CycleTrack: Development of a crowdsource model to increase access to medical admissions data

Daniel Boris Amusin, Isabelle Hua, Arthi Shankar Kozhumam

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Abstract

Using a crowdsource model, we developed a web-based platform for medical school application tracking and data aggregation.

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Research Letter

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Abstract

Using a crowdsource model, we developed a web-based platform for medical school application tracking and data aggregation.

Keywords: Undergraduate medical education; Medical school admission; Data accessibility; Crowdsourcing

Introduction

Medical school admission in the United States is highly competitive: in the 2023-24 cycle, 43.7% of applicants to allopathic programs matriculated [1]. Applicants frequently seek to optimize acceptance chances by consulting online resources to develop personalized school lists. While data is available through Medical School Admissions Requirements and Choose DO Explorer tools, information gaps

remain including timing of admissions decisions and data specific to dual degree applicants. To find information unavailable through these tools and program websites (the "hidden curriculum"), many applicants turn to websites like Student Doctor Network or Reddit [2]. These are prone to bias and misinformation due to reporting anecdotal data. Low-income, minority background applicants are especially disadvantaged from one-off data points that may discourage applications due to self-selection [3,4].

Achieving equity in the medical school application process requires increased availability of information. Here, we describe CycleTrack, a novel method for increasing access to admissions data through a crowdsource approach [5,6].

Methods

CycleTrack is a free medical school admissions tracking platform built using the Python Flask module [5-7]. Applicants register on the website, create school lists, share optional demographic/statistical information and enter dates of actions such as interview invitations or acceptances (Figure 1). Data is stored in a SQLite3 database, queried hourly to generate summary statistics and graphs displayed publicly through explorer pages unique to each medical school in the United States.
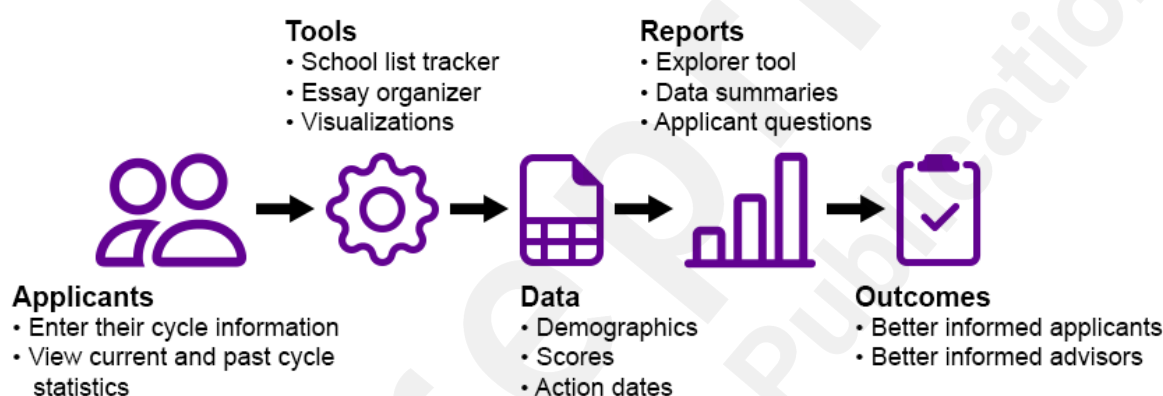

Figure 1. CycleTrack model schematic

As proof-of-concept for database utility, all recorded, completed application cycles were merged into a single model cycle for which proportion of interview invitations recorded over time (n=12,485) was analyzed using R 4.1.1 and ggplot2 [8,9].

Results

Applications and Users

From May 2022-July 2024, 14,216 email-verified users registered on the platform. Of these, 9,277 tracked at least one application (8,152 MD; 890 MD-PhD; 1,683 DO) with a total of 168,849 applications tracked (146,481 MD; 12,146 MD-PhD; 10,222 DO). Most frequently tracked programs included Tufts University, Emory University, and George Washington University which largely aligned with nationally most applied programs [1].

Of applicants who reported any demographic information (5,122, 55.2%), gender identities included 52.4% women, 45.8% men, and 1.8% trans/non-binary. Race and ethnicity of users included 50.4% White, 35.8% Asian, 7.7% Hispanic, 5.6% Black, and 5.1% multiple/others. Mean and standard deviation (SD) age at matriculation was 24.26±2.59 years. Mean grade point average (GPA) and

Medical College Admission Test score (MCAT) ± SD were 3.79±0.21 and 514.48±6.55 respectively.

Platform Analytics

Analytics of website visitors throughout the 2023-24 application cycle (May 2023-July 2024; missing October 2023) demonstrated over 73,000 unique visitors to the website, with most traffic to the data explorer.

Interview Invitations Analysis

The CycleTrack database was used to model the proportion of interview invitations sent throughout an application cycle (Figure 2). This demonstrated differences in duration of the interview season between program types, and allows applicants to accurately set expectations depending on current date.
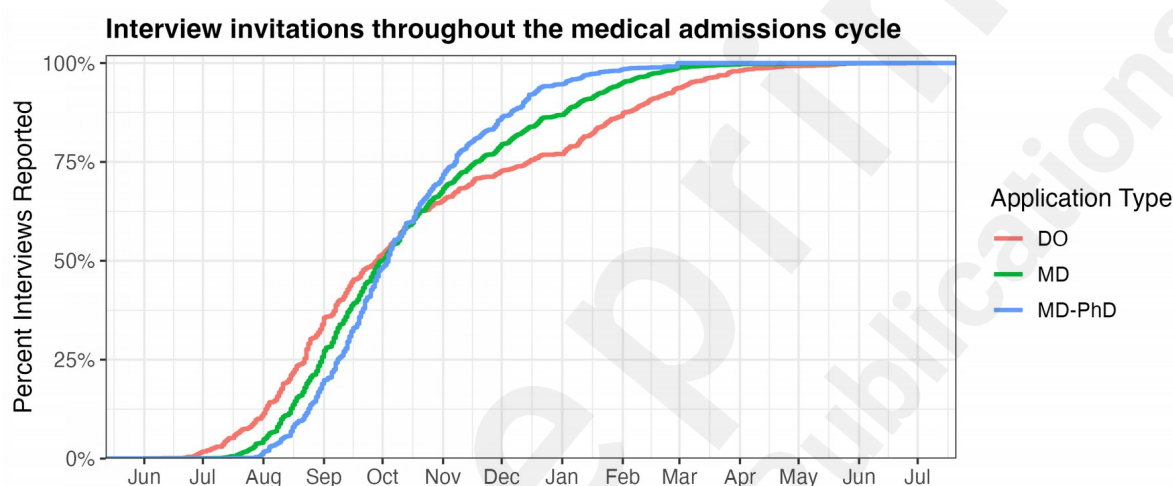

Figure 2. Proportion of interview invitations sent throughout model application cycle, stratified by application type

Discussion

To our knowledge, CycleTrack is the first website platform to centralize medical school application tracking and distribution of aggregated results. The volume of users and website traffic demonstrate demand for free, publicly accessible tools and information about application timelines.

Compared to national averages, CycleTrack data showed a skew toward applicants with higher GPA (MD: 3.8 vs. 3.6, MD-PhD: 3.8 vs. 3.7, DO: 3.7 vs. 3.5) and MCAT (MD: 514.6 vs 506.3, MD-PhD: 516.2 vs. 511.1, DO: 509.4 vs. 503.4). However, all means were within one SD of national averages. Additionally, CycleTrack users were more likely to be men (45.8% vs. 42.9%) and White (50.4% vs. 40.2%) or Asian (35.8% vs. 30.0%) [1,10]. Two factors may explain these trends. First, lower-scoring or underrepresented applicants may be hesitant to self-report data. Additionally, higher-achieving applicants may be more likely to seek out such a tool. Future directions require interventions targeted toward increasing representativeness of the tool's user base, such as outreach involving pre-health advisors. While self-reported data is subject to entry errors, the impact of such error is likely small given the size of the database.

Despite these limitations, CycleTrack has several key advantages. It uniquely captures temporal data

on admissions actions, provides data specific to dual-degree applicants, and builds a database that can be queried for data-driven answers to applicant questions. Further, the platform demonstrates the advantages and limitations of a model that can be applied to other pre-professional or residency admissions.

Acknowledgements

Conflicts of Interest

None declared.

Abbreviations

GPA: grade point average
MCAT: Medical College Admission Test
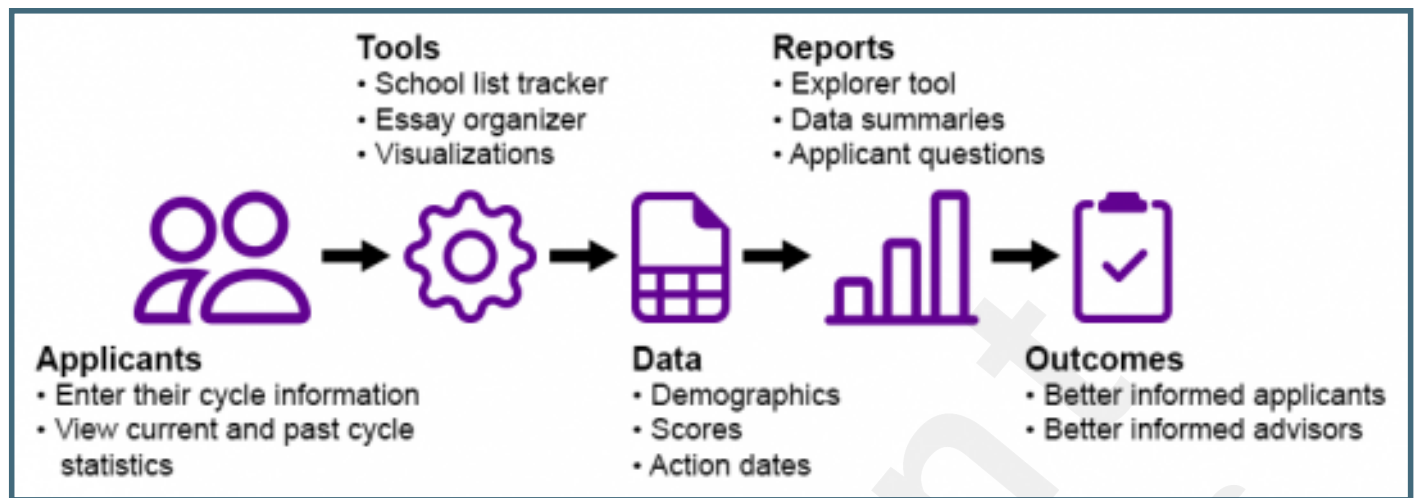SD: standard deviation

References

1. Association of American Medical Colleges. 2023 FACTS: applicants and matriculants data. Published October, 2023. Accessed July 16, 2024. https://www.aamc.org/data-reports/students-residents/data/2023-facts-applicants-and-matriculants-data
2. Mathew D, Grbic D. Use and evaluation of medical school information sources by aspiring medical students. Association of American Medical Colleges Analysis in Brief. 11(3). Published April, 2011. Accessed July 16, 2024. https://www.aamc.org/media/5891/download
3. Christophers B, Gotian R. Using admission statistics to encourage diverse applicants to MD-PhD programs. J Clin Invest; 2020;130(1):17-19. doi:10.1172/JCI134941
4. Hadinger MA. Underrepresented minorities in medical school admissions: a qualitative study. Teach Learn Med; 2017;29(1):31-41. doi:10.1080/10401334.2016.1220861
5. Amusin DB, Hua IJ. CycleTrack. Accessed July 16, 2024. https://cycletrack.org
6. Amusin DB, Hua IJ. CycleTrack. GitHub. Accessed July 16, 2024. https://github.com/RunningMSN/CycleTrack
7. Pallets. Flask (version 2.3.3). Published online August 21, 2023. https://flask.palletsprojects.com/
8. R Core Team. R: a language and environment for statistical computing. Published online 2024. https://www.R-project.org/
9. Wickham H. ggplot2: elegant graphics for data analysis. Published online 2016. https://ggplot2.tidyverse.org
10. American Association of Colleges of Osteopathic Medicine. 2022 entering class AACOMAS profile: applicant and matriculant report. AACOM Research Reports. Published May 28, 2024. Accessed July 16, 2024. https://www.aacom.org/docs/default-source/research-reports/2022-applicant-and-matriculant-report.pdf?sfvrsn=2a986f8f_6

Supplementary Files

Figures

CycleTrack model schematic.

Proportion of interview invitations sent throughout model application cycle, stratified by application type.

Interview invitations throughout the medical admissions cycle