

How Increasing Research Demands Threaten Equity in Dermatology Residency Selection and Strategies for Reform

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PRACTICE POINTS

- Dermatology programs should establish sustainable mentorship networks incorporating faculty, residents, and community dermatologists, as most applicants ranked access to engaged mentors as a top priority for overcoming research barriers.
- Protected research time and funding support for projects are critical, particularly since applicants reporting lack of time and financial barriers were more likely to consider changing their specialty choice.
- Programs should consider implementing caps on reportable research products in residency applications to shift emphasis from quantity to quality while helping address demographic disparities in research access.

The shift in United States Medical Licensing Examination (USMLE) Step 1 scoring to pass/fail has intensified the emphasis on research productivity in dermatology residency applications. Through a cross-sectional survey, we examined barriers to research engagement among dermatology applicants. Time constraints, limited access to opportunities, uncertainty in beginning research, and a lack of mentorship emerged as considerable barriers. Regression analysis revealed that lower socioeconomic status, underrepresented in medicine status, and higher debt levels predicted greater financial barriers and institutional limitations. Barriers including limited research access and insufficient mentorship correlated with decreased publication output. Notably, respondents rating time constraints and uncertainty in how to begin research as notable barriers

were more likely to consider changing their specialty choice. These findings suggest that structural barriers, rather than lack of interest or ability, may create cumulative disadvantages that deter capable candidates and potentially exacerbate existing diversity gaps in the dermatology workforce.

As one of the most competitive specialties in medicine, dermatology presents unique challenges for residency applicants, especially following the shift in United States Medical Licensing Examination (USMLE) Step 1 scoring to a pass/fail format.^{1,2} Historically, USMLE Step 1 served as a major screening metric for residency programs, with 90% of program directors in 2020 using USMLE Step 1 scores as a primary factor when deciding whether to invite applicants for interviews.¹ However, the recent transition to pass/fail has made it much harder for program directors to objectively compare applicants, particularly in dermatology. In a 2020 survey, Patrinely Jr et al² found that 77.2% of dermatology program directors agreed that this change would make it more difficult to assess candidates objectively. Consequently, research productivity has taken on greater importance as programs seek new ways to distinguish top applicants.^{1,2}

In response to this increased emphasis on research, dermatology applicants have substantially boosted their scholarly output over the past several years. The 2022 and 2024 results from the National Residency Matching Program's Charting Outcomes survey demonstrated a steady rise in research metrics among applicants across various specialties, with dermatology showing one of the

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The eTables and eFigures are available in the Appendix online at www.mdedge.com/cutis.

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largest increases.^{3,4} For instance, the average number of abstracts, presentations, and publications for matched allopathic dermatology applicants was 5.7 in 2007.⁵ This average increased to 20.9 in 2022³ and to 27.7 in 2024,⁴ marking an astonishing 485% increase in 17 years. Interestingly, unmatched dermatology applicants had an average of 19.0 research products in 2024, which was similar to the average of successfully matched applicants just 2 years earlier.^{3,4}

Engaging in research offers benefits beyond building a strong residency application. Specifically, it enhances critical thinking skills and provides hands-on experience in scientific inquiry.⁶ It allows students to explore dermatology topics of interest and address existing knowledge gaps within the specialty.⁶ Additionally, it creates opportunities to build meaningful relationships with experienced dermatologists who can guide and support students throughout their careers.⁷ Despite these benefits, the pursuit of research may be landscaped with obstacles, and the fervent race to obtain high research outputs may overshadow developmental advantages.⁸ These challenges and demands also could contribute to inequities in the residency selection process, particularly if barriers are influenced by socioeconomic and demographic disparities. As dermatology already ranks as the second least diverse specialty in medicine,⁹ research requirements that disproportionately disadvantage certain demographic groups risk further widening these concerning representation gaps rather than creating opportunities to address them.

Given these trends in research requirements and their potential impact on applicant success, understanding specific barriers to research engagement is essential for creating equitable opportunities in dermatology. In this study, we aimed to identify barriers to research engagement among dermatology applicants, analyze their relationship with demographic factors, assess their impact on specialty choice and research productivity, and provide actionable solutions to address these obstacles.

Methods

A cross-sectional survey was conducted targeting medical students applying to dermatology residency programs in the United States in the 2025 or 2026 match cycles as well as residents who applied to dermatology residency in the 2021 to 2024 match cycles. The 23-item survey was developed by adapting questions from several validated studies examining research barriers and experiences in medical education.^{6,7,10,11} Specifically, the survey included questions on demographics and background; research productivity; general research barriers; conference participation accessibility; mentorship access; and quality, career impact, and support needs. Socioeconomic background was measured via a single self-reported item asking participants to select the income class that best reflected their background growing up (low-income, lower-middle, upper-middle, or high-income); no income ranges were provided.

The survey was distributed electronically via Qualtrics between November 11, 2024, and December 30, 2024, through listserves of the Dermatology Interest Group Association (sent directly to medical students) and the Association of Professors of Dermatology (forwarded to residents by program directors). There was no way to determine the number of dermatology applicants and residents reached through either listserve. The surveys were reviewed and approved by the University of Alabama at Birmingham institutional review board (IRB-300013671).

Statistical analyses were conducted using RStudio (Posit, PBC; version 2024.12.0+467). Descriptive statistics characterized participant demographics and quantified barrier scores using frequencies and proportions. We performed regression analyses to examine relationships between demographic factors and barriers using linear regression; the relationship between barriers and research productivity correlation; and the prediction of specialty change consideration using logistic regression. For all analyses, barrier scores were rated on a scale of 0 to 3 (0=not a barrier, 1=minor barrier, 2=moderate barrier, 3=major barrier); R^2 values were reported to indicate strength of associations, and statistical significance was set at $P<.05$.

Results

Participant Demographics—A total of 136 participants completed the survey. Among the respondents, 12% identified as from a background of low-income class, 28% lower-middle class, 49% upper-middle class, and 11% high-income class. Additionally, 27% of respondents identified as underrepresented in medicine (URiM). Regarding debt levels (or expected debt levels) upon graduation from medical school, 32% reported no debt, 9% reported \$1000 to \$49,000 in debt, 5% reported \$50,000 to \$99,000 in debt, 15% reported \$100,000 to \$199,000 in debt, 22% reported \$200,000 to \$299,000 in debt, and 17% reported \$300,000 in debt or higher. The majority of respondents (95%) were MD candidates, and the remaining 5% were DO candidates; additionally, 5% were participants in an MD/PhD program (eTable 1).

Respondents represented various stages of training: 13.2% and 16.2% were third- and fourth-year medical students, respectively, while 6.0%, 20.1%, 18.4%, and 22.8% were postgraduate year (PGY) 1, PGY-2, PGY-3, and PGY-4, respectively. A few respondents (2.9%) were participating in a research year or reapplying to dermatology residency (eTable 2).

Research Barriers and Productivity—Respondents were presented with a list of potential barriers and asked to rate each as not a barrier, a minor barrier, a moderate barrier, or a major barrier. The most common barriers (ie, those with >50% of respondents rating them as a moderate or major) included lack of time, limited access to research opportunities, not knowing how to begin research, and lack of mentorship or support. Lack of time and not knowing where to begin research were

reported most frequently as major barriers, with 32% of participants identifying them as such. In contrast, barriers such as financial costs and personal obligations were less frequently rated as major barriers (10% and 4%, respectively), although they still were identified as obstacles by many respondents. Interestingly, most respondents (58%) indicated that institutional limitations were not a barrier, but a separate and sizeable proportion (25%) of respondents considered it to be a major barrier (eFigure 1).

The distributions for all research metrics were right-skewed. The total range was 0 to 45 (median, 6) for number of publications (excluding abstracts), 0 to 33 (median, 2) for published abstracts, 0 to 40 (median, 5) for poster publications, and 0 to 20 (median, 2) for oral presentations (eTable 3).

Regression Analysis—Linear regression analysis identified significant relationships between demographic variables (socioeconomic status [SES], URiM status, and debt level) and individual research barriers. The heatmap in eFigure 2 illustrates the strength of these relationships. Higher SES was predictive of lower reported financial barriers ($R^2=.2317$; $P<.0001$) and lower reported institutional limitations ($R^2=.0884$; $P=.0006$). A URiM status predicted higher reported financial barriers ($R^2=.1097$; $P<.0001$) and institutional limitations ($R^2=.04537$; $P=.013$). Also, higher debt level predicted increased financial barriers ($R^2=.2099$; $P<.0001$), institutional limitations ($R^2=.1258$; $P<.0001$), and lack of mentorship ($R^2=.06553$; $P=.003$).

Next, the data were evaluated for correlative relationships between individual research barriers and research productivity metrics including number of publications, published abstracts and presentations (oral and poster) and total research output. While correlations were weak or nonsignificant between barriers and most research productivity metrics (published abstracts, oral and poster presentations, and total research output), the number of publications was significantly correlated with several research barriers, including limited access to research opportunities ($P=.002$), not knowing how to begin research ($P=.025$), lack of mentorship or support ($P=.011$), and institutional limitations ($P=.042$). Higher ratings for limited access to research opportunities, not knowing where to begin research, lack of mentorship or support, and institutional limitations all were negatively correlated with total number of publications ($R^2=-.27$, $-.19$, $-.22$, and $-.18$, respectively) (eFigure 3).

Logistic regression analysis examined the impact of research barriers on the likelihood of specialty change consideration. The results, presented in a forest plot, include odds ratios (ORs) and their corresponding 95% CIs and P values. Lack of time ($P=.001$) and not knowing where to begin research ($P<.001$) were the strongest predictors of specialty change consideration (OR, 6.3 and 4.7, respectively). Financial cost ($P=.043$), limited access to research opportunities ($P=.006$), and lack of mentorship or support ($P=.001$) also were significant predictors of specialty change consideration (OR, 2.2, 3.1, and 3.5,

respectively). Institutional limitations and personal obligations did not predict specialty change consideration (eTable 4 and eFigure 4).

Mitigation Strategies—Mitigation strategies were ranked by respondents based on their perceived importance on a scale of 1 to 7 (1=most important, 7=least important) (eFigure 5). Respondents considered access to engaged mentors to be the most important mitigation strategy by far, with 95% ranking it in the top 3 (47% of respondents ranked it as the top most important mitigation strategy). Financial assistance was the mitigation strategy with the second highest number of respondents (28%) ranking it as the top strategy. Flexible scheduling during rotations, research training programs or discussions, and peer networking and research collaboration opportunities also were considered by respondents to be important mitigation strategies. Time management support/resources frequently was viewed as the least important mitigation strategy, with 38% of respondents ranking it last.

Comment

Our study revealed notable disparities in research barriers among dermatology applicants, with several demonstrating consistent patterns of association with SES, URiM status, and debt burden. Furthermore, the strong relationship between these barriers and decreased research productivity and specialty change consideration suggests that capable candidates may be deterred from pursuing dermatology due to surmountable obstacles rather than lack of interest or ability.

Impact of Demographic Factors on Research Barriers—All 7 general research barriers surveyed were correlated with distinct demographic predictors. Regression analyses indicated that the barrier of financial cost was significantly predicted by lower SES ($R^2=.2317$; $P<.001$), URiM status ($R^2=.1097$; $P<.001$), and higher debt levels ($R^2=.2099$; $P<.001$) (eFigure 2). These findings are particularly concerning given the trend of dermatology applicants pursuing 1-year research fellowships, many of which are unpaid.¹² In fact, Jacobson et al¹¹ found that 71.7% (43/60) of dermatology applicants who pursued a year-long research fellowship experienced financial strain during their fellowship, with many requiring additional loans or drawing from personal savings despite already carrying substantial medical school debt of \$200,000 or more. Our findings showcase how financial barriers to research disproportionately affect students from lower socioeconomic backgrounds, those who identify as URiM, and those with higher debt, creating systemic inequities in research access at a time when research productivity is increasingly vital for matching into dermatology. To address these financial barriers, institutions may consider establishing more funded research fellowships or expanding grant programs targeting students from economically disadvantaged and/or underrepresented backgrounds.

Institutional limitations (eg, the absence of a dermatology department) also was a notable barrier that

was significantly predicted by lower SES ($R^2=.0884$; $P<.001$) and URiM status ($R^2=.04537$; $P=.013$) (eFigure 2). Students at institutions lacking dermatology programs face restricted access to mentorship and research opportunities,¹³ with our results demonstrating that these barriers disproportionately affect students from underresourced and minority groups. These limitations compound disparities in building competitive residency applications.¹⁴ The Women's Dermatologic Society (WDS) has developed a model for addressing these institutional barriers through its summer research fellowship program for medical students who identify as URiM. By pairing students with WDS mentors who guide them through summer research projects, this initiative addresses access and mentorship gaps for students lacking dermatology departments at their home institution.¹⁵ The WDS program serves as a model for other organizations to adopt and expand, with particular attention to including students who identify as URiM as well as those from lower socioeconomic backgrounds.

Our results identified time constraints and lack of experience as notable research barriers. Higher debt levels significantly predicted both lack of time ($R^2=.03915$; $P=.021$) and not knowing how to begin research ($R^2=.0572$; $P=.005$) (eFigure 2). These statistical relationships may be explained by students with higher debt levels needing to prioritize paid work over unpaid research opportunities, limiting their engagement in research due to the scarcity of funded positions.¹² The data further revealed that personal obligations, particularly family care responsibilities, were significantly predicted by both lower SES ($R^2=.0539$; $P=.008$) and higher debt level ($R^2=.03237$; $P=.036$) (eFigure 2). These findings demonstrate how students managing academic demands alongside financial and familial responsibilities may face compounded barriers to research engagement. To address these disparities, medical schools may consider implementing protected research time within their curricula; for example, the Emory University School of Medicine (Atlanta, Georgia) has implemented a Discovery Phase program that provides students with 5 months of protected faculty-mentored research time away from academic demands between their third and fourth years of medical school.¹⁶ Integrating similarly structured research periods across medical school curricula could help ensure equitable research opportunities for all students pursuing competitive specialties such as dermatology.⁸

Access to mentorship is a critical determinant of research engagement and productivity, as mentors provide valuable guidance on navigating research processes and professional development.¹⁷ Our analysis revealed that lack of mentorship was predicted by both lower SES ($R^2=.039$; $P=.023$) and higher debt level ($R^2=.06553$; $P=.003$) (eFigure 2). Several organizations have developed programs to address these mentorship gaps. The Skin of Color Society pairs medical students with skin of color experts while advancing its mission of increasing diversity

in dermatology.¹⁸ Similarly, the American Academy of Dermatology founded a diversity mentorship program that connects students who identify as URiM with dermatologist mentors for summer research experiences.¹⁹ Notably, the Skin of Color Society's program allows residents to serve as mentors for medical students. Involving residents and community dermatologists as potential dermatology mentors for medical students not only distributes mentorship demands more sustainably but also increases overall access to dermatology mentors. Our findings indicate that similar programs could be expanded to include more residents and community dermatologists as mentors and to target students from disadvantaged backgrounds, those facing financial constraints, and students who identify as URiM.

Impact of Research Barriers on Career Trajectories— Among survey participants, 35% reported considering changing their specialty choice due to research-related barriers. This substantial percentage likely stems from the escalating pressure to achieve increasingly high research output amidst a lack of sufficient support, time, or tools, as our results suggest. The specific barriers that most notably predicted specialty change consideration were lack of time and not knowing how to begin research ($P=.001$ and $P<.001$, respectively). Remarkably, our findings revealed that respondents who rated these as moderate or major barriers were 6.3 and 4.7 times more likely to consider changing their specialty choice, respectively. Respondents reporting financial cost ($P=.043$), limited access to research opportunities ($P=.006$), and lack of mentorship or support ($P=.001$) as at least moderate barriers also were 2.2 to 3.5 times more likely to consider a specialty change (eTable 4 and eFigure 4). Additionally, barriers such as limited access to research opportunities ($R^2=-.27$; $P=.002$), lack of mentorship ($R^2=-.22$; $P=.011$), not knowing how to begin research ($R^2=-.19$; $P=.025$), and institutional limitations ($R^2=-.18$; $P=.042$) all were associated with lower publication output according to our data (eFigure 3). These findings are especially concerning given current match statistics, where the trajectory of research productivity required for a successful dermatology match continues to rise sharply.^{3,4}

Alarming, many of the barriers we identified—linked to both reduced research output and specialty change consideration—are associated with several demographic factors. Higher debt levels predicted greater likelihood of experiencing lack of time, insufficient mentorship, and uncertainty about initiating research, while lower SES was associated with lack of mentorship. These relationships suggest that structural barriers, rather than lack of interest or ability, may create cumulative disadvantages that deter capable candidates from pursuing dermatology or impact their success in the application process.

One potential solution to address the disproportionate emphasis on research quantity would be implementing caps on reportable research products in residency applications (eg, limiting applications to a certain number of

publications, abstracts, and presentations). This change could shift applicant focus toward substantive scientific contributions rather than rapid output accumulation.⁸ The need for such caps was evident in our dataset, which revealed a stark contrast: some respondents reported 30 to 40 publications, while MD/PhD respondents—who dedicate 3 to 5 years to performing quality research—averaged only 7.4 publications. Implementing a research output ceiling could help alleviate barriers for applicants facing institutional and demographic disadvantages while simultaneously boosting the scientific rigor of dermatology research.⁸

Mitigation Strategies From Applicant Feedback—Our findings emphasize the multifaceted relationship between structural barriers and demographics in dermatology research engagement. While our statistical interpretations have outlined several potential interventions, the applicants' perspectives on mitigation strategies offer qualitative insight. Although participants did not consistently mark financial cost and lack of mentorship as major barriers (eFigure 1), financial assistance and access to engaged mentors were among the highest-ranked mitigation strategies (eFigure 5), suggesting these resources may be fundamental to overcoming multiple structural challenges. To address these needs comprehensively, we propose a multilevel approach: at the institutional level, dermatology interest groups could establish centralized databases of research opportunities, mentorship programs, and funding sources. At the national level, dermatology organizations could consider expanding grant programs, developing virtual mentorship networks, and creating opportunities for external students through remote research projects or short-term research rotations. These interventions, informed by both our statistical analyses and applicant feedback, could help create more equitable access to research opportunities in dermatology.

Limitations

A major limitation of this study was that potential dermatology candidates who were deterred by barriers and later decided on a different specialty would not be captured in our data. As these candidates may have faced substantial barriers that caused them to choose a different path, their absence from the current data may indicate that the reported results underpredict the effect size of the true population. Another limitation is the absence of a control group, such as applicants to less competitive specialties, which would provide valuable context for whether the barriers identified are unique to dermatology.

Conclusion

Our study provides compelling evidence that research barriers in dermatology residency applications intersect with demographic factors to influence research engagement and career trajectories. Our findings suggest that without targeted intervention, increasing emphasis on research productivity may exacerbate existing disparities in dermatology. Moving forward, a coordinated effort among institutions,

dermatology associations, and dermatology residency programs will be fundamental to ensure that research requirements enhance rather than impede the development of a diverse, qualified dermatology workforce.

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APPENDIX

**eTABLE 1. Respondent Characteristics
(N=136)**

Characteristic	No. of respondents (%)
Socioeconomic status ^a	
Low income	16 (12)
Low-middle income	37 (28)
Upper-middle income	64 (49)
High income	14 (11)
Underrepresented minority in medicine	
No	99 (73)
Yes	37 (27)
Debt level status, \$	
0	44 (32)
1-49,999	12 (9)
50,000-99,999	7 (5)
100,000-199,999	20 (15)
200,000-299,999	30 (22)
≥300,000	23 (17)
Type of program attended	
MD	129 (95)
DO	7 (5)
MD/PhD participation	
No	129 (95)
Yes	7/136 (5)

^aOnly 131 responses were collected for this survey item.**eTABLE 2. Respondent Training Status
(N=136)**

Status	No. of respondents (%)
MS3	18 (13)
MS4	22 (16)
Research ^a	3 (2.2)
Reapplying ^b	1 (0.7)
PGY-1	8 (6)
PGY-2	28 (20)
PGY-3	25 (18)
PGY-4	31 (23)

Abbreviations: MS, medical student; PGY, postgraduate year.

^aCompleting a research year between M3 and M4 (MD/DO track).^bReapplying to dermatology residency in the upcoming match cycle (following an initial unsuccessful match).

eTABLE 3. Research Productivity Metrics of Respondents

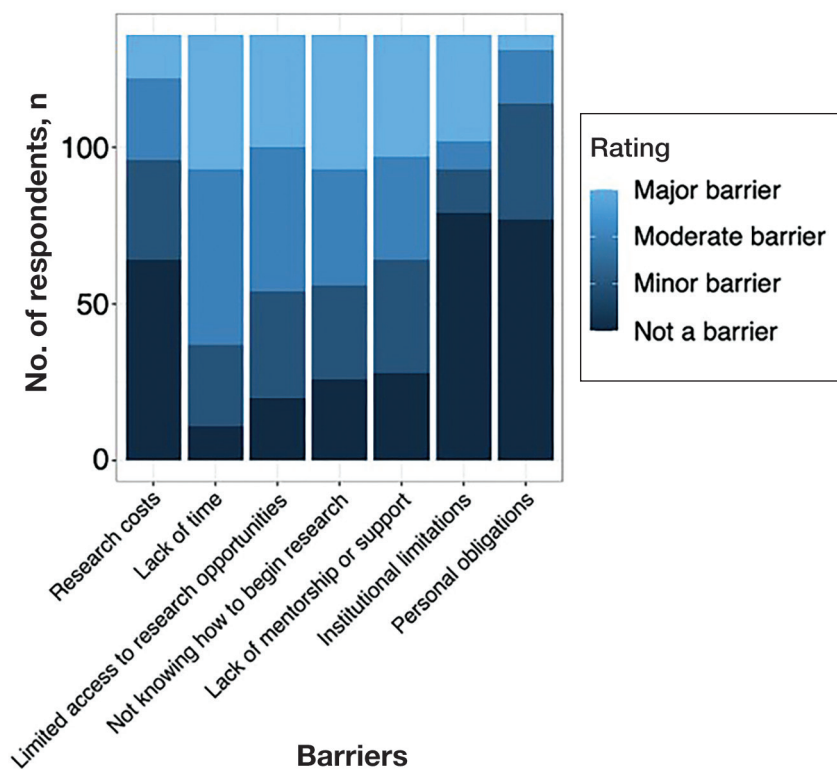
Metric	Value
No. of publications (excluding abstracts)	
Mean (SD)	8.02 (7.94)
Median (IQR)	6 (2.0-10.0)
Total range	0-45
No. of published abstracts	
Mean (SD)	3.71 (5.66)
Median (IQR)	2 (0-4.5)
Total range	0-33
No. of poster presentations	
Mean (SD)	8.06 (7.64)
Median (IQR)	5 (2.0-11.5)
Total range	0-40
No. of oral presentations	
Mean (SD)	2.70 (3.18)
Median (IQR)	2 (0-4.0)
Total range	0-20

Abbreviation: IQR, interquartile range.

eTABLE 4. Research Barriers Affecting Specialty Change Consideration

Barrier	OR	95% CI	P value
Financial cost	2.20	1.03-4.73	.0426
Lack of time	6.33	2.30-22.4	.0011
Limited access to research opportunities	3.06	1.42-7.00	.0057
Not knowing how to begin research	4.73	2.12-11.5	<.001
Lack of mentorship or support	3.51	1.66-7.75	.0013
Institutional limitations	1.02	0.471-2.17	.957
Personal obligations	1.73	0.675-4.38	.244

Abbreviation: OR, odds ratio.



eFIGURE 1. Participant-reported severity rankings of 7 general research barriers among dermatology residency applicants.

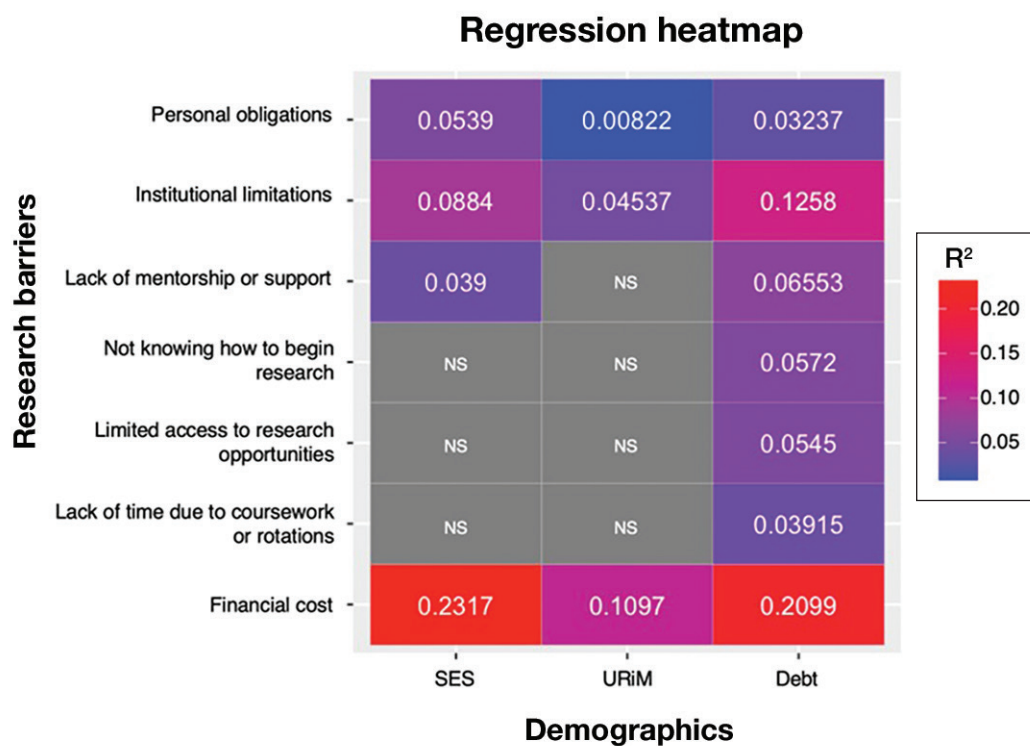
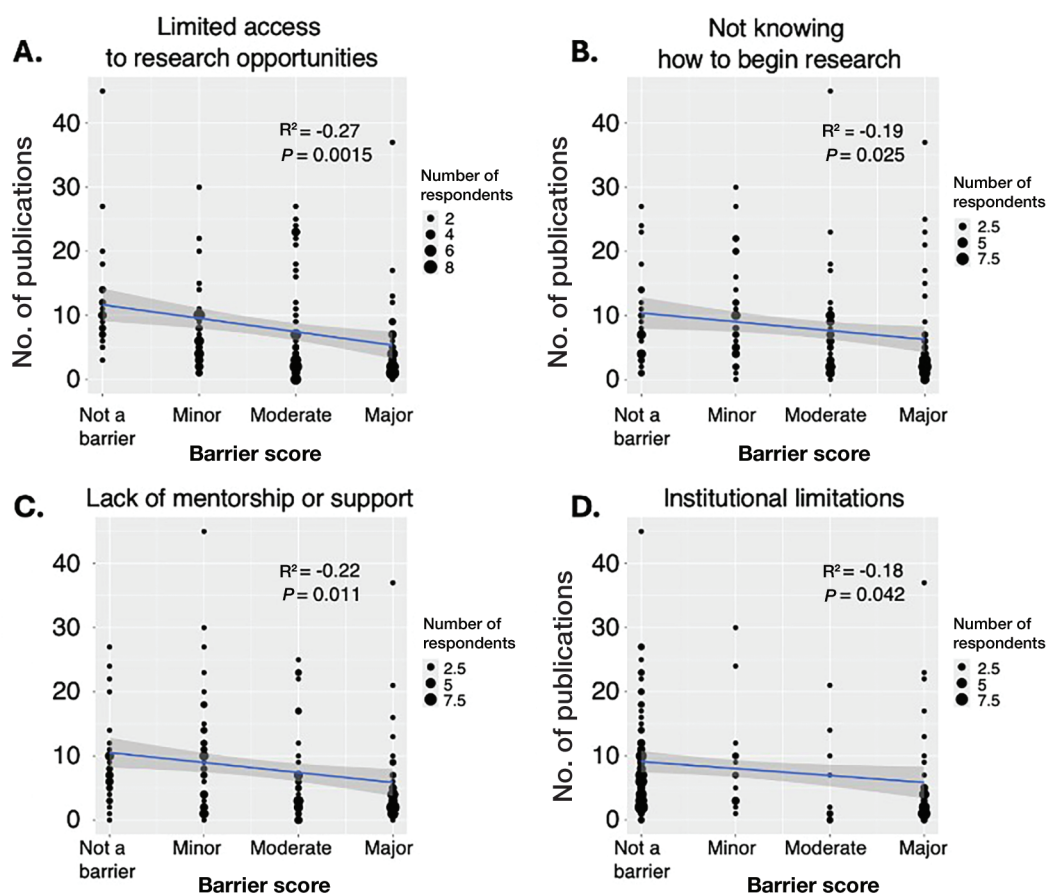
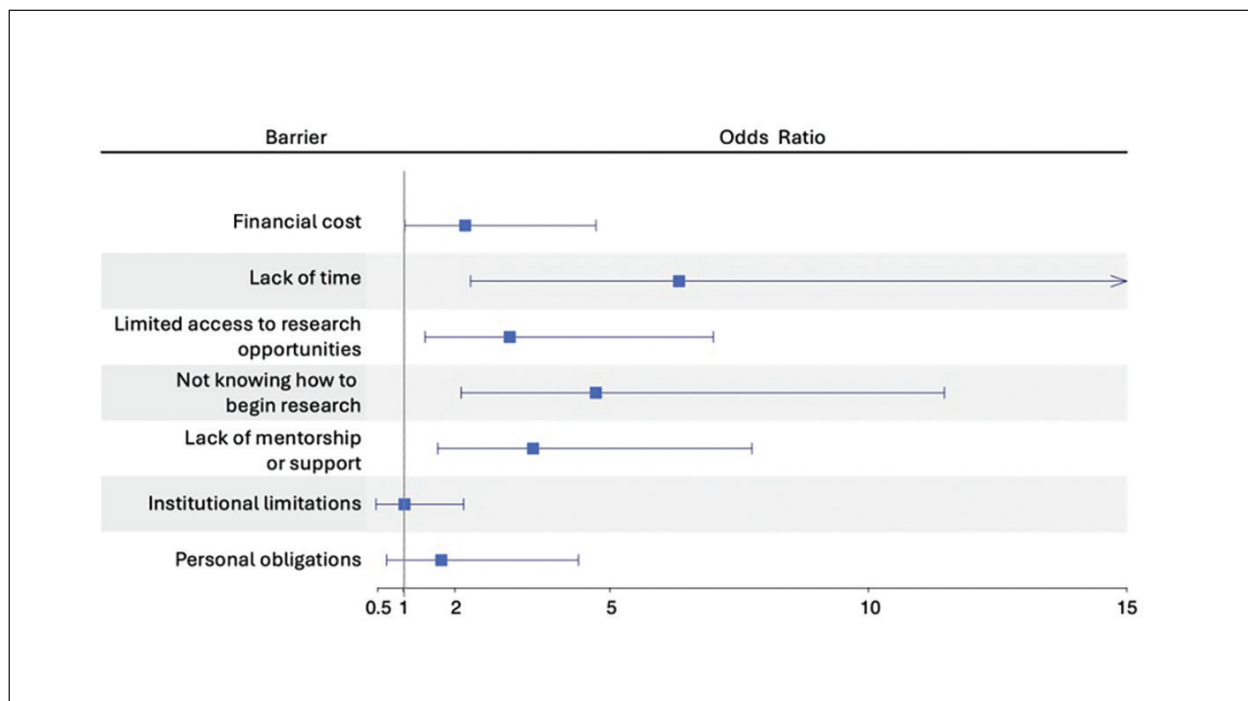


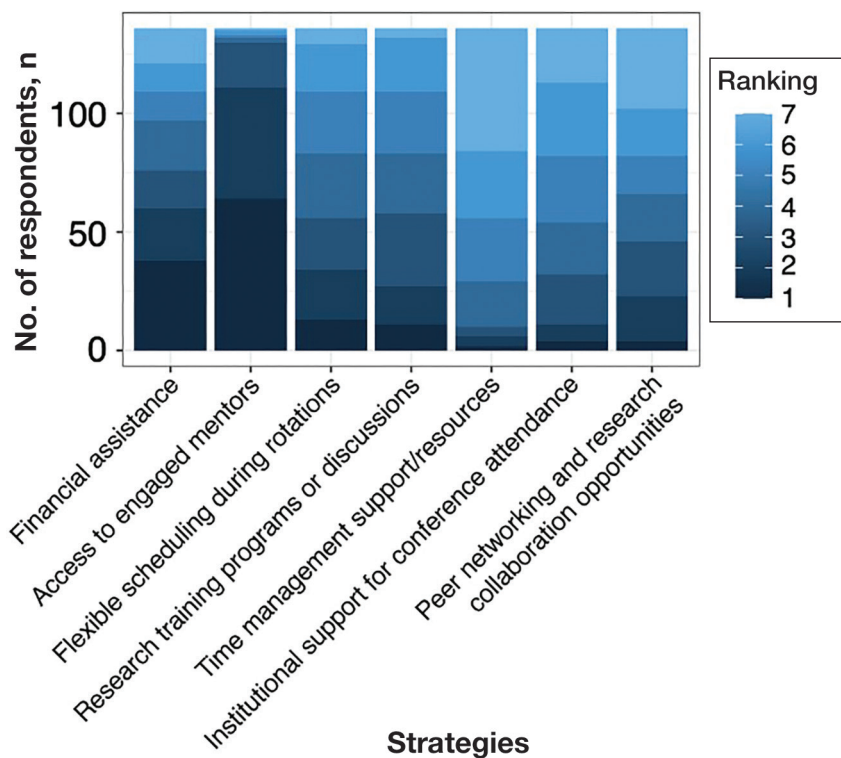
FIGURE 2. Heatmap of linear regression associations between demographic factors and reported research barriers. NS indicates nonsignificance; SES, socioeconomic status; URiM, underrepresented in medicine.



eFIGURE 3. Associations between individual research barriers and total publication count among respondents.



eFIGURE 4. Forest plot of odds ratios for the relationship between specific research barriers and consideration of changing specialty choice.



eFIGURE 5. Participant-ranked importance of mitigation strategies to address research barriers.