Original Paper

Student Scholarly Research Programs in US Medical Schools: Cross-Sectional Web Audit

Dongyoon Lee[1*]; Changyoon Lee[2*], MD; Sarah Soyeon Oh[3], PhD; Keeheon Lee[4], PhD; Chul S Hyun[5], MD, PhD, MPH; Jae Il Shin[3,5,6,7,8,9], MD, PhD; Shinki An[3,8], MD, PhD; John PA Ioannidis[10,11], MD, DSc

[1]College of Medicine, The Catholic University of Korea, Seoul, Republic of Korea
[2]Yonsei University College of Medicine, Seoul, Republic of Korea
[3]Institute for Global Engagement & Empowerment, Yonsei University, Seoul, Republic of Korea
[4]Creative Technology Management, Underwood International College, Yonsei University, Seoul, Republic of Korea
[5]Division of Digestive Diseases, Department of Medicine, Yale School of Medicine, Yale University, New Haven, CT, United States
[6]Department of Pediatrics, Yonsei University College of Medicine, Seoul, Republic of Korea
[7]Severance Underwood Meta-research Center, Institute of Convergence Science, Yonsei University, Seoul, Republic of Korea
[8]Department of Medical Education, Yonsei University College of Medicine, Seoul, Republic of Korea
[9]The Center for Medical Education Training and Professional Development, Yonsei-Donggok Medical Education Institute, Seoul, Republic of Korea
[10]Departments of Medicine, Epidemiology and Population Health, and Biomedical Data Science, and Meta-Research Innovation Center at Stanford (METRICS), Stanford University, Stanford, CA, United States
[11]Stanford Prevention Research Center, Department of Medicine, Stanford University, Stanford, CA, United States
*these authors contributed equally

Corresponding Author:

Jae Il Shin, MD, PhD
Department of Pediatrics
Yonsei University College of Medicine
50 Yonsei-ro, Seodaemun-gu, C.P.O. Box 8044
Seoul 03722
Republic of Korea
Phone: 82-2-2228-2050
Email: shinji@yuhs.ac

Abstract

Background: Participating in research during medical school is supported by institutional programs and may influence subsequent professional development. However, the benefit is uncertain, and scholarly research programs are heterogeneous in structure, resources, and equity implications, such as funding and protected time. What US medical schools publicly report about these programs currently has not been characterized.

Objective: This study aimed to describe what US medical schools publicly report about scholarly research programs for medical students in the United States, including expectations, support, and key structural features.

Methods: We conducted a cross-sectional web audit of official webpages for all accredited US Doctor of Medicine (MD)–granting and Doctor of Osteopathic Medicine (DO)–granting medical schools (reaudited from April to May 2026). Two reviewers independently extracted participation requirements, mentorship, timing and duration (overall and dedicated research time), expected scholarly outputs, funding sources, stipend information, and stated program goals. We compared programs at Carnegie Classification Research 1 (R1; very high research activity) versus other institutions, Quacquarelli Symonds Top 50 versus other institutions, and MD versus DO schools using cluster-robust generalized estimating equations (binomial, proportional odds ordinal, and multinomial; school as cluster), with school-cluster permutation fallbacks. $P<.005$ was considered statistically significant, and $P=.005$ to .05 was considered suggestive.

Results: Programs were publicly described at 194 of 202 schools (257 programs). Faculty mentorship was described for 99.6% (242/243) of programs. Funding was mentioned by 57.6% (148/257), program director was named by 47.9% (123/257), and compulsory participation was required by 21.8% (55/252). Duration, dedicated research time, stipends, and goals varied widely. Programs at Carnegie R1 institutions more often described longer dedicated research duration (odds ratio [OR] 3.24, 95% CI 1.51-6.93; $P=.002$). Suggestive differences ($P=.005$-.05) included, at R1 institutions, more external funding (OR 2.33, 95% CI 1.12-4.86; $P=.02$) and higher stipend amounts (OR 1.78, 95% CI 1.01-3.13; $P=.047$); at Quacquarelli Symonds Top

50 institutions, more frequent compulsory participation (OR 3.95, 95% CI 1.52-10.24; *P*=.005) and longer dedicated duration (OR 2.11, 95% CI 1.01-4.43; *P*=.048); and, for MD versus DO programs, more frequent naming of a program director (OR 2.14, 95% CI 1.04-4.42; *P*=.04). These differences remained consistent across school level and, where applicable, missing-data sensitivity analyses, whereas other suggestive differences (research-year funding, research-expense support, and stated goals) did not persist.

Conclusions: Unlike studies evaluating selected programs or outcomes, this national audit systematically describes what accredited US MD- and DO-granting schools publicly disclose about scholarly research programs. Programs were publicly described at nearly all medical schools but were heterogeneous in structure, expectations, and support. Public reporting itself was selectively incomplete: faculty mentorship was described almost universally, whereas resource commitments were frequently unspecified. Research-intensive institutions tended to describe more external funding and higher stipend amounts. Top-ranked and research-intensive institutions publicly reported longer protected time for research. Future studies should test whether greater transparency or standardization benefits students and how students obtain information about research opportunities.

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Keywords: undergraduate medical education; medical schools; medical students; program evaluation; mentoring; research support as topic; cross-sectional studies; internet; research; United States

Introduction

Engaging in scholarly research during medical school may help inspire and prepare some students to pursue a physician-scientist career [1], but it may also benefit physicians who enter clinical practice without research aspirations. The research experience may translate into improved patient care if it can foster the ability to integrate science-based, evidence-based reasoning into the clinical decision-making process [2,3]. Early exposure to research may cultivate a deeper understanding of the scientific method, enhance problem-solving abilities, and encourage a lifelong commitment to learning and discovery within the medical profession [4,5]. The physician-scientist pipeline has long been under threat [6], but it is unclear which measures might help sustain it and whether engaging students in research during medical school is an effective measure in this regard. For the average medical student, the outcomes are even more uncertain. A review of 39 studies on "scholarly concentration" programs found mixed results [7]. Some studies suggested that some students did go into academic careers, published papers or made research presentations, or were helped in their clinical specialty choice [7]. However, other studies noted the burden of mixing such programs with the already high demands of clinical training and the effort required to complete scholarly projects [7].

The literature also highlights substantial heterogeneity in program designs [4]. For example, an evaluation of programs at 15 different US medical schools showed diversity in program structures, focus, duration, centralization, capstone requirements, faculty involvement, outcome definitions, and evaluation rigor [8]. At the curricular level, schools have adopted diverse approaches ranging from elective summer programs to multiyear mentored projects and scholarly concentration tracks. Each has different resource requirements and potential equity implications (ie, reliance on external funding, variable stipend support, and differences in protected time) [8,9]. Recent reviews continue to identify limited time, mentorship, and funding as systemic barriers to medical student research participation across institutions [10].

As these programs have become widely available across medical schools in the United States, it is important to gain a contemporary, national-level characterization of what medical schools publicly report about their student scholarly research programs and how consistently key program features are described across institutions. Prior work has underscored both the importance of scholarship opportunities and the difficulty of drawing cross-institutional conclusions when program descriptors are inconsistent or incomplete [7]. A systematic assessment of publicly available information can therefore provide a useful starting point for describing what schools currently report and a first step toward identifying inconsistencies and gaps in the transparency of this public reporting. It may also help to perform comparisons across different types of institutions in terms of key program features they disclose.

Because the research environment of the parent university may shape the opportunities a medical school can offer, we examined whether publicly reported program characteristics differed by 2 widely used institutional markers. The first marker is the Carnegie Classification's Research 1 (R1) designation, which, in its 2025 revision, identifies universities with very high research activity using threshold-based criteria for annual research and development spending and research doctorate production [11,12]. The second is a top 50 position in the Quacquarelli Symonds (QS) World University Rankings, a composite global ranking that incorporates indicators such as academic and employer reputation, faculty-to-student ratio, and research citations [13]. Research-intensive and globally top-ranked universities typically have greater research funding, infrastructure, and faculty research engagement [12,14], which could plausibly translate into more structured, better-resourced, or more frequently required student research programs. Consistent with this, students at more research-intensive medical schools have been reported to undertake more research experiences and achieve higher publication output, indicating that the institutional research

environment can shape student research participation [15]. We additionally compared Doctor of Medicine (MD)- and Doctor of Osteopathic Medicine (DO)-granting schools, given their differing historical emphases on research. We treated these institutional characteristics as exploratory contextual markers rather than causal determinants: medical student research programs are also shaped by curricular design, institutional priorities, and administrative organization (eg, a dedicated medical student research office) that need not track the parent university's overall research intensity.

In this cross-sectional web audit, we aimed to characterize the publicly disclosed structural features of medical student scholarly research programs across all US medical schools. We focused on program identification and coverage, as well as key descriptors such as funding or stipend reporting, duration and timing, mentorship, expected outcomes, and stated goals. We further investigated whether there were differences in reported program characteristics based on institutional research intensity, global ranking strata, and type of degree.

Methods

Study Design

We conducted a cross-sectional web audit of publicly available, official institutional webpages of US medical schools to characterize publicly reported features of student scholarly research. The audit frame comprised all 158 US medical schools accredited by the Liaison Committee on Medical Education to grant MDs (Liaison Committee on Medical Education Medical School Directory, accessed September 2, 2024) and 44 institutions accredited by the American Osteopathic Association Commission on Osteopathic College Accreditation to grant DO degrees (AACOM US College of Osteopathic Medicine roster, accessed September 2, 2024). Program webpages were initially identified between September 2024 and January 2025 and were comprehensively reaccessed and re-extracted between April and May 2026 to ensure currency; all analyses reflect the April to May 2026 extraction. Each institution's active accreditation status was reverified during extraction.

We defined a "scholarly research program" as a defined program or track that includes explicit expectations (ie, duration or milestones) and institutional supports (ie, mentorship, protected time, or funding). Programs were included if a medical school's official webpage described structured programs for all students or a selected subset, across all formats, including summer research programs, short scholarly projects, longitudinal (multiyear) programs, dedicated research-year (year-out programs), and research-honors programs. Institution-wide programs hosted at the parent university were included only if the official medical school webpage introduced those as an opportunity for medical students. We excluded ad hoc research opportunities without a defined program structure (ie, open invitations to contact individual faculty) and dual-degree pathways (MD/PhD, MD/MS, MSTP). Programs that also enrolled other trainees (ie, undergraduate, graduate, or other health professions students) were included. When multiple programs were listed for a school, each research program was separately extracted as the unit of analysis. We report methods and results in alignment with STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) principles for cross-sectional studies (Checklist 1). We did not preregister a protocol, as we came across peculiarities in specific websites and tried to capture maximal information.

Search Strategy

The search was conducted by 2 authors experienced with medical student scholarly research programs (DL, a medical student, and CL, a physician). Because this was a structured audit of publicly available institutional webpages rather than a bibliographic database search, no professional librarian was involved. For each institution, 2 researchers (DL and CL) navigated from the official medical school homepage to pages describing student research, scholarly concentration, summer research, and dedicated research years. If programs were not located via navigation, we performed site-specific searches using standardized keywords ("scholarly concentration," "research track," "summer research," "student research," "student research program," "medical student research," and "medical student research program").

Data Extraction

A standardized extraction sheet was developed a priori. Two reviewers (DL and CL) piloted the form on an initial subset of schools and refined variable definitions. All 202 schools were independently extracted in duplicate by 2 reviewers (DL and CL). Interrater agreement was high (overall 93.4% across 2222 paired cells), with almost-perfect Cohen κ for faculty mentorship (1.00), funded status (0.99), and compulsory/optional status (0.97), and almost-perfect agreement for the more granular variables (κ=0.85-0.93 for curricular years, dedicated duration, stipend amount, funding organization, form of outcome, and goals). Discrepancies (146/2222) were resolved by consensus, with discussion with a third investigator (JS) when needed. All the schools with multiple programs (41/202) were then disaggregated into program-level records for analysis by 2 reviewers through discussion (DL and CL). Extracted variables included whether student participation was compulsory or optional, the presence of faculty mentors, program start and end years, overall duration, dedicated research time, expected scholarly outputs, funding sources, stipend type and amount, and stated program goals.

For features a program may genuinely lack and that no program declared absent (funding, funding sources, stipend amount, and whether a program director was named), nonmention denoted "none publicly described" and was retained in the denominator. Because no programs explicitly mentioned these features as absent, these variables are treated as reporting-dependent variables and interpreted as a measure of public description. For features that every program necessarily has but may leave undocumented (compulsory or optional status, dedicated research duration, and goals), nonmention denoted missing information and was

excluded from analysis, yielding a variable-specific complete-case denominator.

Statistical Analysis

We compared characteristics of 257 publicly described programs from 194 institutions by institutional research intensity, global ranking status, and degree type. For 2×2 tables, we used cluster-robust binomial generalized estimating equations (GEEs), grouping on school; when all expected cell counts were less than 5, or when the binomial GEE failed to converge, we used a school-cluster permutation test of the 2×2 Pearson statistic. For ordered categorical variables, we used proportional-odds ordinal logistic GEEs with cluster-robust SEs, grouping on school; when ordinal GEE estimation failed to converge, we reported a school cluster permutation trend test. For nominal multicategory variables, we used marginal multinomial GEE with school as the clustering unit, with a school-cluster permutation omnibus test when marginal multinomial GEEs failed to converge. For ordered variables with a significant trend, we examined the proportional odds assumption. As a sensitivity analysis, we repeated all comparisons at the school level by aggregating each school's programs into a single record. Features were coded as present if reported by any program, and the highest category was taken for ordinal variables.

For variables with a complete-case denominator (missing rows excluded from the analysis), sensitivity analysis was additionally done to address missing data. Estimates are treated as unbiased if, within subgroups, nonreporting is unrelated to the unreported value (missing at random [MAR]). For a more informative assessment, we report tipping point analysis results: starting from a MAR baseline, we determined the proportion of unreported programs that would need to take the least favorable value to render the differences nonsignificant (Multimedia Appendix 1). For several reporting-dependent variables (funding, funding source, stipend amount, and named program director), as nonmention denotes the absence of a public description rather than an unobserved value, they are not amenable to missing data sensitivity analysis. Their robustness was instead assessed against the unit of analysis in the school-level sensitivity analysis, alongside all other variables.

Analyses were conducted using R (version 4.4.2; R Foundation for Statistical Computing) and Python (version 3.12.2). We report absolute counts and percentages with variable-specific denominators. Because comparisons were hypothesis-generating across multiple program features, we emphasize effect sizes and consistency of patterns rather than *P* values alone. *P* values of less than .005 are considered fully statistically significant, and *P* values from .005 to .05 are considered to have suggestive statistical significance [16].

Ethical Considerations

This study used only publicly available information from official medical school program webpages and did not involve human participants, patient data, or interaction with individuals. Thus, the study was determined not to constitute human subjects research, and institutional review board review and exemption review were not required. All extracted information was publicly posted and pertained to programs and institutions; analyses used only institution- and program-level variables, and where a webpage publicly listed a program director, only the presence of a named director was recorded as a binary indicator, with no individual analyzed at the individual level. Any personal contact details appearing on public pages were not analyzed and were excluded from the shared dataset, which contains only program- and institution-level information. The manuscript and multimedia appendices contain no images, and no individual participants or users can be identified from any material in the manuscript or multimedia appendices.

Results

Webpage Identification/Coverage

We conducted a comprehensive review of official webpages describing medical student scholarly research programs for 257 publicly available student scholarly research programs across 194 of the 202 accredited US MD- and DO-granting medical schools. Among the remaining 8 schools, 3 did not publicly report student scholarly research programs, and official documentation was inaccessible during the audit window for 5 institutions. Most schools publicly described a single program (153/194); 41 schools described 2 to 6 programs each. The 257 programs comprised 93 summer programs, 67 longitudinal programs throughout the school years, 61 short scholarly projects, 21 year-out programs, and 15 research-honors programs. Most programs were hosted by the medical school; 16 of 257 (6.2%) were institution-wide opportunities hosted at the parent university (11 summer programs, 2 longitudinal programs, 2 year-out programs, and 1 short scholarly project). For each institution, the program webpages were identified, and data were extracted from the most current page available during the review period (initially identified between September 2024 and January 2025; reaccessed and re-extracted between April and May 2026).

Institutions varied in how extensively they documented program details; program attributes were frequently not documented on webpages, leading to variable-specific denominators across measures (ie, compulsory participation was reported for 252/257 programs, and mentorship for 243/257). To characterize documentation completeness more explicitly, we summarized missingness by variable and compared missingness patterns across institutional subgroups (Multimedia Appendix 2). Differences in missingness between institutional subgroups reached $P<.005$ for compulsory participation (MD: 1/203 vs DO: 4/54, $P=.004$), starting year (MD: 31/203 vs DO: 21/54, $P<.001$), ending year (MD: 32/203 vs DO: 23/54, $P<.001$), duration (R1: 9/139 vs non-R1: 24/118, $P=.001$; MD: 16/203 vs DO: 17/54, $P<.001$), and dedicated duration (R1: 37/139 vs non-R1: 55/118, $P=.001$) (Multimedia Appendix 2).

Program Characteristics: Overall

As shown in Table 1, nearly half of the programs mentioned a program director (123/257, 47.9%), over half explicitly mentioned funding (148/257, 57.6%), and slightly under one-quarter were compulsory (55/252, 21.8%). Almost all programs explicitly described faculty mentorship (242/243, 99.6%).

Table 1. Publicly described characteristics of student scholarly research programs in US medical schools, overall and by Carnegie tier[a].

Characteristic	Total (N=257), % (n/N)	Carnegie research tier 1 (n=139), % (n/N)	Others (n=118), % (n/N)	*P* value[b]
Program director	47.9 (123/257)	51.8 (72/139)	43.2 (51/118)	.24
Funded	57.6 (148/257)	59 (82/139)	55.9 (66/118)	.62
Compulsory	21.8 (55/252)	20.9 (29/139)	23 (26/113)	.69
Mentored by faculty	99.6 (242/243)	99.2 (130/131)	100 (112/112)	.91[c]
Starting year				.71
1	37.7 (77/204)	38.1 (45/118)	37.2 (32/86)	
2	42.6 (87/204)	40.7 (48/118)	45.3 (39/86)	
3	12.7 (26/204)	13.6 (16/118)	11.6 (10/86)	
4	6.9 (14/204)	7.6 (9/118)	5.8 (5/86)	
Ending year				.66
1	2 (4/201)	1.7 (2/115)	2.3 (2/86)	
2	41.3 (83/201)	42.6 (49/115)	39.5 (34/86)	
3	7.5 (15/201)	8.7 (10/115)	5.8 (5/86)	
4	48.3 (97/201)	45.2 (52/115)	52.3 (45/86)	
5[d]	1.0 (2/201)	1.7 (2/115)	0.0 (0/86)	
Duration (y)				.78
<0.25	42.0 (94/224)	38.5 (50/130)	46.8 (44/94)	
0.25-0.99	6.7 (15/224)	6.9 (9/130)	6.4 (6/94)	
1.00-1.99	16.5 (37/224)	21.5 (28/130)	9.6 (9/94)	
2.00-2.99	6.2 (14/224)	6.2 (8/130)	6.4 (6/94)	
3.00-3.99	8.9 (20/224)	7.7 (10/130)	10.6 (10/94)	
≥4.00	19.6 (44/224)	19.2 (25/130)	20.2 (19/94)	
Dedicated duration (y)				.002[e]
<0.25	72.7 (120/165)	64.7 (66/102)	85.7 (54/63)	
0.25-0.99	10.9 (18/165)	13.7 (14/102)	6.3 (4/63)	
≥1.00	16.4 (27/165)	21.6 (22/102)	7.9 (5/63)	
Form of outcome				.39[f]
Report	4.6 (9/196)	6.4 (7/109)	2.3 (2/87)	
On-campus presentation	33.7 (66/196)	33 (36/109)	34.5 (30/87)	
Optional publication or conference presentation	48.5 (95/196)	45.0 (49/109)	52.9 (46/87)	
Required publication or conference presentation	13.3 (26/196)	15.6 (17/109)	10.3 (9/87)	
Amount of stipend				.047[e]
US $0 or not mentioned	69.6 (179/257)	66.2 (92/139)	73.7 (87/118)	
US $1 to US $2999	10.1 (26/257)	9.4 (13/139)	11.0 (13/118)	
US $3000 to US $4999	12.5 (32/257)	12.9 (18/139)	11.9 (14/118)	
≥US $5000	7.8 (20/257)	11.5 (16/139)	3.4 (4/118)	
Funding organization				
Internal	39.3 (101/257)	39.6 (55/139)	39.0 (46/118)	.93
External	16.0 (41/257)	20.9 (29/139)	10.2 (12/118)	.02[e]
Type of funding				
Summer stipend	32.3 (83/257)	33.8 (47/139)	30.5 (36/118)	.57
Research-year funding	6.2 (16/257)	9.4 (13/139)	2.5 (3/118)	.03[e]
Travel funding	16.3 (42/257)	14.4 (20/139)	18.6 (22/118)	.36

Characteristic	Total (N=257), % (n/N)	Carnegie research tier 1 (n=139), % (n/N)	Others (n=118), % (n/N)	*P* value[b]
Scholarship/grants	11.3 (29/257)	11.5 (16/139)	11 (13/118)	.91
Research-expense support	12.1 (31/257)	10.1 (14/139)	14.4 (17/118)	.35
Other publicly described type	8.6 (22/257)	11.5 (16/139)	5.1 (6/118)	.07
Goal[g]				
Research competence	85.2 (184/216)	82.5 (94/114)	88.2 (90/102)	.23
Dissemination	27.3 (59/216)	30.7 (35/114)	23.5 (24/102)	.26
Career development	22.2 (48/216)	28.1 (32/114)	15.7 (16/102)	.02[e]
Research attitude	19.0 (41/216)	19.3 (22/114)	18.6 (19/102)	.91

[a]Cross-sectional web audit of official webpages from 194 of 202 accredited US MD- and DO-granting medical schools (257 programs, initially identified between September 2024 and January 2025 and re-extracted between April and May 2026). Values are % (n/N). Denominators vary by variable: reporting-dependent attributes (program director, funding, funding source, stipend amount, and funding type) are shown at the full sample size (N), with nonmention counted as none publicly described; attributes that every program has but may not document (eg, compulsory status, duration, curricular year, outcome form, and goals) use complete cases, excluding nonmention. Programs at Carnegie Research 1 (very high research activity) institutions are compared with those at other institutions.
[b]All *P* values are from cluster-robust generalized estimating equations (GEE; school as the clustering unit) unless a footnote indicates a prespecified fallback test.
[c]Sparse cell (expected count <5): a school-cluster permutation test of the 2×2 Pearson statistic is reported instead of the GEE.
[d]Year-out program; extends medical school by 1 year.
[e]*P*<.005 was considered statistically significant, and *P*=.005 to .05 was considered suggestive.
[f]Multinomial GEE for form of outcome was unstable; a school-cluster permutation omnibus test is reported.
[g]Goal categories: research competence (research-skills training); dissemination (producing and sharing research outcomes); career development (preparing future physician-scientists); research attitude (emphasizing the value of research in medicine).

Structure and time commitment varied substantially. Overall program duration ranged from short-term experiences of less than 0.25 year in two-fifths of the programs to longitudinal programs spanning 4 years or more in almost one-fifth. In contrast, dedicated research time was most commonly (in almost 3-quarters) less than 0.25 year. Expected scholarly outputs also differed across programs. Among described outcomes (n=196), slightly under half expected publication or conference presentation as optional (95/196, 48.5%), while about 1 out of 8 required a publication or conference presentation (26/196, 13.3%). Other programs emphasized on-campus presentations (66/196, 33.7%) or written reports (9/196, 4.6%).

Financial support was inconsistently reported. Stipend was frequently absent or reported as US $0 in more than two-thirds of the programs. Among programs reporting stipends, amounts ranged substantially, with 20 programs publicly reporting US $5000 or more. Funding sources were also heterogeneous, with internal funding noted in 39.3% (101/257) and external funding in 16% (41/257).

Program Characteristics in Institutional Subgroups

As shown in Table 1, programs in Carnegie tier R1 institutions more frequently reported longer dedicated research duration (OR 3.24, 95% CI 1.51-6.93; *P*=.002). Moreover, there was a suggestion that programs at Carnegie R1 institutions reported external funding (OR 2.33, 95% CI 1.12-4.86; *P*=.02), research-year funding (OR 3.96, 95% CI 1.13-13.81; *P*=.03), and higher stipends (OR 1.78, 95% CI 1.01-3.13; *P*=.047) (Table 1) more often than others. There were also suggestions that Carnegie R1 institution programs more frequently described goals related to career development (*P*=.02). In sensitivity analyses, the duration, external-funding, and stipend-amount differences were concordant at the school level, whereas research-year funding and the career-development goal attenuated to nonsignificance (Multimedia Appendix 3). The dedicated-duration difference (a complete-case variable) additionally held under a MAR assumption, requiring approximately 14% of unreported programs to take the least favorable value to overturn; the career-development goal did not persist under this analysis (Multimedia Appendix 1).

As shown in Table 2, only 25 programs were identified at institutions ranked among the top 50 worldwide according to the QS ranking; thus, comparisons may be tenuous due to limited precision. Programs at QS Top 50 institutions were more likely to be described as compulsory than those at other institutions (12/25, 48% vs 43/227, 18.9%; OR 3.95, 95% CI 1.52-10.24; *P*=.005). They also tended to describe longer dedicated research duration (OR 2.11, 95% CI 1.01-4.43; *P*=.048) (Table 2). Both QS Top 50 differences remained consistent at the school level (Multimedia Appendix 3). The compulsory participation difference was additionally robust to extreme missingness (it did not tip even when every unreported program was reassigned to the opposite status), and the dedicated-duration difference held under a MAR assumption (overturned only by ~14% adverse missingness) (Multimedia Appendix 1).

Table 2. Publicly described program characteristics in US medical schools, by Quacquarelli Symonds Top 50 status[a].

Characteristic	QS[b] Top 50 (n=25), % (n/N)	Others (n=232), % (n/N)	*P* value[c]
Program director	40 (10/25)	48.7 (113/232)	.47
Funded	48 (12/25)	58.6 (136/232)	.38
Compulsory	48 (12/25)	18.9 (43/227)	.005[d]
Mentored by faculty	100 (25/25)	99.5 (217/218)	.51[e]
Starting year			.15
1	26.1 (6/23)	39.2 (71/181)	
2	43.5 (10/23)	42.5 (77/181)	
3	21.7 (5/23)	11.6 (21/181)	
4	8.7 (2/23)	6.6 (12/181)	
Ending year			.75
1	0.0 (0/21)	2.2 (4/180)	
2	42.9 (9/21)	41.1 (74/180)	
3	14.3 (3/21)	6.7 (12/180)	
4	42.9 (9/21)	48.9 (88/180)	
5[f]	0.0 (0/21)	1.1 (2/180)	
Duration (y)			.12
<0.25	27.3 (6/22)	43.6 (88/202)	
0.25-0.99	22.7 (5/22)	5.0 (10/202)	
1.00-1.99	27.3 (6/22)	15.3 (31/202)	
2.00-2.99	9.1 (2/22)	5.9 (12/202)	
3.00-3.99	13.6 (3/22)	8.4 (17/202)	
≥4.00	0.0 (0/22)	21.8 (44/202)	
Dedicated duration (y)			.048[d]
<0.25	50 (11/22)	76.2 (109/143)	
0.25-0.99	31.8 (7/22)	7.7 (11/143)	
≥1.00	18.2 (4/22)	16.1 (23/143)	
Form of outcome			.32[g]
Report	4.8 (1/21)	4.6 (8/175)	
On-campus presentation	52.4 (11/21)	31.4 (55/175)	
Optional publication or conference presentation	33.3 (7/21)	50.3 (88/175)	
Required publication or conference presentation	9.5 (2/21)	13.7 (24/175)	
Amount of stipend			.38
US $0 or not mentioned	88 (22/25)	67.7 (157/232)	
US $1 to US $2999	0.0 (0/25)	11.2 (26/232)	
US $3000 to US $4999	0.0 (0/25)	13.8 (32/232)	
≥US $5000	12 (3/25)	7.3 (17/232)	
Funding organization			
Internal	36 (9/25)	39.7 (92/232)	.79
External	12 (3/25)	16.4 (38/232)	.61[e]
Type of funding			
Summer stipend	36 (9/25)	31.9 (74/232)	.68
Research-year funding	12 (3/25)	5.6 (13/232)	.30[e]
Travel funding	8 (2/25)	17.2 (40/232)	.26[e]
Scholarship/grants	12 (3/25)	11.2 (26/232)	.93[e]
Research-expense support	4 (1/25)	12.9 (30/232)	.25[e]
Other publicly described type	4 (1/25)	9.1 (21/232)	.40[e]
Goal[h]			
Research competence	71.4 (15/21)	86.7 (169/195)	.07[e]
Dissemination	33.3 (7/21)	26.7 (52/195)	.56

Characteristic	QS[b] Top 50 (n=25), % (n/N)	Others (n=232), % (n/N)	*P* value[c]
Career development	23.8 (5/21)	22.1 (43/195)	.86[e]
Research attitude	9.5 (2/21)	20 (39/195)	.29[e]

[a]Same web audit, population, time frame, denominators, and methods as Table 1. Programs at QS World University Rankings Top 50 institutions are compared with others.
[b]QS: Quacquarelli Symonds.
[c]All *P* values are from cluster-robust generalized estimating equations (GEE; school as the clustering unit) unless a footnote indicates a prespecified fallback test.
[d]*P*<.005 was considered statistically significant, and *P*=.005 to .05 was considered suggestive.
[e]Sparse cell (expected count <5): a school-cluster permutation test of the 2×2 Pearson statistic is reported instead of the GEE.
[f]Year-out program; extends medical school by 1 year.
[g]Multinomial GEE for form of outcome was unstable; a school-cluster permutation omnibus test is reported.
[h]Goal categories: research competence (research-skills training); dissemination (producing and sharing research outcomes); career development (preparing future physician-scientists); research attitude (emphasizing the value of research in medicine).

There was a suggestion that a named program director was documented more often for MD than DO programs (51.7% vs 33.3%; OR 2.14, 95% CI 1.04-4.42; *P*=.04). There were also suggestions that DO programs more often described research-expense support (9.4% vs 22.2%; OR 0.36, 95% CI 0.14-0.91; *P*=.03) and a research-competence goal (82.6% vs 95.5%; OR 0.23, 95% CI 0.05-0.98; *P*=.045) (Table 3).

At the school level, the program-director difference remained consistent, whereas the research-expense and research-competence differences attenuated to nonsignificance (Multimedia Appendix 3). The research-competence goal also did not persist under the missing-data analysis (Multimedia Appendix 1).

Table 3. Publicly described program characteristics in US medical schools, by degree type[a].

Characteristic	Doctor of Medicine (n=203),% (n/N)	Doctor of Osteopathic Medicine (n=54),% (n/N)	*P* value[b]
Program director	51.7 (105/203)	33.3 (18/54)	.04[c]
Funded	57.1 (116/203)	59.3 (32/54)	.77
Compulsory	21.8 (44/202)	22 (11/50)	.97
Mentored by faculty	99.5 (192/193)	100 (50/50)	.75[d]
Starting year			.87
1	38 (65/171)	36.4 (12/33)	
2	43.9 (75/171)	36.4 (12/33)	
3	9.9 (17/171)	27.3 (9/33)	
4	8.2 (14/171)	0.0 (0/33)	
Ending year			.75
1	2.4 (4/170)	0.0 (0/31)	
2	41.8 (71/170)	38.7 (12/31)	
3	6.5 (11/170)	12.9 (4/31)	
4	48.2 (82/170)	48.4 (15/31)	
5[e]	1.2 (2/170)	0.0 (0/31)	
Duration (y)			.34
<0.25	41.2 (77/187)	45.9 (17/37)	
0.25-0.99	6.4 (12/187)	8.1 (3/37)	
1.00-1.99	16.6 (31/187)	16.2 (6/37)	
2.00-2.99	5.9 (11/187)	8.1 (3/37)	
3.00-3.99	9.1 (17/187)	8.1 (3/37)	
≥4.00	20.9 (39/187)	13.5 (5/37)	
Dedicated duration (y)			.39[f]
<0.25	71.2 (99/139)	80.8 (21/26)	
0.25-0.99	12.2 (17/139)	3.8 (1/26)	
≥1.00	16.5 (23/139)	15.4 (4/26)	
Form of outcome			.09[g]
Report	3.9 (6/153)	7.0 (3/43)	

Characteristic	Doctor of Medicine (n=203),% (n/N)	Doctor of Osteopathic Medicine (n=54),% (n/N)	*P* value[b]
On-campus presentation	35.9 (55/153)	25.6 (11/43)	
Optional publication or conference presentation	44.4 (68/153)	62.8 (27/43)	
Required publication or conference presentation	15.7 (24/153)	4.7 (2/43)	
Amount of stipend			.12
US $0 or not mentioned	68.0 (138/203)	75.9 (41/54)	
US $1 to US $2999	9.9 (20/203)	11.1 (6/54)	
US $3000 to US $4999	12.8 (26/203)	11.1 (6/54)	
≥US $5000	9.4 (19/203)	1.9 (1/54)	
Funding organization			
Internal	36.9 (75/203)	48.1 (26/54)	.14
External	18.2 (37/203)	7.4 (4/54)	.06
Type of funding			
Summer stipend	35.0 (71/203)	22.2 (12/54)	.10
Research-year funding	7.4 (15/203)	1.9 (1/54)	.15[d]
Travel funding	15.8 (32/203)	18.5 (10/54)	.62
Scholarship/grants	10.8 (22/203)	13.0 (7/54)	.67
Research-expense support	9.4 (19/203)	22.2 (12/54)	.03[c]
Other publicly described type	8.4 (17/203)	9.3 (5/54)	.84[d]
Goal[h]			
Research competence	82.6 (142/172)	95.5 (42/44)	.045[c]
Dissemination	26.2 (45/172)	31.8 (14/44)	.46
Career development	23.8 (41/172)	15.9 (7/44)	.20
Research attitude	19.2 (33/172)	18.2 (8/44)	.88

[a]Same web audit, population, time frame, denominators, and methods as Table 1. MD- and DO-granting schools are compared.
[b]All *P* values are from cluster-robust generalized estimating equations (GEE; school as the clustering unit) unless a footnote indicates a prespecified fallback test.
[c]*P*<.005 was considered statistically significant, and *P*=.005 to .05 was considered suggestive.
[d]Sparse cell (expected count <5): a school-cluster permutation test of the 2×2 Pearson statistic is reported instead of the GEE.
[e]Year-out program; extends medical school by 1 year.
[f]Cluster-robust ordinal GEE did not converge; complete-case Mann-Whitney P reported.
[g]Multinomial GEE for form of outcome was unstable; a school-cluster permutation omnibus test is reported.
[h]Goal categories: research competence (research-skills training); dissemination (producing and sharing research outcomes); career development (preparing future physician-scientists); research attitude (emphasizing the value of research in medicine).

Discussion

Principal Findings and Institutional Differences

In this cross-sectional web audit of scholarly research programs across all 202 US MD- and DO-granting medical schools, we aimed to characterize what US medical schools publicly report about student scholarly research programs and how consistently key features are described. Programs were publicly described at nearly all schools (194/202; 257 programs), and core program elements were commonly documented. Most programs explicitly described faculty mentorship, and funding was mentioned on the majority of program webpages. However, beyond these shared features, programs showed heterogeneity in structure, including dedicated research time and the reporting of stipends and funding sources.

We also observed some notable subgroup differences by institutional context, which should be interpreted as exploratory associations. Research-intensive institutions tended to report external funding more frequently, describe higher stipend amounts, and report longer dedicated durations. Programs at top-ranked institutions were more likely to publicly require compulsory participation and also tended to describe longer dedicated durations. These patterns are plausibly explained by differences in research infrastructure, the availability of external grant mechanisms, and institutional priorities [4,15]. For example, R1 institutions may have more established pathways for connecting students to externally supported research environments, and highly ranked institutions may integrate scholarship more tightly into curricula and graduation expectations [14,15,17]. These observations are consistent with prior literature: medical student research output has been shown to track institutional research resources [10], and the structural heterogeneity we observed parallels earlier systematic reviews documenting wide variation in the design of scholarly-concentration

programs [18]. Suggestive differences in research stipends need to be seen with caution, as this information was missing for many programs and only a few institutions were among the QS Top 50.

The observed heterogeneity also likely reflects genuine differences in curricular design and mission. How schools choose to balance research training with clinical and foundational science requirements largely affects program design [19]. For example, research on medical education in Asia points to how factors such as cultural values, leadership gaps, and differing institutional missions can shape what schools choose to emphasize, often resulting in less focus on research in favor of clinical training or policy-driven goals [20].

Beyond heterogeneity in program design, our audit shows that public reporting is itself selectively incomplete. Features such as faculty mentorship were described almost universally, whereas concrete resource commitments (ie, stipend amounts, funding sources, and dedicated research time) were frequently unspecified. This parallels an earlier content analysis of US medical school websites, which likewise found research information to be inconsistently presented [21]. However, that analysis recorded research only as a presence-or-absence item within a broader inventory of website content.

Limitations

This study has several limitations inherent to a web audit design. First, our findings depend on publicly available, self-presented webpage information, which may be incomplete, outdated, or selectively emphasized and thus may not reflect actual program implementation. Second, funding, stipend, and program-director measures reflect what programs publicly described, not confirmed provision, and should not be read as proving the absence of unadvertised support. For features that programs necessarily have but may not document, such as dedicated research time and goals, missingness was substantial, and some differences were sensitive to it (Multimedia Appendix 1). Furthermore, we did not assess information communicated through admissions events, research fairs, advising, mentorship networks, information sessions, or internal portals. Consequently, nonreporting on a public webpage does not establish that students lack access to the information or opportunities. Finally, we did not assess program quality, student experiences, mentorship effectiveness (accessibility and quality), or downstream outcomes (ie, research competence, publications, residency placement, or long-term academic career trajectories), which cannot be inferred reliably from webpages alone.

Future Directions

Future research should link program structures to outcomes and experiences. Combining surveys or interviews of program leaders and students, structured evaluations of mentorship and protected time, and objective outcomes such as dissemination or research skills assessments could clarify which program elements are most strongly associated with educational benefit, if any, and which impose time or resource costs without commensurate benefit. Beyond outcomes, future work could also address questions outside the scope of the present audit: how prospective and enrolled students obtain information about research opportunities [22-24], whether publication-oriented requirements are well matched to available research time and may risk low-value or predatory output [25,26], and whether broad research-competence goals are attainable given the mentorship and protected time available [10,27].

Conclusions

Student scholarly research programs were publicly described at nearly all US medical schools but varied widely in their publicly stated structure, expectations, and support. Public reporting was itself selectively incomplete: faculty mentorship was described almost universally, whereas stipend amounts, funding sources, and dedicated research time were frequently unspecified. Research-intensive institutions may more often report external funding and longer dedicated time, and top-ranked institutions more often reported a required component. Unlike studies that examine small purposive samples of programs [8,9] or prior website work that recorded only whether research was mentioned within a broader inventory [21], this audit resolves individual programs across every accredited US MD- and DO-granting school. Therefore, this study provides a contemporary national baseline of what medical schools disclose about student research. This baseline offers educators and researchers a catalog of summer programs, short scholarly projects, longitudinal tracks, dedicated research years, and research-honors programs; a means to monitor how the public presentation of these programs evolves; and to examine the questions that remain for future research, including whether greater transparency or standardization of public reporting benefits students and how students obtain information about research opportunities (Multimedia Appendix 4).

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Generative AI Use

The authors declare the use of generative AI in the research and writing process. According to the GAIDeT taxonomy (2026), the following tasks were delegated to generative AI (GAI) tools under full human supervision: (1) code optimization, (2) validation, (3) proofreading and editing, (4) adapting and adjusting emotional tone, and (5) reformatting.

The GAI tool used was: ChatGPT (GPT-4o and GPT-5; OpenAI, April 2025-August 2026). Responsibility for the final manuscript lies entirely with the authors. GAI tools are not listed as authors and do not bear responsibility for the final outcomes.

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Data Availability

The raw data set is available from the Multimedia Appendix 4.

Authors' Contributions

DL and CL contributed equally to this work and share cofirst authorship. DL and CL contributed to investigation and data curation (search and data extraction), performed the formal analysis, and drafted the manuscript (writing – original draft). JS contributed to conceptualization, methodology, validation (data extraction consensus), supervision, and project administration, and provided critical manuscript review and editing (writing – review & editing). JPI contributed to methodology, supervision and oversight of formal analysis and participated in manuscript revision (writing – review & editing). SA, SSO, KL, and CSH contributed to methodology and provided feedback and manuscript revision (writing – review & editing). All authors reviewed and approved the final manuscript for submission. JS and SA equally contributed as cocorresponding authors.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Sensitivity of complete-case subgroup differences to informative missingness (tipping-point analysis).
[DOCX File (Microsoft Word File), 29 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Reporting completeness (missingness) of program characteristics.
[DOCX File (Microsoft Word File), 28 KB-Multimedia Appendix 2]

Multimedia Appendix 3

School-level sensitivity analysis.
[DOCX File (Microsoft Word File), 42 KB-Multimedia Appendix 3]

Multimedia Appendix 4

Extracted raw program characteristic data from all US medical schools.
[XLSX File (Microsoft Excel File), 82 KB-Multimedia Appendix 4]

Checklist 1

STROBE checklist.
[PDF File (Adobe File), 133 KB-Checklist 1]

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Abbreviations

DO: Doctor of Osteopathic Medicine
GEE: generalized estimating equation
MAR: missing at random
MD: Doctor of Medicine
QS: Quacquarelli Symonds

R1: Research 1 (Carnegie Classification of Institutions of Higher Education; very high research activity)
STROBE: Strengthening the Reporting of Observational Studies in Epidemiology

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