

College-level Baccalaureate-MD Student Perceptions of Research and Research-Oriented Careers

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ABSTRACT

PURPOSE: Concern about the decline in physician scientists has generated interest in promoting research participation among medical students. This study aimed to examine perceptions of research and research-oriented careers among college-level baccalaureate-MD (BA/MD) students at one institution in the United States.

METHODS: A cross-sectional survey was distributed to a sample of 241 BA/MD students. Descriptive statistics were used to examine research perceptions of participants.

RESULTS: The response rate was 52% (126/241). Most respondents conducted scientific research in high school and were interested in research-oriented careers. Most students participated in a research program (research course, faculty mentorship, or research grant), disseminated their research, and believed that research programs would be helpful for their research participation. The most common perceived barriers were a lack of time, interest, and prior research experience.

CONCLUSIONS: College-level BA/MD students had positive perception of research-oriented careers and found student research programs helpful. However, addressing key barriers such as lack of time, interest and experience will help expand BA/MD student engagement in research.

KEYWORDS: survey, research perceptions, BA/MD students

INTRODUCTION

The United States physician scientist workforce has declined and aged in recent years.¹ Policymakers and scientists have been increasingly raising concerns about the decline in physician-scientists.¹⁻⁴ Studies have largely focused on medical students and residents as target populations for exposure to research supporting programs as ways to grow the pipeline of future academic physicians.⁵ However, a large proportion of medical students do not participate or have little interest in participating in research.^{6,7}

It has been proposed that future physicians should be exposed to research earlier, making college students enrolled in US institutions with baccalaureate-MD (BA/MD)

programs a prime target population for research supporting programs.^{8,9} Furthermore, as college undergraduates, BA/MD students may not face the same time constraints as their medical school counterparts.¹⁰ However, there is a dearth of studies on the research perceptions and the scientific experience of college students in BA/MD programs.

Herein, we surveyed college students in one BA/MD program to better understand their perceptions of research and research-oriented careers, including perceived barriers and solutions to increasing their participation in research.

METHODS

The Brown University Institutional Review Board determined this study did not meet the definition of human participants research and did not require formal review.

We administered an anonymous cross-sectional online survey to the 241 college students enrolled in the Brown University Program in Liberal Medical Education (PLME) during the 2020-2021 academic year to evaluate their research interest and practices.¹¹ Survey questions were adapted from previous studies assessing research perceptions among medical students,^{6,7,12} and the survey instrument was designed using Qualtrics (Provo, UT).¹³ A survey methodologist (MAC), university dean (JYI), and a group of three college students critically reviewed the survey instrument, which was then revised based on their feedback. The survey was emailed to the PLME listserv provided by the program dean (JYI) and distributed in the PLME Facebook groups.

The survey included questions in eight areas: research exposure, research program support, potential research program helpfulness, research engagement, research barriers, research output, interest in a research-oriented career, and demographics. Research programs were defined as a specialized research course (providing course credit for independent research), faculty mentorship program (matching students with research faculty), or a student research grant (financial support for research). The survey instrument can be found here: <https://doi.org/10.26300/dhss-8670>

Statistical analyses were conducted using Stata (StataCorp, College Station, Texas).¹⁴ Descriptive statistics were used to characterize the research perceptions of PLME students. Research participation of PLME students were compared by class level using descriptive statistics and² tests. Significance levels were set at $p < 0.05$.

RESULTS

The overall response rate was 52% (126/241). Respondent characteristics are shown in **Table 1**. Most respondents were male (55%; 69/126), graduates of public high schools (65%; 82/126), and graduates of high schools located in the US (85%; 107/126).

Table 1. Demographic characteristics of respondents.

Demographics	Respondents (n = 126)
Gender, n (%)	
Male	69 (55)
Female	39 (31)
Non-binary	1 (1)
Refused to answer	17 (13)
Race, n (%)	
Non-URM	82 (65)
URM	24 (19)
Refused to answer	20 (16)
Class year, mean (SD)	1.37 (1.26)
First year, n (%)	44 (35)
Second year	12 (10)
Third year	25 (20)
Fourth year or more	30 (24)
Refused to answer	15 (12)
High school status, n (%)	
Public	82 (65)
Private	29 (23)
Refused to answer	15 (12)
High school location, n (%)	
United States	107 (85)
International	4 (3)
Refused to answer	15 (12)

SD: standard deviation; URM: underrepresented minority.

Respondent perceptions of research are shown in **Table 2**. Most respondents conducted scientific research in high school (56%; 70/126) or in college (52%; 65/126). First-year student respondents were less likely to participate in undergraduate research than those in higher class levels (14% [6/44] vs 72% [48/67]; $p < 0.001$) but both groups had similar rates of participation in high school research (57% [25/44] vs 55% [37/67]; $p = 0.869$).

The majority of respondents were interested in a research-oriented career (64%; 84/126). Most respondents perceived a faculty mentorship program (72%; 95/126), research grant program (67%; 89/126), or research course (64%; 84/126) as helpful for participating in research. The most common barriers to research participation were lack of time (55%; 72/126), interest (42%; 53/126), or prior research experience (36%; 45/126). When queried for other research barriers not listed in the survey, seven students

Table 2: Student perceptions of research.

Topic (n = 126)	Respondents, n (%)
Scientific research experiences in high school	
No	56 (44)
Yes	70 (56)
Research experiences as an undergraduate student	
No	61 (48)
Yes	65 (52)
Personal barriers at Brown to participating in research^a	
Lack of interest	53 (42)
Lack of time	72 (57)
Lack of opportunities	34 (27)
Lack of prior research experience	45 (36)
Lack of scientific background	44 (35)
Lack of funding	26 (21)
Lack of faculty support	16 (13)
Other ("Remote", "COVID-19")	10 (8)
Programs that could facilitate participation in research^a	
A specialized course for research (i.e., CURE or independent study)	84 (67)
A faculty mentorship program (i.e., Medicine in Action)	95 (75)
A research funding program (i.e., UTRA, SRA)	89 (71)
Other ("External research funding and opportunities")	2 (2)
Plans to participate in research during your medical career	
No	4 (3)
Yes	84 (67)
Don't know	0 (0)
Refused to answer	38 (30)

CURE: Course-Based Undergraduate Research Experience; SRA: Summer Research Assistantship; UTRA: Undergraduate Teaching and Research Award.

^aStudents were asked to "Mark all that apply" for this question.

Table 3. Experiences and perceptions of students participating in undergraduate research.

Topic (n = 65)	Respondents, n (%)
Research experience^a	
Supervised by a faculty mentor	46 (71)
Based in a laboratory setting	28 (43)
Based in a clinical care setting	17 (26)
Based in other settings	8 (12)
None of the above	0 (0)
Scholarly output^a	
Abstract	13 (20)
Poster presentation	17 (26)
Oral presentation	19 (29)
Published paper	15 (23)
Other ("Video presentation")	3 (5)
Desired goal of research^a	
Knowledge	33 (51)
Abstract/Presentation	14 (22)
Publication	22 (34)
Qualifications for Residency	22 (34)
Long-term Career Goals	26 (40)
Other	0 (0)
Programs that facilitated participation in research^a	
A specialized course for research (i.e., CURE or independent study)	17 (26)
A faculty mentorship program (i.e., Medicine in Action)	7 (11)
A research funding program (i.e., UTRA, SRA)	26 (40)
Other ("More funding", "guidance")	4 (6)

CURE: Course-Based Undergraduate Research Experience; SRA: Summer Research Assistantship;

UTRA: Undergraduate Teaching and Research Award.

^aStudents were asked to "Mark all that apply" for this question.

(5%) responded that “COVID-19” or “remote studying” were significant barriers.

Research perceptions among the 65/126 (52%) respondents with undergraduate research experience are shown in **Table 3**. The most cited motivation for research participation was an interest in obtaining knowledge (51%; 33/65). Most respondents reported receiving faculty mentorship (71%; 46/65) and participation in a research program (51%; 33/65). The majority of respondents disseminated their research (62%; 40/65), most commonly through presentations or papers.

DISCUSSION

This survey suggests that most BA/MD students had positive perceptions of research and research-oriented careers. The majority of respondents believed that a faculty mentorship program, research course, or research grant would assist them in participating in research. The most common barriers to research were lack of time, interest, and research experience. Most respondents disseminated their research through presentations or papers.

The importance of faculty mentorship is supported by the literature on medical student research.¹⁵⁻¹⁸ As a result of participating in faculty mentorship programs, medical students had more interest in research-oriented careers, increased research productivity, and stronger research skills.¹⁵⁻¹⁷ Faculty mentorship can also address barriers to research participation such as lack of research experience and subject matter knowledge.¹⁷ Studies suggest finding research mentors is a significant challenge for medical students.^{6,7} To help address this barrier, Brown University PLME students have access to resources such as an annual PLME-compiled research project list and the Medicine in Action program, which helps to match students with academic physicians.^{19,20}

Medical students who complete specialized research courses become more interested in conducting research and acquiring scientific knowledge.²¹⁻²³ Research courses also provide protected time and exposure to research methodology, addressing student barriers such as lack of time and experience.²² Independent study courses, preclinical electives, and Course-Based Undergraduate Research Experience (CURE) classes are options available to Brown University PLME students.²⁴⁻²⁶

Student research grants provide exposure to research and generate interest in research.²⁷ Approximately 45 percent of Brown University college students receive need-based financial aid²⁸ and are eligible to participate in work-study programs to pay for educational expenses.²⁹ Research grants offer an alternative to employment and may support living and educational expenses. Studies suggest that inadequate funding is an important barrier for medical students.^{6,7} However, few respondents in our survey reported this as a barrier. The availability of targeted research grants for PLME

students such as the Summer Research Assistantships, Undergraduate Teaching and Research Awards, and Summer/Semester Projects for Research, Internships, and Teaching may be a factor.^{19,30,31}

Most respondents who conducted scientific research presented or published their findings. An important reason may be the longitudinal nature of undergraduate research experiences, which have significantly higher publication rates than shorter research experiences,³² due to extended support from research grants and faculty mentorship programs.³³

Another barrier to research participation was the coronavirus disease 2019 (COVID-19) pandemic. At Brown University, first-year and other remote students were not allowed on campus during the fall semester and had no access to laboratory-based research.³⁴ Not surprisingly, we found first-year student respondents had significantly less undergraduate but similar high school research experience compared to upper-year students. The pandemic has underscored the need to develop viable remote alternatives for BA/MD students to engage in research.³⁵ However, another possible reason for the lower research participation among first-year students is that PLME faculty advisors often encourage first-year students to explore new fields in their first semester prior to committing to research experiences.

This study has several limitations. First, our survey relied on self-reported research participation, which may be subject to response bias given the potential for inaccurate reporting.³⁶ Second, this survey was distributed near the conclusion of the 2020–2021 academic year – two weeks prior to final exams – which may have affected response rates. Third, the PLME provides many research programs and substantial academic flexibility that other BA/MD programs may not offer, which may limit the generalizability of this study.¹⁰ Fourth, there may have been response bias in the survey, although our response rate was higher than comparable medical student surveys (37–47%).^{6,37}

In sum, this survey suggests that faculty mentorship, research courses, and research funding programs are important to encourage BA/MD students to acquire research experience. Larger studies with BA/MD programs from multiple institutions are needed to comprehensively assess student research perceptions and inform programs that will help create a pipeline of future clinician-scientists.

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