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Research article

Rates, routes, and reasons for attending community college before medical school: An analysis of a subset of Southern California medical students

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Abstract: Community college (CC) has traditionally existed as a bridge between high school and a four-year, baccalaureate-awarding, university. With the ever-increasing number of CCs present in the United States and the rising numbers of applicants to medical school, there will inevitably be a substantial proportion of future physicians who have attended CC. Based on previous research, we surveyed the University of California, Irvine, School of Medicine (UCISOM) student body to assess how many students had attended CC, when and why they attended, and if they intended to practice with underserved communities in the future. A total of 30 (28.6%) of the 105 survey respondents attended CC prior to medical school. Those students cited Academic Flexibility, Financial Reasons/Affordability, and the inability to enroll in a particular course at their four-year institutions as the top three reasons for attending CC. Ten of those students (30%) reported they were informed that attending CC would negatively impact their medical school application. Older students were more likely to attend CC, and there was no statistically significant correlation between CC attendance and the number of times one applied to medical school or between CC attendance and gender, race, ethnicity, and intention to practice in underserved communities. This article highlights the understanding of the effects of CC attendance on medical school admissions while comparing our sample of 105 UCISOM students to previous research studies.

Keywords: community college; junior college; admissions; medical school admissions; matriculation

Abbreviations: CC: Community college; URM: Underrepresented minority; AAMC: Association of American Medical Colleges; MSQ: Matriculating school questionnaire; UCISOM: University of California, Irvine, School of Medicine; MS1: First year medical student; MS2: Second year medical student; MS3: Third year medical student; MS4: Fourth year medical student; ADCOMs: Admission Committees; SLP: Service learning project; PA: Physician associate

1. Introduction

As of 2024, there are a total of 1026 community colleges in America [1]. Community college (CC) is traditionally a 2-year institution of higher education following high school but now includes a myriad of different educational avenues. CCs serve as the main higher education pathway for many underrepresented minority (URM) and low socioeconomic status students [2]. For the 2023–2024 academic year, the average annual tuition for CC students was \$3990, whereas the average annual tuition for public, in-state, four-year universities was over \$11000 [1]. CCs are also known as institutions where people from diverse backgrounds are educated, with 32% of students being the first in their family to attend college, 23% of students identifying as living with disability(ies), and 73% of full-time CC students concurrently employed while completing their education [1].

Literature evaluating the pathways to CC matriculation describes five major categories: HS-CC (attended a CC during high school typically to begin earning college credit early), First-CC (“traditional” CC users who attended a CC before enrolling in a four-year university), 4Y-CC (attended a CC while enrolled at a 4-year university such as taking a class over the summer), Post-CC (attended a CC after graduating from a 4-year university such as a post-baccalaureate program), and Non-CC (never attended a CC) [3–6]. These categories were created from the Carnegie Classification of Institutions of Higher Education [7] and are the most common pathways from CC to medical school [8]. We will be utilizing these categories in our study.

Community colleges reported the following demographics for the 2024 academic year: White (43%), Hispanic (28%), Black (12%), Asian/Pacific Islander (6%), and Native American (1%); 58% women and 42% men; and average age of 27 years old (median 23 years old) [1]. Comparatively, the selected demographics for those enrolled in 4-year universities in 2022 are as follows: White (33%), Hispanic (17.9%), Black (10.8%), Asian/Pacific Islander (3.8%), and Native American (0.8%); 59% women and 41% men; and average age of 22.7 years old (full-time undergraduate students; median not provided) [9]. According to the National Center for Public Policy and Higher Education, 28% of white students begin their college career at a CC, compared to 50% of Latino students and 33% of black students (for reference, the general population in the United States (US) is 18.9% Latino and 13.6% Black) [5,10]. When considering economic status and first-generation college students, 44% of low-income students and 38% of first-generation college students start their collegiate education at CCs, whereas only 15% of high-income students and 20% of students with a parent who completed a college degree start there [5].

When discussing the pathways from CC to medical school, one must consider the benefits and limitations. First, CCs attract similarly high-quality students as four-year universities, yet many choose to attend CC while others are required secondary to homelife, limited financial resources/aid, and/or

inadequate counseling [5]. Somers et al. [11] found six major themes regarding students' reasoning to attend CC: They Said I Couldn't Do It, Life Happens, Educational Aspirations, Influence of Peers and Family, Price and Location, and Institutional Characteristics. Researchers have described numerous advantages to attending CC including earnings gains, improved health status, reduced welfare dependence, decreased criminality, location (e.g., local to family), affordability, flexibility, accommodations for non-academic commitments, dedicated teaching faculty, smaller class sizes, and accessible learning support systems [12,13]. Challenges faced by CC students include lower odds of obtaining a bachelor's degree, interruption of study, and institutional obstacles such as transfer rates, non-transferable courses, and fewer resources than four-year-universities [13,14].

1.1. Seminal research regarding community college to medical school

In 2014, Talamantes and colleagues published the first research paper regarding the characteristics of pre-medical students who use CC pathways [3]. Using data from the 2012 Association of American Medical Colleges (AAMC) Matriculating School Questionnaire (MSQ), they included 17518 matriculating students. Their data shows that 4920 (28%) of matriculants followed one of the CC pathways with their Post-CC (combined the 4Y-CC and Post-CC groups) pathway attracting the most students, 2105 (12%). The mean age of matriculants was 22 years (2.7), and 8082 (46%) were women. They also found that URM and first-generation college students were more likely than white students and those with college-educated parents to attend CC before transferring to a four-year-institution.

In addition, the authors also investigated the rates of medical school acceptance, intentions to serve underserved communities, and desire to work primarily with minority populations. They found that even when controlling for applicant age, demographics, grade point average, and Medical College Admission Test score, students in the First-CC pathway were significantly less likely to be accepted to medical school than students who directly enrolled into a 4-year university following high school. Saguil and Kellermann [5] suggest this may be due to decreased numbers of CC graduates applying to medical school, CC students being less likely to have the research and extracurricular experiences required for a competitive application, and admissions committee biases. Next, compared to all other pathways, those who took the First-CC pathway were more likely to intend to practice in underserved communities compared to all others. Last, the percentage of those with intentions to work primarily with minority populations did not differ depending on CC pathway.

In 2016, Talamantes and colleagues [15] published another paper on CC matriculants, focusing on Latino students in California. When the study was conducted, Latinos comprised approximately 17% of the US population but only 8% of matriculants to medical school [15]. Forty-Five Latino students from 16 California CCs participated in focus groups that were supplemented with a group of 20 semi-structured interviews of "key informants." The study identified two major facilitators of medical school attendance: CC premedical guidance and health-related experiences, and two major barriers for attendance: Affordability and competing responsibilities.

In 2018, Talamantes et al. [6] examined residents who graduated from medical school between 2010 and 2012. For this cohort of 43382 residents, roughly 26% attended CC at some point in their education. They found that 8.7% of their cohort trained in family medicine (FM), and those in the HS-CC, FY-CC, and Post-CC pathways were each significantly more likely to train in FM compared to the Non-CC pathway. Among FM residents who also attended CC, 50.8% were Latino, 32.7% were Black, 35.2% were Asian, and 32.7% were white.

1.2. *Our goals*

During their first and second year of medical school, students at the University of California, Irvine, School of Medicine (UCISOM) complete a “Service Learning Project” (SLP) with the goal of benefiting the communities within the greater Southern California area. We chose to create a brochure (Supplemental Digital Appendix 1) to distribute to local CCs that summarizes current research and qualitative data on the impact of CC attendance on medical school admissions. To aid in its creation, we polled current UCISOM students using similar quantitative measures as each Talamantes et al. [3,6] study, additionally integrating qualitative factors such as the perception of their CC’s pre-medical counseling and barriers faced as a CC graduate. We hypothesized that a similar proportion of UCISOM students who responded to the survey had attended CC as the national average (approximately 1/3rd of medical students) while also assessing the impact of race, ethnicity, gender, and perceived bias regarding CC to medical school pathways. Additionally, we had hoped the survey style, with a section of free-response open-ended questions, could provide information specific to UCISOM that could be potentially generalizable.

2. **Materials and methods**

2.1. *Sample*

From December 30th, 2021 to January 9th, 2022, UCISOM students were invited by email to complete a voluntary and anonymous survey. Respondents were informed that if they attended CC, their survey would include additional questions about their experience. At the time of the survey, the institution had over 400 medical students enrolled with roughly 104 students in each of the four years. Ethical approval was granted as this study qualified as pre-determined exempt status from the University of California, Irvine, Institutional Review Board, July 22nd, 2022 (Protocol number 1767).

2.2. *Survey design*

The authors determined Google Forms a suitable survey method given its ease of use, familiarity for UCISOM students, and the response rates to prior Google Forms surveys. The survey contained demographic questions (age, race, ethnicity, and gender) and utilized logic systems through which respondents were presented customized questions based on their answers to prior questions. For example, there was a subset of questions asked only to those who responded “Yes” if they had ever attended CC. Examples of questions asked specifically to those who attended CC included: “When did you attend CC,” “Why did you attend CC,” “How would you rate your CC’s premed counseling,” and “Were you ever TOLD your medical school application would suffer (in any way) from attending a community college?” Questions asked to all respondents included: “How many times did you apply to medical school before matriculating” and “Do you have an intention to practice in underserved communities following graduation?” Additionally, various questions were asked to all respondents in order to provide a basis for comparison.

2.3. Statistical analysis

Association of attending community college with other variables was examined using chi-square statistic test. P-value < 0.05 was considered statistically significant. Frequencies are presented as N (%). Data was analyzed using SPSS statistics (IBM Corp. Released 2021. IBM SPSS Statistics for Windows, Version 28.0. Armonk, NY: IBM Corp). An ad-hoc subgroup analysis was completed based on survey response rates stratified by grade level [first year medical students (MS1) and second years (MS2) compared to third years (MS3) and fourth years (MS4s)].

3. Results

Of the 400+ respondents invited to participate in our questionnaire, 105 participants completed all required questions (~25% response rate), 30 (28.6%) of them attended CC (Table 1). Among 66 participants aged 18–25 years, 14 (21.2%) attended CC. Among 39 participants aged 26–35 years, 16 (41.0%) attended CC ($p = 0.030$). In the subgroup analysis, this was also the case with MS1 and MS2 ($p = 0.043$). However, the pattern was the same among MS3–4 but failed to attain statistical significance ($p = 0.137$). For CC attendees ($N = 30$), the breakdown of which pathway they attended is as follows: 10 HS-CC (33%), 12 First-CC (40%), 14 4Y-CC (47%), and 8 Post-CC (27%). Of note, students could fall into multiple categories indicating multiple periods of discrete CC use. One student had attended CC after a foreign university but before enrolling in a US university and was counted as attending CC but not placed into one discrete pathway (Figure 1).

The top three reasons for attending CC were: Academic Flexibility ($N = 15$, 50% of CC attendees), Financial Reasons/Affordability ($N = 14$, 46.7%), and inability to take a specific class at their 4-year university ($N = 6$, 20%). Alternatively, when considering those that did not attend CC ($N = 75$), the top three reasons were: Campus Life (or lack thereof) ($N = 34$, 45.3%), Limited Degree Options ($N = 27$, 36%), and Limited Curriculum ($N = 24$, 33%).

Overall, 41 (43.2%) participants had heard (colloquial representation of what students have absorbed from their peers/environments about CCs) that attending community college would negatively affect their medical school application, which was more prevalent among those who had attended CC ($N = 17$, 85.0%) compared to those who had not ($N = 24$, 32.0%) ($p < 0.001$). This was the case among MS1–2 ($p < 0.001$) but not MS3–4 ($p = 0.28$). However, there was not a statistically significant association between attending CC and the number of applications before matriculation to UCISOM. Only four students had been told that their medical school application would benefit from attending CC ($N = 30$, 13.3%) and three students had their CC experience brought up in a medical school interview ($N = 30$, 10%). Only three CC-attending students reported being unhappy with their decision to attend CC ($N = 30$, 10%).

There was no statistically significant association between attending CC and gender, race, ethnicity, and intention to practice in underserved communities in our study. A comprehensive breakdown of each of these demographics can be found in Table 1.

We asked free response questions about positive and negative experiences of CC attendance. For CC-attendees ($N = 30$), the positive experiences revolved around academic flexibility ($N = 15$, 50%), saving money ($N = 14$, 47%), and the inability to take a certain class at a four-year university ($N = 6$, 20%). A smaller subset of attendees also noted transfer agreements, smaller class sizes, needing or wanting to stay close to home, and an easier transition to college level learning after high school as

reasons for attending CC (N = 5, 17%, for each response). Conversely, the negative experiences included difficulty enrolling in science courses (N = 4, 13%), fewer networking or research opportunities (N = 4, 13%) and quality of instruction (N = 4, 13%). Of the 30 CC-attendees, nine had been directly told their application would suffer by attending CC (compared with 17 that had heard about it) and many were told things such as “Community college seems too easy in the eyes of ADCOMs,” “... most medical schools will reject applicants who went to community college before even reading their apps,” “I heard a lot that I need to take all my bio classes at university and the research I do at community college doesn’t count for anything.”

Table 1. Study sample and demographics.

		Had attend a community college					
		No		Yes		Total	
		Count	Percent	Count	Percent	Count	Percent
Age	18–25	52	69.3	14	46.7	66	62.9
	26–35	23	30.7	16	53.3	39	37.1
Gender	Female	50	66.7	14	46.7	64	61.0
	Male	25	33.3	15	50.0	40	38.1
	Non-binary	0	0.0	1	3.3	1	1.0
Hispanic, Spanish, or Latino	No	65	86.7	25	83.3	90	85.7
	Yes	10	13.3	4	13.3	14	13.3
	Prefer not to say	0	0.0	1	3.3	1	1.0
Race	White	33	44.0	12	40.0	45	42.9
	Asian	30	40.0	9	30.0	39	37.1
	African American	2	2.7	1	3.3	3	2.9
	Others	10	13.3	8	26.7	18	17.1
Heard community college negatively affects application	Yes	24	32.0	17	85.0	41	43.2
	No	51	68.0	3	15.0	54	56.8
Intention to practice in underserved communities	Yes	38	50.7	17	56.7	55	52.4
	Maybe	34	45.3	10	33.3	44	41.9
	No	3	4.0	3	10.0	6	5.7
Times applied before matriculation	1	65	86.7	22	73.3	87	82.9
	2	8	10.7	8	26.7	16	15.2
	3	2	2.7	0	0.0	2	1.9
Year	MBA/MPH/PhD	1	1.3	0	0.0	1	1.0
	MS1	33	44.0	17	56.7	50	47.6
	MS2	21	28.0	6	20.0	27	25.7
	MS3	11	14.7	2	6.7	13	12.4
	MS4	9	12.0	5	16.7	14	13.3

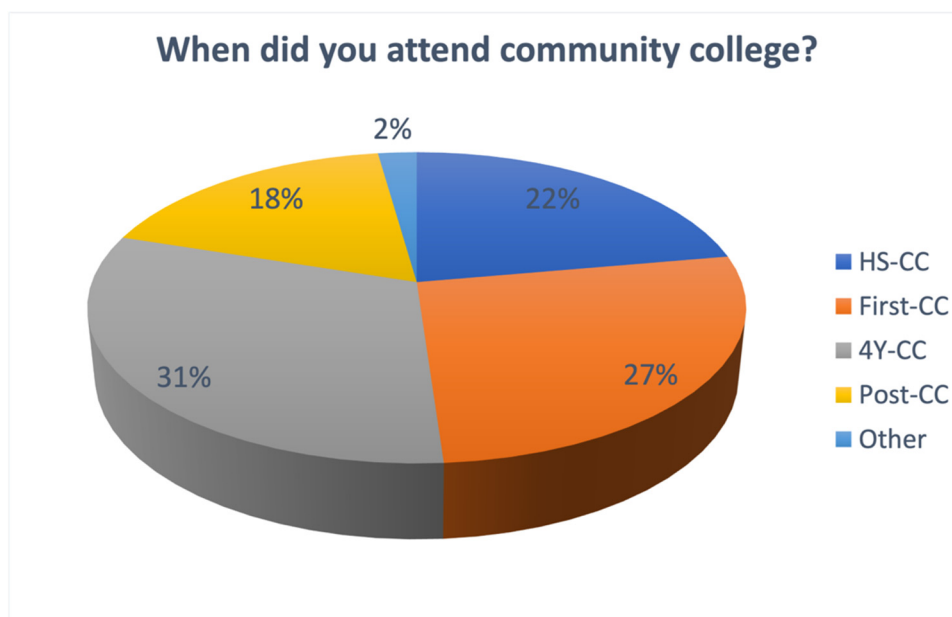


Figure 1. Distribution of community college attendees.

4. Discussion

We found that 28.6% of respondents had attended CC at some point. This is very close to the averages presented in 2014 [3] and 2018 [6], and it shows that CC students matriculate to UCISOM at the same rate compared to previous national studies. We found no association between race or ethnicity and CC attendance and no association with CC attendance on career outcomes, specifically the desire to practice in underserved communities. Given that this study utilized a single Southern California medical school, investigation into school policies, practices, and culture is warranted when determining the validity of the reported findings. While the results regarding race, ethnicity, and career aspirations appear to contradict previous research [3], the authors believe the lack of difference in these rates between the CC-attendees and Non-CC attendees is due to UCISOM's focus on equitable practices for selecting medical students and the emphasis placed on recruiting and training medical students to serve in underserved communities or with minority populations. Specifically, the Programs in Medical Education (PRIME) Leadership Education to Advance Diversity—African, Black and Caribbean (LEAD-ABC) and PRIME for the Latino Community (PRIME-LC) are direct examples of UCISOM's emphasis on belonging, equity, and empowerment, which extends to the consideration of students with CC backgrounds in admissions. These programs may serve as an example to other medical schools and a representation of what UCISOM stands for, even if not specifically targeted to CC utilizing students. Also, students are exposed to these practices before medical school through a top-down approach from the University of California system to approach diversity, equity, and inclusion in all areas of education, including medical.

Regarding age, our survey found that older respondents were more likely to have attended CC. We believe this to be due to two potential factors. First, while we collected age ranges, not specific ages, we are confident results would be similar to nationwide studies comparing the average age of CC and four-year university students (27 and 22.7 respectively) [1,9]. Second, the average age of medical students has steadily risen to an average age of 24 in 2017–2018 [16]. The 2022 AAMC MSQ showed

that the percentage of respondents aged 23 to 25 increased to 54.0% (52.7% in 2021 and 51.9% in 2020) while those aged 20 to 22 at matriculation dropped to 28.9% in 2022 (30.3% in 2021) [17]. It is largely believed that the increase in age of medical students is due to students taking an increased amount of time between college graduation and medical school matriculation colloquially called “gap years.” [18]. Also, medical training, at a minimum, is seven years long an applicant’s age may be taken into consideration by some schools when admissions committees are choosing potential matriculants for their schools. This may lead to downstream effects as CC students are likely to be older and this may impact admissions decisions, although analyzing this aspect would be rife with confounds.

A unique aspect of our study, and one that we feel can be generalized to community college students considering a multitude of options for graduate schooling in the health professions, was the inclusion of free response questions. These questions allowed clarification of several statements heard, read, or directly told to CC attendees regarding the effects attending CC on medical school applications as well as new insights on the advantages, disadvantages, and barriers that CC students self-identify. We are the first study on this topic to utilize this method and feel the insights gleaned from the direct experiences of these students outweighs any objective data that could be captured. Advantages listed include class flexibility, financial savings, ability to take a course that is not offered at their current university, smaller class sizes, and staying close to home. These advantages are like those identified by Somers et al. [11], but have an increased importance when considering what follows the baccalaureate degree for these students (e.g., medical school). Specifically, the financial savings that CC offers, in combination with staying close to home, allows students to receive the highest education for the lowest cost to begin saving funds for their future endeavors. Self-reported disadvantages included course enrollment difficulties, fewer extracurricular opportunities, and concerns regarding the quality of instruction. Interestingly, when non-CC attendees were asked the same question, they cited lack of campus life as the biggest disadvantage. It is interesting that campus life was not brought up by CC attendees who instead focused on items that would one day directly impact their medical education (extracurriculars and academics). Both CC and Non-CC attendees reported hearing that CC may negatively affect their medical school application, and CC-attendees were more likely to have heard that sentiment. In a similar fashion, some responses centered on stigmas and biases regarding how admissions committee members would presumably view CC coursework on applications, which is concerning, as approximately 1/3rd of medical students utilize CC in some capacity. Interestingly, a study conducted in 2022 examined many of the same variables in relation to CC and Physician Associate (PA) school [4]. Using data from 2016–2017, the researchers determined that more than 75% of PA matriculants had attended a CC at one point (N = 8577). First-CC and Post-CC matriculants were more likely to be Black or Hispanic and from a disadvantaged background than those who had never attended CC. After controlling for confounders, PA students who attended CC after high school but prior to transferring to a 4-year university had 17% lower odds of matriculating to PA school than Non-CC. It is evident that any form of CC attendance is a major pathway to both medical and PA school, is utilized by many URM students, and can unfortunately decrease the likelihood of acceptance to these graduate school programs.

4.1. Limitations and future directions

Our study has limitations. First, only 25% of students who received the survey responded; literature has shown the average response rate to be 52.7% [19]. While we found our sample size

satisfactory given the known response rates for other surveys conducted at our institution, it is a limitation compared to other studies with larger samples. Regardless, the survey was answered by more first- and second-year students than third- and fourth-year students. In order to adjust for this factor, multiple subgroup analyses were completed to gain further insight into the trends found in our data. While many of the results held significance when we conducted our subgroup analysis, we would have preferred a significantly larger proportion of later year medical students to have responded for a better representation of UCISOM's medical student population. Given the focus of the survey questions on experiences prior to medical school, however, the predominance of first- and second-year student respondents is not concerning. Due to the retained significance during subgroup analysis, as well as the similar demographic makeup and admissions processes for other University of California (UC) campuses, we feel that the results are generalizable to other UC medical institutions at the very least.

Next, an additional outcome variable we were interested in analyzing was the effect of CC attendance on acceptance rates. We asked respondents how many times they applied to medical school (not just UCISOM) before successfully matriculating. However, the data yielded that there was no significant association in our sample between community college status and number of times a student applied to medical school before being accepted. In retrospect, we should have included a question about students' career plans. As many as 25% of medical students alter their specialty choice throughout medical school training [20], we would have liked to collect data for a smaller comparative study to the 2018 Talamantes and colleagues' study [6].

With the insights gleaned through our survey, in conjunction with prior findings, we feel both medical schools and CC advisors have room to grow in terms of information disseminated to current and prospective medical students. On the CC front, advisors must be intimately aware of the career plans of their students and such effects CC may have on that decision. Notably, advisors can utilize this study and previous studies as well as the brochure our team created to disseminate evidence-based information to students regarding medical school to work to dispel myths and stigma associated with CC and medical school. On a larger level, advocacy for policy change to increase education to CC advisors and hold CC advisors to higher standards such as requiring greater familiarity with the pre-medical process through seminars or online modules. Next, we urge medical school admission committees to reassess their admission practices. Medical schools may not accept CC coursework and, when reviewing applicants for interviews and subsequent admission, may place stigma on those that are from CC instead of attending only a four-year institution. This contrasts with evidence (studies cited above including ours) that a large proportion of medical students come from a CC background. However, it must be noted that, to date, there are no studies addressing the academic performance of medical students when considering their CC status. Last, we urge community colleges to continue offering affordable and accessible education while considering the campus culture, extracurricular activities, and having professors teach courses in which they are appropriately trained to do so.

It is predicted that by 2023, there will be a shortage of nearly 140000 physician jobs in the United States [21]. Options proposed to alleviate this stressor include hiring more mid-level providers, decreasing tuition costs of medical school, and utilizing more foreign medical graduates. We also propose that increasing the representation of community college graduates in medicine is one way to assist in alleviating the predicated physician shortage. However, it should be noted that for this to succeed, a major shift in medical training (e.g., cost of medical school and reimbursement of residency programs by the government to allow for more resident spots) must occur to allow for more medical students and residents to be trained. Should these changes be implemented, and if more seats in US

medical schools were to become available, decreasing the stigma of having community college credit on your transcript when applying to medical school would only encourage these prospective doctors to apply.

By association, we also propose that increasing the representation of community college graduates in health professions, other than becoming a physician, would benefit these medicine-adjacent professions such as dentistry and pharmacy. While there are no published research studies on the effect of community college attendance on acceptance rates to other professional schools, the anecdotal evidence available tells a similar story to what has been presented already—there are numerous advantages to completing coursework at community college but there are inevitably disadvantages to consider as well. Overall, should graduate schools of any kind work to further equitable admissions processes by removing the community college stigma, more seats could be filled in each of these training programs.

Given the limitations and lack of research on this topic, we propose several future directions. First, Talamantes and colleagues [3] used matriculant data from 2010–2012. Future research, especially considering the decreased odds of acceptance if one attends CC, should be reanalyzed using current data. Next, many medical schools keep data on current and recent graduates. While obtaining data from all US medical schools via the AAMC is possible, research can be advanced by obtaining and analyzing “in-house” data from individual medical schools. Given the benefits of CC, the proportion of URM and first-generation students who utilize CC and matriculate into medical school, novel programs like the University of California, Davis, School of Medicine’s AvenueM [22] should become commonplace. AvenueM provides a CC to medical school pathway that works to eliminate traditional barriers of entry to medical school, especially for URM and historically excluded students, by filling gaps in the transfer student pathway through interventions and wraparound services. We strongly believe research should be conducted to update many of the statistics found in the seminal papers.

5. Conclusions

Historically, CC has been viewed as a bridge between high school graduates and either employment-focused pathways or four-year, baccalaureate-awarding, universities [11]. Today, students utilize CC in a variety of ways prior to matriculation to medical school. In our sample of 105 UCISOM students, 28.6% had attended CC at some point before medical school matriculation and there was no statistically significant association between attending community college and gender, race, ethnicity, and intention to practice in underserved communities. Many CC attendees reported numerous benefits, but also difficulties and a stigmatizing perception both within their CC and when applying to medical school. There are numerous reasons why a CC student may not enroll in medical school, including real or perceived obstacles such as inadequate knowledge of requirements, advisement toward other career paths, and financial inaccessibility of medical school [4]. The perception that CC attendance could be a reason for non-acceptance to medical school needs to be eliminated through blinding the school’s name or type for application reviewers or formal partnerships between local CCs and medical schools. The same barriers that prevent non-traditional and diverse students from matriculating to undergraduate colleges and medical schools must be addressed to allow more CC attending students to matriculate to medical school and contribute to much needed healthcare diversity.

Use of AI tools declaration

The authors declare that they have not used Artificial Intelligence (AI) tools in the creation of this article.

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Authors' contributions

The authors also note the presence of more than six contributing authors. Given the uniqueness of the survey and project described in the following manuscript, all authors who have actively engaged in program creation, leadership, or advancement contributed to this work. All authors provided invaluable feedback during the drafting and editing process, while writing various sections throughout the paper. Thus, all authors listed above meet the ICMJE criteria for authorship.

KD contributed to the conception, design, survey creation, acquisition of data, data analysis and interpretation, and manuscript drafting and editing. SS made substantial contributions to statistical analysis of survey data and interpretation and manuscript drafting and editing. TD, CH, KU, and JS contributed to the conception, design, survey creation, acquisition of data, manuscript drafting, and editing. RR contributed to the conception and design, data interpretation, manuscript drafting, and editing. AW contributed to the conception, design, survey creation, acquisition of data, data analysis and interpretation, manuscript drafting, and editing. All authors read and approved the final manuscript.

Conflict of interest

The authors declare no conflicts of interest in this paper.

References

1. American Association of Community Colleges, AACC Fast Facts 2024. Washington American Association of Community Colleges, 2024. Available from: <https://www.aacc.nche.edu/research-trends/fast-facts/>. Accessed February 27th, 2024.
2. Carnevale AP, Strohl J, Separate and unequal: How Higher Education Reinforces the Intergenerational Reproduction of White Racial Privilege. Washington Georgetown Public Policy Institute, Center on Education and the Workforce, 2013. Available from: <https://cew.georgetown.edu/cew-reports/separate-unequal>
3. Talamantes E, Mangione CM, Gonzalez K, et al. (2014) Community college pathways: improving the U.S. physician workforce pipeline. *Acad Med* 89: 1649–1656. <https://doi.org/10.1097/ACM.0000000000000438>

4. Luo Q, Erikson CE, Chitwood R, et al. (2022) Does community college attendance affect matriculation to a Physician Assistant Program? A pathway to increase diversity in the health professions. *Acad Med* 97: 121–128. <https://doi.org/10.1097/ACM.0000000000003860>
5. Saguil A, Kellermann AL (2014) The community college pathway to medical school: A road less traveled. *Acad Med* 89: 1589–1592. <https://doi.org/10.1097/ACM.0000000000000439>
6. Talamantes E, Jerant A, Henderson MC, et al. (2018) Community college pathways to medical school and family medicine residency training. *Ann Fam Med* 16: 302–307. <https://doi.org/10.1370/afm.2270>
7. American Council on Education, Carnegie Classification of Institutions of Higher Education. Washington American Council on Education, 2021. Available from: <https://carnegieclassifications.acenet.edu/>
8. Grbic D, Garrison G (2011) From Community College to Physician: Diversity and Educational Pathways to Medical School. Poster presented at the Association for Institutional Research National Forum; May 23, 2011; Toronto, Ontario, Canada.
9. National Student Clearinghouse Research Center, Term Enrollment Estimates Spring 2022. Herndon National Student Clearinghouse Research Center, 2022. Available from: https://nscresearchcenter.org/wp-content/uploads/CTEE_Report_Spring_2022.pdf
10. United States Census Bureau, U.S. Census Bureau QuickFacts: United States. Maryland United States Census Bureau, 2021. Available from: <https://www.census.gov/quickfacts/fact/table/US/PST045221>
11. Somers P, Haines K, Keene B, et al. (2006) Towards a theory of choice for community college students. *Community Coll J Res Pract* 30: 53–67. <https://doi.org/10.1080/10668920500248886>
12. Belfield CR, Bailey T (2011) The benefits of attending community college: A review of the evidence. *Community Coll Rev* 39: 46–68. <https://doi.org/10.1177/0091552110395575>
13. McFarland J, Pape-Lindstrom P (2016) The pipeline of physiology courses in community colleges: to university, medical school, and beyond. *Adv Physiol Educ* 40: 473–476. <https://doi.org/10.1152/advan.00141.2016>
14. Dougherty KJ, Lahr HE, Morest VS (2017) Reforming the American community college: promising changes and their challenges. *CCRC Working Papers* 98: 1–36. <https://doi.org/10.7916/D8MD05TK>
15. Talamantes E, Gonzalez K, Mangione CM, et al. (2016) Strengthening the community college pathway to medical school: A study of Latino students in California. *Fam Med* 48: 703–710.
16. Association of American Medical Colleges, Table A-6: Age of Applicants to U.S. Medical Schools at Anticipated Matriculation by Sex and Race/Ethnicity, 2014–2015 through 2017–2018. Washington Association of American Medical Colleges, 2017. Available from: <https://www.aamc.org/system/files/d/1/321468-factstablea6.pdf>
17. Association of American Medical Colleges, Matriculating Student Questionnaire, All Schools Summary Report. Washington Association of American Medical Colleges, 2022. Available from: <https://www.aamc.org/data-reports/students-residents/report/matriculating-student-questionnaire-msq>
18. Strowd LC, Gao H, O'Brien MC, et al. (2019) Prematriculation Healthcare employment predicts success in clerkship environment. *Med Sci Educ* 30: 211–217. <https://doi.org/10.1007/s40670-019-00859-2>

19. Baruch Y, Holtom BC (2008) Survey response rate levels and trends in organizational research. *Hum Relat* 61: 1139–1160. <https://doi.org/10.1177/0018726708094863>
20. Hendry TA, Specialty preferences before and after med school: by the numbers. Illinois American Medical Association, 2016. Available from: <https://www.ama-assn.org/medical-students/specialty-profiles/specialty-preferences-and-after-med-school-numbers>
21. Zhang X, Lin D, Pforsich H, et al. (2020) Physician workforce in the United States of America: forecasting nationwide shortages. *Hum Resour Health* 18: 8. <https://doi.org/10.1186/s12960-020-0448-3>
22. AvenueM (California Medicine Scholars Program), AvenueM Scholar Journey. Davis AvenueM, 2020. Available from: <https://avenuem.ucdavis.edu/program-overview>



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