Perceptions of Research and Research-Oriented Careers Among College-Level Baccalaureate-MD Students in the United States

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Abstract

A survey was administered to describe research perceptions among college-level students in combined baccalaureate-MD (BA/MD) programs in the United States. Descriptive statistics were used to analyze participant research perceptions. The estimated response rate was 26% (430/1653). Most respondents conducted scientific research in high school and college and reported barriers to research participation. Key barriers to research participation included lack of time, research knowledge or experience, and sufficient research guidance as well as the disruptions of COVID-19. Most respondents reported that research-supporting programs were available at their institution and perceived faculty mentorship programs as the most helpful for broadening their research experience.

Keywords Medical education · Combined baccalaureate-MD program · Research-oriented careers · Mentorship

Background

Engaging medical students and residents in research is essential for improving long-term physician participation in research [1–5]. A 2006 systematic review and two recent United States (USA) national studies have found that early research participation and publication are consistently associated with a career in academic medicine as well as improved confidence in key clinical collaboration and communication skills [6–8]. However, many medical students do not participate in, or have little interest in participating in, research [9, 10]. Several medical schools developed programs to encourage students to participate in research and bolster interest in research-oriented careers [11, 12].

Baccalaureate-MD (BA/MD) programs can expose college students to biomedical research before medical school [13, 14], but the research perceptions of college-level BA/MD students are not well understood [15]. Herein, we surveyed college students in BA/MD programs across the USA to understand their perceptions of research and identify perceived barriers to participating in research.

Activity

The Institutional Review Board of Rhode Island Hospital (Providence, RI) exempted this study. Based on previous questions that were tested in global medical student populations for face and construct validity [9, 10, 16], the survey was developed, tested, and validated in a BA/MD student sample [15]. A survey methodologist (MAC) and a medical school admission dean (LA) critically reviewed and revised the survey instrument. We then used Qualtrics (Provo, UT) to administer the survey.

Eligible BA/MD programs, defined as combined degree programs that provide conditional acceptance to medical school for students who are entering college, were identified from the 2021 Association of American Medical Colleges (AAMC) list of 43 medical schools offering combined BA/
MD programs [17]. Contact information for programs was obtained by reviewing program websites in August 2021; if information was not found online, both the undergraduate and medical school institutions were contacted by email and/or phone in September 2021.

The number of eligible respondents (BA/MD students) was estimated by multiplying the total number of medical students by the percentage of combined BA/MD student graduates in the four most recent years (2018–2021) of the AAMC Graduation Questionnaire data [18]. Of note, this cohort estimate may have overestimated the BA/MD student population size and therefore underestimated our calculated response rate because students at many larger programs only have to complete 2 or 3 years of college education instead of 4 years [19]. The 241 BA/MD students at Brown University who received the pilot survey were excluded from this study [15].

The anonymous online survey was administered in October and November 2021. The survey link and two follow-up reminder emails were sent to college-level students by their BA/MD program directors. The survey instrument is in Appendix 1.

The estimated response rate was calculated by dividing the number of respondents by the estimated number of college-level BA/MD students nationwide. Student characteristics, research perceptions, and experiences of college-level BA/MD students were characterized using descriptive statistics. Descriptive statistics and χ² tests were used to compare research participation and perceptions based on student demographics. All statistical analyses were conducted using Stata (StataCorp, College Station, TX) [20]; significance levels were set at p < 0.05.

Results and Discussion

The estimated response rate was 26% (430/1653). Student responses are shown in Table 1. The median class year of respondents was second year (interquartile range [IQR], 1–3). Most respondents were not members of underrepresented groups (67%; 290/430) and female (51%; 218/430).

Almost 60% of respondents conducted research in high school (59%; 254/430) and in college (58%; 251/430). Less than half of respondents were interested in a research-oriented career (44%; 187/430). First-year student respondents had a lower level of college research participation than their peers in higher class levels (p < 0.01) and were less likely to report receiving sufficient research guidance (p < 0.01). Most respondents reported at least one barrier to research participation (76%; 330/430); common barriers (Fig. 1) included lack of time (43%; 183/430) or research knowledge or experience (42%; 181/430). Less than a quarter of respondents reported receiving sufficient guidance to develop a publishable research project (23%; 100/430). On a Likert scale of 1 (not at all) to 5 (very much), respondents rated their research guidance in college (mean [SD], 2.98 [1.23]) and interest in a research-oriented career (mean [SD], 3.62 [1.21]). Most respondents agreed that the coronavirus disease 2019 (COVID-19) pandemic and the shift to more remote research made their research participation more difficult (68%; 289/430).

Fig. 1 Barriers to research for BA/MD students*

*72 (17%) students did not answer this question; respondents were allowed to select multiple options
| Topic (n = 430)                                                                 | Respondents, n (%) |
|-------------------------------------------------------------------------------|-------------------|

Research is defined as “systematic investigation designed to develop or contribute to generalizable knowledge.” Did you have any research experience in high school?

| No | Yes | Did not answer |
|----|-----|---------------|
| 173 (40) | 254 (59) | 1 (0) |

Have you had any research activity as an undergraduate student?

| No | Yes | Did not answer |
|----|-----|---------------|
| 177 (41) | 251 (58) | 2 (0) |

What barriers, if any, have you encountered to participating in research? Please mark all that apply

| Lack of experience or knowledge | Difficulty finding a mentor | Insufficient financial support | Lack of time | Not sure where to get started | Other (“COVID-19,” “just started college,” “age limit”) | No barriers | Did not answer |
|--------------------------------|-----------------------------|-------------------------------|--------------|----------------------------|--------------------------------------------------------|-------------|---------------|
| 181 (42)                      | 167 (39)                    | 100 (23)                      | 183 (43)     | 187 (43)                   | 25 (6)                                                | 26 (6)      | 72 (17)       |

On a scale of 1 to 5 with 1 being not at all to 5 being very much, to what extent have you received sufficient guidance to develop a publishable research project?

| 1 (not at all) | 2 | 3 | 4 | 5 (very much) | Did not answer |
|----------------|---|---|---|---------------|---------------|
| 32 (7)         | 84 (20) | 75 (17) | 58 (13) | 42 (10) | 139 (32) |

On a scale of 1 to 5 with 1 being not at all to 5 being very much, how interested are you in participating in research as part of your medical career?

| 1 (not at all) | 2 | 3 | 4 | 5 (very much) | Did not answer |
|----------------|---|---|---|---------------|---------------|
| 15 (3)         | 54 (13) | 87 (20) | 77 (18) | 110 (26) | 87 (20) |

Which of the following programs, if any, are available at your institution? Mark all that apply

| A research methods course | Course credit for an independent research project | A program matching students with faculty mentors | Financial support for undergraduate research | Other (“student research mentors”) | No programs | Did not answer |
|---------------------------|--------------------------------------------------|-----------------------------------------------|---------------------------------|---------------------------------|-------------|---------------|
| 219 (51)                  | 294 (68)                                         | 154 (36)                                      | 253 (59)                        | 8 (2)                           | 11 (3)      | 71 (17)       |

Which of the following programs, if any, would help broaden your research experience? Mark all that apply

| A research methods course | Course credit for an independent research project | A program matching students with faculty mentors | Financial support for undergraduate research | Other (“research advisors,” “research rotations”) | No programs | Did not answer |
|---------------------------|--------------------------------------------------|-----------------------------------------------|---------------------------------|---------------------------------|-------------|---------------|
| 129 (30)                  | 109 (25)                                         | 248 (58)                                      | 138 (32)                        | 9 (2)                           | 27 (6)      | 87 (20)       |
Most respondents reported that their institution provided course credit for an independent research project (68%; 294/430), financial support for research (59%; 253/430), or a research methods course (51%; 219/430). A minority of respondents reported having a faculty mentorship program (36%; 154/430), defined as a formal program that matches students with faculty mentors; a majority believed that a faculty mentorship program (Fig. 2) would help broaden their research participation (58%; 248/430). Research participation was not an institutional requirement for most respondents (62%; 266/430).

Fig. 2 Programs supporting BA/MD student research*

A program matching students with faculty mentors
Financial support for undergraduate research
A research methods course
Course credit for an independent research project
Other programs
None of the above

*87 (20%) students did not answer this question; respondents were allowed to select multiple options.
Research Perceptions Among College Students

National surveys of research perceptions among college students have been conducted in other countries, though these students likely differ from USA students in BA/MD programs demographically (e.g., race/ethnicity, geographic origin, religion) and based on their unknown interest in a medical career. A study of New Zealand college-level nursing students found that approximately 40–44% expressed some interest in a research-oriented career [21]; 17% of college-level Malaysian pharmacy students planned to work in research or academia after graduation [22]. In single-institution surveys, 60% of college-level pharmacy students in Iran but less than 25% in Northern Ireland expressed interest in research-oriented careers [23, 24]. Other surveys on college student interest in research in the USA were conducted among students enrolled in research programs and in courses at a single institution—two cohorts that may not be representative of most college students [25–29].

Addressing Perceived Barriers

While most respondents reported that faculty mentorship programs would be helpful for their research experience, only a minority reported that their BA/MD programs provided faculty mentorship programs. Previous research suggests that faculty mentorship programs promote college and medical student interest in research-oriented careers, increase research productivity, and improve research skills [10, 25–32]. Hence, developing faculty mentorship programs may increase college BA/MD student engagement in research.

Not understanding where to get started in research, lack of time, lack of research knowledge or experience, and lack of sufficient research guidance were also common barriers to research participation, similar to previous surveys of BA/MD and medical students [9, 10, 15, 33]. Programs should also introduce college BA/MD students to research based on guidance from existing literature on college research programs [25–29], including offering research funding, course credit for research, and research methods courses [12, 34–37].

Most respondents reported that the COVID-19 pandemic made research more difficult; a leading reason may be that many institutions did not allow student participation in laboratory-based research in 2020 and/or 2021 for safety reasons [15, 38–40]. The pandemic underscored the importance of developing virtual options for BA/MD students to participate in research such as systematic reviews or research using public databases [41].

Limitations

This study had several limitations. First, all measured variables were self-reported. [42] Second, there may have been response bias in the survey, although our response rate was similar to the 2020 national mean for college student surveys (30%) [43] and there were no differences in survey responses based on demographics. Third, this survey was administered near the beginning of the 2021–2022 academic years, which may have especially influenced the responses of first-year students who did not have much time to participate in research in college. However, first-year year students only differed from more senior students in college research experiences and receiving sufficient research guidance; their overall perceptions were otherwise similar. Finally, sampling across multiple time points (e.g., following a cohort through multiple years) may have produced different findings.

In sum, this survey suggests that BA/MD programs aiming to broaden college student engagement in research should establish faculty mentor programs and develop clear pathways to getting started in a research program. Although many respondents reported interest in a research-oriented career, few believed that they had received sufficient guidance to develop a publishable research project, and most reported facing barriers to research participation, including COVID-19.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40670-022-01619-5.

Declarations

Ethics Approval The Institutional Review Board of Rhode Island Hospital (Providence, RI) exempted this study.

Consent to Participate All participants completed an informed consent form prior to beginning the survey.

Competing Interests The authors declare no competing interests.

Disclaimer The views expressed here are those of the authors and do not necessarily reflect the position or policy of the US Department of Veterans Affairs or the US government.

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