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Dental students' perceived comfort and future willingness to treat underserved populations: surveys prior to and immediately after extramural experiences

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Abstract

The purpose of this study was to compare the perceived change in comfort level and future willingness of senior dental students toward treating 12 different groups of traditionally underserved populations.

Written surveys of senior dental students were conducted prior to and after completing extramural clinical rotations. A Likert-type scale was used to assess student comfort, whereas future willingness to treat these populations was dichotomous.

Over a 13-year period (1992–2004), 560 students completed both surveys. There was an improvement in students' comfort level for 7 of 12 groups after the community-based assignments, yet there were no differences among population groups based on students' gender or assignments. There were positive changes for future willingness to treat patients who were mentally compromised, homeless, and non-English speaking, while there was a negative change for treating patients who were frail and elderly and those who were HIV+ or had AIDS. Students with improved comfort levels were more apt to be willing to treat patients who were frail elderly, medically complex, mentally compromised, and non-English speaking in the future.

While student comfort in treating several groups improved after completion of the community-based experiences, there were mixed results for future willingness to treat underserved populations.

Keywords

educational research; access; educational outcomes; extramurals; student attitudes; community-based clinical activities

Introduction

For a substantial portion of the United States population, access to dental care is a major problem.¹ Individuals with special needs—such as being physically or mentally challenged,

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having complex medical conditions, being economically poor, or being frail and elderly—often have difficulty accessing dental care.^{2–5} A contributing factor is the availability of dentists who are willing to treat individuals who do not meet perceived cultural norms for health and social status.^{6–8} Some dentists feel that they were not adequately trained to treat special needs populations when they were in dental school.⁹ These attitudes are problematic because thousands of individuals with intellectual and developmental disabilities, who formerly would have had healthcare services provided within a state institution, have been mainstreamed and now look to local providers for oral health services.¹⁰ Separately, some dentists choose not to treat low-income groups, particularly those who are Medicaid-eligible, because the reimbursement received may not cover the operational costs of providing care.¹¹

One approach to minimizing access problems is to provide dental students guided opportunities to interact with individuals who may be different from the patients typically seen in dental school settings. With such experiences, students may become more comfortable treating a variety of patients, thus increasing their likelihood to treat traditionally underserved populations after graduation.

Community-based clinical experiences, sometimes known as extramural programs, are an important aspect of the curriculum at many dental schools. However, these experiences vary among institutions,^{12–13} both in the amount of time devoted to these activities and the type of patients seen. While some programs focus on treatment of special needs populations, such as frail elderly and those who are medically, mentally or physically challenged, other programs primarily address the needs of financially burdened individuals who frequent ambulatory community centers. It is hoped that such programs provide opportunities for students to observe and interact with members of socially and culturally diverse populations, many of whom have oral and general health issues that are not frequently seen by predoctoral dental students within dental school clinics.

Generally, students' perceptions of treating underserved populations are recorded at some point, such as upon completion of extramural activities or after graduation.^{14–17} Other studies^{18–19} are limited to a single special needs group, such as people with mental disabilities or the elderly.

The purpose of this study was to examine senior dental students' perceived comfort level in treating traditionally underserved populations prior to and immediately after participating in community-based clinical programs. While previous research by this team has separately addressed student responses immediately prior²⁰ or subsequent to the community-based experience,²¹ this study is important because it compares comfort levels before and after these community-based experiences. This study also explores changes about students' willingness to treat these populations after graduation.

Methods

The overall goal of the University of Iowa extramural program, which was initiated as a voluntary activity in 1969 but became a mandatory program for all senior dental students in 1975, is to provide essential experiences that help students develop a broad understanding of the responsibilities they will have as dental professionals. Although the program has many objectives, the three major thrusts are to: (1) increase student interactions with individuals from varied demographic and social groups at community-based facilities; (2) understand the role of oral health within the context of the community; and (3) hone clinical skills and decrease time required to complete routine clinical care.

During the study period (1992 to 2004), each senior student participated in two consecutive, five-week rotations. Approximately one-quarter of the senior class rotated through this experience at any one time. Two weeks prior to their extramural experiences, students met with the extramural director for an orientation session. During each orientation, students were asked to complete a survey (“pre”) that ascertained students’ comfort level and future willingness to treat 12 traditionally underserved populations (Table 1). Specifically, students were asked “How comfortable are you toward treating _____?” Possible responses included: 5=no problem; 4=OK; 3=some concern; 2=rather not; and 1=will not. The survey also asked students about their anticipated willingness to treat these patient groups beyond graduation (Yes/No). Additional survey items included questions about each student’s gender, race, and the names of the two extramural programs he or she would be attending.

At the end of each 10-week experience, students who were returning from their community-based rotations participated in an all-day exit seminar. During the exit seminar, students were asked to complete a survey (“post”) that contained identical questions to those found in the orientation (“pre”) survey. The *pre* and *post* survey forms were retrieved and individually matched by student.

For analysis purposes, some variables were re-categorized. Student assignments were placed in one of four categories: Special Care Program and Broadlawns Medical Center; Special Care Program and any other program besides Broadlawns Medical Center; Broadlawns Medical Center and any other program besides Special Care Program; and both assignments were neither Special Care Program nor Broadlawns Medical Center. Broadlawns Medical Center is a primarily publically funded hospital and clinic that treats the indigent population of Polk County in Des Moines, Iowa. Information about the various sites is explained elsewhere.²² Graduation year was dichotomized into those who graduated between 1992 and 1998 versus 1999 through 2004.

A new variable “change in comfort level” was created, with groups consisting of those who improved, stayed the same, or became worse between the *pre* and *post* surveys. Because the intent was to determine students’ improved comfort, the variable was then collapsed into *improved* versus *stayed the same* or *became worse*. Likewise, a new variable was developed to measure change in willingness to treat underserved populations in the future. Once again, the categories were dichotomized: *improved* versus *stayed the same* or *became worse* (see Table 3).

Data from the matched surveys were analyzed to determine whether statistically significant changes occurred in students’ perceived comfort in treating each of the 12 underserved populations and their anticipated willingness to treat each population group. A Wilcoxon signed-rank test was used to determine whether or not statistically significant differences existed in comfort level change for each group. Moreover, Kendall’s tau-b statistic was used to measure the strength of the association between the pairs of semi-quantitative *pre* and *post* evaluations of comfort as measured on an ordinal scale (1 to 5). In order to fully assess the association of the community-based program with student comfort levels, separate analyses were conducted with and without students who responded “5=no problem” for both surveys. Many students perceived themselves as very comfortable treating specific populations, thus not allowing room for improvement.

Since responses for future willingness to treat the underserved populations were dichotomous (Yes/No), McNemar’s test was used to compare students’ results between both surveys.

Bivariate analyses were performed to compare change in (1) comfort level and (2) future willingness to treat the 12 populations, by student gender, year of graduation, and

community-based assignments. The bivariate analysis concerning future willingness to treat also included the students' perceived comfort level change for the respective population group. Separate analyses were conducted for each of the 12 underserved populations. Chi-square analysis, Fisher's exact test, Wilcoxon rank-sum test, and Kruskal-Wallis tests were used, as appropriate.

All tests employed a 0.05 level of statistical significance. SAS for Windows (v9.1, SAS Institute Inc., Cary, NC, USA) was used for the data analysis. The research protocol was approved by the University of Iowa Institutional Review Board.

Results

Of the 852 participants during this 13-year period, 690 senior dental students completed the orientation (*pre*) surveys, and 726 completed the exit (*post*) surveys. In total, 560 *pre-post* surveys were matched by respondent. Among the matched pairs, 364 (64.6%) were male and 319 (57.0%) graduated between 1992 and 1998. There were no statistically significant differences ($p < 0.05$) between subjects who completed both surveys and those who did not, by gender, graduation year, or student rotations.

Table 1 displays students' mean comfort levels treating the identified populations prior to and immediately after participation in community-based clinical experiences. Table 1 also shows the overall change of comfort level between the two survey periods.

Because several subjects already had the highest level of comfort prior to the community-based experiences and maintained this comfort level at the end of their rotations, a second table (Table 2) was created that excluded those subjects who responded that they were at the highest comfort level (i.e., 5=no problem) for both surveys. This allowed for statistical analysis of those with some potential for improvement. For instance, 330 subjects responded they had *no problem* in comfort level with the population group "low income" both before and after their community-based experiences. Using data from the remaining 218 surveys, a non-parametric Wilcoxon signed-rank test was used to determine whether a statistically significant change occurred in comfort level. Bivariate analyses demonstrated statistically significant changes in comfort level for the following groups of patients: frail elderly ($p = 0.0001$); medically complex ($p < 0.0001$); mentally compromised ($p < 0.0001$); homeless ($p = 0.0008$); drug users ($p < 0.0001$); HIV+/AIDS ($p = 0.0004$); and jailed patients ($p = 0.0007$) (Table 2). For each of these seven groups, the percentage of individuals who improved in comfort level after the community-based experiences was higher than the percentage that indicated their comfort level became worse.

Table 3 displays students' future willingness to treat each population group from two perspectives: (1) the number and percentage of students who improved, stayed the same, or became less inclined to treat respective groups after the community-based rotations; and (2) when there was change in survey results, whether these differences were statistically significant. Many subjects were anchored either positively or negatively regarding their future willingness to treat specific underserved populations. For example, approximately 60% of subjects were willing to treat groups that had low income, were medically complex, and other ethnic groups both before and immediately after their community-based experiences. Conversely, more than 80% of subjects were consistent in their unwillingness to treat patients who were homebound, homeless, and jailed in their future practices.

Statistically significant differences existed between students' *pre* and *post* survey responses toward treating the following groups (Table 3): frail elderly; patients who were mentally compromised; patients who were homeless; patients who were HIV+ or had AIDS; and non-English-speaking patients. Subjects were more likely to exhibit positive changes, rather than

negative changes, in their willingness to treat patients who were mentally compromised (21.9% improved vs. 14.8% worse), homeless (9.8% improved vs. 5.5% worse), and non-English speaking (21.4% improved vs. 12.1% worse); however, subjects were more likely to exhibit negative changes in their willingness to treat frail elderly (11.6% improved vs. 17.3% worse) and patients who were HIV+ or had AIDS (12.1% improved vs. 18.3% worse). Overall, subjects showed the most improvement in their willingness to treat patients who were mentally compromised and did not speak English.

Bivariate analysis between change in comfort level, by subjects' gender, graduation year, and community-based assignments, is shown in Table 4. Subjects who graduated between 1992 and 1998 were more likely to have an improved comfort level in treating low-income patients compared to those who graduated between 1999 through 2004 (49.2% vs. 29.6%, respectively). However, there were no other statistically significant findings between change of comfort level toward any of the other 11 population groups and either subjects' gender, graduation year, or community-based assignments.

Similarly, subjects' gender, graduation year, and community-based assignment were not significantly associated with a change in willingness to treat any of the identified underserved populations, with one exception (Table 5). Female subjects were more likely to have improved willingness to treat other ethnic groups than male subjects (24.3% vs. 9.7%). Subjects demonstrated statistically significant associations between their change in future willingness to treat and change of comfort for the following four groups: frail elderly ($p=0.0266$); medically complex ($p=0.0095$); mentally compromised ($p=0.0033$); and non-English speaking ($p=0.0315$). Subjects whose comfort level improved between pre- and post-community-based experiences were more likely to have improved willingness to treat frail elderly than those whose comfort level stayed the same or worsened (47.8% vs. 31.4%). Likewise, subjects whose comfort level improved (versus stayed the same or worsened) for each of the following groups were more likely to have improved willingness to treat these patients in the future: medically complex (57.8% vs. 37.7%); mentally compromised (29.1% vs. 16.7%); and non-English speaking (28.2% vs. 18.5%).

Discussion

An evaluation of the results from this study suggests that students' comfort levels in treating underserved populations and students' future willingness to treat underserved populations varied by group. For example, Table 1 shows that at a minimum 30% of subjects reported changes in comfort level in treating low-income populations and other ethnic groups, while 60% of subjects reported changes in comfort level with treating patients who were mentally compromised. Since the majority of subjects reported the highest levels of comfort treating low-income populations and other ethnic groups prior to these rotations, there was limited opportunity for change. When improvement in comfort level was possible, many statistically significant improvements in comfort were made. However, negative changes in comfort level were also observed. Among subjects who did not report the highest levels of comfort both before and after their community-based rotations (Table 2), 18.2% reported decreased levels of comfort toward treating patients whose conditions were medically complex, while 41.1% of subjects reported decreased comfort in treating Title XIX patients.

Similarly, there were some statistically significant changes in students' willingness to treat underserved populations (Table 3). For example, subjects were more willing to treat patients who were mentally compromised, homeless, and non-English speaking after completing their community-based rotations. Conversely, subjects were less willing to treat populations of frail elderly and those with HIV+/AIDS. The majority of subjects, however, remained

consistent between the two surveys regarding their willingness to treat underserved populations.

In general, students' gender, year of graduation, and community-based assignments were rarely or never associated with their change in comfort level or willingness to treat underserved populations. However, change in comfort was significantly associated with change of willingness. When there was an improved comfort level for these groups (frail elderly, medically complex, mentally compromised, and non-English speaking), subjects were more likely to have an improvement in future willingness to treat the respective groups.

Numerous publications^{23–27} document health professionals' and students' attitudes concerning various underserved populations. Among these publications, many demonstrate that dental students' clinical exposure to traditionally underserved populations increases comfort level in caring for the studied populations.^{18,28–30} Our findings, however, demonstrate that there is not a uniform increase in comfort level across all traditionally underserved population groups. Moreover, lack of a relationship between changes in comfort level by community-based student assignment is somewhat disheartening, especially since one of the cornerstone rotations (Geriatrics and Special Needs) emphasizes student interactions with patients who are frail, medically complex, or mentally compromised. However, one should use caution in interpreting these results. It is unknown whether a control group (i.e., did not participate in community-based programs) would have demonstrated statistically significant differences between those who participated in these community experiences for changes in either comfort level or future willingness to treat these underserved populations.

Like previous research,^{18,28,31} this study showed some statistical relationships between students' change in comfort level and anticipated future willingness to treat certain underserved groups. Students with increased comfort were more likely to have positive changes in their willingness to treat some underserved populations. Because students showed greater positive changes in comfort levels compared to willingness to treat, educational programs should consider focusing their efforts on increasing students' comfort treating various populations with the hope that students' willingness to treat underserved populations will follow as their comfort level increases.

Nonetheless, the current results concerning students' future willingness to treat some populations (e.g., homebound, homeless, imprisoned) are disheartening from a societal perspective, especially since a considerable amount of curriculum time is spent at community-based programs caring for a very diverse patient pool. If the intended outcome of community-based educational programs is to improve students' attitudes toward traditionally underserved populations, then a multi-faceted educational approach, including clinical exposure to diverse populations, is required. Future research is required to test specific pedagogic methods that would increase comfort levels for addressing select underserved groups. Researchers also need to determine whether the perceived comfort impediments (i.e., no improvement) are primarily due to interactions between students and patients (or faculty) or whether there are other non-treatment related concerns, such as billing issues for Medicaid patients or involving an interpreter, that create or reinforce a negative stereotype about certain underserved groups. Current findings suggest that many students have preconceived and somewhat stereotypic notions about whom they will treat in their future practices (i.e., relatively healthy and financially sound patients). Future research should be conducted to determine if the findings in this study are generalizable or if they are unique to this academic institution.

There are several limitations to this study. First, student assessment forms are voluntary; however, almost two-thirds of students did complete both surveys. Second, while the patient pool has not changed much at each of these sites, students have varied clinical experiences and patient interactions, even at the same sites. Thus, each student may be affected differently, based on such encounters. These varied experiences may help explain why rotation assignments were not significantly associated with changes in comfort or willingness to treat underserved populations. Third, patients may fit into several different categories, which could adversely impact another category. For instance, a patient who is considered frail elderly may also be mentally challenged, medically compromised, and/or enrolled in the Medicaid program. This current survey instrument does not provide the precision to differentiate one category from another from the students' perspective. Fourth, for this study the overwhelming majority of dental students were White, non-Hispanic; thus, the predominance of one racial group precluded analysis for this variable. Caution is given when interpreting the findings for "other ethnic groups."

Because societal norms also may change with time, there may be ecological influences that change opinions. As such, students' comfort or future willingness to treat these selected population groups at the time of the pre- or post-program survey may or may not accurately indicate whether an individual will treat such underserved populations once they leave the educational environment. For example, student indebtedness may have a substantial influence on whether dentists will treat any or all of these underserved populations. Block and Walken³² raised concerns that improved student attitudes at the completion of an extramural program was no guarantee that graduates would treat these population groups once they were in practice. Others have echoed the concern that student competency does not necessarily translate into a person who is willing to provide care.³³ The authors of this study are currently analyzing data from alumni to determine which population groups, if any, dentists treat and the extent to which these population groups are incorporated in their practices. The alumni data can then be matched to the *pre/post* responses to measure the extent that the *pre/post* surveys correspond to actual treatment. While it seems intuitive that comfort with population groups would precede willingness to treat a population group, this may not necessarily be the case.

Conclusion

Attitudinal findings from a 13-year review of senior dental students who participated in an extensive extramural experience demonstrated mixed findings for change in comfort level and future willingness in treating several traditionally underserved populations. Students exhibited positive changes in comfort level toward treating patients who were frail elderly, medically complex, mentally compromised, homeless, drug users, were HIV+/had AIDS, or were jailed based on student surveys prior to and immediately after participating in community-based rotations. However, neither students' gender, nor graduation year, nor community-based assignment was significantly related to a change in comfort level.

Likewise, there were positive changes for students' future willingness to treat patients who were mentally compromised, homeless, and non-English speaking; however, students' future willingness to treat patients who were frail and elderly or were HIV+/had AIDS decreased after the community-based experiences. Students whose comfort levels improved between the two surveys were more apt to indicate that they were more willing to treat patients who were frail elderly, medically complex, mentally compromised, and non-English speaking in the future.

Future research will determine whether these former students have incorporated the studied underserved populations into their practices.

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References

1. U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. Rockville, MD: USDHHS, National Institutes of Health, National Institute of Dental and Craniofacial Research; 2000. NIH Pub 00-4713
2. Al Agili DE, Roseman J, Pass MA, Thornton JB, Chavers LS. Access to dental care in Alabama for children with special needs: parents' perspectives. *J Am Dent Assoc.* 2004; 135:490-5. [PubMed: 15127874]
3. Dolan TA, Atchison KA. Implications of access, utilization and need for oral health care by the non-institutionalized and institutionalized elderly on the dental delivery system. *J Dent Educ.* 1993; 57:876-87. [PubMed: 8263235]
4. U.S. General Accounting Office. Oral health: Factors contributing to low use of dental services by low-income populations. Washington, DC: US General Accounting Office; 2000.
5. Davis MJ. Issues in access to oral health care for special care patients. *Dent Clin North Am.* 2009; 53:169-81. [PubMed: 19269389]
6. Fishman SK. Health professionals' attitudes toward older people. *Dent Clin North Am.* 1989; 33:7-10. [PubMed: 2642823]
7. McCarthy GM, Koval JJ, MacDonald JK. Factors associated with refusal to treat HIV-infected patients: the results of a national survey of dentists in Canada. *Am J Public Health.* 1999; 89:541-5. [PubMed: 10191798]
8. MacEntee MI, Weiss RT, Waxler-Morrison NE, Morrison BJ. Opinions of dentists on the treatment of elderly patients in long-term care facilities. *J Public Health Dent.* 1992; 52:239-44. [PubMed: 1512750]
9. Casamassimo PS, Seale NS, Ruehs K. General dentists' perceptions of educational and treatment issues affecting access to care for children with special health care needs. *J Dent Educ.* 2004; 68:23-8. [PubMed: 14761169]
10. Anderson LL, Lakin KC, Mangan TW, Prouty RW. State institutions: thirty years of depopulation and closure. *Ment Retard.* 1998; 36:431-43. [PubMed: 9879181]
11. Waldman HB, Perlman SP. Why is providing dental care to people with mental retardation and other developmental disabilities such a low priority? *Pub Health Rep.* 2002; 117:435-9. [PubMed: 12500959]
12. Ayers CS, Abrams RA, McCunniff MD, Goldstein BR. A comparison of private and public dental students' perceptions of extramural programming. *J Dent Educ.* 2003; 67:412-7. [PubMed: 12749570]
13. Andersen RM, Davidson PL, Atchison KA, et al. Summary and implications of the Dental Pipeline program evaluation. *J Dent Educ.* 2009; 73(2 Suppl):S319-30. [PubMed: 19237366]
14. Gardiner JF, Lotzkar S. A survey of extramural experiences for dental students. *J Dent Educ.* 1975; 39:530-4. [PubMed: 1057593]
15. Berg R, Berkey DB. University of Colorado School of Dentistry's Advanced Clinical Training and Service Program. *J Dent Educ.* 1999; 63:938-43. [PubMed: 10650420]
16. Jacobson JJ, Kotowicz WE, Turner DF. University of Michigan School of Dentistry's Community Practice 857. *J Dent Educ.* 1999; 63:964-8. [PubMed: 10650425]
17. DeCastro JE, Matheson PB, Panagakos FS, Stewart DC, Feldman CA. Alumni perspectives on community-based and traditional curricula. *J Dent Educ.* 2003; 67:418-26. [PubMed: 12749571]
18. Wolff AJ, Waldman HB, Milano M, Perlman SP. Dental students' experiences with and attitudes toward people with mental retardation. *J Am Dent Assoc.* 2004; 135:353-7. [PubMed: 15058626]
19. Ettinger RL, Watkins C, Cowen H. Reflections on changes in geriatric dentistry. *J Dent Educ.* 2000; 64:715-22. [PubMed: 11258859]

20. Kuthy RA, McQuistan MR, Riniker KJ, Heller KE, Qian F. Students' comfort level in treating vulnerable populations and future willingness to treat: results prior to extramural participation. *J Dent Educ.* 2005; 69:1307–14. [PubMed: 16352766]
21. Kuthy RA, Heller KE, Riniker KJ, McQuistan MR, Qian F. Students' opinions about treating vulnerable populations immediately after completing community-based clinical experiences. *J Dent Educ.* 2007; 71:646–54. [PubMed: 17493973]
22. McQuistan MR, Kuthy RA, Heller KE, Qian F, Riniker KJ. Dentists' comfort in treating underserved populations after participating in community-based clinical experiences as a student. *J Dent Educ.* 2008; 72:422–30. [PubMed: 18381848]
23. Geskie, MA.; Salasek, JL. Attitude of health care personnel toward persons with disabilities. In: Yunker, HE., editor. *The measurement of attitudes toward disabled persons.* New York, NY: Springer Pub Co; 1988. p. 187-200.
24. Adelman RD, Albert RC. Medical student attitudes toward the elderly: a critical review of the literature. *Gerontol Geriatr Educ.* 1987; 7:141–55. [PubMed: 3330979]
25. Bedi R, Champion J, Horn R. Attitudes of the dental team to the provision of care for people with learning disabilities. *Spec Care Dentist.* 2001; 21:147–52. [PubMed: 11669063]
26. Bennett ME, Weyant RJ, Wallisch JM, Green G. Dentists' attitudes toward the treatment of HIV-positive patients. *J Am Dent Assoc.* 1995; 126:509–14. [PubMed: 7722113]
27. Crandall SJ, Volk RJ, Loemker V. Medical students' attitudes toward providing care for the underserved. Are we training socially responsible physicians? *JAMA.* 1993; 269:2519–23. [PubMed: 8487415]
28. Baumeister SE, Davidson PL, Carreon DC, Nakazono TT, Gutierrez JJ, Andersen RM. What influences dental students to serve special care patients? *Spec Care Dentist.* 2007; 27:15–22. [PubMed: 17388225]
29. Wood GJ, Mulligan R. Cross-sectional comparison of dental students' knowledge and attitudes before geriatric training: 1984–1999. *J Dent Educ.* 2000; 64:763–71. [PubMed: 11191878]
30. Smith CS, Ester TV, Inglehart MR. Dental education and care for underserved patients: an analysis of students' intentions and alumni behavior. *J Dent Educ.* 2006; 70:398–408. [PubMed: 16595532]
31. Stiefel DJ, Truelove EL, Jolly DE. The preparedness of dental professionals to treat persons with disabling conditions in long-term care facility and community settings. *Spec Care Dentist.* 1987; 7:108–13. [PubMed: 2954237]
32. Block MJ, Walken JW. Effect of an extramural program on student attitudes toward dental care for the mentally retarded. *J Dent Educ.* 1980; 44:158–61. [PubMed: 6444432]
33. Bedi R, O'Donnell D. Long-term effects of a course on dental care for handicapped persons. *J Dent Educ.* 1989; 53:722–4. [PubMed: 2531765]

Change of comfort level of University of Iowa senior dental students (1992–2004) from pre- to post-community-based clinical experiences for treating 12 underserved population groups (n=560).

Table 1

Population group	N	Pre Mean Score	Post Mean Score	Improved (%)	Same (%)	Worse (%)
Low income	548	4.72	4.72	90 (16.4)	381 (69.5)	77 (14.1)
Frail elderly	546	3.88	4.03	178 (32.6)	252 (46.2)	116 (21.2)
Homebound	503	3.86	3.87	149 (29.7)	217 (43.1)	137 (27.2)
Medically complex	549	3.77	4.05	218 (39.7)	243 (44.3)	88 (16.0)
Mentally compromised	541	3.72	4.01	221 (40.9)	217 (40.1)	103 (19.0)
Homeless	534	4.27	4.39	153 (28.7)	284 (53.2)	97 (18.1)
Drug user	543	3.82	4.07	206 (38.0)	231 (42.5)	106 (19.5)
Other ethnic group	541	4.75	4.73	73 (13.5)	389 (71.9)	79 (14.6)
Title XIX	546	4.62	4.54	93 (17.0)	345 (63.2)	108 (19.8)
HIV+/AIDS	532	3.57	3.70	157 (29.5)	273 (51.3)	102 (19.2)
In jail	519	3.95	4.11	167 (32.2)	249 (48.0)	103 (19.8)
Non-English speaking	544	3.91	3.96	159 (29.2)	256 (47.1)	129 (23.7)

Table 2

Change of comfort level of senior dental students from pre- to post-community-based clinical experiences for treating 12 underserved population groups, excluding subjects who had the highest comfort score for both pre- and post-survey.

Population group	N	Improved (%)	Same (%)	Worse (%)	Pre-Post Change p-value
Low income	218	90 (41.3)	51 (23.4)	77 (35.3)	0.6092
Frail elderly	462	178 (38.5)	168 (36.4)	116 (25.1)	0.0001*
Homebound	434	149 (34.3)	148 (34.1)	137 (31.6)	0.4336
Medically complex	485	218 (44.9)	179 (36.9)	88 (18.2)	0.0001*
Mentally compromised	472	221 (46.8)	148 (31.4)	103 (21.8)	0.0001*
Homeless	369	153 (41.5)	119 (32.3)	97 (26.2)	0.0008*
Drug user	445	206 (46.3)	133 (29.9)	106 (23.8)	0.0001*
Other ethnic group	198	73 (36.9)	46 (23.2)	79 (39.9)	0.3783
Title XIX	263	93 (35.3)	62 (23.6)	108 (41.1)	0.0687
HIV+/AIDS	453	157 (34.7)	194 (42.8)	102 (22.5)	0.0004*
In jail	398	167 (41.9)	128 (32.2)	103 (25.9)	0.0007*
Non-English speaking	436	159 (36.5)	148 (33.9)	129 (29.6)	0.1139

* p-value <0.05 (Wilcoxon signed-rank test for improved vs. stayed the same or worse)

Table 3

Change of future willingness to treat 12 underserved population groups for senior dental students (1992–2004) from pre- to post-community-based surveys (N=398 responded to both surveys).

Population group	Improved		Stayed the Same		Worsened		Change p-value	Simple Kappa (95% Confidence Interval)
	Pre-Post No to Yes (%)	Pre-to Post Both Yes (%)	Pre-Post Both No (%)	Pre-Post Yes to No (%)	Pre-Post Yes to No (%)	Pre-Post Yes to No (%)		
Low income	51 (12.8)	239 (60.0)	54 (13.6)	54 (13.6)	54 (13.6)	54 (13.6)	0.769	0.33 (0.22, 0.43)
Frail elderly	46 (11.6)	181 (45.5)	102 (25.6)	69 (17.3)	69 (17.3)	69 (17.3)	0.032 *	0.40 (0.31, 0.49)
Homebound	25 (6.3)	13 (3.3)	334 (83.9)	26 (6.6)	26 (6.6)	26 (6.6)	0.889	0.27 (0.12, 0.41)
Medically complex	45 (11.3)	257 (64.6)	44 (11.1)	52 (13.1)	52 (13.1)	52 (13.1)	0.477	0.32 (0.21, 0.42)
Mentally compromised	87 (21.9)	119 (29.9)	133 (33.4)	59 (14.8)	59 (14.8)	59 (14.8)	0.021 *	0.27 (0.18, 0.36)
Homeless	39 (9.8)	17 (4.3)	320 (80.4)	22 (5.5)	22 (5.5)	22 (5.5)	0.029 *	0.27 (0.14, 0.41)
Drug user	53 (13.3)	56 (14.1)	237 (59.5)	52 (13.1)	52 (13.1)	52 (13.1)	0.922	0.33 (0.23, 0.44)
Other ethnic group	59 (14.8)	234 (58.8)	29 (7.3)	76 (19.1)	76 (19.1)	76 (19.1)	0.143	0.08 (−0.02, 0.18)
Title XIX	59 (14.8)	146 (36.7)	125 (31.4)	68 (17.1)	68 (17.1)	68 (17.1)	0.425	0.36 (0.27, 0.45)
HIV+/AIDS	48 (12.1)	63 (15.8)	214 (53.8)	73 (18.3)	73 (18.3)	73 (18.3)	0.023 *	0.29 (0.19, 0.39)
In jail	27 (6.8)	11 (2.7)	340 (85.4)	20 (5.0)	20 (5.0)	20 (5.0)	0.307	0.25 (0.10, 0.41)
Non-English speaking	85 (21.4)	127 (31.9)	138 (34.7)	48 (12.1)	48 (12.1)	48 (12.1)	0.001 *	0.34 (0.25, 0.43)

* p-value <0.05 (McNemar's test for improved vs. stayed the same or worse)

Table 4

Bivariate analysis between change of level of comfort (improved vs. same or worse) from pre- to post-community-based clinical experiences in treating each underserved population (excluding subjects who had the comfort score of 5 prior to and immediately after the rotations).

Population group	Gender	Year of graduation	Community-based students' assignments
Low income	0.6912	0.0038*	0.3021
Frail elderly	0.5181	0.9321	0.1837
Homebound	0.7612	0.0845	0.7520
Medically complex	0.7979	0.2311	0.0710
Mentally compromised	0.7875	0.2630	0.2194
Homeless	0.8222	0.3659	0.1316
Drug user	0.6063	0.8202	0.3056
Other ethnic group	0.1922	0.7008	0.5054
Title XIX	0.6286	0.9984	0.1740
HIV+/AIDS	0.1057	0.9011	0.9554
Jail	0.9351	0.4619	0.1502
Non-English speaking	0.3768	0.5093	0.3330

* p value < 0.05 (chi-square statistic test for improved vs. same or worse)

Table 5

Bivariate analysis between change of willingness (improved vs. same or worse) from pre- to post-community-based clinical programs in treating each of the underserved population (N=560).

Population group	Gender	Year of graduation	Community-based students' assignments	Change of comfort level
Low income	0.7679	0.9723	0.7574	0.4627
Frail elderly	0.2963	0.6041	0.9384	0.0266*
Homebound	0.7312	0.8976	0.5092	0.7615
Medically complex	0.7834	0.4939	0.5784	0.0095*
Mentally compromised	0.3883	0.3510	0.6306	0.0033*
Homeless	0.9209	0.4569	0.1354	0.9604
Drug user	0.2997	0.5353	0.4713	0.4862
Other ethnic group	<0.0001*	0.4060	0.4824	0.0698
Title XIX	0.4159	0.4060	0.2432	0.4177
HIV+/AIDS	0.3153	0.8442	0.9340	0.9894
In jail	0.2962	0.1887	0.4479	0.1070
Non-English speaking	0.0690	0.9725	0.1723	0.0315*

* p-value < 0.05 (chi-square statistic test and Fisher's exact test for improved vs. same or worse)