



Associations between student social position, training, and plans to care for underserved populations over the course of medical school

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ABSTRACT

There is a shortage of physicians ready to care for underserved communities in the United States. Given the American structure of Undergraduate Medical Education (UME) and Graduate Medical Education (GME), it is up to students to choose to care for underserved populations; medical school leaders may create programming to incentivize this choice, but that choice is ultimately up to students to make. Who, then, makes this choice? In this article, we examine a large, longitudinal dataset of multiple cohorts of medical students (2016–2020 through 2020–2024; $N = 53,417$) to identify patterns among which students plan to care primarily for underserved populations; we also investigate the factors that influence this choice over the course of medical school. Utilizing latent class analysis (LCA) and mixed-effect logistic regressions, we considered whether students' social and educational background influenced their choices at matriculation and graduation, as well as whether any courses or training experiences in medical school impacted their changed plans. We found that students from lower income, higher debt, and racially minoritized backgrounds were more likely to commit to caring for underserved populations compared to students from higher income, lower debt, and white backgrounds, who were more likely to not express such an intention. Additionally, we found that elective coursework oriented around underserved communities did not impact students' likelihood to change their mind over the course of medical school to make this career choice. Our findings are important for informing medical school admissions and curricular policy, especially considering the physician shortage in underserved communities.

1. Introduction

In the United States, approximately a quarter of the patient population is categorized as underserved (U.S. Committee on Ways and Means, 2020). Underserved populations are characterized by their limited access to healthcare, encompassing areas with high population-to-physician ratios, particularly in primary care; high poverty rates or low-income populations; and higher percentages of racial minorities and patients with limited English proficiency.¹ For patients, being underserved comes with detrimental effects to one's physical and psychological well-being; these negative impacts may manifest in the short term, like long emergency room wait times (Lara-Millan, 2021), or the long term, like increased hypertension, diabetes, and cardiovascular

disease (Hargrove, 2018; Metzl, 2019; Raudenbush, 2020). Unequal access to quality healthcare also leaves these underserved communities more vulnerable to health crises, whether a global infectious disease pandemic or climate change induced extreme weather events (Paschal, 2020; Schell et al., 2020; Washington, 2008). Unfortunately, this problem is likely to intensify, as the Association of American Medical Colleges (AAMC) projects a physician shortfall of 21,000 to 55,200 physicians by 2032, with underserved communities poised to bear the brunt of this shortage (AAMC, 2019).

While addressing the health and healthcare problems that impact underserved populations is not solely the responsibility of the medical profession, they are often called upon to do so (Institute of Medicine, 2001). Federal and professional bodies argue that U.S. medical

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¹ Despite cueing a general idea of a patient who is not receiving the kind or amount of healthcare they may need, how students interpret “underserved populations” may vary. At the federal level, designated Health Professional Shortage Areas (HPSA), Medically Underserved Areas (MUA), and Medically Underserved Populations (MUP) capture either a shortage of providers for an entire geographic region or a specific population within that area, including unhoused, low-income, or migrant patients. While HPSAs cover a deficit of primary, dental, and mental healthcare providers, MUA/Ps are delimited to just primary care (HRSA, 2023).

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educators bear a social responsibility to encourage and prepare medical students to practice medicine in underserved communities (Leaune et al., 2021; VanderWielen et al., 2015). To that end, the medical profession has established pipeline programs, concentrations, and pathways for medical students committed to this work, in addition to providing students with in-class and service-learning opportunities to encourage them to care about—and for—underserved communities (Henry, 2016; Tuohy et al., 2025). In other words, medical educators largely address this shortage of underserved physician provider problem by admitting students who already plan to care for underserved populations and offering educational opportunities to promote students without preexisting intentions to develop this interest.

Given that it is up to students to choose this career path—and that all medical school leaders can do beyond selecting motivated students is to develop curricular programming encouraging students to make this choice—it is important to understand which students commit to caring for underserved populations and whether medical school programming influences students' career plan formation. Prior research on how the medical profession enacts its social mission to care for underserved patient populations have pinpointed *admissions* as a central vehicle for fulfilling these goals (Evans et al., 2020; Salhi et al., 2022; Xu et al., 1997). At admissions, students' social position—such as their race, gender, and economic status—and students' educational backgrounds—such as their college major—emerge as potentially important factors influencing students' career aspirations, especially with regard to underserved populations.

Most of the extant research focuses on students from underrepresented racial groups since there is evidence that these are the students more likely to plan to practice in underserved areas and populations (Dyrbye et al., 2023; Garcia et al., 2018; Komaromy et al., 1996; Puertas et al., 2013). Scholars argue that students from racially marginalized backgrounds are motivated by “a lived experience of being, or interacting with, a member of an underserved medical community” (Salhi et al., 2022: 934). For these scholars, the central mechanism undergirding students' career plans is exposure to underserved communities, and implicit—although not discussed—is that lacking such lived experience motivates white students' resistance to forming these kinds of career plans.

There is a similar logic undergirding the research on lower income or working-class students' likelihood to plan to care for underserved populations (Abreu et al., 2021; Garcia et al., 2018); however, debt has taken on a different tenor. While the U.S. medical profession boasts some of the highest salaries for physicians in the world, it is also among the costliest (Jenkins, 2020). According to the AAMC, the average tuition debt for four years of medical school totals at \$222,516. This number does not account for additional fees like healthcare and living expenses, nor does it consider the interest that accrues as new graduates accept low-paying residencies in the years following medical school. Many of the arguments about the relationship between debt and medical students' desires to practice primarily in underserved communities posit that students choose *not* to go into family medicine, primary care, nor in underserved areas precisely because they wish to pursue higher-paid positions to help them pay off their debt (Horowitch, 2024). Therefore, as students try to make a pragmatic choice about their future, the logic goes, they will opt against a career primarily oriented around caring for underserved populations (Burr et al., 2025).

Scholars have also drawn attention to gender, finding that female students are more likely than male students to plan to care for underserved populations (Dyrbye et al., 2023; Motta-Moss and Hussain, 2020). However, rather than driven by prior exposure, gender socialization emerges as the explanatory mechanism leading female students to more often plan to serve underserved communities (Boulis and Jacobs, 2008; Ku, 2011). Some scholars note the historical funneling of women into “caring” professions (Adams, 2010) or roles (Joseph and Hirshfield, 2011), with evidence that female students matriculate with their career plans formed (Ku, 2011). There is limited information on

why male students do not form such plans; however, some parallel research suggests that men are socialized to value high-paying, prestigious, and research-oriented work (Blair-Loy and Cech, 2022). Therefore, when it comes to assuming the professional responsibility to address healthcare inequity, the literature would predict that students' gender is likely to play a role.

In addition to race, socioeconomic status, and gender, educational background may impact students' plan formation. Scholars have demonstrated that humanities and social sciences degrees cultivate students who are innovative, socially and culturally sensitive, and empathic (Kuh, 1999). In contrast, STEM and business majors develop less critical thinking skills, lower creative capacity, and a diminished interest in participating in civic duties or social justice advocacy (Arum and Roksa, 2010). Moreover, research on interdisciplinary collaborations scholars have found that the humanists and social scientists are more likely to be seen in a “caring” role (Viseu, 2015). It is thus possible that a medical students' college major could influence their interests in caring for underserved populations.

And, in addition to the potential impact of education before matriculation, there is a body of work centering the influence of medical school coursework on student plans (AAMC, 2019; VanderWielen et al., 2015). The medical profession has argued that the social sciences encourage future physicians to be more equitable providers (Metzl and Hansen, 2014; Kirch, 2012; Olsen, 2024) and a few studies have addressed the impact of coursework on career plans at specific medical schools. For example, in their study of 146 medical students at one medical school, Godkin and Savageau (2003) found that students who engaged in international experiences had an increased likelihood of wishing to care for underserved multicultural patients. In another study comparing medical students at two medical schools, Ko et al. (2023) found that the students who engaged in community service and health inequalities electives had a greater likelihood of planning to serve underserved populations than their peers that did not. Similarly, in a study of emergency medicine residents, Abreu and collaborators (2021) found that the residents who were more likely plan to practice in underserved areas had experiences in health education within local and global communities. Boscardin et al., 2014 similarly found that community health field experience, health disparities and cultural competence training, and attending schools with more of a commitment to social medicine were associated with students choosing to practice medicine in underserved communities. These case studies point to coursework having a positive association with students' intentions to care for underserved populations.

While prior research has identified individual predictors of commitment to underserved practice, as well as engaged in compelling research of single-case studies, less is known about how these characteristics cluster together to form distinct student profiles in a multi-institutional, large student body. Additionally, much of the research focuses on outcomes at one point in time (e.g., matriculation, graduation), and less is known about how commitment trajectories evolve from matriculation through graduation across different student subgroups. Moreover, existing studies often interpret associations between educational experiences and career plans as causal effects of coursework, without adequately accounting for self-selection into electives. Finally, very little attention has been paid to students—and their social positions—who do *not* plan to care for underserved communities, consistent with health inequities research that ignores the decisions of those in privileged positions (Link and García, 2021).

Our present study addresses these gaps by drawing upon longitudinal survey data of medical students from multiple cohorts (2016–2020 through 2020–2024, N = 53,417) collected by the AAMC at two points in time: matriculation and graduation. We analyze the variation in student responses to the question: “Regardless of location, do you plan to care primarily for underserved populations?” In following other scholars, we conceptualize underserved populations in an expansive sense—encompassing the socioeconomic profiles of patient populations

as well as patients on the lower end of the geographic and organizational distribution of healthcare resources (Reynolds, 2021; Salhi et al., 2022). Specifically, we examine: (1) What distinct profiles of medical students emerge based on social, economic, and educational characteristics? (2) How does commitment to underserved practice change from matriculation to graduation, and do these trajectories differ across student profiles? (3) Are educational experiences associated with commitment patterns, and do these associations reflect selection effects or moderating influences on change over time?

First, we conducted a latent class analysis (LCA) to identify distinct classes of medical student respondents. LCA lets the data reveal natural student groupings rather than testing pre-specified intersectional categories. Second, we measured students' commitment to their plans to care for underserved populations. Third, and finally, to think through what happened during medical training that might lead to the conversion of students' commitments between matriculation and graduation, we examined elective course effects on the outcome variable. While students had the opportunity to take many electives, we grouped them into in-class training (e.g., students took a course on health policy), service learning (e.g., students volunteered at a free clinic), and

professionalization (e.g., students worked on a research presentation) electives. In what follows, we will outline our data sources and methodological approach, our results from our latent cluster analysis and mixed-effect regression analyses, and discuss the implications of our findings for the scholarly literature and medical education policy more broadly.

2. Methods

2.1. Data sources

There are two main sources of data informing our present study: student demographic data from the American Medical College Application Service (AMCAS) and student survey data from the Association of American Medical Colleges (AAMC) at matriculation and graduation. We have data from multiple cohorts (2016–2020, 2017–2021, 2018–2022, 2019–2023, 2020–2024); each student has a unique identifier ($N = 53,417$), which allowed us to link the data across datasets and time. Within these datasets there are several variables of interest. The dependent variables are drawn from the AAMC surveys at the two

Table 1

Social, economic, and academic characteristics of medical students in total and by latent class membership, $N = 53,417$ (AAMC, 2016 – 2024).

	Total	Class 1	Class 2	Class 3	p
n (%)		31,324 (58.64%)	10,763 (20.15%)	11,330 (21.21%)	
Academic Year of Graduation					<0.001
2019–2020	9393 (17.58%)	6842 (21.84%)	302 (2.81%)	2249 (19.85%)	
2020–2021	9789 (18.33%)	6822 (21.78%)	362 (3.36%)	2605 (22.99%)	
2021–2022	11,213 (20.99%)	6003 (19.16%)	2084 (28.65%)	2126 (18.76%)	
2022–2023	11,217 (21.00%)	5653 (18.05%)	3432 (31.89%)	2132 (18.82%)	
2023–2024	11,805 (22.10%)	6004 (19.17%)	3583 (33.29%)	2218 (19.58%)	
Sex					<0.001
Male	23,787 (44.53%)	14,576 (46.53%)	4187 (38.90%)	5024 (44.34%)	
Female	29,604 (55.42%)	16,735 (53.43%)	6563 (60.98%)	6306 (55.66%)	
Non-binary	26 (0.05%)	13 (0.04%)	13 (0.12%)	0	
Race/Ethnicity					<0.001
White	29,953 (56.07%)	18,058 (57.65%)	5840 (54.26%)	6055 (53.44%)	
Black	2939 (5.50%)	2280 (7.28%)	614 (5.70%)	45 (0.40%)	
Asian	11,177 (20.92%)	5153 (16.45%)	2287 (21.25%)	3737 (32.98%)	
Hispanic	2924 (5.47%)	2272 (7.25%)	530 (4.92%)	122 (1.08%)	
AIAN/NHPI	87 (0.16%)	69 (22%)	8 (0.07%)	10 (0.09%)	
Multiracial	6267 (11.73%)	3477 (11.10%)	1450 (13.47%)	1340 (11.83%)	
Unknown	70 (0.13%)	15 (0.05%)	34 (0.32%)	21 (0.19%)	
Total Debt					<0.001
No debt	14,052 (26.31%)	323 (1.03%)	3413 (31.71%)	10,316 (91.05%)	
Q1 (lowest)	7410 (13.87%)	5204 (16.61%)	1383 (12.85%)	823 (7.26%)	
Q2	7992 (14.96%)	6435 (20.54%)	1397 (12.98%)	160 (1.41%)	
Q3	7017 (13.14%)	5730 (18.29%)	1287 (11.96%)	0 (0.00%)	
Q4	8555 (16.02%)	7144 (22.81%)	1411 (13.11%)	0 (0.00%)	
Q5 (highest)	6500 (12.17%)	5375 (17.16%)	1125 (10.45%)	0 (0.00%)	
Missing/unknown	1891 (3.54%)	1113 (3.55%)	747 (6.94%)	31 (0.27%)	
Household Income					<0.001
Q1 (lowest)	8228 (15.40%)	7454 (23.80%)	0 (0.00%)	774 (6.83%)	
Q2	8573 (16.05%)	7340 (23.43%)	0 (0.00%)	1233 (10.88%)	
Q3	8075 (15.12%)	6664 (21.27%)	13 (0.12%)	1398 (12.34%)	
Q4	8527 (15.96%)	6205 (19.81%)	1 (0.01%)	2321 (20.49%)	
Q5 (highest)	8158 (15.27%)	3335 (10.65%)	10 (0.09%)	4813 (42.48%)	
Missing/unknown	11,856 (22.20%)	326 (1.04%)	10,739 (99.78%)	791 (6.98%)	
College Major					<0.001
STEM	38,470 (72.02%)	22,820 (72.85%)	7742 (71.93%)	7908 (69.80%)	
Interpretive social sciences	870 (1.63%)	440 (1.40%)	178 (1.65%)	252 (2.22%)	
Positivist social sciences	830 (1.55%)	475 (1.52%)	159 (1.48%)	196 (1.73%)	
Humanities	1559 (2.92%)	847 (2.70%)	306 (2.84%)	406 (3.58%)	
Other	11,688 (21.88%)	6742 (21.52%)	2378 (22.09%)	2568 (22.67%)	
Elective Courses: In-Class Learning					<0.001
No	6045 (11.32%)	3296 (10.52%)	1328 (12.34%)	1421 (12.54%)	
Yes	47,372 (88.68%)	28,028 (89.48%)	9435 (87.66%)	9909 (87.46%)	
Elective Courses: Professionalization					<0.001
No	3763 (7.04%)	2354 (7.52%)	815 (7.57%)	594 (5.24%)	
Yes	49,654 (92.96%)	28,970 (92.48%)	9948 (92.43%)	10,736 (94.76%)	
Elective Courses: In-Class Learning					<0.001
No	1522 (2.85%)	777 (2.48%)	378 (3.51%)	367 (3.24%)	
Yes	51,895 (97.15%)	30,547 (97.52%)	10,385 (96.49%)	10,963 (96.76%)	

distinct moments in the medical student pipeline: students' expressed plan to care primarily for underserved populations before matriculating (Matriculating Student Questionnaire, MSQ) and before entering residency (Medical School Graduation Questionnaire, GQ). The independent variables are medical student social and educational background, which we capture with each student's responses on the AMCAS and GQ, and whether they participated in elective coursework that might influence their career plans. All of these variables are described in [Table 1](#) below.

2.2. Measures

The outcome was a binary indicator of plan to work primarily with underserved communities, at matriculation and at graduation. The question on the survey was: "Regardless of location, do you plan to care primarily for an underserved population?" Students had the opportunity to either not answer the question or reply with "No," "Unsure," or "Yes." We combined 'No' and 'Unsure' responses into a single category versus 'Yes.' This approach was justified by several considerations: 'Unsure' responses were modal at matriculation (55% of students) and showed minimal variation across latent classes (52–59% across all three classes at both timepoints), limiting discriminatory value; for workforce planning purposes, ambivalence at graduation is functionally similar to lack of commitment; and this dichotomization aligns with prior medical education research examining career intentions ([Merritt et al., 2020](#)).

Based on student responses on the AMCAS, we included graduation academic year (5 categories: 2016–2020, 2017–2021, 2018–2022, 2019–2023, 2020–2024), gender (male, female, nonbinary), race/ethnicity (7 categories: White, Black, Asian, Hispanic, Indigenous/American Indian or Native Hawaiian/Pacific Islander, Multiracial, Unknown), educational debt quintile (no debt, quintiles 1–5 among those with debt, missing/unknown), and income quintile (quintiles 1–5, missing/unknown) as class indicators in the Latent Class Analysis (LCA). Debt and income quintiles were calculated among those reporting non-zero values to avoid conflating zero values with the distribution among those with debt or income.

Regarding students' educational background, prospective students reported their college major when applying for medical school, which was transformed in the AMCAS database into a categorical variable (e.g., English, Chemistry, etc.). We followed the "epistemological styles" logic of [Lamont et al. \(2006\)](#) and divided social sciences into interpretive and positivist categories. We constructed aggregate categories for the Humanities (e.g., art, history, music), Positivistic Social Sciences (e.g., political science, economics), Interpretive Social Sciences (e.g., sociology, anthropology), and STEM (e.g., biology, chemistry, physics). In addition to these more traditional liberal arts disciplines, we also created an aggregate category for the health oriented "practical arts" disciplines ([Brint et al., 2005](#)), which we call Helping Professions (e.g., nutrition, nursing) and a catchall for other "practical arts" disciplines, which we call Miscellaneous (e.g., business, international relations).

To assess the impact of coursework on students' responses, we included whether they reported taking electives that exposed them to the needs of underserved populations or if they engaged in professionalization coursework. Thus, we examined three types of elective courses: service learning (e.g., community-based projects, health education, free clinic work, international missions), in-class training (e.g., focused on health disparities, cultural awareness, working with an interpreter), and professionalization (e.g., research, authoring an article, presentation practice). Participation in each elective type was coded as yes/no. As [Table 1](#) shows, a high number of students in the sample took electives in these three categories.

2.3. Statistical analysis

First, we conducted a latent class analysis (LCA) to identify distinct classes of medical student respondents. We included graduation

academic year, race/ethnicity, educational debt quintile, and income quintile in LCA to identify distinct subgroups of medical students based on sociodemographic and financial characteristics. LCA is a person-centered approach that identifies unobserved (latent) subgroups based on patterns of responses across multiple categorical variables. We tested 2-, 3-, and 4-class solutions and compared model fit using Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), with lower values indicating better fit. The 3-class solution was selected based on optimal fit statistics (AIC = 844,309; BIC = 844,931), successful model convergence, and theoretical interpretability. The 4-class solution failed to converge, and the 2-class solution showed significantly worse fit (AIC = 847,789; BIC = 848,213). Analysis was restricted to students with complete data on both outcome measurements and the covariates considered in the analyses ($n = 53,417$).

Then, we measured students' commitment to their plans to care for underserved populations. To examine changes in commitment to underserved practice from matriculation to graduation, we used mixed-effects logistic regression with repeated measures nested within individuals. We tested a series of nested models: (1) time effect only (Model 1), (2) adding latent class membership as a predictor (Model 2), (3) adding class $\times$ time interaction to test whether trajectories differed by class (Model 3), (4) adding elective course participation (service learning, in-class training focused on underserved populations, and professionalization courses) as predictors (Model 4), and (5) adding elective $\times$ time interactions to test whether electives moderated change over time (Model 5). Model fit was compared using likelihood ratio tests. The final model presented in the current study (Model 5) included class membership, time, and elective participation as predictors; interaction terms did not significantly improve model fit and were excluded. Results are presented as odds ratios (OR) with 95% confidence intervals. Predicted probabilities were calculated from the final model to facilitate interpretation of effect sizes. Results from other models are available upon request. All analyses were conducted using Stata 16.² Statistical significance was set at $\alpha = .05$ for all tests and detailed model comparison statistics are available upon request.

3. Results

[Table 1](#) and [Figs. 1](#) and [2](#) present social, economic, and academic characteristics of medical students by latent class membership ($N = 53,417$). All variables varied significantly across classes (all $p < .001$), showing three distinct profiles whereupon gender and college major were largely consistent across the three classes. The LCA identified three distinct classes of respondents who answered the outcome variable about whether students planned to care for underserved populations. Class 1 (58.6%; $n = 31,324$ of 53,417) was characterized by high debt burden across all quintiles (77% in Q2–Q5), lower household income (68% in Q1–Q3), and more students of color (especially more Black, Hispanic, and multiracial backgrounds). Class 2 (20.2%; $n = 10,763$) had lower debt than Class 1 (32% no debt) but complete income missingness (100%), concentrated in recent graduation cohorts (94% from 2021 to 2024), and minimal representation of students of color. Class 3 (21.2%; $n = 11,330$) reported minimal debt (91% no debt), high household income (63% in Q4–Q5), and notable underrepresentation among Black students (0.4% vs. 7.3% in Class 1).

[Fig. 2](#) visualizes the relative magnitude of these class differences: Class 3's extreme financial advantage is evident in its +65 percentage point deviation for no debt and +27 percentage point deviation for high income, while Class 2's defining characteristic—recent graduation cohort concentration—shows a striking +78 percentage point deviation. The visualization clarifies that while all three classes differ significantly, Class 3 represents the most distinctive subgroup in terms of financial resources. Participation in elective coursework was high across all classes (>87%), with minimal variation.

[Table 2](#) presents students' commitment to practicing in underserved communities at matriculation and graduation by latent class

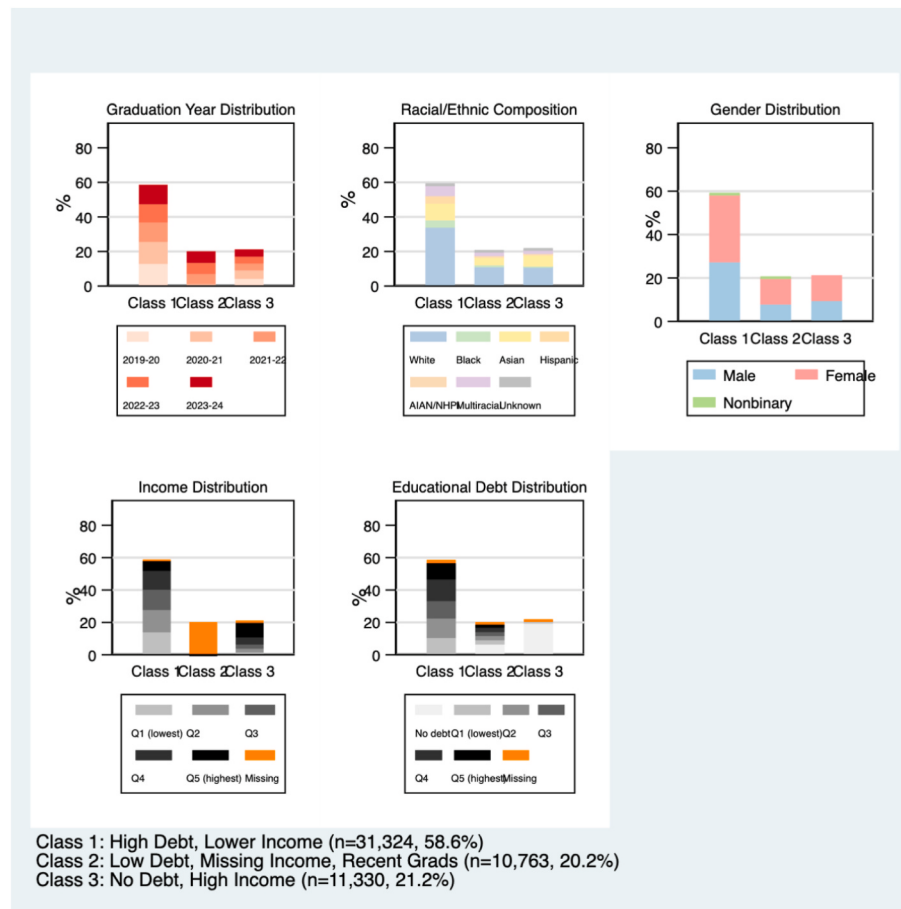


Fig. 1. Latent class profiles.

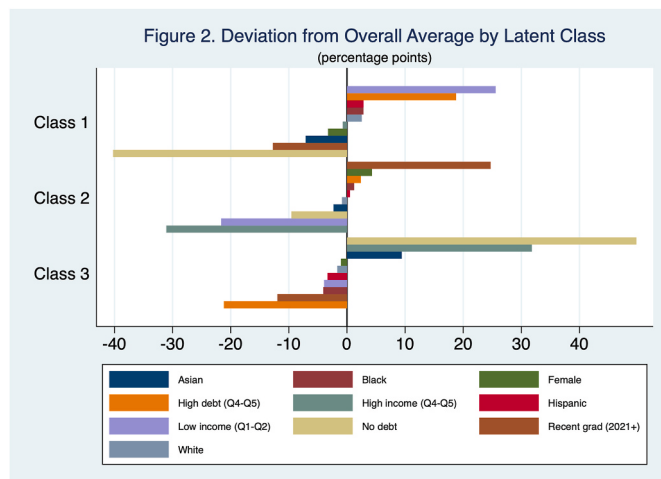


Fig. 2. Deviation from overall average by latent class.

membership. All patterns varied significantly across classes (all $p < .001$). Overall, commitment declined modestly from matriculation to graduation (30.1% to 29.0%), with all three classes showing similar net declines of approximately 1 percentage point. This decline in commitment from matriculation to graduation was evenly distributed for all classes declined at similar rates; in fact, there was no significant Class $\times$ Time interaction.

However, baseline commitment and retention patterns differed substantially by class. Class 1 demonstrated the highest commitment to

planning to care for underserved populations at both timepoints (33.8% at matriculation, 32.8% at graduation) and the highest retention rate among initially committed students (21.1% stable yes vs. 12.7% attrition). In contrast, Class 3 showed the lowest commitment throughout (21.7% at matriculation, 20.8% at graduation) and the lowest retention (11.5% stable yes vs. 10.2% attrition). Conversion rates from uncommitted to committed also followed this gradient, with Class 1 showing the highest gains (11.7%) and Class 3 the lowest (9.3%).

Table 3 presents results from a mixed-effects logistic regression model predicting commitment to underserved practice across matriculation and graduation. The model revealed a modest overall decline in commitment from matriculation to graduation (odds ratio [OR] = 0.92, $p < .001$), corresponding to 8% lower odds at graduation. Class membership was strongly associated with commitment: compared to Class 1, Class 2 students had 37% lower odds of commitment (OR = 0.63, $p < .001$) and Class 3 students had 65% lower odds (OR = 0.35, $p < .001$), demonstrating a clear gradient where financial advantage predicted lower commitment. The Class $\times$ Time interactions were not significant (both $p > .10$), indicating that all three classes experienced similar rates of decline over time.

Educational experiences showed divergent associations: students who took in-class training had 3.11 times the odds of commitment compared to those who did not (OR = 3.11, $p < .001$), service learning participants had 1.37 times the odds (OR = 1.37, $p = .001$), professionalization elective participation was associated with 55% lower odds of commitment (OR = 0.45, $p < .001$). However, as illustrated in Figs. 3–5, these associations reflect self-selection rather than causal effects of the electives themselves. Students who took in-class training already showed 11.5 percentage points higher commitment at matriculation (31.0% vs. 19.5%), while those who took professionalization

Table 2
Commitment to underserved practice at matriculation, graduation, and change over time by latent class membership, N = 53,417 (AAMC, 2016 – 2024).

	Total	Class 1	Class 2	Class 3	p
n (%)		31,324 (58.64%)	10,763 (20.15%)	11,330 (21.21%)	
Intention at Matriculation					<0.001
No/undecided	37,347 (69.92%)	20,746 (66.23%)	7733 (71.85%)	8868 (78.27%)	
Yes	16,070 (30.08%)	10,578 (33.77%)	3030 (28.15%)	2462 (21.73%)	
Intention at Graduation					<0.001
No/undecided	37,950 (71.04%)	21,057 (67.22%)	7920 (73.59%)	8973 (79.20%)	
Yes	15,467 (28.96%)	10,267 (32.78%)	2843 (26.41%)	2357 (20.80%)	
Changes in Intention					<0.001
Stable no/undecided	31,524 (59.01%)	17,091 (54.56%)	6615 (61.46%)	7818 (69.00%)	
Stable yes	9644 (18.05%)	6612 (21.11%)	1725 (16.03%)	1307 (11.54%)	
Yes to no/undecided	6426 (12.03%)	3966 (12.66%)	1305 (12.12%)	1155 (10.19%)	
No/undecided to yes	5823 (10.90%)	3655 (11.67%)	1118 (10.39%)	1050 (9.27%)	

Table 3
Mixed-effects logistic regression predicting commitment to underserved practice, N = 53,417 (AAMC, 2016 – 2024).

Variable	OR	95% CI	p-value
Time (ref: Matriculation)			
Graduation	0.92	[0.88, 0.96]	<0.001
Class Membership (ref: Class 1)			
Class 2	0.63	[0.58, 0.69]	<0.001
Class 3	0.35	[0.32, 0.38]	<0.001
Time × Class Membership			
Graduation × Class 2	0.93	[0.85, 1.02]	0.111
Graduation × Class 3	0.99	[0.90, 1.08]	0.771
Educational Experiences			
Service learning (yes vs. no)	1.37	[1.13, 1.67]	0.001
In-class training (yes vs. no)	3.11	[2.80, 3.44]	<0.001
Professionalization (yes vs. no)	0.45	[0.40, 0.50]	<0.001
Random Effects			
Individual-level variance	5.94	[5.67, 6.23]	
Model Fit Statistics			
Wald $\chi^2(8)$	1512.12		<0.001
Log likelihood	−58,805.41		
LR test vs. logistic model	$\chi^2(1) = 9694.17$		<0.001

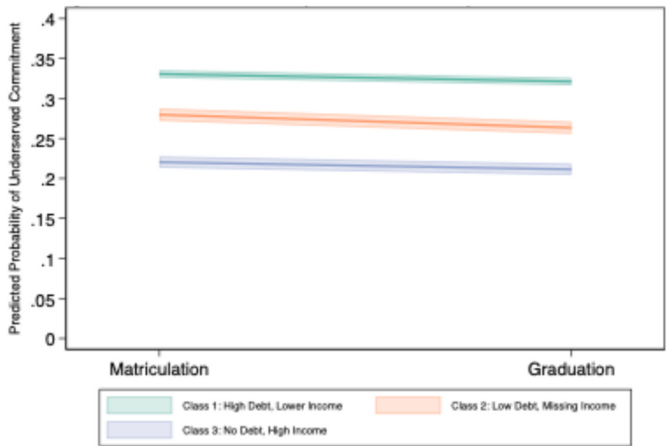


Fig. 3. Predicted probability of commitment by class and time.

electives showed 9.4 percentage points lower baseline commitment (28.9% vs. 38.3%), indicating that students selected into electives consistent with their pre-existing orientations. Critically, elective participation did not moderate the decline in commitment over time (Elective × Time interactions all non-significant, $p > .05$); both participants and non-participants in each elective type experienced similar modest declines from matriculation to graduation. It is important to note that none of the electives prevented decline over time in students' overall commitment to their plans. All students, regardless of their

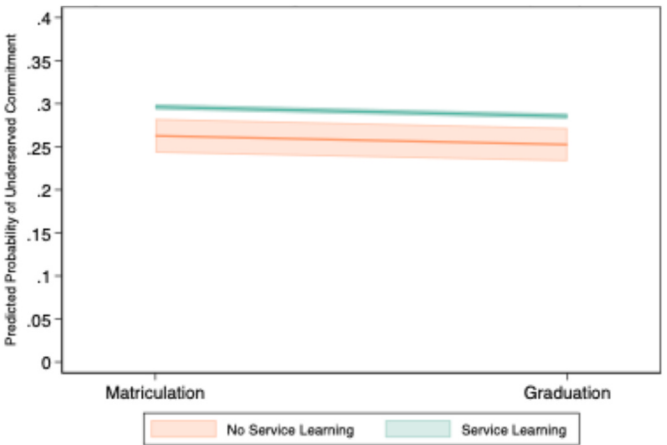


Fig. 4. Service learning effect on commitment trajectory.

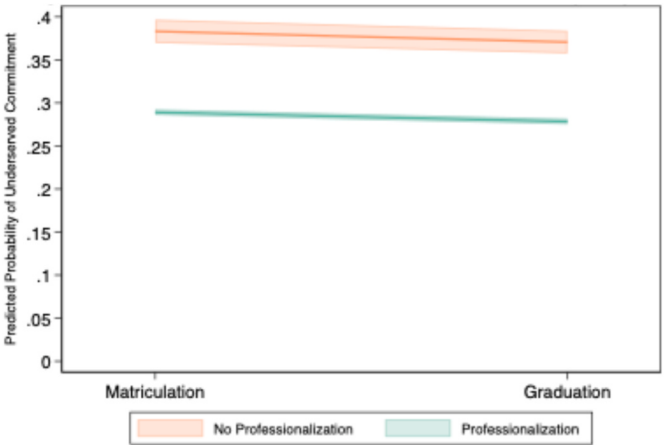


Fig. 5. Professionalization elective effect on commitment trajectory.

choice of electives, had a modest decline in their commitment to underserved populations.

4. Discussion

In our results presented above, we show a few important empirical contributions about which medical students plan to care for underserved populations. First, and most significantly, we show that a student's financial burden—specifically measured by their reported debt—predicts *higher*, not lower, commitment to caring for underserved populations. While it is possible students held and maintained this

commitment based upon loan forgiveness incentives or their own lived experience with health/healthcare inequalities, this finding is nonetheless counter to the dominant narratives about the relationship between medical student debt and underserved practice (see Horowitz, 2024; Burr et al., 2025). It is simply not the empirical case that higher debt burdens push students to choose higher paying specialties. Similarly, students from lower-income and more racially marginalized backgrounds were more likely to plan to care primarily for underserved populations, while their low-debt, high-income, whiter peers were more likely to not make such plans. Students' gender nor their college major did not emerge as salient relative to students' class and racial background.

Second, medical school experience produced modest but universal declines in students' commitments to care for underserved populations, regardless of student background or coursework. Akin to students' declines in empathy over the course of medical school (Olsen and Gebremariam, 2022), this finding is suggestive of systemic factors (e. g., disinvestment in community health, poor curricular supports, specialty reverence) that are eroding students' willingness to care for underserved populations at a national scale.

Third, while our findings are consistent with research on the association between taking an in-class or service-learning elective oriented around addressing social inequalities and expressed desires to care for underserved populations (Boscardin et al., 2014; Godkin and Savageau, 2003; Ko et al., 2023), importantly, our work reveals that there is a large self-selection effect. Elective courses appear to be markers of students' existing commitments to underserved practice rather than switchmen themselves. In other words, students who already are committed to underserved practice are more likely to self-select into in-class or service-learning about social inequalities and students who are not interested in caring for underserved populations are more likely to choose professionalization courses oriented around research time and article preparation. That students choosing medical career-oriented professionalization electives are less likely to plan to care for underserved populations speaks to the values of the profession and medical education field, more broadly.

Based upon these findings, this study has implications for how medical schools may wish to proceed with admissions should they desire increased commitment to caring for underserved populations. On the one hand, our findings make a decisive case for admitting more low-income, high debt, students of color, in that they are much more likely to matriculate and graduate with a plan to care for underserved populations. This is especially important given the conservative push – via lawsuits or threats to withdraw federal funding – to remove considerations of race in medical school admissions and eliminate programming that falls under the umbrella of diversity, equity, and inclusion (Oza, 2026). In fact, legal scholars have challenged the applicability of the U.S. Supreme Court (2023) ruling against the use of race in admissions in *Students for Fair Admission v. President and Fellows of Harvard College* (SFFA) for medical schools, claiming that medical schools need to use race precisely because it will address the needs of its diverse patient population (Dairkee et al., 2026).

Interestingly, prior research indicates that minority students' experience of racism during medical school may be positively associated with a decision to serve high-need communities after graduation (Phelan et al., 2019). While there is scant attention to the factors associated with persistent intentions *not* to serve underserved communities, prior research indicates that both increased implicit racial bias and negative racial attitudes reported in the fourth year play a role in pushing students of color toward caring for underserved populations (Phelan et al., 2019). Conversely, research also shows that a medical program's commitment to equity and diversity is positively associated with students' intentions to serve both underserved communities as well as racial minorities. For example, Phelan et al. (2019) found that interactions with Black medical students, faculty, and staff, was positively associated with an increased intention to practice in underserved communities

between matriculation and graduation. It is thus possible that a medical school's reinforcement of a social hierarchy leads those students who perceive themselves to be higher on that hierarchy, specifically white students, to avoid careers aimed to serve communities deemed lower in that social hierarchy.

On the other hand, while there are many reasons to increase the diversity of our physician workforce, the responsibility of reaching underserved communities should not fall on the shoulders of those from marginalized backgrounds. In other words, what does it mean to rely upon students of color and those who are economically disadvantaged to commit to caring for underserved populations? While more equitable admissions are of the utmost importance, placing the burden of expectation to serve the underserved upon people of color is unfair and limiting (Michalec et al., 2017; Joseph and Hirshfield, 2011; Lerma et al., 2020). Such a burden not only leads to a smaller proportion of physicians addressing the needs of a larger proportion of patients, but such a persistent finding indicates an acceptance that medical students from historically marginalized groups should limit their career trajectories and financial futures. Family and primary care specialties are among the lowest earning specialties within medicine; with students having higher debt than their peers, entering lower paying specialties will set them on a much lower-earning trajectory than their lower-to-no-debt, higher-paid, white peers. While empirically understudied, sorting medical students from lower income, higher debt, and racially marginalized backgrounds could be one mechanism leading to unequal salaries for physicians of color relative to white physicians (AAMC, 2019; Lara-Millan, 2021). Each of these findings further indicates the role of systemic and institutional racism—and classism—in maintaining the shortage of healthcare professionals capable and willing to meet the needs of underserved communities. To properly acknowledge and mitigate these oppressive structures, medical schools must extend this expectation to care for underserved communities to structurally privileged students, too.

In addition to admissions considerations, medical educators may also harness curriculum to encourage graduates to care for underserved populations, *if* medical schools transform these courses into requirements rather than merely electives *and* pay close attention to how they design and carry out these courses. Olsen (2024) has shown how medical school leaders have shoehorned in social sciences to limited and less desirable curricular slots, deemphasized the importance of social scientific knowledge via formal and informal socialization, and instructed students with inaccurate information due to clinical faculty's lack of expertise. In some cases, medical school leaders devolved the instruction on social topics, like that of race, onto students of color (Olsen, 2019), which appears to be a similar strategy to how medical school leaders approach training future physicians for underserved populations. Further evidence shows that medical students and residents from historically marginalized groups continue to experience micro-aggressions, tokenism, and political proselytizing (Cedeño et al., 2023). Therefore, any curricular reform measure adopted by medical school leaders must critically interrogate what is—and is not—being taught and who is charged with the instruction.

Our findings are not without several limitations. First, it is possible that the medical students who responded to the survey question about their plans to care primarily for underserved populations selected for students more likely to express a desire to do so. The response rate was 63% at the first wave (matriculation), 75% at the second wave (graduation), and 51% for both waves. Given how many students answered the question at graduation, we feel confident that it captures the range of students' plans in relation to this question. While we cannot know whether there is selection bias in which medical students responded to the AAMC survey, in general, the overall portrait of responding students remains consistent across both waves.

Second, we cannot know for certain how medical students interpreted the question “Regardless of location, do you plan to care primarily for underserved populations?” It is possible that some students

narrowly interpreted this to mean specific populations (e.g., Medicaid-using patients, patients of color, incarcerated patients). Given the association of such plans with specialty selection (Salhi et al., 2022), some respondents may have also considered this a proxy for primary care. Though the phrase “regardless of location” allows students to focus more on the population than geographic area, some students may have conflated underserved populations with rural or urban locations. While it is possible students may have interpreted the question in slightly different ways, we feel confident that students’ expressed intentions to care for underserved communities—as well as students’ lack of intention to do so—is indicative of differing career orientations.

Third, it is possible that the AAMC inadvertently included gendered language in the question they posed, language that may be rooted in historically gendered inequalities of professions. Specifically, caring skills have largely been attributed to women and the specific term “care” may carry such gendered implications (Fudge and Owens, 2006). Furthermore, some scholars have indicated a historical distinction made between those professions which “care about” clients and patients—coded as experts—and those professions perceived to lack professional expertise which “care for” people (Hugman, 1991). The language of the survey question posed by the AAMC includes this clause to “care for” and could inadvertently cue both de-professionalizing and feminizing processes. Still, given the additional association of respondent social position such as economic advantage and race it is clear that this is more than a gendered phenomenon. While we accept such possibilities, we also remain confident that students would have had ongoing familiarity with the AAMC designation of MUA/Ps and understood this to mean a population in need of care and likely under-resourced.

Fourth, our data can only capture intentions. We do not have longitudinal data on residencies pursued, nor where students currently practice. That said, in line with other scholars, we feel confident that intentions matter, especially regarding students’ expressed intentions not to care for underserved populations (Dyrbye et al., 2023; Garcia et al., 2018; Motta-Moss and Hussain, 2020; Salhi et al., 2022). At minimum, what we are showing about the association between medical education and intentions over time tells us something important about how the medical profession is choosing to address the problem of caring for underserved populations.

Fifth, these data are limited to the United States and are not necessarily generalizable to other countries’ medical schools. That said, USMD medical schools are in a symbiotic relationship with medical schools across the globe. On the one hand, many internationally trained medical graduates aspire to do their residency training in U.S. residency programs (Jenkins, 2020; Jenkins and Reddy, 2016), placing U.S. medical schools as a model that other countries could emulate. On the other hand, many international medical schools develop curricular practices that are unique to their country’s national health system. In a meta-analysis with a related research question, scholars found that across higher-income countries (e.g. United States), middle-income countries (e.g., Chile), and lower-income countries (e.g., Turkey), medical students were more likely to plan for a career in primary care—which, as we discussed in the introduction, can be conflated with and interpreted as an underserved patient population—if they had previous exposure to a rural location, had role models in family medicine, felt that the working conditions were flexible, and identified as female (Puertas et al., 2013). Our findings around debt are likely more exceptionally American, in that other countries’ approaches to higher and professional education are less debt-centric than in the United States.

5. Conclusion

This research contributes to our understanding of the association between medical student social position and educational background—as well as medical school elective coursework—and their

plans to care primarily for underserved populations. Our contributions center on our longitudinal approach, whereby we examine matriculation, graduation, and students’ plans over time; and, our relational approach, whereby we analyze not only students who plan to care primarily for underserved populations—but also those who decisively express that they do not. This research is a contribution to an ongoing set of conversations about how to improve equity among patients as well as physicians, and we hope that future research takes up many questions that remain unanswered with our data and analyses.

CRedit authorship contribution statement

Lauren D. Olsen: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Laura A. Orrico:** Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Lin Zhu:** Data curation, Formal analysis, Methodology, Software, Validation, Visualization, Writing – review & editing.

Data availability

The authors do not have permission to share data.

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