

Adverse Childhood Experiences, Household Income, and Mentorship Among Interns Who Are Underrepresented in Medicine

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ABSTRACT

Background Underrepresented in medicine (UIM) interns have unique lived experiences that affect their paths to medicine, and more information is needed for medical residency and fellowship programs to better support them.

Objective We describe self-reported differences between UIM and White physician interns in key demographic areas, including household income growing up, physician mentorship, and adverse childhood experiences (ACEs).

Methods Between 2019 and 2021, we administered a diversity survey to incoming medical interns at the University of Minnesota-Twin Cities. Response rates across the 3 years were 51.2% (167 of 326), 93.9% (310 of 330), and 98.9% (354 of 358), respectively. We conducted analyses to compare UIM and White groups across demographic variables of interest.

Results A total of 831 of 1014 interns (81.9%) completed the survey. Relative to White interns, UIM interns had lower household incomes growing up, lower rates of mentorship, and higher rates of experiencing 4 or more ACEs. The odds of experiencing the cumulative burden of having a childhood household income of \$29,999 or less, no physician mentor, and 4 or more ACEs was approximately 10 times higher among UIM (6.41%) than White (0.66%) interns (OR=10.38, 95% CI 1.97-54.55).

Conclusions Childhood household income, prior mentorship experiences, and number of ACEs differed between UIM and White interns.

Introduction

Despite the development of pathway programs and focused recruitment of people of color (POC), some physician training programs have relatively few underrepresented in medicine (UIM) trainees. UIM trainees are those with racial/ethnic backgrounds who are underrepresented in the medical profession relative to numbers in their local communities.¹⁻⁴ More research is needed to assist medical education institutions to better understand barriers and facilitators for POC to pursue medicine,² which can help with addressing the overrepresentation of White trainees in medical programs.

Historically, POC trainees are more likely to be under-resourced, have lower socioeconomic status (SES),⁵⁻⁷ and receive fewer mentorship opportunities than White trainees.⁸ These factors also affect trainees' opportunities to matriculate into medical school and residency.^{7,8} Existing literature indicates

that SES significantly impacts decisions to study medicine, and SES and race/ethnicity are associated.⁹ Little is known, however, about the relative proportions of UIM and non-UIM trainees with differing SES backgrounds, mentorship opportunities, or adverse childhood experiences (ACEs) prior to residency. This knowledge gap limits identification of support for UIM trainees to increase their success during this important phase of medical education.

Early research on ACEs underscored the connection between the cumulative negative impact of ACEs and health and socioeconomic disparities in adulthood, including chronic illnesses, substance use, depression, suicide attempts,¹⁰ lower educational attainment, and future SES.¹¹⁻¹³ While this research suggests that ACEs should affect UIM trainees' representation in medical education and residency, it does not lend insight into the relative proportions of UIM and non-UIM learners with different numbers of ACEs. The only study measuring ACEs scores for physicians had a majority White sample, and participants had lower cumulative ACEs scores compared to the general public.¹⁴

DOI: <http://dx.doi.org/10.4300/JGME-D-22-00333.1>

Editor's Note: The online version of this article contains the survey used in the study.

UIM interns may have unique lived experiences that differ from White interns, and more information is needed for residency and fellowship programs to better support them. The purpose of this study was to examine differences in self-reported household income growing up, mentorship experiences, and ACEs among UIM and White interns in order to identify ways to better support UIM interns pre- and post-matriculation to encourage their success. Given the influence of ACEs on SES and SES on the decision to apply to medical school, we hypothesized that UIM interns would have a higher proportion of ACEs than non-UIM interns.

Methods

The main site for this multiyear, multispecialty study was the University of Minnesota (UMN)-Twin Cities, which sponsors 95 Accreditation Council for Graduate Medical Education (ACGME)-accredited and 41 non-ACGME-accredited residency and fellowship programs and has approximately 1200 residents and fellows. Participants included incoming interns in academic years (AY) 2019-2020, 2020-2021, and 2021-2022.

Scale development was led by 4 authors (C.P., M.J.C., B.K.S., D.S.U.). M.J.C. and B.K.S. both have PhDs in industrial and organizational psychology. Item development began with identifying important elements of diversity and inclusion from published literature and reviewing examples from scales used nationally and within our departments. Using the nominal group technique, a research group including faculty, staff, and trainees agreed on the areas to target.¹⁵ The draft survey focused on sociodemographic characteristics (race, ethnicity, gender, sexual orientation, disability status, religious and spiritual beliefs, etc), characteristics relevant to UIM status (date of acquiring citizenship status, year of immigration, place of birth, mentorship experiences, etc), and SES (estimated household income growing up). The initial draft survey had 32 items containing anchors that varied according to the areas assessed. The UMN Graduate Medical Education Diversity, Equity, and Inclusion Subcommittee reviewed and provided feedback on the drafted items. Based on the feedback, the research group made minor edits to improve content validity via consensus judgment that the questions would elicit information relevant to the targeted category.¹⁶ The research group again employed the nominal group technique to select the final 30 questions for the pilot study.

Items were piloted with trainees in AY 2018-2019 to ensure instructions, scales, and anchors were clear.¹⁷ The pilot sample included 218 White, 26

Objectives

The purpose of this research was to describe self-reported differences between underrepresented in medicine (UIM) and White physician interns in household income growing up, physician mentorship, and adverse childhood experiences (ACEs).

Findings

Compared to White interns, UIM interns had lower childhood household incomes, lower rates of mentorship, and higher rates of experiencing 4 or more ACEs.

Limitations

The rates reported do not include individuals who did not match or did not finish medical school, may be underestimates due to missing data, and were not elaborated on with qualitative input from participants.

Bottom Line

Contextual considerations, such as the significant barriers and challenges UIM interns encounter growing up, need to be addressed during the residency and fellowship program application and onboarding process to provide ongoing support to UIM trainees.

UIM, and 85 non-White, non-UIM participants. After receiving feedback from participants, minor wording adjustments were made, and 10 new items, including the ACEs question, were added. The final 40-item survey (provided as online supplementary data) was administered to incoming interns in AY 2019-2020, 2020-2021, and 2021-2022. At the start of AY 2019-2020, the associate dean for graduate medical education emailed new interns and asked them to complete the survey within 4 weeks. Two email reminders were sent. In AY 2020-2021 and AY 2021-2022, the survey was introduced at the start of each academic year during general orientation by the associate dean for graduate medical education, and interns were given dedicated time during orientation to complete it. In all years, participants were entered into a drawing for 1 of 10 \$50 gift cards. Survey completion took 10 to 15 minutes.

Our primary focus was examining differences in key intern background characteristics. We created 2 groups for analyses: a UIM group and a White group. The UIM group consisted of interns self-identifying with at least one of the following racial/ethnic identities: African American or Black, American Indian or Alaska Native, Hispanic or Latino/a, Hmong, or Hawaiian/Pacific Islander. The White group included interns who self-identified as White only.

Because response rates were significantly lower in AY 2019-2020, we examined results including and excluding this data. As results did not differ, we included data for all 3 years in analyses. Analyses included creating frequency distributions of UIM and White trainees for annual household income growing

TABLE 1

Frequency and Percentages of White, Non-White/Non-UIM, UIM, and Prefer Not to Answer/Blank Interns in 2019-2021 Cohorts

UIM Status	n (%)
White	475 (57.2)
Non-White/Non-UIM	208 (25.0)
Asian or Pacific Islander	140 (16.8)
Middle Eastern or North African	23 (2.8)
Other	16 (1.9)
Multiracial	29 (3.5)
UIM	135 (16.2)
American Indian or Alaska Native	6 (0.7)
Hmong	2 (0.2)
Multiracial	42 (5.1)
Black or African American	62 (7.5)
Hispanic or Latino/a	23 (2.8)
Prefer not to answer	11 (1.3)
Left blank	2 (0.2)

Abbreviation: UIM, underrepresented in medicine.

Note: Overall N=831.

up, mentorship via exposure to the health care field growing up, and ACEs. Next, χ^2 tests and odds ratios were computed to compare UIM and White interns. We based the following decision points on previous literature and common cutoffs. For example, we chose $< \$30,000$ because the poverty income level was defined as $\$26,500$ in 2021 for a household with 2 parents and 2 children by the US Department of Health and Human Services,¹⁸ and 4 or more ACEs is what is commonly used and has undergone sensitivity analysis.¹⁹ We examined White-UIM differences between childhood household earnings (1) above and below $\$30,000$ and (2) above and below $\$100,000$. Then, we examined White-UIM differences regarding the presence or absence of a physician mentor and mentorship from any source. Third, we examined White-UIM differences in experiencing (1) no ACEs versus 1 or more ACEs, and (2) ≤ 3 ACEs vs 4 or more ACEs. Finally, to provide a summary comparison of the number of burdens experienced by each group, we compared what percentage of each group experienced 1, 2, or 3 of the following burdens: childhood household incomes under $\$30,000$, no physician mentor, or 4 or more ACEs. Because we conducted multiple comparisons, Bonferroni corrections were applied. The adjusted P values were $P < .025$ (0.05 of 2) for the childhood household income, mentorship, and ACE analyses, and $P < .017$ (0.05 of 3) for the burdens analyses. Otherwise, a 2-sided significance level of .05 was selected.

TABLE 2

Household Income Growing Up Among White and UIM Interns in 2019-2021 Cohorts

Income Growing Up	White Interns, n (%)	UIM Interns, n (%)
\$500,000 or more	24 (5.4)	4 (3.7)
\$100,000-\$499,999	242 (54.6)	23 (21.1)
\$75,000-\$99,999	94 (21.2)	23 (21.1)
\$50,000-\$74,999	45 (10.2)	16 (14.7)
\$30,000-\$49,999	24 (5.4)	15 (13.8)
\$29,999 or less	14 (3.2)	28 (25.7)

Abbreviation: UIM, underrepresented in medicine.

Note: Overall N for White participants=443; Overall N for UIM participants=109.

This study was determined to be exempt from review by the human subjects committee of the UMN-Twin Cities Institutional Review Board.

Results

The total number of interns across the 3 cohorts was 831. Response rates across the 3 years were 51.2% (167 of 326), 93.9% (310 of 330), and 98.9% (354 of 358), respectively. TABLE 1 indicates that about one-sixth of the sample identified with at least one racial/ethnic identity considered UIM (16.2%, 135 of 831), and the majority of the sample were White (57.2%, 475 of 831). A quarter of the interns self-reported at least one non-White racial/ethnic identity not included in the UIM group (ie, categorized as non-White/non-UIM; 25.0% [208 of 831]). Eleven interns indicated that they preferred not to indicate their race/ethnicity, and 2 interns left this question blank.

TABLE 2 indicates that a higher proportion of UIM interns reported growing up under the national median household income of $\$67,521$ than White interns.²⁰ Among UIM interns, more than 1 in 4 (25.7%, 28 of 109) reported a childhood household income in the lowest category of $\$29,999$ or less compared to 3.2% of White interns ($\chi^2=63.15$, $P < .0001$). More than half (60.0%, 266 of 443) of White interns reported childhood household incomes greater than $\$100,000$ compared to about a quarter (24.8%, 27 of 109) of UIM interns ($\chi^2=43.7$, $P < .0001$). Interns in the lowest childhood household income category ($< \$30,000$) were approximately 10 times more likely to be UIM (OR=10.59, 95% CI 5.34-20.99). Similarly, those in the 2 highest childhood household income groups ($> \$100,000$) were more than 4 times likely to be White (OR=4.56, 95% CI 2.84-7.34).

Exposure to the health care field varied across UIM and White interns for different types of pre-matriculation mentorship experiences (TABLE 3). Compared

TABLE 3

Frequency and Percentage of Mentorship Experiences via Type of Exposure to Health Care Field Among White and UIM Interns in 2019-2021 Cohorts

Health Care Exposure Type	White Interns, n (%)	UIM Interns, n (%)
College or university program(s)	111 (24.2)	28 (21.1)
Community program(s)	80 (17.5)	26 (19.6)
Counselor(s) or advisor(s)	49 (10.7)	13 (9.8)
Friend(s)	53 (11.6)	13 (9.8)
Media	64 (14.0)	15 (11.3)
Non-physician mentor	52 (11.4)	10 (7.5)
None	48 (10.5)	25 (18.8)
Other	26 (5.7)	6 (4.5)
Other family member(s)	71 (15.5)	23 (17.3)
Parent(s) or guardian(s)	150 (32.8)	29 (21.8)
Physician mentor	102 (22.3)	22 (16.5)
School program(s)	24 (5.2)	7 (5.3)
Sibling(s)	26 (5.7)	8 (6.0)
Teacher(s)	49 (10.7)	15 (11.3)
Volunteering	316 (69.0)	79 (59.4)

Abbreviation: UIM, underrepresented in medicine.

Note: N for White participants=458; Overall N for UIM participants=133.

with other types of opportunities, the percentage of interns who reported volunteering was highest for UIM (59.4%, 79 of 133) and White (69.0%, 316 of 458) interns. There were notable differences between White and UIM participants for mentorship experiences involving parents/guardians (32.8% [150 of 458] of White participants; 21.8% [29 of 133] of UIM participants), physician mentors (22.3% [102 of 458] of White interns; 16.5% [22 of 133] of UIM interns), and not having any mentor at all (10.5% [48 of 458] of White interns; 18.8% [25 of 133] of UIM interns). The White-UIM differences were not significant ($\chi^2=2.04$, $P=.15$) for having a physician mentor, but were significant for not having exposure to any mentorship experience ($\chi^2=6.5849$; $P=.010$; OR=1.98 [95% CI 1.17-3.35]).

TABLE 4 presents the distribution of ACEs of White and UIM interns. Among White participants,

TABLE 4

Adverse Childhood Experiences Growing Up Among White and UIM Interns in 2019-2021 Cohorts

ACE Events	White Interns, n (%)	UIM Interns, n (%)
0	276 (65.1)	58 (51.3)
1	64 (15.1)	11 (9.7)
2	39 (9.2)	17 (15.0)
3	25 (5.9)	5 (4.4)
4+	20 (4.7)	22 (19.5)

Abbreviation: UIM, underrepresented in medicine.

Note: Overall N for White participants=424; Overall N for UIM participants=113.

the rates decrease as the number of ACEs increases, whereas there is more variability in the rates among UIM interns. Nearly half of UIM interns reported at least one ACE compared to approximately a third of White interns ($\chi^2=7.19$; $P=.015$; OR=1.77 [95% CI 1.16-2.69]). Notably, almost 1 in 5 (20%) UIM interns experienced 4 or more ACEs, which is more than 4 times the rate among White interns (4.7%; $\chi^2=26.93$; $P<.0001$; OR=4.88 [95% CI 2.56-9.33]).

When examining cumulative burdens (household income growing up $\leq \$29,999$, no physician mentor, and 4 or more ACEs), group differences emerged (TABLE 5). The rate of experiencing no burdens was comparable across groups ($\chi^2=3.38$, $P=.07$). However, the rate of experiencing 2+ burdens differed ($\chi^2=34.00$, $P<.0001$), with individuals

TABLE 5

Frequency and Percentage of Burdens Experienced Among White and UIM Interns in 2019-2021 Cohorts

No. of Burdens Experienced by Trainees	White Interns, n (%)	UIM Interns, n (%)
No burdens	63 (20.7)	9 (11.5)
1 burden	217 (71.2)	43 (55.1)
2 burdens	23 (7.5)	21 (26.9)
3 burdens	2 (0.7)	5 (6.4)

Abbreviation: UIM, underrepresented in medicine.

Note: Burdens= $\leq \$29,999$ or less household income growing up, no physician mentor growing up, and 4 or more adverse childhood experiences. Overall N for White participants=305; Overall N for UIM participants=78.

experiencing 2+ burdens over 5 times more likely to be UIM (OR=5.60 [95% CI 3.00-10.45]). Similarly, experiencing all 3 burdens ($\chi^2=11.46$, $P<.001$) was approximately 10 times more likely among UIM (6.41%) than White interns (0.66%; OR=10.38 [95% CI 1.97-54.55]).

Discussion

In this study, we investigated disparities in childhood household income, mentorship types, and ACEs in UIM vs White interns. UIM interns were poorer growing up, less likely to have had exposure to at least one mentorship experience, and experienced more ACEs and cumulative burdens compared to White interns. Twenty percent of UIM interns (vs 4.7% of White interns) experienced 4 or more ACEs growing up, which was higher than previous studies.^{21,22} These results illustrate that some UIM interns faced significant barriers and trauma prior to entering residency and fellowship, and provide important contextual information for improving the residency and fellowship application process for UIM trainees and supporting UIM trainees during their residency and fellowship training.

Applying to residency is an expensive endeavor. The process includes application and interview costs, as well as completing away rotations in some specialties. These costs can be overwhelming for UIM trainees. Most interns in this study, whether White or UIM, tended to be more affluent compared to the general population. This is consistent with previous studies.⁵ However, the racial inequity in income becomes stark when considering that 25.7% of UIM vs 3.2% of White interns self-reported household income growing up in the lowest category of \$29,999 or less. Thus, a significant number of UIM interns were likely under the poverty income level growing up (ie, defined as \$26,500 in 2021 for a household with 2 parents and 2 children by the US Department Health and Human Services).¹⁸ These results suggest that one way to improve the residency application experience for UIM trainees might be to create programs or scholarships that help defray the costs of the process.

Our finding that UIM interns had less exposure to mentorship experiences growing up highlights the importance of ensuring UIM trainees gain these experiences during residency training. Strategies that increase UIM trainee representation in medical training (eg, medical trainee-led educational outreach programs²³) may increase the pool of UIM mentors and thus increase mentorship of future UIM trainees. Ultimately, increased representation of UIM trainees may allow a greater number of UIM trainees to

mentor other UIM residents and medical students, leading to improved access to care, and more culturally effective care.²

At the national level, 12.5% of the general population reported 4 or more ACEs.²¹ In our study, White interns reported lower rates of ACEs than the general population, whereas UIM interns reported higher rates. Medical education may benefit from a trauma-informed approach to graduate medical education. The combination of ACEs and racial trauma that UIM interns may experience could be associated with an intern having difficulty during situations such as rapid response incidents (eg, resuscitation efforts), conflict, police encounters, or when witnessing patients with trauma. These interns may also have difficulty trusting systems that have historically harmed and excluded marginalized communities, and experience challenges building relationships with faculty who have worldviews and lived experiences different from themselves. These challenges can realistically be expected to affect UIM interns' performance in residency, as well as in independent practice. More research should investigate the impact of previous ACEs on these health care outcomes.

The majority of interns had at least one described burden. However, 33.3% of UIM interns reported 2 or more burdens compared to 8.2% of White interns. Medical institutions must also understand that the ACEs UIM interns have faced may have long-term effects on their health and education. Previous research suggests that resilience can mitigate decreased medical school engagement, particularly for those with higher ACEs scores.²² Specific resilience and protective factors in this sample of UIM interns is unknown; future research is needed to explore protective factors that can contribute to the resilience of UIM residents. Additionally, longitudinal studies are needed to examine how UIM trainees fare during training, which can assist with identifying future strategies for success and support.

This study included individuals starting their residency, an important research sample to focus on to continue learning ways to increase recruitment and retention of UIM interns through completion of residency. This study has limitations. Causality cannot be inferred due to the cross-sectional data. Given the quantitative survey approach, qualitative data were not gathered about the variables of interest, such as how they affect UIM trainees' decisions to apply to medical programs, what UIM interns describe as contributing to their resilience for medical training, or what UIM interns would like with regard to supports and resources. Further, the rates observed

may be underestimates due to missing data or participants' selecting that they prefer not to respond. This study does not include the potential residents who did not finish medical school or failed to match because of challenges related to childhood household income, mentorship, and ACEs. Further research should examine these challenges for this critical population. Finally, this study focuses on the burdens experienced by UIM interns, but non-White/non-UIM interns may experience their own unique burdens. Future research should investigate how burdens for this group differ from those of UIM and White interns.

Conclusions

Childhood household income, mentorship, and ACEs differed between UIM and White interns. UIM interns were poorer, less connected, and had more ACEs compared to their White counterparts.

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Funding: The authors report no external funding for this study.

Conflict of interest: The authors declare they have no competing interests.

The authors would like to acknowledge Graduate Medical Education's Diversity, Equity, and Inclusion Advisory Group at the University of Minnesota for its support and advocacy of trainees underrepresented in medicine and the University of Minnesota's Graduate Medical Education Office for providing funding for the participant gift card raffle.

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Received April 21, 2022; revisions received October 27, 2022, and April 7, 2023; accepted April 11, 2023.