Role Models and the Formation of Long-Run Gender Norms *

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Abstract

We study how naturally occurring exposure to female role models during university shapes long-run gender norms measured up to 24 years after enrollment. To do so, we combine administrative and newly collected survey data from the American University of Beirut, where first-year students are randomly assigned to academic advisors. We find that female students assigned to women advisors adopt significantly more progressive views on gender roles, with effects concentrated on beliefs about women's political leadership and labor force participation. In contrast, male students exposed to women advisors show weaker and sometimes more conservative responses, widening the gender gap in gender beliefs and attitudes and increasing polarizing views. These gaps are strongest in STEM fields and among religious students, contexts where traditional gender hierarchies are most pronounced. These findings provide causal evidence that naturally occurring exposure to women role models during university is an important determinant of long-run gender attitudes.

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1 Introduction

Gender inequality remains pervasive across much of the world. Its extent, however, varies substantially across countries (Bursztyn et al., 2020). While high-income economies experienced convergence in men's and women's education and labor force participation over the 20th century (Goldin, 2014), progress in other regions has been much slower. For example, the Middle East and North Africa (MENA) region is characterized by persistently low female labor force participation despite a narrowing of the gender gap in educational attainment— a phenomenon commonly referred to as the MENA paradox (Assaad et al., 2020). Gender norms, seen as deep societal beliefs about, for example, whether women should work after marriage or hold political leadership positions, potentially explain these cross-country differences (Alesina et al., 2013; Bursztyn et al., 2017, 2020).

A central question is which factors shape individuals' gender norms, and whether common social interactions play a significant role in their formation. In this paper, we begin to shed light on this question by examining how social interactions within higher education influence gender norms. We specifically focus on the interaction between college students and their academic advisors. Academic advising is a key part of many students' college experience. In our setting, advisors are faculty members who provide academic guidance, helping students select courses and make key decisions such as changing majors. We ask whether the gender of academic advisors influences students' long-term attitudes toward gender norms. Two main challenges arise in addressing this question. First, because students typically select their advisors, advisor gender may be correlated with unobservable factors that also shape students' gender attitudes. Second, tracking students' attitudes after graduation—especially over long horizons—is difficult, as such information is rarely available in administrative data.

To overcome these issues, we exploit a unique setting where first-year students at the American University of Beirut (AUB), a private 4-year college in Lebanon, are randomly assigned to academic advisors. We collect rich administrative data covering all students who first enrolled at AUB from the years 2001 to 2018. These data allow us to identify student-advisor matches, and to track students' academic outcomes for as long as they are enrolled at the university. We then link this administrative data to a novel student survey, which we designed to measure students' attitudes towards gender norms. Administered between March and May 2025, the survey captures students' gender attitudes measured 7 to 24 years after their initial contact with an advisor.

Our main findings show that exposure to female role models during university has persistent effects on students' gender attitudes up to 24 years after enrollment. Female students assigned to a woman advisor develop significantly more progressive views on gender roles, while male students exhibit weak and generally insignificant shifts in the opposite direction. On our composite "Gender Role Attitudes" index, female students' views become substantially more progressive (–0.422). The effects are most pronounced on specific beliefs about women's participation in leadership positions,

politics and the workforce. Indeed, we find that women matched to female advisors during their first year at university are 7 percentage points less likely to agree that "men are better suited for politics," 5.9 percentage points less likely to believe that "women should stop working after marriage," and 8.8 percentage points less likely to think "men should be the sole providers of a household". By contrast, male students exposed to female advisors sometimes shift toward more conservative positions, though estimates are not statistically significant for the main sample. These effects translate into significant and large 10 to 14 percentage point increases in gender gaps regarding the aforementioned beliefs and attitudes.

Additional analysis reveals that this documented divergence between men and women's views is particularly strong in male-dominated contexts such as STEM fields and among religious students, where we observe highly polarized responses: religious women adopt more progressive views, while religious men become more conservative. In more gender-balanced or less religious contexts, however, the influence of female advisors primarily operates through women, with little evidence of backlash from men. Finally, we also document improvements in women's academic outcomes—mainly GPA and persistence—from female advisor exposure, suggesting a dual channel of mentorship and role modeling.

This paper is the first to document that the gender of a role model in education shapes long-term attitudes towards gender norms. A large literature examines gender role models in education, but its focus has been almost exclusively on academic outcomes. The general finding from this literature is that female students see improvements in academic performance, and are more likely to enroll in STEM majors and pursue STEM occupations when exposed to female rather than male teachers (Carrell et al., 2010; Lim and Meer, 2017; Mansour et al., 2022), advisors (Canaan and Mouganie, 2023) or external role models (Porter and Serra, 2020). Another strand of literature examines the determinants of gender norms and evaluates interventions designed to influence gender attitudes in different contexts. These include gender quotas in political leadership positions (Beaman et al., 2009), the influence of media (Jensen and Oster, 2009), the integration of women in the military (Dahl et al., 2014), and in-classroom discussions on gender equality (Dhar et al., 2022).

Our paper makes several contribution to the literature. First, we identify a new factor that influences gender attitudes: the gender of a role model in education. Unlike most previous studies on the determinants of gender norms, our treatment is not intended to change gender attitudes, either explicitly or implicitly. Interactions with academic advisors are naturally occurring and are an integral part of most students' university experience. Second, a unique feature of our paper is that we can track gender attitudes over the long term, for up to 24 years after initial contact.Prior studies focus on contemporaneous or short-run attitudes, typically measured within a few months or two to three years from the start of an intervention.[1] Our results highlight that gender attitudes

[1]One exception is Beaman et al. (2011), who document that women in India are more likely to be elected to village

are malleable in the long run and that the types of interactions individuals experience at critical points in their lives play a crucial role in shaping gender norms.

2 Background and Key Institutional Features

2.1 The University

Founded in 1866 by American Protestant missionaries, the American University of Beirut (AUB) is a private, secular institution in Lebanon that provides a liberal arts education, with English as the sole language of instruction. Degrees are registered through the New York Board of Regents, and the university mirrors the characteristics of a typical American private nonprofit liberal arts college (Canaan et al., 2022). AUB maintains an 11:1 student–faculty ratio, with average class sizes under 25 students, and 83% of full-time faculty hold doctoral degrees. The student body is 50% female, while women constitute 40% of full-time faculty.

AUB is the oldest and most prestigious university in Lebanon and one of the oldest in the Middle East. It has historically attracted talented students from Lebanon and neighboring countries, reflecting its reputation as an elite institution in the region. The university is selective, with total undergraduate enrollment of approximately 7,000 to 8,000 students. Tuition is relatively high, averaging $20,000 to 25,000$ per year depending on the major. The student population is religiously and linguistically diverse, and a system of financial aid and merit- or need-based scholarships ensures a degree of socioeconomic diversity. Politically, AUB maintains institutional neutrality while fostering an engaged student body, supporting active student participation in civic life, and regularly hosting events addressing contemporary public affairs and social issues.

2.2 The Academic Advising System

Our analysis focuses on students enrolled in AUB's undergraduate programs. Upon admission, students enroll directly in their intended major and are randomly assigned to an academic advisor from the professorial faculty within their department at the beginning of the academic year. We exploit this advising program structure to identify the causal impact of advisor gender on students' long-run beliefs and attitudes regarding gender norms. Advisor assignment follows a systematic randomization process that ensures causal identification. Students are sorted alphabetically by surname or numerically by ID (with the sorting method consistent within each year), while advisors are randomly ordered on a separate list. Administrators then sequentially match students to advisors from these ordered lists (Canaan et al., 2022). This process ensures that student–advisor assignments are independent of students' or advisors' gender, beliefs, preferences, or academic ability.

councils ten years after the introduction of gender quotas.

Faculty advisors play a central role in students' academic experience and are an important determinant of student success (Canaan et al., 2022). Their primary responsibilities include helping students choose courses and monitoring academic progress. Major academic decisions—such as course withdrawals, changing majors, selecting a minor, applying for exchange programs, taking a semester leave, or applying to graduate school—are discussed with advisors. The advising system design ensures substantial student—advisor interaction. Students must meet in person with their advisor at least once per semester to discuss their course registration plan, as the registration pin required to enroll is provided only by the advisor. Advisors also approve all academic petitions initiated by students, typically following an in-person meeting. In sum, academic advisors serve as key mentors and role models, whose interactions can shape students' outcomes and perspectives both immediately and over the long term.

3 Data and Summary Statistics

This study relies on two merged primary data sources. The first is novel survey data that we collected from alumni of the American University of Beirut (AUB). The second is administrative student-level data obtained from AUB's Registrar's Office. In what follows, we describe each dataset in detail and present summary statistics.

3.1 Alumni Survey

The first component of our data consists of newly collected survey measures. The survey elicited demographic information, current place of residence, and a broad range of social, political, religious and gender attitudes and beliefs. Measures of gender norms constitute the primary outcome variables analyzed in this paper. To elicit these measures, we designed and administered an online survey targeting individuals who first enrolled at the American University of Beirut between 2001 and 2018. The survey was fielded from March to May 2025.[2] The university registrar provided a comprehensive roster of alumni meeting our inclusion criteria—namely, first-time undergraduate enrollment between the years 2001 and 2018. The AUB Alumni Office implemented a three-wave contact protocol: an initial invitation, followed by two reminder emails at three-week intervals. Survey administration concluded on May 30, 2025. To encourage participation, respondents were offered a $15 gift card upon survey completion. Alternatively, respondents could choose to donate the equivalent amount to one of three designated local medical institutions. The incentive options were disclosed in the initial invitation.

The Alumni Office maintains a database of permanent email addresses provided during the graduation clearance process. The alumni roster that included our eligibility criteria contained 25,530 former students. After the initial invitation, 923 emails were reported as undeliverable by the survey platform, effectively making 24,607 individuals our upper bound sample frame for this

[2] A pilot survey was conducted a few months earlier on a smaller, randomly selected subset of eligible alumni.

study.[3] We received 1,287 complete responses and 170 partial responses, for a total of 1,457 responses. This corresponds to a response rate of approximately 6 percent relative to our sample frame of 24,607 individuals (1,457/24,607). Figure 1 shows that response rates—relative to all students enrolled between 2001 to 2018, i.e., not just our sample frame—were relatively stable across entry cohorts from 2001 to 2018, ranging between 4 and 5 percent.[4]

To assess compositional differences, we compare baseline characteristics and early academic outcomes of survey respondents from the alumni sample with those of the full population of AUB undergraduates (excluding respondents) who first enrolled between 2001 and 2018. These results are summarized in Table 1. We are able to merge 1,396 students successfully with the administrative data. Differences in SAT scores and the share of female students are relatively small. However, respondents' average first-year GPA is approximately 1.14 points higher than that of the full student population. This difference is not unexpected, as alumni are, by definition, all graduates, whereas the full student population includes non-graduates, i.e., students who, most likely, underperformed.

3.2 University Registrar Data

We merge the survey responses with administrative data from the AUB Registrar's Office. The registrar data include students' SAT scores, high school of graduation, year and semester of first enrollment, gender, major or department of study, graduation GPA, and—most importantly for the purposes of this study—the gender of the student's first-year academic advisor. A de-identified merged dataset was then made available to the research team for analysis.

Table 2 reports summary statistics for the survey participants. Panel A presents baseline characteristics. Women make up 52 percent of the sample. Most participants responded either to the initial invitation or after the first reminder, with an average of 0.947 reminders received. The average completion time for the 46-question survey was $\approx$ 10 minutes (575 seconds). Panel B additionally shows that the average first-year GPA for students responding to the survey is 78.8 out of a 100.

Panel C of Table 2 summarizes the main outcome variables. Questions are grouped into two categories using a Principal Component Analysis: "Gender Role Attitudes" and "Gender Status Perceptions". The first index comprises four questions eliciting deeply held beliefs regarding gen-

[3]It is important to note that, according to the Alumni Office, some of the email addresses on record were likely outdated, including accounts that graduates no longer monitor. Indeed, for many alumnae, the contact email on file was their AUB student email account. Although these accounts remain active indefinitely, many graduates discontinue their use after leaving university. While the exact number of outdated emails is unknown, the 24,607 individuals in the sampling frame should be viewed as an upper-bound estimate of the true population available for contact in our study.

[4]Due to data merger protocols and anonymity agreements, we cannot identify the specific 24,607 students included in the survey sampling frame. Instead, we observe the universe of AUB undergraduates who enrolled between 2001 and 2018 (31,483 students) and the subset who completed the survey.

der norms, coded as binary variables equal to one if the respondent answered "Strongly Agree" or "Agree," and zero otherwise. Overall, 15.4 percent of participants agreed that men are better political leaders than women; 6 percent supported the view that only men should attain the highest political offices (e.g., president or prime minister); 5.2 percent believed that women should stop working after marriage; and 12.1 percent endorsed the view that men should be the sole family providers.

The second index, "Gender Status Perceptions," consists of three questions capturing perceptions of women's current status in society and the economy. Specifically, 21.2 percent of respondents reported that women's participation in the Lebanese labor market is already sufficient; 8.5 percent believed that women's role in Lebanese society does not need to be improved; and 17.3 percent considered women in Lebanon to be "too progressive."

4 Identification Strategy

To identify the causal long-run impacts of exposure to female versus male role models, we exploit the random assignment of advisors to first-year students at the American University of Beirut, as detailed in Section 2. This randomization ensures that no observable or unobservable student characteristics—such as academic ability or preferences—confound our results. We examine how exposure to these role models during university, a formative period, shapes long-run attitudes towards women's rights and societal roles as well as perceptions about women's role in society up to 24 years after initial contact. Using the same approach as in (Canaan and Mouganie, 2021, 2023), we estimate the following linear regression model for first-year students enrolled at the university between the years 2001 and 2018:

$$Y_{idat} = \beta_0 + \beta_1 Femadv_a + \beta_2 Femst_i + \beta_3 Femst_i * Femadv_a + \sigma_{dt} + X_i'\gamma + A_a'\delta + \epsilon_{idat} \qquad (1)$$

where Y_{idat} refers to the outcome of interest for student i in department d matched to advisor a in academic year t. $Femadv_a$ is a dummy variable that takes on values of 1 if an advisor a is female and 0 otherwise. $Femst_i$ is another indicator variable for whether student i is a women. Additionally, we include an interaction term of both of these indicators. Finally, in all regression specifications, we include a department-by-year fixed effect σ_{dt}, which is essential for identification since randomization occurs within the same department and year. Our simplest specification includes only these variables. Given the random assignment of students to advisors, all β coefficients are unbiased and can be interpreted causally.

We focus on three main parameters of interest: β_1, β_3 and the sum of both. β_1 measures the effect of assignment to a woman versus man advisor for male students, while $(\beta_1 + \beta_3)$ measures this effect for female students. β_3 captures the differential impact on the gender gap in outcomes

when students are assigned to female rather than male advisors.[5] In alternate specifications, we add a rich set of controls that should improve precision by reducing residual variation in the outcome variable, but should not significantly alter the treatment estimates. These include a vector of student controls X_i' that contain information on students' SAT scores, legacy admission status, survey reminders as well as birth year fixed effects. The vector A_a' controls for advisors' academic rank. Additionally, we control for the interaction of all our baseline covariates and fixed effects with the student gender indicator variable $Femst_i$ to account for differential impacts on female and male students. ϵ_{idat} represents our error term.

Finally, we also provide evidence of long-run role model effects using a continuous measure of treatment defined as the share or proportion of women faculty advisors students are exposed to across all years they are enrolled at AUB.[6] Formally, in such specifications, we estimate the following linear regression model for first-year students enrolled between 2001 and 2018:

$$Y_{idat} = \beta_0 + \beta_1 PropFemadv_a + \beta_2 Femst_i + \beta_3 Femst_i * PropFemadv_a + \sigma_{dt} + X_i'\gamma + A_a'\delta + \epsilon_{idat} \tag{2}$$

where all variables and parameters are similar to equation (1) except that treatment is now defined as the proportion or share of female advisors ($PropFemadv_a$) students are exposed to during all their years at university.

5 Tests of the Identifying Assumption

5.1 Selection into Survey

Before presenting our main results, we conduct a series of tests to support the causal interpretation of our effects. Our first concern is selection bias arising from differential survey response rates based on advisor gender matching.

Specifically, we test whether the likelihood of responding to our survey correlates with treatment status, i.e., whether students are more or less likely to respond based on their advisor's gender. This poses a potential threat to validity if: (1) advisor gender affects students' propensity to respond to our survey, and (2) those same factors that influence response rates also directly affect gender attitudes. For instance, if female students assigned to female as opposed to male advisors were systematically more likely to respond to our survey—perhaps due to greater satisfaction with their AUB experience—this could create selection issues. Indeed, in such a scenario, our sample would over-represent female students who had positive experiences with female mentorship, leading us to

[5] β_2 is the average difference in outcomes between female and male students when matched to male advisors.

[6] For many students, the advisor is the same throughout their time at university, but advisor switches are possible due to advisors going on sabbatical, advisors deciding to quit, students changing departments or, in very rare cases, students requesting a change in advisor.

potentially overestimate the long-term effects of female advisor assignment on gender attitudes.

To ease such concerns, we run equation (1) using an indicator for responding to the survey as our outcome of interest for the universe of students enrolled at AUB between the years 2001 and 2018. Table 3 presents the results of this analysis. We find no evidence that advisor gender affects survey response rates in a way that would bias our estimates. For male students, assignment to a female advisor has virtually no effect on response probability, with point estimates of 0.003 (0.3 percentage points) for both binary (first year women advisor assignment) and continuous (share of women advisors across all university years) treatment specifications that are statistically indistinguishable from zero. Similarly, female students show no differential response patterns based on their advisor's gender, with identical point estimates of 0.003 for binary treatment and slightly higher but still insignificant estimates of 0.006 for continuous treatment.

Importantly, the gender gap in response rates, measured as the difference between female and male students' propensity to respond when assigned to female versus male advisors, is essentially zero across both specifications. The point estimates range from 0 to 0.3 percentage points and are statistically insignificant, indicating that any differential effects of advisor gender on survey participation are not systematically related to student gender. These findings provide reassurance that our main results are not driven by selective survey participation.

5.2 Tests of Randomization

To identify causal effects, student characteristics must be independent of advisor assignment. Although our institutional context ensures random matching between students and advisors within the same department and year, we conduct several tests to support that our data align with this randomization process. We begin by examining whether baseline student characteristics are balanced across advisor gender for both male and female students within randomization strata. To do so, we run equation (1) using students' Math and Verbal SAT scores as outcomes of interest for the sample of students who responded to our survey. This enables us to check whether being matched to an advisor of a different gender is correlated with men's and women's predetermined student characteristics. Table A1 summarizes the results of this exercise, where we separately report coefficients for male and female students in the first and second rows, respectively, while the third row presents estimates on the gender gap.

We find that male students matched to women as opposed to men faculty advisors have statistically similar Math SAT scores as indicated by the statistically insignificant and small estimate of 8.049 SAT points in the first row of column (1). We also find no effect on female students and the corresponding gender gap in Math SAT scores. However, we do find a small but marginally significant effect on Verbal SAT scores for men, with an increase of 17.824 points when matched to a women advisor. For women, we find that Verbal SAT scores are balanced across advisor gender

as shown in the second row. Additionally, we find no statistically significant differences on the gender gap in Verbal SAT scores when students are assigned to female rather than male advisors as highlighted by the insignificant estimate in the third row. We conduct a similar exercise using our continuous definition of treatment (proportion of female advisors across all university years) and reach a similar conclusion. These results are summarized in Appendix Table A2.

To further assess whether the data are consistent with random assignment, we complement the above analysis with formal tests of randomization, following the approach of Carrell and West (2010) and Canaan and Mouganie (2023). Specifically, we draw 10,000 random samples of equal size within each department and year for every advisor group combination, without replacement. For each randomly sampled advisor group combination, we calculate the sum of female students, the sum of Math SAT scores, and the sum of Verbal SAT scores. We then construct empirical p-values for each advisor group based on the proportion of simulations in which the number of female students, total Math SAT scores, or total Verbal SAT scores is smaller than the observed value. Under random assignment, all empirical p-values should be equally likely, so their distribution is expected to be uniform. We formally test the uniformity of the empirical p-value distributions for each variable using a χ^2 goodness-of-fit test. These tests are conducted both for the full sample and for survey respondents only.

Findings from these tests are summarized in Table 4. For survey respondents, we fail to reject the null hypothesis of random assignment for all three characteristics tested. Specifically, 0 out of 99 tests failed for female students, 0 out of 131 tests failed for Math SAT scores, and 0 out of 132 tests failed for Verbal SAT scores.[7] For the full sample, only 3 out of 921 tests failed. Overall, these results provide no strong evidence of non-random assignment of students to advisors based on gender or academic ability, consistent with the institutional assignment procedure.

6 Results

6.1 Long-run Outcomes

We examine the long-term impacts of exposure to female versus male role models on gender norms and beliefs. Our main outcomes of interest are measures of gender attitudes and perceptions captured through an online alumni survey conducted with former students up to 24 years after initial enrollment at the American University of Beirut.

Table 5 summarizes our main estimates examining the effects of being assigned to a female rather than a male advisor on two composite indices of gender attitudes. The first index, "Gender Role Attitudes", captures normative beliefs about gender roles as measured through women's

[7]The reduced number of tests for female students reflects the fact that—conditional on the survey respondent sample—some departments exhibit no variation in female students in certain years.

participation in politics, leadership, and the workforce. The second index, "Gender Status Perceptions", captures descriptive perceptions about women's current situation in Lebanon as measured through labor market participation and societal position. These indices were constructed using a Principal Component Analysis (PCA) decomposition with a positive number indicating more conservative views and a negative number indicating more progressive attitudes.

Our results reveal striking patterns in how early exposure to female role models shapes long-term gender attitudes. For the "Gender Role Attitudes" index, we find that male students show a positive but statistically insignificant response (0.282) to having been assigned a female advisor. However, female students exhibit a large and statistically significant negative effect of -0.422. This translates to a substantial 0.703 reduction in the gender gap. We find similar but statistically insignificant patterns when looking at the "Gender Status Perceptions" index, indicating that exposure to female advisors leads to a divergence in gender attitudes between men and women, with women developing more progressive views relative to their male counterparts.

While instructive, these indices are difficult to interpret on their own. Table 6 disaggregates these effects to examine impacts on individual survey questions that compose our gender attitude measures. This allows us to identify which specific beliefs are most responsive to early role model exposure. Columns (1) through (4) in Table 6 present estimates for outcomes used in the first index ("Gender Role Attitudes"), while columns (5) through (7) represent outcomes used in measuring "Gender Status Perceptions".

The individual outcome analysis reveals that our findings are most pronounced for attitudes related to women's participation in politics and the workforce. Indeed, outcomes in columns (1) through (4) of Table 6 reveal that female students who were exposed to female advisors are 7 percentage points less likely to agree that "men are better suited for politics" (significant at the 10% level) and 5.9 percentage points less likely to believe that "women should stop working when they get married". They are also 8.8 percentage points less likely to agree that "men should be the main providers in households". These effects translate to substantial reductions in gender gaps across multiple dimensions. The gender gap in beliefs about men being better suited for politics widens by 14.1 percentage points, while the gap regarding women stopping work after marriage increases by 10.8 percentage points. These findings suggest that early exposure to women advisors has lasting effects on fundamental attitudes or beliefs about gender roles in society.

Finally, estimates presented in columns (5) through (7) summarize effects on individual outcomes related to perceptions about women's status in society. We observe similar patterns as those found in columns (1) through (4), with a divergence in perceptions between men and women—though these effects are not statistically significant. For example, exposure to female advisors leads men to be more likely to perceive that women's labor force participation is sufficiently high in Lebanon,

while women become less likely to hold this view. Similarly, men are more inclined to think that women's current role in society is appropriate, whereas women develop more critical assessments of women's societal position. Men also become more likely to perceive women as too progressive in Lebanon, while women move in the opposite direction on this measure.

Tables 7 and 8 present findings using a continuous treatment specification, which measures the share of female advisors students are exposed to across all university years rather than just the gender of their first-year advisor. This approach captures broader exposure to female role models within the university. Consistent with our binary definition of treatment, results summarized in Table 7 indicate that exposure to a higher share of female faculty advisors mainly affects beliefs related to "Gender Role Attitudes".

The individual outcome results under the continuous treatment specification show even stronger (and more robust) effects for several key attitudes; mainly those capturing attitudes regarding gender roles as presented in columns (1) through (4). A 10 percentage point increase in the share of women advisors students are exposed to decreases female students' likelihood of agreeing that only men should be president or prime minister by 0.66 percentage points, while having no significant effect on male students; this widens the gender gap by 1.5 percentage points. Similarly, a 10 percentage point increase in exposure decreases the likelihood that women believe men are better at politics by 1.06 percentage points, but increases the likelihood that men hold this belief by 1.43 percentage points (significant at the 10 percent level); this widens the gender gap by 2.49 percentage points. Finally, female students are 0.74 and 1.16 percentage points less likely to believe women should stop working after marriage and that men should be the main provider in the household, respectively.

These findings provide strong evidence that early exposure to female role models has significant and lasting effects on beliefs and attitudes regarding gender roles, with impacts persisting decades after initial exposure, suggesting that such exposure fundamentally reshapes how individuals view gender roles in society.

6.2 Heterogeneity Analysis

6.2.1 STEM versus non-STEM Departments

To better understand the mechanisms driving our main results, we investigate whether the impact of advisor gender differs across departments where women are traditionally underrepresented versus not —i.e., STEM versus non-STEM departments. This analysis helps us understand whether our documented findings on long-run beliefs are concentrated in traditionally male-dominated environments or whether their effects are more universal.

We focus primarily on the binary treatment specification, measuring the gender of students' first-year advisor. One limitation of this heterogeneity analysis is reduced precision due to smaller sample sizes within each subgroup. Tables 9 and 11 present results for our composite indices, while Tables 10 and 12 examine individual outcome measures. We also provide results using continuous treatment in the appendix.[8]

In departments where women are traditionally underrepresented (STEM fields), we find particularly pronounced effects of female advisor exposure on gender role attitudes. Table 9 shows that male students in STEM contexts exhibit a significant positive response to female advisor assignment (0.571) in our PCA index measuring "Gender Role Attitudes", while female students show a substantial negative effect (-0.333), resulting in a large and significant increase in the gender gap (-0.904). This suggests that in male-dominated academic environments, exposure to female role models creates divergent responses between genders, mainly affecting attitudes towards gender roles as we detect no statistically significant effects on perceptions about women's current gender status.

The individual outcome analysis in Table 10 reveals that these effects are concentrated in beliefs about political leadership and workforce participation. In STEM departments, exposure to female advisors leads male students to be 17.3 percentage points more likely to believe only men should be president. This leads to an increase of 22.5 percentage points in the gender gap related to this outcome. This divergence is also noticeable for beliefs about men being better suited for where women are 9.5 percentage points less likely to believe so. Interestingly, we also find that men exposed to a female advisor in a STEM department are 13.2 percentage points more likely to perceive that "women in Lebanon are too progressive".

The pattern differs substantially in non-STEM departments where women are better represented. Table 11 shows that while female students still exhibit more progressive attitudes towards gender roles (-0.463) from female advisor exposure, male students show no significant response (-0.185); if anything the effect is towards more progressive views. This results in a smaller and statistically insignificant gender gap effect (-0.278). This suggests that in more gender-balanced academic environments, female role models primarily influence women's attitudes without generating significant counter-reactions among men. These findings are broken down by individual outcomes in Table 12.

Findings from this section suggest that the influence of female role models can be highly context-dependent. In male-dominated fields, female advisors appear to create polarizing responses, potentially reinforcing existing gender divisions as men may react defensively to challenges to traditional

[8] Appendix Tables A3, A4, A5 and A6 summarize heterogeneity using continuous treatment, defined as the share of women advisors students are exposed to throughout university.

gender hierarchies; particularly in a gender conservative, and more patriarchal, society like Lebanon. In contrast, in more gender-balanced contexts, female role models can influence women's attitudes toward more progressive views without triggering backlash effects among male students.

6.2.2 Religiosity and Religion

Next we turn to the role of religion in estimating where our documented findngs may be largest. Lebanon is dominated by two main religions: Islam and Christianity, and is considered to be a religiously conservative society overall, particularly when it comes to gender norms and beliefs. As a result, we hypothesize that the effects of female role models may be particularly pronounced among religious students, who may hold more traditional views about gender roles that could be more susceptible to change through exposure to counter-stereotypical role models—female university professors. We examine heterogeneity by religiosity comparing students who identify as religious versus those who do not. Tables 13 and 14 present results for religious students, while Tables 15 and 16 show findings for non-religious students.[9]

Table 13 shows that religious male students exhibit a large positive, i.e. conservative, response (0.716) to female advisor assignment in our "Gender Role Attitudes" index, while religious female students show a negative and significant effect (-0.577), resulting in a highly significant gender gap of -1.293. We also observe significant effects on the "Gender Status Perceptions" index for male students (0.698), suggesting that exposure to female advisors influences both normative beliefs about gender roles and descriptive perceptions about women's current status in society. The individual outcome analysis in Table 14 reveals that religious male students exposed to female advisors are 26.3 percentage points more likely to believe men are better suited for politics and 17.2 percentage points more likely to perceive women as too progressive, while religious female students are 8.5 percentage points less likely to believe women should stop working after marriage. In stark contrast, Tables 15 and 16 show that non-religious students exhibit much different and statistically insignificant responses to female advisor exposure across all measures.

These findings suggest that religious identity serves as a crucial moderating factor, with female role models creating the strongest—and most polarizing—responses among students who likely enter university with more traditional gender views, while having little effect on non-religious students who may already hold more balanced gender egalitarian attitudes.

[9] Appendix Tables A7, A8, A9 and A10 summarize religious heterogeneity using continuous treatment, defined as the share of women advisors students are exposed to throughout university.

7 Discussion and Mechanisms

While the exact mechanisms are difficult to disentangle, several pieces of evidence suggest that at least part of our main effects are driven by female advisors serving as role models for female students. One potential channel is through improved academic experiences and outcomes. If female advisors provide more effective mentorship or support, female students may achieve higher academic performance, which in turn could enhance confidence and shape long-term gender beliefs and perceptions. To examine this channel, we analyze how advisor gender affects key academic outcomes—first-year GPA, first-year dropout likelihood, and six-year graduation probability—using the full sample of students enrolled at AUB between 2001 and 2018. We expand beyond survey respondents because the alumni database (our survey frame) includes only graduates.

Table 17 provides evidence consistent with this mechanism. Female students assigned to women advisors exhibit significantly better academic outcomes. First-year GPA increases by 0.071 standard deviations for female students, while male students show no significant change, resulting in a gender gap increase of 0.068 standard deviations. Female students are also 3.2 percentage points less likely to drop out in their first year, with no corresponding effect for male students. Although female students are not more likely to graduate within six years, we observe a significant 2.4 percentage point change in the gender gap, primarily driven by lower graduation rates among men.[10]

These findings suggest that female advisors may serve as particularly effective mentors for female students, providing guidance, aspirational role modeling, and supportive academic environments. Enhanced academic success and confidence through these interactions could contribute to more progressive gender attitudes persisting decades after graduation. However, academic performance alone is unlikely to fully explain our results. The polarizing effects we observe—female advisors shifting women toward more progressive attitudes while sometimes pushing men toward more conservative views—suggest additional mechanisms. For instance, female advisors may expose students to counter-stereotypical examples of women in authority, particularly in a conservative context like Lebanon, challenging traditional gender norms in ways that elicit divergent responses by gender.

The heterogeneity across contexts presented in section 6.2 is consistent with such an interpretation. In STEM fields, where women are underrepresented, female advisors provide salient examples of women succeeding in male-dominated domains. Yet these role models generate polarizing effects: male students are more likely to adopt conservative views, potentially as a defensive response to challenges to traditional gender hierarchies. In non-STEM departments, where women are not a minority, we do not observe similar polarizing effects. Similarly, among religious students, who may

[10]Continuous treatment results in Table A11 tell a similar story. A 10-percentage-point increase in exposure to female advisors across university changes the gender gap in GPA by 0.62 percent of a standard deviation. Female students also become 0.26 percentage points less likely to drop out in the first year, and the gender gap in graduation shifts by 0.44 percentage points.

enter university with more traditional gender views, exposure to female authority figures produces the largest attitude shifts. Religious male students respond conservatively, whereas religious female students develop significantly more progressive attitudes, suggesting that female role models have the strongest impact where they most directly challenge existing beliefs.

In sum, our findings suggest that female advisors serve as influential role models, positively shaping female students' academic outcomes and long-term gender attitudes, while sometimes producing more conservative responses among male students. The magnitude and persistence of these effects—lasting up to 24 years after initial exposure—underscore how formative university experiences, particularly sustained mentoring relationships, can both promote progressive attitudes among women and highlight the complex, gender-specific dynamics of exposure to counter-stereotypical role models.

8 Conclusion

This paper provides causal evidence on the long-run effects of exposure to female role models during university on gender norms. Exploiting the random assignment of academic advisors at the American University of Beirut, we show that female students assigned to women advisors adopt significantly more progressive views on gender roles even two decades after enrollment. Conversely, male students exhibit weaker and sometimes more conservative responses, leading to wider gender attitude gaps and increased polarization.

We further show that these effects are heterogeneous. They are strongest in STEM fields and among religious students, where traditional gender hierarchies are more salient, and weaker in more gender-balanced or less religious settings. In addition, female advisor exposure improves women's academic performance and persistence, consistent with mentorship and role-model mechanisms. Together, these findings underscore that early and meaningful interactions with role models can durably shape gender norms, with effects that persist well beyond university. More broadly, they highlight the importance of everyday institutional environments in influencing social attitudes and the potential for naturally occurring exposures, rather than explicit interventions, to shift long-run beliefs.

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A Figures

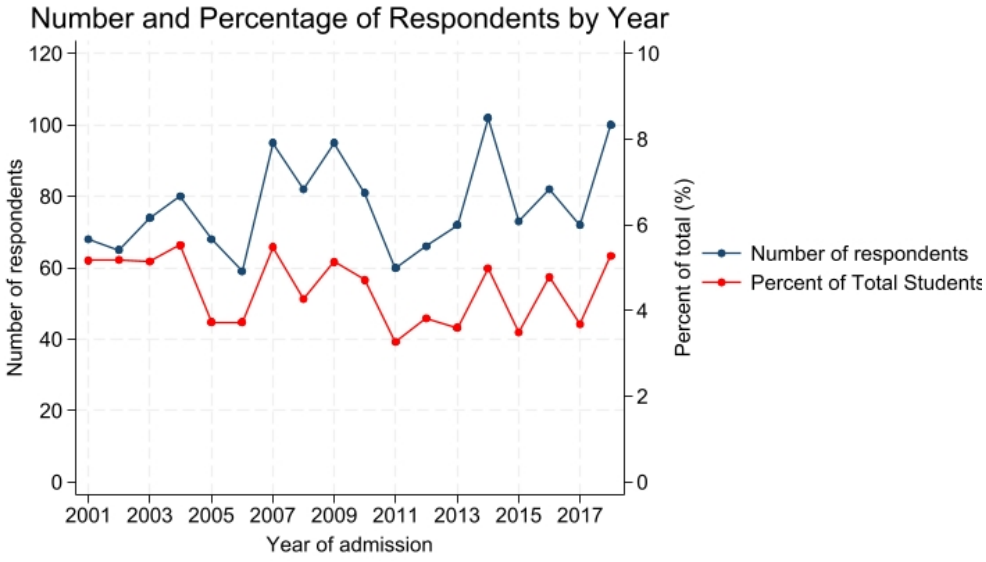


Figure 1: Number and Percentage of Respondents by Year of Admission

B Tables

Table 1: Comparison of Survey Respondents and All Students

	Respondents	All Students Excluding Respondents	Difference
	(1)	(2)	(3)
Panel A: Outcomes at AUB			
First Year GPA	78.793	77.652	1.141
	(7.496)	(8.301)	
Panel B: Baseline Characteristics			
SAT - Math	636.423	628.500	7.923
	(75.304)	(79.050)	
SAT - Verbal	540.103	532.385	7.718
	(108.689)	(105.948)	
Female Student	0.520	0.495	0.025
	(0.500)	(0.500)	
Observations	1,396	30,176	

Notes: This table compares characteristics of survey respondents and all students enrolled at the American University of Beirut between the years 2001 and 2018 excluding respondents. "All students" comprises mostly all survey non-responders but also includes some students not targeted in our survey. We are unable to pinpoint the sample of all students targeted by the survey using our linked anonymized administrative data. Standard deviations are in parentheses.

Table 2: Summary Statistics for Survey Respondents

	All Students (1)
Panel A: Baseline Characteristics	
SAT - Math	636.423
	(75.304)
SAT - Verbal	540.103
	(108.689)
Female student	0.520
	(0.500)
Number of survey reminders	0.947
	(0.738)
Total time spent on survey	574.69
	(638.91)
Panel B: Outcomes at AUB	
First-Year GPA	78.793
	(7.496)
Panel C: Survey Responses	
"Gender Role Attitudes" Index	-0.005
	(1.308)
Only men should be President or Prime Minister	0.059
	(0.236)
Men are better at political leadership than women	0.154
	(0.361)
It is best if women stop working after marriage	0.052
	(0.222)
Men should be the sole provider of the family	0.121
	(0.326)
'Gender Status Perceptions" Index	-0.003
	(1.328)
Women's participation in the labor market in Lebanon is high enough	0.212
	(0.409)
Women's role in Lebanese society does not need improving	0.085
	(0.279)
Women in Lebanon are too progressive	0.173
	(0.378)
Observations	1,396

Notes: The sample includes all students who responded to our survey and who were enrolled at the American University of Beirut between the years 2001 and 2018.

Table 3: Effects of Female Advisor on Likelihood of Survey Response

	Binary Treatment	Continuous Treatment
Effects on male students	0.003	0.003
	(0.005)	(0.005)
Effects on female students	0.003	0.006
	(0.005)	(0.005)
Gender gap	0.000	0.003
	(0.005)	(0.006)
Observations	31418	31483
Mean with male advisor (Men)	0.042	0.042
Mean with male advisor (Women)	0.043	0.041

Note: This table summarizes both the effects of being assigned a female advisor during first year at university and the proportion of female advisors at university on the likelihood of responding to the survey. The sample includes all students enrolled between the years 2001 and 2018 at the American University of Beirut. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equations (1) and (2). *** p<0.01, ** p<0.05, * *** p<0.01, ** p<0.05, * p<0.10.

Table 4: Random Assignment Test

	(1) Female student Empirical P-Value	(2) Math SAT Empirical P-Value	(3) Verbal SAT Empirical P-Value
Test for Student Characteristics in Survey Sample			
χ^2 goodness of fit test (no. failed/total tests)	0/99	0/131	0/132
Test for Student Characteristics in Full Sample			
χ^2 goodness of fit test (no. failed/total tests)	0/295	2/314	1/312

Notes: The empirical p-value of each advisor represents the proportion of the 10,000 simulated groups of students with a summed value less than that of the observed group. Sample includes students entering from academic years 2001 till 2018. The χ^2 goodness of fit test results indicate the number of tests of the uniformity of the distribution of p-values that failed at the 5% level. The reduced number of tests for Female student is due to the fact some departments do not have any variation in Female students in certain years.

Table 5: Gender Interaction Effects on Index Outcomes - Binary Treatment

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	0.282	0.298
	(0.238)	(0.246)
Effects on female students	-0.422***	-0.191
	(0.161)	(0.223)
Gender gap	-0.703**	-0.490
	(0.280)	(0.329)
Observations	922	922
Mean with male advisor (Men)	0.164	0.077
Mean with male advisor (Women)	-0.178	-0.123

Notes: This table shows the effects of being assigned a female advisor during first year at university. The sample includes all students enrolled between the years 2001 and 2018. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, *

Table 6: Gender Interaction Effects on Individual Outcomes - Binary Treatment

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	0.057	0.071	0.050	-0.023	0.035	0.063	0.076
	(0.054)	(0.067)	(0.044)	(0.058)	(0.074)	(0.056)	(0.062)
Female students	-0.021	-0.070*	-0.059**	-0.088**	-0.027	-0.026	-0.064
	(0.037)	(0.042)	(0.029)	(0.039)	(0.070)	(0.044)	(0.058)
Gender gap	-0.078	-0.141*	-0.108**	-0.064	-0.062	-0.089	-0.140
	(0.065)	(0.076)	(0.053)	(0.069)	(0.096)	(0.070)	(0.086)
Observations	922	922	922	922	922	922	924
Mean with male advisor (Men)	0.061	0.247	0.069	0.116	0.216	0.102	0.196
Mean with male advisor (Women)	0.041	0.074	0.045	0.112	0.207	0.058	0.136

Notes: This table shows the effects of being assigned a female advisor during first year at university. The sample includes all students enrolled between the years 2001 and 2018. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, *

Table 7: Gender Interaction Effects on Index Outcomes - Continuous Treatment

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	0.329	0.430
	(0.277)	(0.286)
Effects on female students	-0.629***	-0.004
	(0.192)	(0.236)
Gender gap	-0.958***	-0.433
	(0.337)	(0.369)
Observations	923	923
Mean with male advisor (Men)	0.164	0.077
Mean with male advisor (Women)	-0.178	-0.123

Notes: This table shows the effects of the proportion of female advisors (continuous treatment) students are exposed to during their university career. The sample includes all students enrolled between the years 2001 and 2018. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, *

Table 8: Gender Interaction Effects on Individual Outcomes - Continuous Treatment

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	0.084	0.143*	0.018	-0.035	0.093	0.066	0.106
	(0.064)	(0.081)	(0.050)	(0.054)	(0.079)	(0.062)	(0.073)
Female students	-0.066*	-0.106**	-0.074*	-0.116**	-0.019	-0.032	0.056
	(0.038)	(0.043)	(0.039)	(0.049)	(0.078)	(0.049)	(0.070)
Gender gap	-0.150**	-0.249***	-0.092	-0.081	-0.112	-0.098	-0.050
	(0.074)	(0.090)	(0.063)	(0.073)	(0.108)	(0.079)	(0.103)
Observations	923	923	923	923	923	923	925
Mean with male advisor (Men)	0.061	0.247	0.069	0.116	0.216	0.102	0.196
Mean with male advisor (Women)	0.041	0.074	0.045	0.112	0.207	0.058	0.136

Notes: This table shows the effects of the proportion of female advisors (continuous treatment) students are exposed to during their university career. The sample includes all students enrolled between the years 2001 and 2018. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, *

Table 9: Heterogeneous Effects of Advisor Gender on Index Outcomes - Binary Treatment (STEM Departments)

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	0.571*	0.441
	(0.296)	(0.325)
Effects on female students	-0.333**	0.025
	(0.166)	(0.263)
Gender gap	-0.904***	-0.417
	(0.336)	(0.398)
Observations	487	487
Mean with male advisor (Men)	0.144	0.024
Mean with male advisor (Women)	-0.250	-0.192

Notes: This table shows the effects of having a female advisor (binary treatment) during first year. The sample includes all students enrolled between the years 2001 and 2018 and who were enrolled in a STEM department. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, *

Table 10: Heterogeneous Effects of Advisor Gender on Individual Outcomes - Binary Treatment (STEM Departments)

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	0.173**	0.050	0.081	0.008	0.014	0.104	0.132*
	(0.068)	(0.083)	(0.060)	(0.078)	(0.087)	(0.070)	(0.079)
Female students	-0.051	-0.095*	0.000	-0.071	-0.025	0.017	0.015
	(0.045)	(0.055)	(0.000)	(0.056)	(0.107)	(0.044)	(0.077)
Gender gap	-0.225***	-0.145	-0.081	-0.079	-0.038	-0.087	-0.117
	(0.081)	(0.101)	(0.060)	(0.096)	(0.123)	(0.081)	(0.111)
Observations	487	487	487	487	487	487	489
Mean with male advisor (Men)	0.055	0.246	0.068	0.113	0.198	0.096	0.186
Mean with male advisor (Women)	0.025	0.076	0.034	0.101	0.202	0.042	0.118

Notes: This table shows the effects of having a female advisor (binary treatment) during first year. The sample includes all students enrolled between the years 2001 and 2018 and who were enrolled in a STEM department. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, *

Table 11: Heterogeneous Effects of Advisor Gender on Index Outcomes - Binary Treatment (Non-STEM Departments)

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	-0.185	0.068
	(0.358)	(0.367)
Effects on female students	-0.463**	-0.291
	(0.223)	(0.302)
Gender gap	-0.278	-0.359
	(0.404)	(0.480)
Observations	435	435
Mean with male advisor (Men)	0.250	0.307
Mean with male advisor (Women)	-0.109	-0.056

Notes: This table shows the effects of having a female advisor (binary treatment) during first year. The sample includes all students enrolled between the years 2001 and 2018 and who were enrolled in a non-STEM department. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, *

Table 12: Heterogeneous Effects of Advisor Gender on Individual Outcomes -Binary Treatment (Non-STEM Departments)

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	-0.130*	0.105	-0.000	-0.074	0.070	-0.003	-0.014
	(0.072)	(0.112)	(0.058)	(0.082)	(0.132)	(0.092)	(0.095)
Female students	-0.007	-0.059	-0.086**	-0.096*	-0.028	-0.046	-0.100
	(0.049)	(0.056)	(0.042)	(0.051)	(0.090)	(0.061)	(0.077)
Gender gap	0.123	-0.164	-0.086	-0.022	-0.098	-0.043	-0.086
	(0.088)	(0.118)	(0.071)	(0.095)	(0.155)	(0.110)	(0.124)
Observations	435	435	435	435	435	435	435
Mean with male advisor (Men)	0.088	0.250	0.074	0.132	0.294	0.132	0.235
Mean with male advisor (Women)	0.057	0.073	0.057	0.122	0.211	0.073	0.154

Notes: This table shows the effects of having a female advisor (binary treatment) during first year. The sample includes all students enrolled between the years 2001 and 2018 and who were enrolled in a non-STEM department. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, *

Table 13: Heterogeneous Effects of Advisor Gender on Index Outcomes - Binary Treatment (Religious Students)

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	0.716*	0.698*
	(0.403)	(0.372)
Effects on female students	-0.577***	-0.007
	(0.202)	(0.329)
Gender gap	-1.293***	-0.706
	(0.439)	(0.496)
Observations	503	503
Mean with male advisor (Men)	0.498	0.325
Mean with male advisor (Women)	-0.006	-0.023

Notes: This table shows the effects of having a female advisor (binary treatment) during first year. The sample includes all students enrolled between the years 2001 and 2018 and who identify as religious (religiosity==1). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, *

Table 14: Heterogeneous Effects of Advisor Gender on Individual Outcomes - Binary Treatment (Religious Students)

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	0.113	0.263**	0.081	-0.027	0.134	0.119	0.172*
	(0.096)	(0.107)	(0.076)	(0.093)	(0.103)	(0.077)	(0.100)
Female students	-0.056	-0.099	-0.085**	-0.082	0.023	-0.005	-0.019
	(0.049)	(0.066)	(0.040)	(0.053)	(0.095)	(0.065)	(0.085)
Gender gap	-0.169	-0.362***	-0.166*	-0.055	-0.111	-0.123	-0.190
	(0.109)	(0.122)	(0.085)	(0.104)	(0.132)	(0.100)	(0.132)
Observations	503	503	503	503	503	503	505
Mean with male advisor (Men)	0.099	0.314	0.099	0.180	0.262	0.134	0.270
Mean with male advisor (Women)	0.056	0.105	0.056	0.161	0.252	0.063	0.154

Notes: This table shows the effects of having a female advisor (binary treatment) during first year. The sample includes all students enrolled between the years 2001 and 2018 and who identify as religious (religiosity==1). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, * p<0.10.

Table 15: Heterogeneous Effects of Advisor Gender on Index Outcomes - Binary Treatment (Non-Religious Departments)

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	-0.171	-0.271
	(0.167)	(0.452)
Effects on female students	-0.274	-0.589
	(0.236)	(0.417)
Gender gap	-0.104	-0.318
	(0.289)	(0.615)
Observations	240	240
Mean with male advisor (Men)	-0.181	-0.228
Mean with male advisor (Women)	-0.395	-0.329

Notes: This table shows the effects of having a female advisor (binary treatment) during first year. The sample includes all students enrolled between the years 2001 and 2018 and who identify as non-religious (religiosity==0). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, * p<0.10.

Table 16: Heterogeneous Effects of Advisor Gender on Individual Outcomes -Binary Treatment (Non-Religious Departments)

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	0.053	-0.243**	0.000	0.053	-0.060	-0.086	-0.007
	(0.048)	(0.102)	(0.000)	(0.048)	(0.132)	(0.113)	(0.078)
Female students	0.000	-0.057	-0.029	-0.076	-0.105	-0.114	-0.133
	(0.083)	(0.052)	(0.000)	(0.067)	(0.151)	(0.071)	(0.102)
Gender gap	-0.053	0.186	-0.029	-0.129	-0.045	-0.028	-0.126
	(0.096)	(0.115)	(0.000)	(0.083)	(0.201)	(0.134)	(0.128)
Observations	240	240	240	240	240	240	240
Mean with male advisor (Men)	0.025	0.176	0.042	0.042	0.160	0.059	0.109
Mean with male advisor (Women)	0.038	0.019	0.038	0.038	0.154	0.038	0.077

Notes: This table shows the effects of having a female advisor (binary treatment) during first year. The sample includes all students enrolled between the years 2001 and 2018 and who identify as non-religious (religiosity==0). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, * p<0.10.

Table 17: Effects of Female Advisor on Academic Outcomes - Binary Treatment

	GPA Year 1	Dropout 1st Year	Graduate in 6 Years
All Students			
Effects on male students	0.002	-0.016	-0.019*
	(0.019)	(0.012)	(0.011)
Effects on female students	0.071***	-0.032**	0.004
	(0.018)	(0.013)	(0.009)
Gender gap	0.068***	-0.016*	0.024**
	(0.022)	(0.009)	(0.011)
Observations	26,768	27,590	25,908
Mean with male advisor (Men)	-0.026	0.127	0.787
Mean with male advisor (Women)	0.109	0.145	0.786

Note: This table shows the effects of having a female advisor (binary treatment) during first year on academic outcomes. The sample includes all students enrolled between the years 2001 and 2018 regardless of whether they responded to the survey or not. Column (2) sample is restricted to 2001-2017 cohorts and column (3) sample is restricted to 2001-2015 sample in order to be able to construct these outcomes. GPA outcomes in column (1) are standardized. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, * p<0.10.

C Appendix Tables

Table A1: Baseline Covariates Test: Effects of Female Advisor on SAT Scores - Binary Treatment

	Math SAT	Verbal SAT
Effects on male students	8.049	17.824*
	(9.181)	(10.630)
Effects on female students	0.979	1.680
	(8.233)	(9.025)
Gender gap	-7.070	-16.144
	(10.212)	(12.586)
Observations	867	883
Mean with male advisor (Men)	659.516	550.271
Mean with male advisor (Women)	632.996	543.339

Note: This table shows results using binary treatment, i.e. having a female advisor during first-year at university. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (1). *** p<0.01, ** p<0.05, * p<0.10.

Table A2: Baseline Covariates Test: Effects of Female Advisor on SAT Scores - Continuous Treatment

	Math SAT	Verbal SAT
Effects on male students	7.399	10.778
	(10.087)	(13.175)
Effects on female students	5.940	3.971
	(9.057)	(10.494)
Gender gap	-1.459	-6.807
	(12.546)	(15.698)
Observations	868	884
Mean with male advisor (Men)	663.512	558.444
Mean with male advisor (Women)	636.564	549.552

Note: This table shows results using continuous treatment (proportion of female advisors). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A3: Heterogeneous Effects of Advisor Gender on Index Outcomes - Continuous Treatment (STEM Departments)

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	0.510	0.466
	(0.351)	(0.349)
Effects on female students	-0.448**	-0.037
	(0.190)	(0.266)
Gender gap	-0.958**	-0.502
	(0.392)	(0.426)
Observations	487	487
Mean with male advisor (Men)	0.144	0.024
Mean with male advisor (Women)	-0.250	-0.192

Notes: This table shows the effects of the proportion or share of female advisors (continuous treatment) for all students enrolled in STEM departments. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A4: Heterogeneous Effects of Advisor Gender on Index Outcomes - Continuous Treatment (Non-STEM Departments)

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	0.012	0.367
	(0.422)	(0.495)
Effects on female students	-0.740**	0.017
	(0.286)	(0.344)
Gender gap	-0.752	-0.350
	(0.515)	(0.610)
Observations	436	436
Mean with male advisor (Men)	0.250	0.307
Mean with male advisor (Women)	-0.109	-0.056

Notes: This table shows the effects of the proportion or share of female advisors (continuous treatment) for all students enrolled in non-STEM departments. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A5: Heterogeneous Effects of Advisor Gender on Individual Outcomes - Continuous Treatment (STEM Departments)

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	0.193**	0.125	0.042	-0.057	0.006	0.121*	0.132
	(0.086)	(0.088)	(0.067)	(0.070)	(0.096)	(0.069)	(0.091)
Female students	-0.078	-0.089	-0.025	-0.082	0.006	-0.035	0.017
	(0.052)	(0.062)	(0.029)	(0.062)	(0.114)	(0.033)	(0.080)
Gender gap	-0.272***	-0.214**	-0.067	-0.025	0.000	-0.156**	-0.115
	(0.099)	(0.108)	(0.073)	(0.093)	(0.136)	(0.077)	(0.123)
Observations	487	487	487	487	487	487	489
Mean with male advisor (Men)	0.055	0.246	0.068	0.113	0.198	0.096	0.186
Mean with male advisor (Women)	0.025	0.076	0.034	0.101	0.202	0.042	0.118

Notes: This table shows the effects of the proportion or share of female advisors (continuous treatment) for all students enrolled in STEM departments. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A6: Heterogeneous Effects of Advisor Gender on Individual Outcomes - Continuous Treatment (Non-STEM Departments)

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	-0.107	0.173	-0.023	0.003	0.245*	-0.031	0.060
	(0.073)	(0.163)	(0.071)	(0.085)	(0.139)	(0.118)	(0.122)
Female students	-0.058	-0.116**	-0.104*	-0.137*	-0.034	-0.031	0.080
	(0.053)	(0.058)	(0.059)	(0.070)	(0.105)	(0.077)	(0.101)
Gender gap	0.049	-0.290*	-0.080	-0.140	-0.279	0.000	0.019
	(0.091)	(0.170)	(0.092)	(0.109)	(0.172)	(0.141)	(0.161)
Observations	436	436	436	436	436	436	436
Mean with male advisor (Men)	0.088	0.250	0.074	0.132	0.294	0.132	0.235
Mean with male advisor (Women)	0.057	0.073	0.057	0.122	0.211	0.073	0.154

Notes: This table shows the effects of the proportion or share of female advisors (continuous treatment) for all students enrolled in non-STEM departments. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A7: Heterogeneous Effects of Advisor Gender on Index Outcomes - Continuous Treatment (Religious Students)

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	0.628	0.646
	(0.444)	(0.418)
Effects on female students	-0.868***	0.290
	(0.269)	(0.314)
Gender gap	-1.496***	-0.356
	(0.524)	(0.537)
Observations	504	504
Mean with male advisor (Men)	0.498	0.325
Mean with male advisor (Women)	-0.006	-0.023

Notes: This table shows the effects of the proportion or share of female advisors (continuous treatment) for all students identifying as religious (religiosity ==1). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A8: Heterogeneous Effects of Advisor Gender on Index Outcomes - Continuous Treatment (Non-Religious Students)

	Gender Role Attitudes	Gender Status Perceptions
	(1)	(2)
Effects on male students	-0.289	0.234
	(0.380)	(0.484)
Effects on female students	-0.396	-0.245
	(0.273)	(0.513)
Gender gap	-0.107	-0.479
	(0.469)	(0.698)
Observations	240	240
Mean with male advisor (Men)	-0.181	-0.228
Mean with male advisor (Women)	-0.395	-0.329

Notes: This table shows the effects of the proportion or share of female advisors (continuous treatment) for all students identifying as non-religious (religiosity ==0). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A9: Heterogeneous Effects of Advisor Gender on Individual Outcomes - Continuous Treatment (Religious Students)

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	0.144	0.252**	0.056	-0.066	0.141	0.090	0.170
	(0.110)	(0.119)	(0.084)	(0.088)	(0.121)	(0.088)	(0.116)
Female students	-0.104**	-0.147**	-0.103*	-0.144**	0.016	0.021	0.142
	(0.050)	(0.069)	(0.057)	(0.068)	(0.105)	(0.073)	(0.100)
Gender gap	-0.248**	-0.399***	-0.160	-0.078	-0.124	-0.069	-0.028
	(0.123)	(0.138)	(0.102)	(0.109)	(0.159)	(0.113)	(0.158)
Observations	504	504	504	504	504	504	506
Mean with male advisor (Men)	0.099	0.314	0.099	0.180	0.262	0.134	0.270
Mean with male advisor (Women)	0.056	0.105	0.056	0.161	0.252	0.063	0.154

Notes: This table shows the effects of the proportion or share of female advisors (continuous treatment) for all students identifying as religious (religiosity ==1). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A10: Heterogeneous Effects of Advisor Gender on Individual Outcomes - Continuous Treatment (Non-Religious Students)

	Men President	Men Better Politics	Women Stop Working	Men Provide	Women Work High	Women Role Society	Women Too Progressive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male students	0.074	-0.145	-0.059	-0.037	0.035	0.010	0.104
	(0.066)	(0.143)	(0.075)	(0.080)	(0.143)	(0.121)	(0.096)
Female students	-0.085	-0.074	-0.023	-0.058	0.019	-0.098	-0.044
	(0.082)	(0.066)	(0.057)	(0.075)	(0.168)	(0.080)	(0.138)
Gender gap	-0.159	0.071	0.036	-0.022	-0.016	-0.108	-0.148
	(0.105)	(0.158)	(0.094)	(0.110)	(0.221)	(0.145)	(0.165)
Observations	240	240	240	240	240	240	240
Mean with male advisor (Men)	0.025	0.176	0.042	0.042	0.160	0.059	0.109
Mean with male advisor (Women)	0.038	0.019	0.038	0.038	0.154	0.038	0.077

Notes: This table shows the effects of the proportion or share of female advisors (continuous treatment) for all students identifying as non-religious (religiosity ==0). Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.

Table A11: Effects of Female Advisor Proportion on Academic Outcomes- Continuous Treat

	GPA Year 1	Dropout 1st Year	Graduate in 6 Years
All Students			
Effects on male students	-0.033	0.005	-0.050***
	(0.024)	(0.015)	(0.016)
Effects on female students	0.029	-0.026*	-0.006
	(0.020)	(0.014)	(0.013)
Gender gap	0.062**	-0.032***	0.044***
	(0.026)	(0.012)	(0.015)
Observations	26,801	27,648	25,964
Mean with male advisor (Men)	-0.016	0.134	0.773
Mean with male advisor (Women)	0.127	0.169	0.765

Note: This table shows the effects of the proportion or share of female advisors (continuous treatment) on academic outcomes for all students enrolled between the years 2001 and 2018 regardless of whether they responded to survey or not. Column (2) sample is restricted to 2001-2017 cohorts and column (3) sample is restricted to 2001-2015 sample in order to be able to construct these outcomes. GPA outcomes in column (1) are standardized. Standard errors clustered by advisor-year are shown in parentheses. All regressions are run with the inclusion of department-by-year fixed effects as in equation (2). *** p<0.01, ** p<0.05, * p<0.10.