Dental School Application Timing: Implications for Full Admission Consideration and Improving Diversity of Dental Students


Abstract: The national underrepresentation of minorities in dental schools and the dental profession is a significant concern. Despite efforts over previous years, the number of practicing dentists from underrepresented minority (URM) groups has increased very little. Many dental schools have adopted a holistic admissions review process that uses noncognitive factors in an effort to increase diversity. However, application timing also significantly impacts the success of candidates. This study examined whether URM students’ applying late in the application cycle contributes to their lower enrollment. This study attempted to fill a void in the dental admissions knowledge base by examining whether the timing of dental school applications in a rolling admissions system with a set number of interview spots favors those who apply early. De-identified applications (N=1,673) from one U.S. dental school in 2011 were examined. A binary logistic regression analysis revealed that URM applicants were significantly more likely to apply later in the admission cycle than non-URM applicants by a factor of 63 percent (p=0.001), increasing the competitiveness for fewer remaining spots. These results suggest the need for pre-admission interventions and for future research to understand and address barriers that impact application timing.

Keywords: dental education, dental school admissions, underrepresented minorities, rolling admissions, holistic admissions

Submitted for publication 5/23/13; accepted 11/26/13

The value of a diverse health professions workforce has been addressed frequently over the past decade, including reports by the Institute of Medicine and the Sullivan Commission. The Institute of Medicine reported data documenting racial and ethnic disparities in health care and argued that such disparities could be reduced with the education of a more ethnically diverse population of health care workers.¹ The Sullivan Commission’s report focused on policy changes to address the shortage of underrepresented minority (URM) health care professionals and suggested that increasing their number could help address health disparities among URM groups.² The Sullivan report noted that “African Americans, Hispanic Americans, and American Indians make up more than 25 percent of the U.S. population but only 9 percent of the nation’s nurses, 6 percent of its physicians, and 5 percent of dentists. Similar disparities show up in the faculties of health professional schools.”² According to the Association of American Medical Colleges, “underrepresented in medicine means those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population.”³ For the purpose of this study, URM is defined as African American/Black, Hispanic/Latino, and Native American/American Indian/Alaska Native, based on information provided in the Sullivan report regarding which minority groups are underrepresented in the health care fields.

The importance of diversity to the educational environment is emphasized in the accreditation standards of the Commission on Dental Accreditation (CODA). The current CODA predoctoral accreditation standards include administrative policies and procedures designed to achieve appropriate levels of diversity among dental school students. Standard 4-4, for example, calls on dental schools’ Admissions Committees to evaluate strategies to achieve a diverse student body.¹ The U.S. Supreme Court decision Grutter v. Bollinger (2003) affirmed that race is a compelling interest in education and that
the utilization of race as a factor in admission decisions and policies is justifiable.\textsuperscript{5,6} The recent U.S. Supreme Court case \textit{Fisher v. University of Texas at Austin} (2013) held that using race as a factor in admissions is still legal and important for reaching institutional goals of diversity, but did prioritize the need to exhaust all race neutral admissions practices.\textsuperscript{7} This decision also reemphasized that admissions practices must stand up to strict scrutiny and must be narrowly tailored in order to achieve those goals.

Over the past decade, academic dental institutions have implemented strategies to increase enrollment, retention, and graduation rates of URM and low-income students. While efforts to increase diversity have seen some success, efforts to increase the URM student population in dental schools have shown limited improvements. According to Brown et al.\textsuperscript{8} and Woolfolk and Price,\textsuperscript{9} in the 1995-96 year dental schools enrolled approximately 5.5 percent African American, 5.5 percent Hispanic/Latino, and 0.4 percent Native American students. A decline in URM enrollment began the next year and reached a low of 4.7 percent African American, 5.3 percent Hispanic/Latino, and the same percentage Native American students in 1999-2000. Beginning in 2000, there was a small but steady increase, and by 2007-08 the percentages had reached 5.9 percent African American, 6.3 percent Hispanic/Latino, and 0.6 percent Native American students. However, according to these sources, the overall national trend seems to be declining from 2008 to the present, approaching the percentages seen in 1996.

A holistic admissions review process has been found to be an effective admission system in dental schools and one that can contribute to the enrollment of URM students.\textsuperscript{10} Holistic admissions, tied closely to an institution’s mission, considers a variety of noncognitive factors (such as teamwork and communication, life experiences including community service and leadership, ability to overcome obstacles, etc.) in conjunction with an applicant’s metrics (undergraduate grade point average, scores on the Dental Admission Test, etc.) in making admissions decisions. A holistic review of applicants’ qualifications also assists with identifying students from underserved geographic regions, low socioeconomic backgrounds, and diverse cultural/racial groups, as well as nontraditional and first generation college students. Enrolling more students from these populations contributes to the diversity of the educational environment and the profession of dentistry.

For all the value of holistic admissions criteria, however, the use of a rolling admission process, which is one of the main admission processes used in U.S. dental schools, may be inadvertently placing limitations on schools’ ability to create a more ethnically diverse student body. With a rolling admissions process, applications are reviewed and interview spots are offered from the onset of the admissions cycle. Offers of admission are made starting December 1, the universal tell date, so most dental schools have begun the interview process well before that time. Therefore, a rolling admission system favors applicants who apply early in the cycle, typically no later than the published priority deadline. Under this system, many well-qualified dental school applicants do not receive full admission consideration due to delay in submitting a complete application file early in the cycle and after most interview spots are filled.\textsuperscript{11} Applying late in the admissions cycle diminishes an applicant’s chances of being accepted.

Research conducted by Avery et al. on rolling admissions at the undergraduate level found that applying early is advantageous because it “dramatically improves” an applicant’s chances of admission to college.\textsuperscript{12} These researchers conducted a study at fourteen elite universities and reported that students who applied early were most often either Asian American or white, whereas “African Americans applied early about half as often as others; and Hispanics about two-thirds as often as others.” This study reported that “applying early provides an advantage in admissions decision that is approximately equal to the effect of an increase of 100 points in an SAT score.” In addition, it found that applicants who were less likely to apply early were disproportionately minorities from disadvantaged backgrounds, with African Americans and Hispanics applying at an overall lower rate.

Consideration of application submission timing seems to be a meaningful intervention factor to examine. This aim of this study was therefore to understand whether URM applicants to one dental school were more likely to apply later in the cycle than their counterparts. Furthermore, other characteristics of the applicants that may have influenced the delay of the application submission were investigated. The results of this research may help identify issues that can be addressed to improve pre-admissions strategies aimed at increasing the acceptance rate of URM students.
Methods

Of the 1,673 applicants to the University of Kentucky College of Dentistry in 2011, the majority were white (66 percent, N=1,105), followed by other (23.7 percent, N=397) and URM (10.2 percent, N=171). A large majority of applicants were non-residents of the state (90 percent, N=1,508), with 93.6 percent (N=160) of the URM applicants residing outside of the state. Sixty-six percent (N=1,108) were first-time applicants. About three-fourths of the applicants’ parents held a bachelor’s degree or higher (76 percent, N=1,277). Of the applicants with parents with bachelor’s degrees, 70.4 percent (N=324) were white, 22 percent (N=101) were other, and 7.6 percent (N=35) were URM. Of the applicants whose parents held a graduate degree, 69.4 percent (N=540) were white, 20.6 percent (N=160) were other, and 10 percent (N=78) were URM.

A causal-comparative research design was used to examine the relationship between race/ethnicity and the submission timing of a dental school application. The Institutional Review Board of the University of Kentucky approved this research under protocol no. 13-0178-X4B. This study utilized the t-test statistical procedure to conclude whether a statistically significant mean difference existed between URM and non-URM applicants and the number of days to submit a complete application in a rolling admission cycle. The continuous variable, Elapsed Time, was the total number of days from the first possible day of submission (June 1) to the actual day a completed application was submitted. All samples were analyzed using two-tailed t-tests. The significance level for the analysis was α=0.05. All statistical analyses were completed using IBM SPSS Statistics 20.

A standard binary logistic regression was used to model the dependent binary variable of applying “Later” (>120 days) in the dental application cycle, using “Earlier” (≤120 days) as the reference category. The applicant submission timing, using Earlier ≤120 days and Later >120 days, was adapted from the Elam and Johnson study.11 The importance of elapsed time is supported by early action and early decision research, as well as delayed entry research.8,12-14 The independent variables were ethnicity, parent’s education level, residency, and prior application attempt. Significance level for all analyses was α=0.05.

A backward stepwise elimination analysis was conducted to select a subset of significant predictors for interpretation purposes. Removal criteria were set at 0.05 and entry of 0.001. Model 4 was selected as the best model (Y=α + β1 x1 + β2 x2 + β3 x3 + β4 x4 + β5 x5). No concatenations of variables existed; therefore, interaction terms were not included in the final model. The final fitted binary logistic regression model was estimated logit for Later application category= -0.408 + (0.487) * URM + (0.359) * Other + (0.733) * Residency + (0.290) * PriorApp + (-0.138) * HighestParentEd.

Next, binary logistic regression analysis was used to predict the probability of applying in the Later category of the rolling admissions cycle with independent variables of Model 4. Results of the logistic analysis indicated that the five-predictor model provided a statistically significant prediction of success ($\chi^2 [5, N=1,673] = 42.395, p<0.001$). The Nagelkerke pseudo $R^2$ indicated that the model accounted for approximately 3.4 percent of the total variance. Classification success for the cases based on a classification cutoff value of 0.500 for predicting membership in the Later group was moderately high, with an overall prediction success rate of 63 percent.

Results

We conducted a statistical t-test analysis to examine the difference between a URM applicant group and a non-URM applicant group in application submission timing. The results showed that URM students (M=121.58, SD=47.17) applied later in the rolling admissions cycle than non-URM students (M=108.18, SD=45.39), t(1671)=3.644, p<0.001, two-tailed, d=0.30, p<0.05 (Table 1).

Next, to determine if any relationships between the predictor variable and applicant outcomes existed, we performed a binary logistic regression of dependent binary variable of applying Later (>120 days) in the dental application cycle with admission variables. Table 2 shows the regression coefficients, Wald test, odds ratio (Exp [B]), and 95 percent confidence interval (CI) for odds ratios for each predictor. The Wald test indicated that an applicant’s residency and prior application experience were significant predictors of delayed application submission in the rolling admission cycle for all applicants (p<0.001). When comparing a URM applicant and a non-URM applicant, the odds of a URM applicant applying later in the cycle was 1.627 times (CI=1.172, 2.261) more than that of a non-URM applicant, or almost 63 percent more likely to apply later in admission cycle.
the rolling admission cycle, thereby facing increased competitiveness for remaining interview opportunities and subsequent admission. This finding suggests that the timing of application submission should become a meaningful factor in pre-admissions strategies to foster successful URM applicants.

Our study also found that out-of-state students were significantly more likely to apply later in the admission cycle than in-state students. It is likely that our out-of-state applicants have identified schools closer to home where they will pay in-state tuition as their first choice; subsequently, they apply to more expensive, unfamiliar out-of-state schools. Another plausible explanation may be that out-of-state students who are re-applicants expanded their current applications to include more schools, or different schools, compared to the previous cycle. In fact, almost 90 percent of the out-of-state applicants in this study’s data set had previously applied to dental school.

In addition, applicants without previous experience in the application cycle were more likely to apply later than their counterparts. Most students who applied in a previous cycle gained experience and applied earlier in the next cycle as a result of their initial experience.

The findings of our study suggest that continued efforts when all other variables were constant. The influence of residency was strong; after adjusting for race/ethnicity, prior application, and parent education, out-of-state applicants were two times (CI=1.418, 3.052) more likely than in-state applicants to apply later. When comparing an applicant who had not applied in a previous cycle with those who had applied previously, the odds of applying later for first time applicants was 1.336 times that of their counterparts, or almost 34 percent more likely to apply later than a student who previously applied to dental school. Finally, parental education level was not a significant predictor of delayed application submission for the study participants. Among the URM applicants in this study, 67.9 percent (N=116) had parents who held a bachelor’s degree or higher (less than 10 percent of the total sample).

Discussion

This preliminary investigation explored the relationship between dental school applicants’ characteristics in relation to the timing of application submission over one admission cycle. Additionally, it addressed a void in the literature by examining applicant characteristics that may be associated with a delayed submission of applications (race/ethnicity, residency, and prior experience).

This study found that three variables were significant in application submission timing. First, URM applicants were more likely to apply later in the rolling admission cycle, thereby facing increased competitiveness for remaining interview opportunities and subsequent admission. This finding suggests that the timing of application submission should become a meaningful factor in pre-admissions strategies to foster successful URM applicants.

Our study also found that out-of-state students were significantly more likely to apply later in the admission cycle than in-state students. It is likely that our out-of-state applicants have identified schools closer to home where they will pay in-state tuition as their first choice; subsequently, they apply to more expensive, unfamiliar out-of-state schools. Another plausible explanation may be that out-of-state students who are re-applicants expanded their current applications to include more schools, or different schools, compared to the previous cycle. In fact, almost 90 percent of the out-of-state applicants in this study’s data set had previously applied to dental school.

In addition, applicants without previous experience in the application cycle were more likely to apply later than their counterparts. Most students who applied in a previous cycle gained experience and applied earlier in the next cycle as a result of their initial experience.14-16 While this may seem to be a positive outcome, there are also serious considerations for re-applicants, raising questions such as: does it compound financial difficulties due to the accruing of application costs each year? does the delay in acceptance predict the likelihood of reapplying? The findings of our study suggest that continued efforts

### Table 1. Comparison of submission timing: mean number of days after first possible submission by applicant ethnicity

<table>
<thead>
<tr>
<th></th>
<th>URM Applicants</th>
<th>Non-URM Applicants</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>Elapsed time (days)</td>
<td>121.58</td>
<td>47.168</td>
<td>171</td>
</tr>
</tbody>
</table>

### Table 2. Binary logistic regression coefficients of admissions variables and submission timing

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>df</th>
<th>Significance</th>
<th>Exp (B)</th>
<th>95% C.I. for Exp (B)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>URM applicant</td>
<td>0.487</td>
<td>0.168</td>
<td>8.435</td>
<td>1</td>
<td>0.004</td>
<td>1.627</td>
<td>1.172</td>
</tr>
<tr>
<td>Non-URM applicant</td>
<td>0.359</td>
<td>0.122</td>
<td>8.751</td>
<td>1</td>
<td>0.003</td>
<td>1.433</td>
<td>1.129</td>
</tr>
<tr>
<td>Residency</td>
<td>0.733</td>
<td>0.196</td>
<td>14.032</td>
<td>1</td>
<td>0.000</td>
<td>2.081</td>
<td>1.418</td>
</tr>
<tr>
<td>Prior application</td>
<td>0.290</td>
<td>0.110</td>
<td>6.987</td>
<td>1</td>
<td>0.008</td>
<td>1.336</td>
<td>1.078</td>
</tr>
<tr>
<td>Parent education</td>
<td>-0.138</td>
<td>0.120</td>
<td>1.315</td>
<td>1</td>
<td>0.252</td>
<td>0.871</td>
<td>0.688</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-1.408</td>
<td>0.225</td>
<td>39.075</td>
<td>1</td>
<td>&lt;0.001</td>
<td>0.245</td>
<td></td>
</tr>
</tbody>
</table>

Note: Significant values (p=0.05) are in bold.
to develop the pipeline and education of URM and low-income applicants are necessary and that future research is required to further understand the factors that impact application timing.

A previous study found the education level of parents to be a significant factor in the likelihood of the student entering college and completing a degree. However, that factor was not found to be a significant predictor for application submission timing in our study. There are potential reasons parents’ education was not significant for our small group of applicants as contrasted with the previous study, which examined first-generation undergraduate student applicants. Aside from the inherent difference in educational level between college applicants and dental school applicants, it may be that most of our predoctoral URM applicants were among those who come from more affluent socioeconomic family backgrounds, including parents with higher education attainment.

One limitation of our study is the exclusion of family income as a predictive variable. Although income may be considered to be a highly relevant factor, reporting of household income is not required on the ADEA AADSAS application. As a result, the response rate to this item from our study cohort was low: out of 1,673 records, only 896 reported income. Thus, we decided to exclude household income as a variable due to the low number of responses. In addition, the generalizability of these findings is limited since the study was conducted at a single institution. Therefore, future research should investigate additional aspects related to application timing, including additional variables as well as making use of a nationally representative sample of dental school applicants.

Conclusion

To the best of our knowledge, this is the first admissions research study for dentistry or indeed any health profession to provide data about timing of submission of URM students’ applications in a rolling admissions cycle. However, the results of this study were similar to an undergraduate admissions study that found URM students were significantly more likely to apply later in the admissions cycle compared with non-URM students. Based on the results of our study, we recommend future research to identify possible barriers to timely application; identification of barriers can then inform the development of pre-admissions interventions to address late dental application submissions by URM students.

REFERENCES