

Impact of holistic review on student interview pool diversity

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Abstract Diversity in the physician workforce lags behind the rapidly changing US population. Since the gateway to becoming a physician is medical school, diversity must be addressed in the admissions process. The Association of American Medical Colleges has implemented a Holistic Review Initiative aimed at assisting medical schools with broadening admission criteria to include relevant, mission-driven attributes and experiences in addition to academic preparation to identify applicants poised to meet the needs of a diverse patient population. More evidence is needed to determine whether holistic review results in a more diverse selection process. One of the keys to holistic review is to apply holistic principles in all stages of the selection process to ensure qualified applicants are not overlooked. This study examines whether the use of holistic review during application screening at a new medical school increased the diversity of applicants selected for interview. Using retrospective data from the first five application cycles at the Oakland University William Beaumont School of Medicine (OUWB), the author compared demographic and experiential differences between the applicants selected using holistic review, including experiences, attributes and academic metrics, to a test sample selected solely using academic metrics. The dataset consisted of the total group of applicants selected for interview in 2011 through 2015 using holistic review ($n = 2773$) and the same number of applicants who would have been selected for an interview using an academic-only selection model ($n = 2773$), which included 1204 applicants who were selected using both methods (final $n = 4342$). The author used a combination of cross-tabulation and analysis of variance to identify differences between applicants selected using holistic review and applicants in the test sample selected using only academics. The holistic review process yielded a significantly higher than expected percent of female (*adj. resid.* = 13.2, $p < .01$), traditionally underrepresented in medicine (*adj. resid.* = 15.8, $p < .01$), first generation (*adj. resid.* = 5.8, $p < .01$), and self-identified disadvantaged (*adj.*

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resid. = 11.5, $p < .01$) applicants in the interview pool than selected using academic metrics alone. In addition, holistically selected applicants averaged significantly more hours than academically selected students in the areas of pre-medical school paid employment ($F = 10.99$, mean difference = 657.99, $p < .01$) and community service ($F = 15.36$, mean difference = 475.58, $p < .01$). Using mission-driven, holistic admissions criteria comprised of applicant attributes and experiences in addition to academic metrics resulted in a more diverse interview pool than using academic metrics alone. These findings add support for the use of holistic review in the application screening process as a means for increasing diversity in medical school interview pools.

Keywords Holistic review · Medical school admissions · Medical school selection

Introduction

Leaders in academic medicine are calling for greater medical student and workforce diversity to meet the needs of an increasingly diverse patient population (Cohen et al. 2002; Smedley et al. 2003). The emphasis of student body and educator diversity in allopathic medical school accreditation standards (Liaison Committee on Medical Education 2017) further reinforces the importance of both diversity and inclusion. Diversity is recognized as a key component to an enriched learning environment, effective problem solving, and meeting the needs of a diverse patient population (Gurin 2004; Page 2007; Saha et al. 2008). Physicians from underrepresented groups are more likely to serve underrepresented patients (Wayne et al. 2010) and patients from underrepresented groups are more likely to trust physicians from their same racial or ethnic background (Dogra and Carter-Pokras 2005). In addition, studies have demonstrated that both formal and informal interracial interactions result in improved educational outcomes (Gurin et al. 2002; Denson and Chang 2009; Luo and Jamieson-Drake 2009). Specific to medicine, medical students have reported that student body diversity was important to their learning. The more diverse the student body, the stronger the relationship between diversity and student perception of increased learning (Morrison and Grbic 2013).

Diversity in the physician workforce, however, lags behind the rapidly changing US population in terms of race and ethnicity as well as socioeconomic background (Castillo-Page 2008; Grbic et al. 2010). In addition to the workforce coming from predominantly white and Asian backgrounds, medical students are also disproportionately from affluent, well-educated families (Grbic et al. 2010). Since medical school is the gateway to becoming a physician, it is a critical juncture at which to address issues of diversity.

One of the perceived barriers for underrepresented students interested in medicine is an overreliance on academic metrics in selecting students for admission (Smedley et al. 2003; Bowen and Bok 1998). While academic metrics remain key components of admissions, they do not predict all the outcomes desired of medical school graduates. Grade point average (GPA) and Medical College Admission Test (MCAT) scores have been found to reliably predict medical school grades and performance on licensing exams (Donnon et al. 2007) though their ability to predict other important outcomes such as clinical performance and communication skills has been called into question (White et al. 2009; Basco et al. 2000). Further, scholars have raised concerns that overemphasis on standardized test scores, which were never intended to be the central tool for measuring college

preparedness, negatively impacts applicants from underrepresented minority groups (Steinecke et al. 2007).

In 2007, the Association of American Medical Colleges (AAMC) launched its Holistic Review Project to provide guidance and tools to medical schools seeking to diversify the physician workforce to better meet diverse health care needs. As defined by the AAMC, holistic review “is a flexible, individualized way of assessing an applicant’s capabilities by which balanced consideration is given to experiences, attributes, and academic metrics (E-A-M) and, when considered in combination, how the individual might contribute value as a medical student and physician (Association of American Medical Colleges 2013).” A core principle of holistic review is that individual medical schools define their diversity interests and align their admissions criteria with their school-specific missions and values to meet the needs of the communities they serve. In other words, each medical school determines for itself the salient academic metrics, experiences, and attributes necessary to achieve its mission. In the context of holistic review, diversity may include traditional measures of diversity such as race, ethnicity, and gender as well as factors including, but not limited to, distance traveled, socioeconomic status, and educational background (Association of American Medical Colleges 2013). Although academic preparation remains a key indicator of success, schools increasingly are using holistic review processes to select students with additional attributes and experiences that indicate they are poised to meet the needs of diverse patient populations. In fact, by 2014, 91% of medical schools reported using at least some elements of holistic review and those schools reported subsequent increases in student diversity (Urban Universities for HEALTH 2014). And while there are some recent studies that have demonstrated successful use of holistic review principles at varying stages of the admissions processes (Ballejos et al. 2015; Terregino et al. 2015), there remains a need for additional evidence-based studies to evaluate whether holistic review impacts diversity at all stages of the selection process.

This study focused on the use of holistic review principles in the application screening process to diversify the interview pool at a new medical school. The principle question of the study was: Did using holistic review result in a more diverse interview pool than would have resulted from using academic metrics alone? A second core principle of holistic review is that balanced consideration of experiences, attributes and metrics should be applied at every stage of the admissions process – from screening through selection – to ensure interview and selection pools support the institution’s mission (Addams et al. 2010). During screening, application reviewers determine which applicants should be invited for an interview. To determine whether using a holistic process during screening at this new medical school resulted in greater diversity in the interview pool than an academic-only process would have, the researcher examined the results of application screening for the first five application cycles at the Oakland University William Beaumont School of Medicine. The literature lacks studies that focus on the impact of holistic review at the screening stage of the selection process. The increased use of holistic review by more than 90% of US allopathic medical schools along with the demand for increased physician diversity warrants more intensive study. This study adds to the literature in support of holistic review as a means for diversifying interview pools.

Method

The data set consisted of applicants actually selected for interview at OUWB and a test group of applicants who might have been selected had only academic metrics been used to determine applicants to interview. Some applicants were identified by both methods: holistic review and academic-only. The holistic review group was comprised of the applicants actually selected to interview using OUWB holistic admissions criteria in the first five application cycles of the school. There were 2773 applicants selected for an interview at OUWB over 5 years. The academic-only selection group was a test sample of applicants who would have been selected if the committee had only used academic metrics during the screening process. To match the size of the holistic review group, the top 2773 academically qualified applicants were selected for the test academic-only sample. Once both groups were identified, 1204 applicants were noted to have been selected using both approaches, indicating an overlap in the admissions process between holistic and academic-only reviews. The applicants who were present in both the holistic review pool and the academic-only pool were labeled the overlap group. The analysis compared the demographic and experiential differences among the applicants selected using only holistic review, the test sample selected solely on academic metrics, and the overlap group who would have been selected under both systems.

Holistic review process for this study

The holistic review pool was comprised of the actual applicants selected for an interview using OUWB mission-based admission criteria and holistic review process. Two application screeners, from medical school faculty and admissions staff, read each completed application file. The number of faculty members needed to read the applications varied from year to year depending on application volume and faculty workload. The commitment to read every application by two screeners represented a significant resource investment. Studying whether this practice resulted in a more diverse interview pool was needed to assess the effectiveness of this significant investment in human resources.

In addition to reviewing academic criteria, the screeners reviewed applicant experiences and attributes to determine fit with the school's mission and values. Specific areas of consideration included academic preparation, medical exposure, enthusiasm for the profession, service orientation, ability to work with others, teamwork, and adversities overcome (termed distance traveled). Distance traveled was used to understand potential disadvantages in social and financial capital the applicant had to overcome on the road to medical school. Application screeners were trained to view applications in light of distance traveled to prevent lack of cultural or financial capital from eliminating applicants with potential from consideration.

Per holistic review principles, balanced consideration was given to academic metrics, attributes, and experiences to determine which applicants would be invited to interview. For academic preparation, applicants were rated as academically strong, adequate, or weak. For attributes and experiences, applicants were rated on the strength of evidence in the application file. Academically strong and adequate applicants with compelling and/or persuasive evidence of desired experiences and attributes were granted an interview. It is important to note that due to state legislation prohibiting the use of race, ethnicity, and gender in the college admissions process, the admissions office did not even provide information about these demographic factors to the applicant screeners.

Academic-only selection process for this study

The comparison pool was selected for this study using the top academically qualified applicants from each application cycle using a combination of grade point average and MCAT test scores. For each applicant, the researcher multiplied the applicant overall undergraduate grade point average by a factor of 10 and added the highest total MCAT score. Since MCAT2015 was not administered until the spring of 2015, all MCAT scores used were from the previous MCAT examination. Applicants without a GPA or total MCAT score were eliminated from the study. The applicants with the highest academic scores were selected for the test sample, mirroring the size of the actual holistic review pool.

Demographic and experiential variables

The specific variables included in this study were gender, race, ethnicity, parental education, self-identified disadvantaged status, undergraduate overall grade point average, MCAT test scores, community service activities, paid employment, and advanced degrees. All demographic and experiential data were obtained from the American Medical Centralized Application Service (AMCAS) applications, with permission of the Association of American Medical Colleges (AAMC).

Data analysis

Data were analyzed to determine whether the demographic and experiential backgrounds of applicants differed depending on the application selection method used. Data analysis included a combination of Chi square and analysis of variance (ANOVA) depending on the levels of measurements. Chi square analyses were used to determine whether each selection method resulted in applicants with attributes beyond what would be expected by chance for categorical variables (gender, race and ethnicity, first generation college status, self-identified disadvantaged status, and level of education). From these analyses, the difference between the observed and expected counts was divided by an estimate of the standard error to provide a standardized metric. As such, positive adjusted residuals indicated a higher number than expected while a negative adjusted residual indicated a lower number than expected. Adjusted residual values greater than 1.96 or less than -1.96 were considered significant (Agresti and Kateri 2011). For the continuous variables, applicant age and hours of experience in various service and employment activities, analysis of variance factored by review classification (holistic, academic-only or both) were used. These analyses determined whether at least one group differed from the others. Post facto Least Square Difference (LSD) tests were used to identify specifically where differences between groups occurred. IBM SPSS Statistics, Version 22, was used for data analyses.

Results

Of the 4342 applicants selected for interview through either holistic review or academic selection, 1714 (39.5%) were female, 285 (6.6%) were URM, 659 (15.2%) were first generation college students, 454 (10.5%) self-identified as disadvantaged status, and 496 (11.5%) had advanced degrees.

Gender

Cross-tabulation analysis showed significant differences between the applicant pools by gender ($\chi^2 = 218.86$, $df = 2$, $p < .001$). The percent of female applicants was lower (26.7%, $n = 419$) in the academic pool and higher (52.5%, $n = 824$) in the holistic review only pool than in the overall sample. The holistic review process yielded a significantly higher percent of female applicants than expected ($adj. resid. = 13.2$, $p < .01$). The positive adjusted residual indicates that the observed proportion of female applicants in the holistic review pool was more than would have been expected by chance alone. Conversely, the negative adjusted residual for the academic selection method showed that using academic metrics alone yielded a significantly lower percent of female applicants than would have been expected by chance ($adj. resid. = -12.9$, $p < .01$).

Underrepresented in medicine

Cross-tabulation manifested significant differences in traditionally underrepresented applicants between groups ($\chi^2 = 253.60$, $df = 2$, $p < .001$). URM applicants comprised 6.6% of the full sample. The holistic review group had the highest percent of traditionally underrepresented applicants ($n = 227$, 14.5%). The percent of traditionally URM applicants in the holistic review pool was significantly higher than expected by chance ($adj. resid. = 15.8$, $p < .01$). Both the academic group ($n = 21$, 1.3%) and the overlap group ($n = 37$, 3.1%) had significantly lower percent of traditional URM applicants than would be expected ($adj. resid._{academic} = -10.5$, $p < .01$; $adj. resid._{overlap} = -5.8$, $p < .01$). The proportion of traditionally underrepresented applicants in the holistic review process was more than 11 times higher than the academic selection process.

First generation college status

There were significant differences between the applicant pools by first generation college status ($\chi^2 = 39.59$, $df = 2$, $p < .001$). While the overall pool of selected applicants was comprised of 15.2% ($n = 659$) first generation college students, the holistic review pool had a significantly higher percent of first generation students than would be expected, at 19.4% ($n = 304$, $adj. resid. = 5.8$, $p < .01$). The academic pool, on the other hand, had a significantly lower percent of first generation college students ($n = 178$, 11.3%, $adj. resid. = -5.3$, $p < .01$). First generation college students were 1.7 times more likely to be selected using the holistic review process than by a purely academic selection method.

Self-identified disadvantaged status

The AMCAS application asks applicants whether they self-identify as disadvantaged and, if so, to describe why. While AMCAS does not provide a definition or criteria for

disadvantaged, common factors include social, economic, or educational circumstances. There were significant differences in self-identified disadvantaged status between the applicants selected using holistic review, those selected using academic metrics only, and those applicants selected by both models ($chi\ sq = 131.21$, $df = 2$, $p < .001$). Just over ten percent ($n = 454$, 10.5%) of the total selected applicant pool were students who self-identified as disadvantaged. When compared to the other groups, the holistic review group ($n = 275$, 17.5%) was significantly higher with fewer than expected self-identified disadvantaged students in the both the academic ($n = 102$, 6.5%) and overlap groups ($n = 77$, 6.4%) ($adj\ resid. = 11.5$, $p < .01$ for the holistic group, $adj\ resid. = -6.4$, $p < .01$ for the academic group, and $adj\ resid. = -5.4$, $p < .01$ for the overlap group).

Paid employment

A one-way ANOVA was used to test for differences in the number of hours of paid employment between selection method groups. The analysis of variance demonstrated a significant difference in paid employment between groups ($F = 10.985$, $df = 2$, $p < .001$). To understand where the differences occurred, the researcher conducted a post hoc comparison using Least Squares Difference (LSD) test. The post hoc LSD test revealed a significant difference between the academic selection and holistic review groups (mean difference = 657.99, $p < .01$) and between the holistic review and overlap groups (mean difference = 524.94, $p < .01$). The holistic review applicants averaged a significantly higher number of paid employment hours than did the applicants selected through the academic selection process.

Community service

There were significant differences between groups in terms of community service hours ($F = 15.359$, $df = 2$, $p < .01$). The LSD post hoc analysis specified that significant differences manifested between both the academic selection and holistic review groups (mean difference = 475.58, $p < .01$) and the academic selection and the overlap groups (mean difference = 346.12, $p < .01$). The average number of community service hours for the academic selection group was significantly lower than the means for both the holistic review group and the overlap group.

Advanced degrees

Chi square analysis showed significant differences between groups ($chi\ sq = 18.514$, $df = 4$, $p < .001$) in terms of highest level of degree earned prior to application to medical school. For the academic group, all degree levels were represented as would have been expected by chance. However, for the holistic review group, there were significantly fewer applicants with bachelors as highest degree than would have been expected and significantly more masters prepared students. While the total application pool was comprised of 88.6% ($n = 3846$) applicants with a bachelor's degree as the highest degree level, 86.4% ($n = 1355$) of the holistic group was at this level. At the master's degree level, the holistic review group had higher than expected representation. While only 10.5% ($n = 92$) of the total application group had a highest degree level of master's, 12.7% ($n = 199$) of the holistic degree group had master's level attainment.

Discussion

Analyses of the holistic review process for screening at OUWB resulted in significant differences between holistically and academically screened applicants. As seen in Fig. 1, Holistic review created a pool of applicants who were more diverse than the academic-only pool in terms of underrepresented in medicine status, gender, self-identified disadvantaged status, and first-generation college status. Holistically selected applicants also reported significantly more hours spent in premedical experiences involving paid employment and community service than did the students selected using academic metrics alone. Finally, holistically selected applicants were more likely to have a master's degree than academically selected applicants.

The holistic review pool had significantly more traditionally underrepresented minority applicants than did the academic-only interview pool. To be considered underrepresented at this medical school, an applicant must have self-identified as black or African American, Puerto Rican, Mexican, American Indian or Alaskan native. Notably, the school achieved these results using a race-neutral approach to selection. The admissions data screened by faculty and staff members did not include race and ethnicity since the use of these factors was legally restricted by state referendum. This study may have implications for schools restricted from using race as a factor in college admissions decisions. Schools in states with legal restrictions for race-conscious admissions must always use race-neutral alternatives. And, schools in other states are expected to try race-neutral approaches under Supreme Court law. The *Grutter v. Bollinger* Supreme Court ruling requires schools to attempt to diversify their classes using race-neutral alternatives before implementing processes that use race as a factor (Coleman et al. 2014). In light of these legal restrictions, holistic review may represent a viable solution for increasing diversity.

This study showed that the holistic review process at OUWB resulted in significantly more female applicants being selected for an interview than would have been expected by chance. In fact, the proportion of female applicants selected by the holistic review process was more than double that of the full data set. At the same time, the proportion of females in the academic-only pool was significantly lower than expected. This result may not be surprising since females have been shown to score lower on the MCAT than males (Association of American Medical Colleges 2015). Selection criteria that emphasize test scores may disadvantage female applicants and result in a less gender-diverse workforce precluding some of the advantages gender diversity might bring to the learning environment and health care.

This study included differences beyond traditional measurements of diversity. Results included significantly more self-identified disadvantaged applicants as well as first-generation college students selected by the holistic review process than the academic-only process. Considering that medical schools are more heavily populated by students from affluent backgrounds than in the general public, disadvantaged and first-generation college students represent diversity in the medical school learning environment (Grbic et al. 2010).

Some of the significant differences found between holistically and academically selected interviewees involved premedical experiences. For example, applicants selected by holistic review spent significantly more time in paid employment during their premedical years than did the applicants selected by academic metrics alone. These results raise several questions about why these differences exist. The holistic review pool had more applicants who identified as disadvantaged. Did they work more during undergrad to pay for their education? Further, did the extra work hours take away from study time?

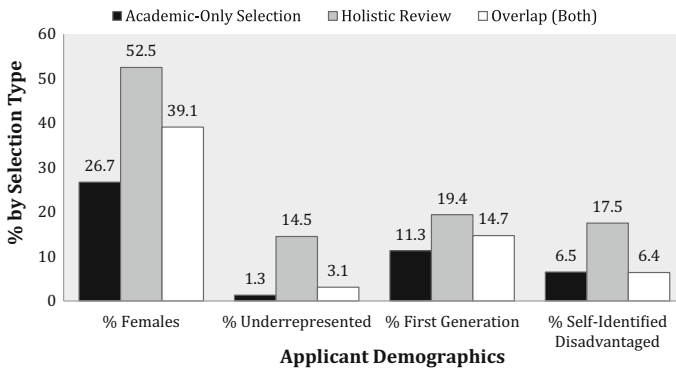


Fig. 1 Percentage of applicants in demographic groups by application selection type

Could the extra work hours account for the lower academic achievements of some of these students? If the applicants who worked more during premedical years were afforded more time to study, would they have achieved the same academic measures as the academically selected applicants? These questions may warrant further study.

At OUWB, a key admission criterion involved community engagement and service orientation. The theory for seeking students who volunteered extensively in their community was that these students may be more altruistic than those applicants who have not dedicated a significant amount of time to helping others. In addition, admissions committee members believed that applicants who interacted with diverse populations were better able to understand and appreciate perspectives of people different from themselves. In this study, the applicants selected using holistic review had significantly more community service hours than did the applicants hypothetically selected solely using academic metrics. This result may be counterintuitive in that there is often an assumption that applicants who must work during college do not have time to volunteer in their communities.

Applicants selected by holistic review were more likely to have a master's degree than expected by chance. This significant increase in master's degrees may be due to an overreliance on academic metrics in the selection process. Applicants with lower than average grades may have pursued graduate level coursework to improve their chances of admission to medical school rather than a sincere interest in obtaining a master's degree. Some of the applicants may have made a change in careers or late decisions about their interest in pursuing medicine. This study did not consider how many students were repeat applicants to medical school. It may be beneficial to study this aspect of the application process to better understand the higher number of master's degrees earned by applicants selected by holistic review. Regardless, holistically selected applicants brought more graduate level preparation to the medical school learning environment than academically selected applicants would have.

Limitations

This study was limited to a single new medical school, and therefore may not be reflective of other schools, particularly those with well-established processes for promoting diversity outside of holistic admissions. For example, applicants who apply to a new medical school

may not represent applicants who apply to more established medical schools. The application pools over the first five admissions cycles, therefore, may differ in unknown ways from typical applicant pools at medical schools with similar curricula and missions. Nonetheless, both where diversity represents a national challenge for all medical schools, and where there are currently a large number of relatively new schools in the medical education landscape, these results remain informative.

This study also did not examine diversity in the resulting matriculating class because other factors such as student choice played a role in the composition of the class. Still, the data do provide insight into how the interview pool was formed using a holistic process. Having a more diverse interview pool provided opportunity for subsequent enrollment of a more diverse class of students.

Finally, it is important to note that while the holistic approach resulted in a more diverse interview pool than the academic-only approach, overall success of diversifying the workforce was not examined for this study. Additionally, it is possible that the results still fell short of the diversity needed to create a critical mass of diverse students.

Conclusion

Holistic review resulted in a more diverse pool of applicants being invited to interview than would have happened if a purely academic selection process were used. This diversity included more females, underrepresented minorities, first-generation college students, and self-identified disadvantaged applicants. The applicants in the holistic review pool spent significantly more time, as measured by hours, in paid employment and community service activities in their premedical years. Importantly, the experiences and attributes reflected in these applicants do not yield diversity for the sake of diversity, but rather align with the qualities the school had identified as critical for achieving its institutional mission and educational goals.

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Compliance with ethical standards

Ethical approval Approval for exempt status for this study was granted by the Oakland University Institutional Review Board on December 2, 2015.

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