Following in Footsteps: Children of Physicians More Likely to Attend Medical School but No More Likely to Succeed

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Abstract

Background: Physician legacy (PL) students are over-represented in medical school compared to non-PL students. There is little published data examining how PL students perform in medical school. We sought to examine differences in medical school performance between PL students and their non-PL student peers at our own institution.

Methods: A retrospective review of three medical school classes identified students with at least one physician parent. A total of 79 PL students (24.16%) were identified out of 327 total students. Multiple medical school performance metrics were obtained for each student.

Results: There was no significant difference in Medical College Admission Test (MCAT), Step 1, Step 2, National Board of Medical Examiners (NBME) Subject exam scores, clerkship grades, or clerkship Honors. PL students were significantly more likely to be elected to Alpha Omega Alpha (AOA) Honor Medical Society.

Conclusions: PL students do not perform better on most objective or subjective assessments of performance despite higher matriculation numbers. These findings have implications for medical school admissions programs where PL applicants may be subject to positive or negative bias during the admissions process. Our recommendation is that PL status not be considered as a strength or weakness of the student's application and that admissions committees consider blinding committee members to PL status to avoid unconscious bias.

Introduction

Significant study and effort have been devoted to examining the medical school admissions process. Ideally, the admissions process should be fair, equitable, and result in selection of diverse exceptional candidates who will succeed in medical training and be representative of the communities they serve. Currently, most admission committees favor a holistic approach to the applicant, categorizing applicant attributes into three main groups: cognitive ability, non-cognitive ability, and demographics.[1] Demographic variables have been used for decades in the medical school admissions process, despite a lack of predictive validity of certain variables on medical school performance.[2] Historically, most medical school applicants come from middle- or upper-class socioeconomic backgrounds, including applicants with a physician parent. No research has established a clear performance advantage of physician legacy (PL) children though multiple studies have examined this concept.[3] Despite this lack

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of evidence, applicants with physician parents are over-represented in current medical school student populations compared to the relative frequency of physician parents in the general workforce. Prior studies have shown between 13-44% of matriculating medical students have at least one physician parent, compared to physicians comprising approximately 1% of the adult workforce.[4-10] A national study in the U.S. found that 22% of the respondents had a physician relative.[11] These statistics stand in contrast to the Association of American Medical Colleges (AAMC) study which did not list parent occupation as one of the admissions variables used by admissions staff and faculty at 113 U.S. allopathic medical schools.[12]

It is possible a PL applicant may have advantages over other applicants that would enhance their medical school application. These advantages include access to prior medical experiences and parental advice on the rigors and challenges of medical school. Additionally, children of physicians may hold a socioeconomic status that allows for private tutors or preparatory courses, and a relative lack of financial burden of higher education expenses.[3] A study in Germany of medical school applicants found those with physician parents did not perform any better than non-legacy applicants in multiple mini-interviews (MMI) or in traditional admissions interviews.[13] Another explanation could be that children of physicians are more likely to apply to medical school. Legacy students in some cultures report family tradition or pressure as a motivation to choose a career in medicine independent of having a personal passion or interest for this field, which may result in lower performance in medical school or burnout.[14-16] Prior studies have shown students with high levels of extrinsic motivation, including perceived pressure from parent expectations, as opposed to intrinsic motivation, do not perform as well in medical school.[17, 18]

We aimed to address the current gap in knowledge regarding whether PL students perform better in medical school than other students.

Methods

We performed a retrospective analysis of students who matriculated to our medical school between the years of 2013-2015. We examined student admission records from the American Medical Colleges Application Service (AMCAS)

and recorded each parent's occupation, which admission committee members may view under the demographics tab of each application. We identified students who had at least one parent with a primary occupation of physician and those students were included in the PL cohort. We extracted additional demographic information including age, sex, and race. Those with missing Year 3 performance data (withdrawals or dismissals) were removed from data analyses. Medical College Admission Test (MCAT) scores were obtained from admission records, and in cases of multiple MCAT scores, the highest score was used in this analysis. For MCAT scores obtained after 2015, a score converter was used to convert new scores to the former scoring system.

For performance measures during medical school, we collected (1) first attempt at United States Medical Licensing Examination (USMLE) Step 1 score, (2) first attempt at USMLE Step 2 Clinical Knowledge (CK) score, and (3) institutional Year 3 performance metrics. Due to variable methods of performance assessment in Year 3, we examined multiple different metrics. The year-end clinical clerkship score is a composite score which includes faculty and resident evaluations, National Board of Medical Examiners (NBME) Subject exam scores, and letter grades (Honors/High Pass/Pass/Low Pass/Fail) across all clerkships. For the individual clerkship clinical score, a standard form assessing eight aspects of clerkship performance (medical knowledge, history taking, physical examination, clinical data, clinical skills, communication, team rapport, and motivation and attitude) is provided to faculty and residents who worked directly with the student. Raw clerkship clinical scores were converted to Z scores to reduce variability across grading among the eight clerkships (family medicine, internal medicine, emergency medicine, obstetrics and gynecology, pediatrics, psychiatry, neurology, and surgery). NBME subject exam scores were also converted to Z scores for easier comparison between exams, using a mean of 70 and standard deviation of 8. Average number of clerkship Honors per student was calculated, as well as average Year 3 grade score (0=Fail, 1=Low Pass, 2=Pass, 3=High pass, 4=Honors). In addition, percentage of students in each cohort who achieved Alpha Omega Alpha (AOA) status and Gold Humanism Award status were determined and a Wald Chi-square test was used to determine statistical significance.

Linear regression analyses were conducted to examine the relationship between PL status and various performance outcomes during medical school (Step 1, Step 2 CK, Year 3 clinical score, Year 3 subject exam results). Regression analyses were also conducted to determine if there were differences in MCAT performance prior to medical school.

Institutional Review Board (IRB) approval was obtained for this study (IRB00043836) and students were consented for participation. Identifying information was removed from records and students were assigned a unique study number to protect individual identity. Student performance was not examined on an individual basis.

Results

The total number of participants was 327 students, with 79 PL students. Thirty-five students were excluded from analyses due to having incomplete Year 3 data. Of these 35 students, six were M.D./Ph.D. students. The 29 remaining students had missing data due to repeating portions of the curriculum, requiring additional time to pass Step 1, leave of absences, withdrawals, or transfers. Of the 29 students with missing data, three were PL students and were not included in the PL cohort. The PL students (n=79) represented 24.16% of participants. Baseline matriculation demographics of PL students versus non-PL students are shown in Table 1. There was no difference in age at matriculation or sex between the

two cohorts. A higher percentage of PL students identified as White compared to the non-PL student cohort.

Comparison of objective standardized tests revealed MCAT (p>0.49), USMLE Step 1 (p>0.41), and USMLE Step 2 (p> 0.05) scores did not differ between the cohorts (Table 2). Multiple performance metrics relevant to Year 3 were examined. These included both objective measures such as NBME subject scores as well as subjective measures such as clinical scores from faculty evaluations. The PL cohort did not perform better on NBME subject exams (p>0.14), clinical scores (p>0.66), number of Honors clerkships (p>0.12), or Year 3 overall score (p>0.15) (Table 2). There was no difference between the two cohorts with election to the Gold Humanism society (p>0.89). The only assessed metric where there was a significant difference between the PL cohort and the non-PL cohort was in election to AOA (p<0.05).

Discussion

Our research finds medical students with a parent who is a physician do not perform better than their peers in medical school for most of the metrics we examined. This finding is true for both objective and subjective performance metrics, with the exception of AOA election. Our results generally support the null hypothesis that PL students do not outperform their peers, despite PL students being over-represented in our medical school class cohorts. The finding

	PL Students (N=79)	Non-PL Students (N=252)
Average age at matriculation (years)	23.94 (SD=2.41)	24.66 (SD=3.32)
Male	43 (54.43%)	127 (50.40%)
Female	36 (45.57%)	125 (49.60%)
White	54 (73.97%)	154 (65.25%)
Non-white	19 (26.03%)	82 (34.75%)

Table 1. Demographic data of physician legacy (PL) cohort versus their peer cohort (SD = standard deviation)
* Race is self-reported data, 22 students did not report race

	PL Students (N=79)	Non-PL Students (N=252)	p-value
MCAT score (average)	30.79 (SD=2.87)	30.52 (SD=3.09)	p=0.49
USMLE Step 1 score (initial attempt)	232.43 (SD=20.27)	230.43 (SD=18.55)	p=0.41
NBME Year 3 Subject exam (average Z scores)	1.36 (SD=0.78)	1.21 (SD=0.82)	p=0.14
Year 3 clinical scores (average Z scores)	0.12 (SD=0.61)	0.08 (SD=0.54)	p=0.66
Average number of Honors	2.90 (SD=2.22)	2.47 (SD=2.10)	p=0.12
Total score (assign 0 for F, 1 for LP, 2 for pass, 3 for HP, and 4 for Honors)	24.65 (SD=4.52)	23.82 (SD=4.44)	p=0.15
Step 2 CK score (initial attempt)	250.97 (SD=16.13)	246.89 (SD=15.67)	p=0.05
AOA status (%)	25.97%	15.66%	Wald chi-square =4.13, p <0.05
Gold Humanism Award status (%)	10.26%	10.80%	Wald chi-square =0.02, p >0.89

Table 2. Standardized exam scores, clinical clerkship performance metrics, AOA and Gold Humanism status for PL and non-PL students (SD = standard deviation, HP = high pass, F = fail, LP = low pass)

that PL students are more likely to gain admission to the AOA Honor Medical Society was unexpected, and stands in contrast to our finding that this cohort of students do not show enhanced performance in medical school. This was surprising as parental occupation is not one of the metrics included in our chapter's AOA election process. We considered several possibilities to explain this finding. Perhaps there is a bimodal distribution of PL students, with both very high performing and very low performing subgroups and the high performing group is elected to AOA. We performed further analyses to investigate this and did not find a bimodal distribution for various outcome measures. We also assessed the percentage of PL students elected to AOA for each included year, and found that in one of the three cohorts there were a high number of elected PL students compared to the other two classes, which may have potentially skewed

the data and suggest perhaps this finding is truly one of chance and not a consistent yearly trend. A third possibility is perhaps PL students have additional advantages in the AOA election process, such as more research, leadership, or service experiences. Further investigation of this unexpected finding was beyond the scope of this study.

The issue of physician legacy and admissions is discussed in an ethics piece published in the American Medical Association Journal of Ethics. The authors posit that physician status likely influences admissions decisions indirectly, by consideration of PL student socioeconomic status or a focus on student academic performance. Additionally, these authors note the possibility of more direct influences on admissions, such as professional courtesy extended to legacy parents. It also suggests PL status may create negative bias towards

the applicant if admissions officers question the PL student's intrinsic motivation to attend medical school.[19]

A paper published in the 1980's sought to examine the trend in PL preference on a national level.[7] The authors examined admissions applications from all medical school applicants (n=36,141) in 1979 and extracted sixty different admissions factors from each application. These factors included sex, race, parental profession, grade point average, MCAT scores and subscores, undergraduate courses and performance, and personality characteristics, among others. Multiple regression analyses demonstrated a clear advantage for students gaining admission who had a physician as a parent. This advantage was not demonstrated for students with parents in other healthcare occupations. The authors concluded they could not find any objective reason for why children of physicians were more likely to be admitted to medical school and suggested there may be a component of nepotism.

Despite the recent campaign by the AAMC to encourage holistic admission strategies, the diversity of medical school graduates does not accurately reflect the diversity of the patient population they will be serving.[20] This is true not only in the U.S. but in other countries as well.[21] From 1987-2005, half of matriculating U.S. medical students came from the top quintile of family income. Only 5.5% of students came from the lower family income quintile. The socioeconomic status of a child's parents is a significant predictor of the child's academic achievement and correlates with higher MCAT scores.[22] In an effort to address these socioeconomic disparities, medical school admission offices should seek out structural barriers within their institutions that may prevent access to medical education for underrepresented groups.[23] Intrinsic racial bias has been shown to exist in admissions committees[24] and other types of intrinsic bias may also exist among committee members. Provided that the majority of admissions committee members are physicians, it may be prudent to blind committee members to applicant PL status to avoid both positive and negative sources of bias. Studies such as this one are important to critically appraise the admissions process and scrutinize all factors to determine their validity.

The strengths of this study include using an analytical approach to assess PL performance via multiple different medical school performance metrics. This study addresses the current gap in the literature regarding PL performance in U.S. medical schools. The pragmatic design of this study lends itself to replication at other medical schools and provides a theoretical framework for future quantitative and qualitative research on assessing correlation of admissions factors with medical school performance.

Limitations

This is a single-institution retrospective study, so it may not be generalizable to other medical school programs. Identification of parental occupation was based on student admission application information, and additional verification of employment was not obtained.

Student performance evaluations during Year 3 clerkships have subjective scoring elements. Each clerkship at our institution employs a different criteria weighing scale to calculate student final grades and the subject exam score contribution to the overall clerkship grade varies somewhat. The number of clinical evaluations varies between students and is comprised of residents, fellows, and faculty evaluators. We attempted to account for this variability by performing and presenting analysis of separate measures of clerkship performance including subject exam scores, clinical evaluation scores, Honors designation, and overall year-end performance scores.

Disclosures

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