ▶ ↑ proxies for labour success among low-SES German students (*Resnjanskij et al., 2024*); ↑ participation in the labour market among students from vocational schools in Uganda (*Alfonsi et al., 2023*)
- ▶ Transition to high school
 - ▶ increase the likelihood of choosing an academic track (*Falk et al., 2020*)
- ▶ Retention in college (*Dennehy & Dasgupta, 2017; Canaan & Mouganie, 2023 on pre-major and gender*) and in academia (*Blau et al., 2010*)
- ▶ **Our contribution:** transition from high school to University, with a specific focus on the field of study

Related literature

- ▶ **Role model programs:** interventions to expose large groups/classes to successful individuals with similar background to boost their aspirations
 - ▶ Female enrollment in STEM and Econ. majors (*Porter and Serra, 2020; Breda et al., 2021*)
 - ▶ Academic high school enrollment in disadvantaged territories (*Biroli et al., 2024*)
- ▶ **Our contribution:** while our intervention share some commonalities with role model programs, we differ in several ways
 - ▶ male and females mentors
 - ▶ personalized ad-hoc discussion
 - ▶ we do not target one field for all participants

Introduction
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Literature
○○

Design
●○○○○○○○○○○

Choice of field
○○○

Labor market and performance
○○○○

Conclusion
○○○

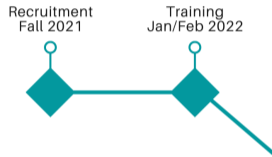


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UNIVERSITÀ DI BOLOGNA

ORIENTA ME

Timeline

MENTORS



MENTEES



Baseline survey and recruitment

- ▶ **Recruitment:** mainly via online orientation fair
- ▶ **Background information:** gender, age, education of parents, type and county of the high school, grades
- ▶ **Choice of fields and degree programs at baseline**
 - ▶ students see all 17 fields and choose their most preferred one ▶ Fields
 - ▶ within the most preferred field, they choose the specific programs
 - ▶ choose the second (and third) most preferred field(s)
 - ▶ specific programs in second (and third) field
 - ▶ **Eligibility requirement: select at least a STEM/Econ field**

Timeline

MENTORS

Recruitment
Fall 2021



Training
Jan/Feb 2022



RANDOM
ASSIGNMENT

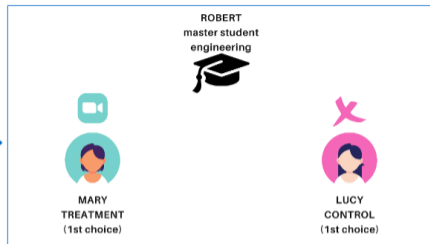
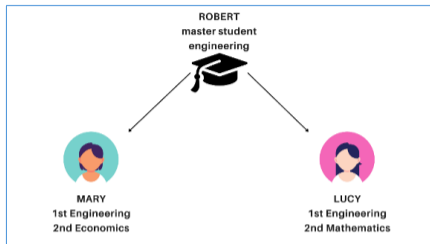
MENTEES

Recruitment and
baseline survey
Jan/Feb 2022

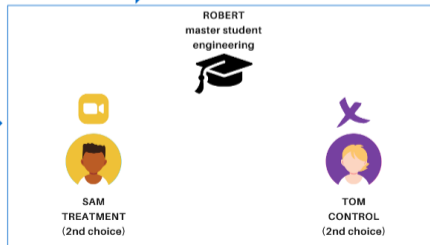
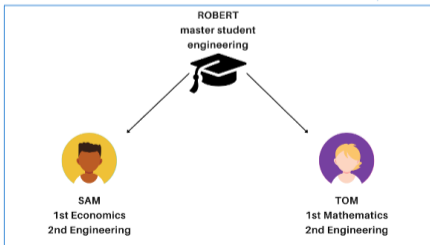


Matching procedure

- ▶ Treatment assignment stratified at the mentor level
- ▶ Algorithm: serial dictatorship mechanism
 - ▶ randomly sorted high school students
 - ▶ sequentially matched with the most affine available mentor
 - ▶ students may be matched with a mentor from the first, second or third preferred field
- ▶ All eligible students are matched with a mentor
- ▶ For each mentor: half of the matched students are assigned to the treatment and half to the control group



Randomization



Timeline

MENTORS

Recruitment
Fall 2021



Training
Jan/Feb 2022



Online meetings
Mar/Jul 2022



MENTEES

Recruitment and
baseline survey
Jan/Feb 2022



**RANDOM
ASSIGNMENT**

Timeline

MENTORS

Recruitment
Fall 2021

Training
Jan/Feb 2022



Online meetings
Mar/Jul 2022

**RANDOM
ASSIGNMENT**



MENTEES

Recruitment and
baseline survey
Jan/Feb 2022



Endline
survey
Aug/Sep 2022



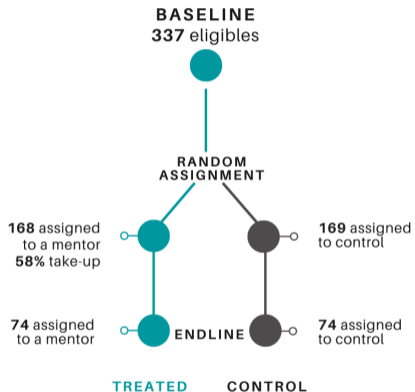
Administrative
data
Dec 2023



Endline surveys and administrative data

- ▶ **Enrollment at endline:** in which field and degree program they have enrolled/want to enroll
 - ▶ we can assess whether they choose the same field as their matched mentor
- ▶ *Subjective expectations and weights (not discussed here)*
- ▶ **Administrative data:** enrollment, grades, and study credits – students enrolled in the host university only

Compliance and attrition



Total answers at endline 169 – Main analysis on 148 students
(each mentor has at least two students matched – mentor FE)

Empirical strategy

► Exclusion Restriction and SUTVA

We estimate the program's LATE by means of 2SLS regressions:

$$Y_i = \underbrace{\alpha T_i}_{\text{treated}} + \underbrace{X_i \beta}_{\text{covariates}} + \underbrace{\mu_j}_{\text{mentor FE}} + \eta_i$$
$$T_i = \pi Z_i + X_i \gamma + v_j + \epsilon_i,$$

- ▶ $Z = 1$ if the student is assigned to the treatment
- ▶ $T = 1$ if the pair met at least once
- ▶ $\hat{\alpha}$ quantifies **the effect of the treatment on compliers**, namely students who take-up the intervention when they are offered it

Impact of the intervention on enrollment choices

Dep. Var.: Takes value 1 if the student chooses the same field of the matched mentor

	(1)	(2)	(3)
Treated	0.170 ⁺ (0.100)	0.221 ^{**} (0.076)	0.208 ^{**} (0.078)
Mentor in pref. field at baseline		0.601 ^{**} (0.086)	0.636 ^{**} (0.120)
Mentor FE	Yes	Yes	Yes
Other covariates	No	No	Yes
Control mean	0.486		
N	148	148	148

Other covariates: dummies for gender, first generation college, school track, and a vector of dummies for their preferred field at baseline.

- ▶ Probability of enrolling in the same field as the mentor **increased by 45%**
- ▶ ITT: 16.6 p.p. and significant

▶ ITT

▶ First Stage

Robustness checks

- ▶ Analysis on different subsamples, with and without mentor FE: similar results
- ▶ Degree class (*classe di laurea*) as outcome variable: similar results ▶ Robustness
- ▶ Simulation to estimate a lower bound for the true effect: 9.6 p.p. (+20%)
 - ▶ assume 0 effect of the intervention on treated who did not answer the endline
 - ▶ compute probability p_i of choosing mentor's field for all non-respondents...
 - ▶ ... and draw their choice from Bernoulli distribution with probability p_i
 - ▶ estimate the usual specification on the full sample with imputed choices
 - ▶ iterate in a Montecarlo ▶ Simulation

Heterogeneity analysis

The observed effect can be driven by two different forces:

- ▶ **Reinforcement effect:** students who met a mentor from their **first field**, are more likely to **confirm** their initial preference and stick with their first field (which corresponds to the field of the mentor)
- ▶ **Attraction effect:** students who met a mentor from their **second/third field**, are more likely to **change** their initial preference and move toward the field of the mentor

Results: both effects play a sizable and significant role in our data [▶ Regression](#)

Medium-run and long-run outcomes

Mentors affect enrollment choices: **is this a desirable outcome?**

1. Do treated students enroll in fields with higher **labor market returns**?
2. Does the intervention affect **university performance**?

Prospective labor market outcomes

- ▶ Enrollment in STEM/Econ increases, enrollment in Humanities decreases, Medicine/Pharmacy not affected. [▶ Regression](#)
- ▶ Prospective wage increases by 3.1-3.7% [▶ Details](#)

(b) Prospective wage in the chosen program

	Studying 5 years	Studying 3 or 5 years	
		(1)	(2)
Treated	64.360* (28.156)	58.003 ⁺ (30.412)	51.708 ⁺ (26.422)
Control mean	1725.931	1629.238	1659.419

Dependent variable: average wage among graduates from the chosen degree program 5-7 years after graduation; the three columns use different methodologies to construct the variable

Administrative data

- ▶ For students who enrolled in the host institution we know:
 - ▶ Enrollment data for both 2022 and 2023 (December)
 - ▶ Study credits (CFU) obtained by the end of the first year (max 60 CFU)
 - ▶ Average GPA (max 30) by the end of the first year
- ▶ 43% (N=144) of baseline respondent enrolled in host institution ▶ Balance
- ▶ Self-reported data are reliable: 98 are both in admin and endline data, only 3 are in a different field than what declared at endline
- ▶ Main result is replicated with admin data, although slightly smaller in magnitude ▶ Regression
- ▶ The effect persists one year after, for enrollment in second year ▶ Regression

University performance

	CFU		≥50% exams		≥80% exams		wGPA	
	(all)	(fe)	(all)	(fe)	(all)	(fe)	(all)	(fe)
Treated	7.895 ⁺	7.091	0.263 [*]	0.211 ⁺	0.027	0.032	3.413	2.977
	(4.634)	(5.604)	(0.104)	(0.123)	(0.111)	(0.122)	(2.170)	(2.559)
Mentor in pref. field	3.875	3.120	0.033	-0.048	0.219 [*]	0.273 [*]	1.728	1.222
	(4.056)	(5.176)	(0.082)	(0.097)	(0.088)	(0.113)	(1.853)	(2.253)
Program: mean CFU	0.555 ⁺	0.291	0.008	0.004	0.013	0.006	0.240 ⁺	0.052
	(0.314)	(0.529)	(0.006)	(0.011)	(0.009)	(0.014)	(0.144)	(0.231)
Program: % dropout	-69.129 ^{**}	-60.497	-1.301 ^{**}	-1.255 ⁺	-1.235 ⁺	-1.672 ⁺	-33.701 ^{**}	-34.974 [*]
	(23.809)	(37.289)	(0.504)	(0.730)	(0.644)	(0.874)	(11.440)	(17.048)
Mentor FE	No	Yes	No	Yes	No	Yes	No	Yes
Mentor covariates	Yes	No	Yes	No	Yes	No	Yes	No
Control mean	39	38.1	.681	.69	.536	.517	16.9	16.5
N	144	111	144	111	144	111	144	111

- ▶ At the very least, the intervention did not affect performance negatively
- ▶ It improved the proportion of exams passed among weaker students

Discussion

- ▶ We only target quantitative fields: Would be a more universal program desirable?
- ▶ Implementation: lesson learned
 - ▶ online mentoring can be effective
 - ▶ overwhelming response of mentors
 - ▶ suggestive evidence that master students are more *effective*
 - ▶ tailored approach seems to be crucial

Conclusion

- ▶ Personalized mentoring program aimed to improve high school students awareness before university enrollment
- ▶ Large (+45%) and significant increase in the likelihood of choosing the mentor's field
- ▶ Mentors can both reinforce preferences and attract toward a different field
- ▶ Prospective wages increase by 3.1-3.7%
- ▶ No negative effect on university performance

|| Thank you
|| for your attention!

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APPENDIX

Fields of study

◀ Back 1

◀ Back 2

▶ **Fields with available mentors:**

- ▶ Accounting, business, management and marketing
- ▶ Economics and finance, political economy, tourism economics
- ▶ Statistics
- ▶ Architecture and industrial design
- ▶ Agricultural and food sciences
- ▶ Biology, geology, environmental sciences
- ▶ Chemistry, physics, mathematics
- ▶ Computer sciences and computer engineering
- ▶ Engineering

▶ **Fields without mentors:**

- ▶ Pharmacy and biotechnology; Medicine, veterinary; *Sports science*; Law; Foreign languages; Psychology, education sciences; Political science, Sociology; Humanities

Recruitment process

- ▶ Recruitment of mentors
 - ▶ requirements: bachelor (not first year) and master students in STEM/Econ, proficient in Italian, good performance [▶ Fields](#)
 - ▶ advertisement: email to program directors of the 120 degrees involved
 - ▶ 82 mentors selected: 58.5% enrolled in a master, 53.7% females, and 52% not from the region of the host university
- ▶ Recruitment of mentees
 - ▶ requirement: last year of an Italian high school
 - ▶ advertisement: orientation events, orientation website, email to schools
 - ▶ eligibility: interested in at least a field with available mentors

Matching & Assignment to treatment

Matching mentor-mentee

- ▶ Serial dictatorship mechanism
 - ▶ assignment primarily based on students preferences for programs
 - ▶ then on residence status (resident, commuter, “fuori sede”)
 - ▶ ties broken at random
- ▶ 58% of the applicants matched with a mentor in their preferred field
 - ▶ 77% in their first *eligible* field
- ▶ 89% matched with a mentor from a program that they selected
 - ▶ 58% in their first *eligible* program; 18% in their second
- ▶ mentors matched with 2-8 applicants (mean 3.8)
 - ▶ 8 mentors with 1 applicants. Treated, excluded from the analysis

Assignment to treatment

- ▶ Stratified by mentor
- ▶ Observables characteristics are balanced

Balance table: Baseline

[◀ Back](#)

(a) Baseline survey

Variable	Control	Treatment	Difference
Female	0.631 (0.484)	0.598 (0.492)	-0.028 (0.063)
First gen. college	0.565 (0.497)	0.615 (0.488)	0.053 (0.070)
From host region	0.542 (0.500)	0.503 (0.501)	-0.051 (0.055)
Academic track	0.774 (0.420)	0.757 (0.430)	-0.023 (0.049)
Math grade	7.820 (1.168)	7.838 (1.179)	0.017 (0.157)
Italian grade	7.976 (0.981)	8.060 (0.986)	0.092 (0.139)
Field 1 not STEM/ECON	0.179 (0.384)	0.213 (0.411)	0.036 (0.042)
Mentor in preferred field	0.607 (0.490)	0.550 (0.499)	-0.051 (0.059)
Observations	168	169	337

Balance table: Endline

[◀ Back](#)

(b) Endline survey

Variable	Control	Treatment	Difference
Female	0.676 (0.471)	0.622 (0.488)	-0.074 (0.144)
First gen. college	0.527 (0.503)	0.568 (0.499)	0.039 (0.130)
From host region	0.581 (0.497)	0.459 (0.502)	-0.092 (0.118)
Academic track	0.757 (0.432)	0.770 (0.424)	-0.044 (0.120)
Math grade	7.919 (1.156)	8.135 (1.220)	0.297 (0.283)
Italian grade	8.122 (0.979)	8.270 (1.038)	0.041 (0.240)
Field 1 not STEM/ECON	0.270 (0.447)	0.270 (0.447)	0.009 (0.095)
Mentor in preferred field	0.635 (0.485)	0.568 (0.499)	-0.063 (0.105)
Observations	74	74	148

Sample characteristics

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	Our sample at baseline (1)	High school population (2)	University population (3)	Prospective uni. students (4)	Orientation virtual fair (5)
School track (%)					
Academic	66.5	53.6	75.0	69.8	74.7
School performance					
Italian grade (<i>max 10</i>)	8.02	7.39	-	-	-
Math grade (<i>max 10</i>)	7.83	7.06	-	-	-
Final grade (<i>max 100</i>)	84.18*	81.02	83.82	84.3	-
Background					
Female (%)	61.4	53.8	55.0	61.0	67.0
First gen. college (%)	59.1	69.6	-	62.6	-
From host region (%)	52.2	6.9	-	-	63.5

Exclusion Restrictions

◀ Back

Treatment Assignment must satisfy the exclusion restriction, implying that the effect on the outcome of the treatment works only via the treatment itself. Outcome: choice of the field of study, and, in particular, if students choose the same field as their mentor. The mere fact of being offered the treatment, appears highly unlikely to affect such choice. This is especially true considering that the existence of a mentor and their field of study was unknown to control students.

Stable Unit Treatment Value Assumption (SUTVA) should be satisfied: no spillover effects. The online nature of our program and the fact that participants are spread out throughout the country make spillover a minor concern in our settings.

First stage

◀ Back

	(1)	(2)	(3)
Assigned to treatment	0.745** (0.072)	0.753** (0.069)	0.734** (0.074)
Mentor in pref. field		0.119 (0.085)	-0.057 (0.120)
Mentor FE	Yes	Yes	Yes
Other covariates	No	No	Yes
F-test	108.2	117.8	98.3
Take-up rate	0.59		
N	148	148	148

Intention to treat

◀ Back

	(1)	(2)	(3)
Assigned to treatment	0.127 (0.099)	0.166* (0.073)	0.153 ⁺ (0.077)
Mentor in pref. field		0.627** (0.107)	0.624** (0.161)
Mentor FE	Yes	Yes	Yes
Other covariates	No	No	Yes
Control mean	0.486		
N	148	148	148

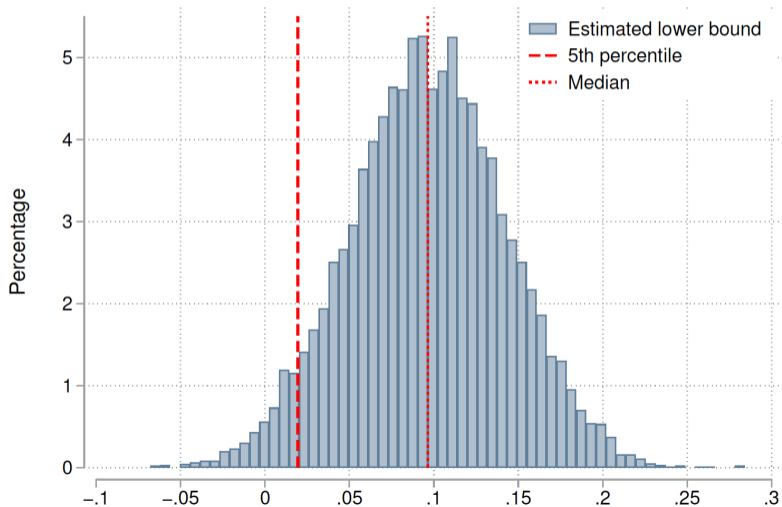
Robustness checks

[◀ Back](#)

	mentor's field			mentor's program
	(1)	(2)	(3)	(4)
Treated	0.220** (0.076)	0.205** (0.065)	0.161** (0.062)	0.184* (0.084)
Mentor in pref. field	0.593** (0.108)	0.591** (0.074)	0.602** (0.069)	-0.284+ (0.150)
Mentor in pref. program at baseline				0.850** (0.137)
Mentor FE	Yes	No	No	Yes
Mentor covariates	No	Yes	Yes	No
Mean control	0.509	0.486	0.506	0.432
N	110	148	169	148

Lower bound simulation

◀ Back



Heterogeneity analysis

◀ Back

	mentor's field		preferred field at baseline		
	(1)	(2)	(3)	(4)	(5)
Treated	0.268 ⁺	0.202	0.087	-0.222	-0.121
	(0.143)	(0.127)	(0.090)	(0.180)	(0.166)
Treated X mentor in pref. field	-0.072	0.004		0.470 [*]	0.333 ⁺
	(0.177)	(0.157)		(0.212)	(0.196)
Mentor in pref. field	0.626 ^{**}	0.589 ^{**}	0.094	-0.068	-0.060
	(0.109)	(0.088)	(0.119)	(0.118)	(0.103)
Mentor FE	Yes	No	Yes	Yes	No
Mentor covariates	No	Yes	No	No	Yes
Treatment + interaction	0.196	0.207		0.248	0.213
P-val (treatment+interaction)	0.036	0.009		0.012	0.010
Control mean - mentor in pref. field	0.723		0.723		
Control mean - mentor not in pref. field	0.074		0.741		
N	148	148	148	148	148

Choice of macro-area

◀ Back

(a) Type of field chosen

	STEM/Econ	Humanities	Medicine
Treated	0.138 ⁺ (0.080)	-0.125 ⁺ (0.069)	-0.013 (0.056)
Control mean	0.662	0.243	0.095

Prospective wages

- ▶ AlmaLaurea survey: contact graduates from almost all Italian universities
 - ▶ Master students: 1, 3, and 5 years after graduation
 - ▶ Bachelor students: 1 year after graduation
- ▶ For each bachelor program, we identify the master programs that are natural prosecution (highest share of enrollment)
- ▶ Our first measure of prospective wage is the average self reported wage 5 years after obtaining a related master degrees (weighted by enrollment)
- ▶ Our second measure is the average between the first measure and wage 7 years after obtaining a bachelor degree without pursuing further studies (weighted by the share of graduates who enroll in a master)
- ▶ We infer wage 7 years after graduation from wage 1 year after graduation
 1. A 40% growth rate is assumed
 2. Growth rate is program specific, and inferred from the wage growth of master graduates in the same field

Balance table: Admin data

◀ Back

(a) All students in the admin data

Variable	Control	Treatment	Difference	Std. diff.
Female	0.536 (0.502)	0.573 (0.498)	0.037 (0.091)	0.052
First gen. college	0.493 (0.504)	0.547 (0.501)	0.050 (0.104)	0.076
From host region	0.638 (0.484)	0.573 (0.498)	-0.014 (0.079)	-0.093
Academic track	0.870 (0.339)	0.800 (0.403)	-0.112 (0.069)	-0.132
Math grade	7.942 (1.247)	7.987 (1.145)	-0.074 (0.210)	0.026
Italian grade	8.072 (1.019)	8.160 (1.014)	0.054 (0.178)	0.061
Field 1 not STEM/ECON	0.145 (0.355)	0.200 (0.403)	0.064 (0.058)	0.103
Mentor in preferred field	0.725 (0.450)	0.573 (0.498)	-0.144+ (0.078)	-0.225
Observations	69	75	144	

Admin data: Main result

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Table A10: Choice of mentor's field - with administrative data

	Admin data		Endline & Admin		Endline or Admin	
	(all)	(fe)	(all)	(fe)	(all)	(fe)
Treated	0.137 ⁺	0.142	0.190 [*]	0.190	0.149 [*]	0.155 [*]
	(0.083)	(0.094)	(0.095)	(0.129)	(0.065)	(0.073)
Mentor in preferred field	0.428 ^{**}	0.453 ^{**}	0.438 ^{**}	0.578 ^{**}	0.549 ^{**}	0.506 ^{**}
	(0.085)	(0.107)	(0.128)	(0.195)	(0.064)	(0.077)
Mentor FE	No	Yes	No	Yes	No	Yes
Mentor covariates	Yes	No	Yes	No	Yes	No
Control mean	0.565	0.603	0.632	0.733	0.500	0.490
N	144	111	83	58	215	201

Admin data: Enrollment in 2023

[◀ Back](#)

Table A13: Enrolled in mentor's field during 2023/24 - with administrative data

	Unibo '23		Everyone	
	(all)	(fe)	(all)	(fe)
Treated	0.165 ⁺	0.136	0.229 ^{**}	0.215 [*]
	(0.086)	(0.099)	(0.086)	(0.097)
Mentor in pref. field	0.389 ^{**}	0.378 ^{**}	0.381 ^{**}	0.388 ^{**}
	(0.096)	(0.128)	(0.083)	(0.104)
Mentor FE	No	Yes	No	Yes
Mentor covariates	Yes	No	Yes	No
Control mean	0.544	0.574	0.449	0.466
N	127	96	144	111