Introduction

Alpha Omega Alpha (AΩA) honor society membership is the hallmark of academic achievement in undergraduate medical education, and AΩA membership is associated with future success in academic medicine.1 AΩA members are chosen based on academic performance, leadership, patient care, and service.2 Nevertheless, studies have shown racial/ethnic disparities in AΩA membership.3,4 Whether similar disparities in AΩA membership exist across socioeconomic strata remains unknown. To address this knowledge gap, we investigated the association between AΩA membership and medical student socioeconomic status.

Methods

In this cross-sectional study, we obtained deidentified data from the Association of American Medical Colleges (AAMC) describing medical students applying to residency between 2018 and 2020 who matriculated in the 2014-2015 and 2015-2016 academic years. We determined students’ AΩA membership through the AAMC's data applications and services5 along with socioeconomic measures, including parental education, childhood household income, Pell grant assistance, and whether the student had been a beneficiary of state or federal financial assistance programs for low-income families. Additional characteristics included sex, self-reported race/ethnicity, and Medical College Admission Test (MCAT) scores. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline and was approved by the Yale University institutional review board.

Our initial cohort included 36,617 students, from which we excluded 1,729 (4.9%) because their medical school had no AΩA chapter, 3,609 (9.8%) because AΩA elections occurred in senior year and results were not reported to the AAMC, and 1,014 (2.7%) because the socioeconomic measures were unknown. Race/ethnicity was reported by students and categorized into the following groups: non-Hispanic White, non-Hispanic Asian, non-Hispanic Black or African American, Hispanic, non-Hispanic American Indian, Alaskan Native, Hawaiian Native, and other Pacific Islander, or other. Students who identified with more than 1 racial/ethnic category were categorized as multiracial.

We compared differences between AΩA members and nonmembers using the χ² test. We used logistic regression to model the association between measures of socioeconomic status and AΩA membership, adjusting for students’ demographic characteristics and MCAT scores. Owing to the collinearity between childhood household income, Pell grant assistance, and state or federal financial aid, childhood household income was selected for inclusion in the multivariate model to provide the greatest distinction in economic advantage between students. Statistical analyses were performed using Stata, version 16.1 (StataCorp). A 2-sided P < .05 defined statistical significance.
Results

Among 30,265 students in the study cohort, 4,504 (14.9%) were first-generation college graduates, 9,130 (30.2%) reported childhood household income less than $75,000, and 6,862 (22.7%) and 5,796 (19.2%) were Pell grant and state or federal financial assistance recipients, respectively. The percentage of students identifying as first-generation college graduates (598 of 5,745 members [10.4%] vs 3,906 of 24,519 nonmembers [15.9%]), reporting childhood household income less than $75,000 (1,238 of 5,745 members [21.4%] vs 7,892 of 24,519 nonmembers [32.2%]), and receiving Pell grants (887 of 5,745 members [15.4%] vs 5,975 of 24,519 nonmembers [24.4%]) or state or federal financial assistance (746 of 5,745 members [13.0%] vs 5,050 of 24,519 nonmembers [20.6%]) was lower for AΩA members compared with nonmembers (P < .001) (Table 1).

In our fully adjusted multivariable model, students reporting a childhood household income less than $125,000 (2,700 of 5,745 members [47.0%] vs 13,705 of 24,519 nonmembers [55.9%]) were less likely to be AΩA members than students reporting a household income of at least $200,000 (1,005 of 5,745 members [17.5%] vs 2,981 of 24,519 nonmembers [12.1%]) (Table 2). This disparity was

Table 1. Characteristics of Medical Students by AΩA Honor Society Membership

| Characteristic                              | AΩA Honor Society member, No. (%) | P value |
|---------------------------------------------|-----------------------------------|---------|
|                                             | Yes (n = 5,746 [19.0%])           |         |
|                                             | No (n = 24,519 [81.0%])           |         |
|                                            |                                   | <.001   |
| First-generation college graduate           |                                   |         |
| No                                          | 5,148 (89.6)                      |         |
| Yes                                         | 598 (10.4)                        |         |
| Childhood household income, $               |                                   | <.001   |
| 0-49 999                                    | 549 (9.6)                         |         |
| 50 000-74 999                               | 689 (12.0)                        |         |
| 75 000-124 999                              | 1,462 (25.4)                      |         |
| 125 000-199 999                             | 936 (16.3)                        |         |
| ≥200 000                                    | 1,005 (17.5)                      |         |
| I do not know or decline to answer<sup>a</sup> | 1,105 (19.2)                      |         |
| Pell grant recipient                        |                                   | <.001   |
| No                                          | 4,859 (84.6)                      |         |
| Yes                                         | 887 (15.4)                        |         |
| State/federal financial assistance          |                                   | <.001   |
| No                                          | 4,596 (80.0)                      |         |
| Yes                                         | 746 (13.0)                        |         |
| I do not know or decline to answer<sup>a</sup> | 404 (7.0)                         |         |
| Sex                                         |                                   | .23     |
| Male                                        | 2,891 (50.3)                      |         |
| Female                                      | 2,855 (49.7)                      |         |
| Race/ethnicity                              |                                   |         |
| Non-Hispanic                                |                                   | <.001   |
| White                                       | 3,940 (68.6)                      |         |
| Asian                                       | 806 (14.0)                        |         |
| Black or African American                   | 111 (1.9)                         |         |
| American Indian, Alaskan Native, Hawaiian Native, or other Pacific Islander | 14 (0.2) |         |
| Multiracial                                 | 277 (4.8)                         |         |
| Hispanic                                    | 199 (3.6)                         |         |
| Unknown or other<sup>c</sup>               | 399 (6.9)                         |         |
| MCAT quartile                               |                                   | <.001   |
| First (lowest)                              | 656 (11.4)                        |         |
| Second                                      | 1,514 (26.4)                      |         |
| Third                                       | 1,380 (24.0)                      |         |
| Fourth (highest)                            | 2,196 (38.2)                      |         |

Abbreviations: AΩA, Alpha Omega Alpha; MCAT, Medical College Admissions Test.

<sup>a</sup> Household income level of family from birth to 18 years of age.

<sup>b</sup> Students selected the option “I do not know” or “Decline to answer.”

<sup>c</sup> Students’ race/ethnicity were unknown, or students selected other.
greatest for students reporting a childhood household income less than $50,000 (549 of 5,745 members [9.6%] vs 4,541 of 24,519 nonmembers [18.5%]), for whom the odds of AΩA membership were 46% lower than the odds for students whose childhood household income totaled $200,000 or more (adjusted odds ratio, 0.54; 95% CI, 0.48-0.62) (Table 2). Female students were more likely than male students to be members (adjusted odds ratio: 1.17, 95% CI: 1.10-1.24), and Asian (adjusted odds ratio, 0.50; 95% CI, 0.46-0.55), Black or African American (adjusted odds ratio, 0.33; 95% CI, 0.27-0.40), Hispanic (adjusted odds ratio, 0.61; 95% CI, 0.52-0.71), and multiracial students (adjusted odds ratio, 0.67; 95% CI, 0.58-0.76) were less likely to be AΩA members than White students. MCAT scores were strongly associated with AΩA membership (Table 2). We found no significant interaction between socioeconomic measures and race/ethnicity.

Discussion

Our study’s major finding is that students from backgrounds with lower income than their peers were less likely to be AΩA members. Consistent with prior studies,2,3 our results show persistent and striking racial/ethnic disparities in AΩA membership, even after adjusting for socioeconomic measures and standardized test scores. Our study has limitations. Childhood income was self-reported and may not fully reflect parental financial resources, including assets. Furthermore, our

Table 2. Association Between AΩA Honor Society Membership and Medical Student Characteristics

| Characteristic                        | Adjusted odds ratio (95% CI) |
|----------------------------------------|-------------------------------|
|                                        | Model 1: socioeconomic measures | Model 2: socioeconomic measures, sex, and race/ethnicity | Model 3: fully adjusted |
| No.                                    | 30,265                        | 30,265                        | 30,265                        |
| First-generation college graduate     |                               |                               |                               |
| No                                     | 1 [Reference]                 | 1 [Reference]                 | 1 [Reference]                 |
| Yes                                    | 0.87 (0.78-0.96)              | 0.89 (0.80-0.98)              | 0.97 (0.87-1.07)              |
| Childhood household income, $          |                               |                               |                               |
| ≥200,000                               | 1 [Reference]                 | 1 [Reference]                 | 1 [Reference]                 |
| 0-49,999                               | 0.38 (0.34-0.43)              | 0.49 (0.43-0.56)              | 0.54 (0.48-0.62)              |
| 50,000-74,999                          | 0.63 (0.56-0.70)              | 0.70 (0.62-0.78)              | 0.74 (0.66-0.83)              |
| 75,000-124,999                         | 0.75 (0.69-0.83)              | 0.80 (0.73-0.88)              | 0.82 (0.75-0.91)              |
| 125,000-199,999                        | 0.91 (0.83-1.01)              | 0.94 (0.85-1.05)              | 0.95 (0.86-1.06)              |
| I do not know or decline to answer a   | 0.69 (0.62-0.76)              | 0.74 (0.67-0.81)              | 0.74 (0.67-0.82)              |
| Sex                                    |                               |                               |                               |
| Male                                   | NA                            | 1 [Reference]                 | 1 [Reference]                 |
| Female                                 | 1.07 (1.01-1.13)              | 1.17 (1.10-1.24)              |                               |
| Race/ethnicity                         |                               |                               |                               |
| Non-Hispanic                           |                               |                               |                               |
| White                                  | NA                            | 1 [Reference]                 | 1 [Reference]                 |
| Asian                                  | NA                            | 0.57 (0.52-0.61)              | 0.50 (0.46-0.55)              |
| Black or African American              | NA                            | 0.24 (0.20-0.29)              | 0.33 (0.27-0.40)              |
| American Indian, Alaskan Native, Hawaiian Native, or other Pacific Islander | NA | 0.61 (0.35-1.08) | 0.75 (0.42-1.33) |
| Multiracial                            | NA                            | 0.64 (0.56-0.71)              | 0.67 (0.58-0.76)              |
| Hispanic                               | NA                            | 0.49 (0.42-0.57)              | 0.61 (0.52-0.71)              |
| Unknown or other b                     | NA                            | 0.65 (0.58-0.73)              | 0.61 (0.55-0.69)              |
| MCAT quartile                          |                               |                               |                               |
| First (lowest)                         | NA                            | NA                            | 1 [Reference]                 |
| Second                                 | NA                            | NA                            | 1.55 (1.40-1.72)              |
| Third                                  | NA                            | NA                            | 2.14 (1.92-2.37)              |
| Fourth (highest)                       | NA                            | NA                            | 2.54 (2.30-2.81)              |

Abbreviations: AΩA, Alpha Omega Alpha; MCAT, Medical College Admissions Test; NA, not applicable.

a Students selected the option “I do not know” or “Decline to answer.”
b Students’ race/ethnicity were unknown, or students selected other.
study involved a 2-year time frame and may not represent historical trends in AΩA membership. However, to our knowledge, this study is the largest and only examination of AΩA membership by socioeconomic status to date. Although AΩA membership has been recognized as a marker of merit, our findings suggest that AΩA membership may also be an indicator of privilege. Medical schools must ensure that the learning environment allows all students to thrive irrespective of their backgrounds.

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