Dental Students and Faculty Members' Attitudes Towards Care for Underserved Patients and Community Service: Do Community-Based Dental Education and Voluntary Service-Learning Matter?

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Abstract: The objectives of this study were to explore 1) how students across the four years of a dental curriculum differed in attitudes towards underserved patients and community service at the beginning and end of each school year; 2) how these attitudes changed as a function of participating in required vs. voluntary community-based activities; and 3) what attitudes faculty members held about the effects of community service-learning on students. Surveys were distributed to 440 students at one dental school at the beginning and end of the school year. The overall response rate for those surveys was 75 percent, with variations among classes: first year, 94 percent; second year, 92 percent; third year, 69 percent; and fourth year, 43 percent. Survey data were also collected from twenty-two students (out of a possible forty-seven) who participated in voluntary service-learning and from fifty-four faculty members (out of approximately 150). The results showed that, at the beginning of the year, the first-year students' attitudes were more positive than the responses of students in all other cohorts. However, at the end of the year, their attitudes were less positive. Participating in voluntary service-learning improved students' attitudes towards treating underserved patients only in the short run, and experiencing ten weeks of community-based dental education did not improve their attitudes. The faculty respondents' attitudes, however, were quite positive. The decrease in students' positive attitudes towards treating underserved patients and participating in community service should raise questions about why this loss of idealism occurred.

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In 2000, the U.S. surgeon general raised awareness about the fact that, despite oral health being essential for general health, not all have access to the oral health care services they need.[1] Since many patients from low-income and/or minority populations face these access to care issues, community dental clinics are of crucial importance for addressing this need.[2] One of the issues that may contribute to this access to care problem may be an insufficient number of dentists who are willing to provide care for these underserved patients,[3] and one explanation for this finding is that dentists might assume that underserved patients are more difficult to treat.[4]

Dental educators can play an important role in addressing this challenge by ensuring that dental students are well educated about the importance of treating patients from all segments of society and have clinical experiences in this area.[5] Studies have repeatedly demonstrated that dental education in classroom, clinic, and community settings shapes future providers' professional attitudes and behavior concerning providing care for underserved patients.[5-10] Community-based dental education (CBDE) has been cited as one major opportunity to create a deeper understanding of these issues.[11] Dental schools therefore have created programs for their students to participate in CBDE, thus providing positive learning experiences for students and needed dental services for the underserved.[12,13] Dental schools intentionally expose students to experiences in the community, dental school-based clinics, and community health clinics to allow them to develop increased knowledge, more positive values, and competence in treating underserved populations.[14]

Research has also found that students who participate in CBDE experience a smoother transition to the life of a dental professional.[15-17] These experiences allow students to place their roles as health professionals into the larger social context and apply what they learn in school to actual professional situations.[15] Evaluations of extramural educational programs indicate that participation improves students' acquisition of clinical skills, facilitates integration of didactic course material, and fosters appreciation of the social, ethical, and cultural aspects of community oral health.[15-17] A study by Holtzman and Seirawan showed that students' attitudes concerning societal expectations, health professionals' responsibility, access to care, and students' personal efficacy to positively impact the need for expanded oral health care services improved.[18] Students' attitudes towards the patients they serve in community service-learning programs have also been shown to improve.[19] However, Valentine and Inglehart found that students' intentions to treat patients covered by Medicaid decreased after exposure to these patients in dental school clinics.[10] In addition, Habibian et al. showed that, over the four-year dental school experience, students' attitudes became less favorable concerning societal expectations, dentist/student responsibility, and access to care after participating in community-based learning.[20]

Based on this past evidence that, on the one hand, stresses the positive contribution of community-based learning to addressing access to care issues and students' attitudes toward underserved populations[13-19] but, on the other hand, points to the sometimes negative impact on students of clinical experiences with underserved populations,[10,20] the objectives of this study were to explore how students' attitudes towards underserved patients and community service differed at the beginning and end of each of the four years at the University of Michigan School of Dentistry. Of special interest is how the fourth-year students' attitudes changed over the course of the school year because they are required to participate in ten weeks of CBDE. Based on previous research, such required activities should result in more positive attitudes towards community service and providing care for underserved patients.[13-19,21]

While many studies have explored the effects of required CBDE, the outcomes of participating in voluntary community service have not been studied as much. Habibian et al. did investigate the effect of students' volunteerism prior to dental school on their attitudes.[20] These authors found that students with more volunteering experiences held more positive attitudes concerning the dentist/student responsibility but did not differ from other students in other attitudes. They therefore argued that these students could be more caring or more aware of the needs of underserved patients and thus might be more sensitized to this subject. They did not, however, track the students who sought out volunteering opportunities at the university outside of their requirements. Reactance theory would predict that students who volunteer will be more positive in their responses concerning activities they choose themselves, while students who are required/forced to participate in certain activities might be less positive to reestablish their sense of freedom of choice.[22] It seems therefore possible that dental students' attitudes can be different after participating in required vs. voluntary community activities. Thus, a second objective of this study was to investigate how students' attitudes changed after voluntary vs. required community-based activities.

A final objective concerns the effort to gain a better understanding of faculty members' attitudes about the benefits of community service-learning for students. Faculty members play a central role in shaping dental students' professional considerations. It is therefore surprising that little research has explored how they approach these matters. While several studies explored how general dentists and specialists differ in their attitudes towards providing care for underserved patients from predoctoral and graduate dental students,[6,8,23-25] only one study investigated how dental faculty members respond to this matter.[26] That research showed that endodontic residents and faculty members had more positive attitudes towards underserved patients with special health care needs, developmental disabilities, and pro bono cases and were more confident when treating patients with developmental disabilities than were private practitioners. The final objective of our study therefore was to investigate how faculty members viewed community-based service-learning and the students' involvement. In summary, this study had the objectives of exploring 1) how students in the four years of the dental curriculum differed in attitudes towards underserved patients and community service at the beginning and end of each school year, 2) how these attitudes changed as a function of participating in required vs. voluntary community-based activities, and 3) what attitudes faculty members held about the effects of community service-learning on students.

Methods

This study was approved by the Institutional Review Board for the Behavioral and Health Sciences at the University of Michigan. Surveys were distributed to 440 dental students at the beginning of the fall term 2011 and again at the end of the winter term 2012 at the University of Michigan School of Dentistry. A survey was also distributed to forty-seven dental students who participated in a voluntary Saturday morning clinic at which free dental care was provided to underserved patients at the dental school. In addition, fifty-four full-time faculty members out of approximately 150 participated in a survey.

At our dental school, students have the opportunity to take part in both voluntary and required community-based activities. In the voluntary experience, students participate in Taft clinics hosted by the school's Jonathan Taft Honorary Society. These clinics provide free dental care for adult dental patients in need on three Saturdays during the academic year. Care provided consists of exams, prophies, radiographs, and restorations with amalgam or composites, and students volunteer to be assistants or providers depending on their clinical knowledge and experience to that point. In addition, CBDE was introduced into the school's curriculum around 1970. It began with students' participation in outreach at county health departments or special dental clinics such as those for migrant farm workers or patients with special health care needs. Since 2001, however, students have been required to participate in CBDE for a specified total number of weeks in their senior year in specifically chosen community-based clinic sites for one- to two-week rotations (2001-04: one or two weeks; 2005-07: three to four weeks; 2008: five weeks; 2009-11: eight weeks; 2011-present: ten weeks).[13]

Procedures and Materials

For this study, surveys were distributed to each class of students at the beginning of a class period. The principal investigator (PI) informed the students about the research and encouraged them to participate. The PI then returned at the end of the class periods and collected the surveys. To increase the response rate of the D4 class, surveys were also emailed to that class, and students were asked to return their responses anonymously. The surveys for student volunteers at the Taft clinics were distributed to each cubicle during the clinic, and students were asked to return surveys at the end of the day to the front desk. Paper copies of the faculty surveys were distributed at a faculty meeting after the research was first explained and were collected at the end of the meeting. Copies of the surveys together with a cover letter explaining the study were also distributed to all full-time faculty mailboxes. A self-addressed return campus mail envelope was attached to the survey to allow the faculty members to return their responses anonymously.

Both the beginning and end of the year surveys for students consisted of four parts. Part 1 asked respondents to provide some demographic information such as year in school. Part 2 focused on assessing students' attitudes towards treating the underserved with six Likert-style questions, to which responses were given on a five-point scale ranging from 1=disagree strongly to 5=agree strongly. Part 3 asked questions about students' voluntary participation in community service activities throughout their dental education. Part 4 focused on the students' attitudes towards community service in general. Seven questions were used to assess these attitudes with responses again ranging from 1=disagree strongly to 5=agree strongly.

A factor analysis (extraction method: principal component analysis; rotation method: Varimax rotation with Kaiser normalization) was conducted with the responses to the six items assessing students' attitudes towards treating underserved patients and the seven items that measured their attitudes towards community service. Since the six items loaded on a first factor and the seven items loaded on a second factor, an index "Attitudes towards underserved patients" was constructed by averaging responses to the six items, and an index "Attitudes towards community service" was computed by averaging responses to the seven items.

The survey used at the three Taft clinics included four of the questions asked at the beginning and end of the school year. Responses were given on a five-point answer scale ranging from 1=disagree strongly to 5=agree strongly. The faculty survey had two parts. Part 1 included five Likert-style items concerning faculty members' general attitudes about how participating in community activities affected students' attitudes, behavioral intentions, and clinical skills concerning providing care for underserved patients. Part 2 consisted of six questions that asked faculty members specifically how students' attitudes,

behavioral intentions, and clinical skills changed after participating in the voluntary Taft clinics. Responses were given on five-point answer scales ranging from 1=disagree strongly to 5=agree strongly. No further information was collected such as information about the respondents' personal or educational background to allow the faculty members to respond anonymously.

Statistical Analyses

All data were analyzed with SPSS (Version 19). Descriptive statistics (frequency distributions, percentages, means, and standard deviations) were computed to describe the responses. Cronbach alpha coefficients were computed to assess the reliability of the scales. Multivariate analyses of variance were used to determine if the responses of the students in the four classes at the beginning of the school year differed significantly. Repeated measurement multivariate analyses of variance were used to analyze if these responses had changed from the beginning to the end of the school year and from the beginning to after the Taft clinic and to the end of the school year. A level of $p<0.05$ was considered significant.

Results

Nearly all of the students in the first (94 percent) and second (92 percent) years responded to the survey. However, the response rates in the D3 and D4 years were lower. Overall, the students' response rate was 75 percent. Approximately equal numbers of male and female students participated, and the respondents were on average twenty-six years of age. The majority of the students were from European American backgrounds (71 percent), with Asian American students being the second most common racial/ethnic group (16 percent). Table 1 provides an overview of the characteristics of these respondents.

While students in the D1, D2, and D3 years (response rate: 94 percent, 92 percent, 69 percent, respectively) have many classes with required attendance, the D4 students do not have any classes they are required to attend because at least one-third of the D4 class is usually outside of the dental school building at any given time for required CBDE rotations. It is therefore not surprising that the D4 class had a lower response rate (43 percent). However, this fact also ensures that the D4 students who were on campus and responded to the survey at the beginning of the fall term had not yet participated in CBDE, like their classmates who were off-campus on rotation when these data were collected. Given that the effects of community-based education on the D4 students' attitudes were supposed to be explored, no effort was made to collect baseline data from the off-campus D4 students after they returned to campus from their rotations.

Thirteen attitudinal items were included in the survey: six items to assess respondents' attitudes towards treating underserved patients, and seven items to measure their attitudes towards community service. At the beginning of the school year, the first-

Table 1. Participating students' demographic characteristics, number, and response rate at beginning of school year

Characteristic	D1	D2	D3	D4	Total
Number of participants	103	98	80	49	330
Response rate	94%	92%	69%	43%	75%
Gender					
Male	48%	58%	56%	49%	53%
Female	52%	42%	44%	51%	47%
Age (in years)					
Mean	23.67	24.90	27.29	26.78	25.66
Standard deviation	2.926	2.998	5.153	2.741	3.851
Ethnicity					
European American	64%	75%	73%	75%	71%
African American	5%	3%	3%	6%	4%
Asian American	19%	15%	16%	13%	16%
Latino/a/Hispanic	1%	2%	3%	0	2%
Other	11%	5%	5%	6%	7%

Table 2. Participating students' average responses at beginning of school year (N=330)

	D1 N=103	D2 N=98	D3 N=80	D4 N=49	p-value	Total
Attitudes towards treating the underserved						
a. Participating in community service activities is a valuable part of dental education.	4.51	4.20	4.20	4.37	0.048	4.32
b. I like to interact with patients from different backgrounds.	4.60	4.44	4.25	4.35	0.038	4.41
c. In my professional life, I plan to treat a diverse patient population.	4.54	4.24	4.27	4.16	0.018	4.30
d. I volunteer my services to underserved patient populations.	4.25	3.83	3.89	3.88	0.012	3.96
e. I feel better about myself when I help the underserved.	4.75	4.35	4.17	4.12	<0.001	4.35
f. I gain just as much as my patient from volunteering my work/time.	4.43	4.04	3.77	3.65	<0.001	3.97
MANOVA: F(18/963)=3.178					<0.001	
Attitudes towards community service						
a. Provides opportunities to put my knowledge to good use outside the classroom.	4.60	4.37	4.50	4.29	0.044	4.44
b. Provides worthwhile opportunities to use my abilities to address community needs.	4.67	4.37	4.39	4.29	0.006	4.43
c. Increases my willingness to help communities by using my abilities and knowledge.	4.52	4.23	4.24	4.02	0.004	4.25
d. Offers opportunities to collaborate with people of diverse backgrounds and interests.	4.63	4.37	4.24	4.22	0.002	4.37
e. Offers ways to connect my career interests to broaden public goals.	4.46	4.02	4.05	3.80	<0.001	4.08
f. Increases my interest in working with others to make the community a better place to live.	4.54	4.17	4.19	4.11	0.003	4.25
g. Deepens my respect for experiences and wisdom of people from backgrounds other than my own.	4.67	4.26	4.07	4.07	<0.001	4.27
MANOVA: F(21/921)=2.24					0.001	

Note: Response options to all items ranged from 1=disagree strongly to 5=agree strongly.

year students had consistently the most positive attitudes towards underserved patients and community service (Table 2). Their average responses to the attitude items concerning treating underserved patients ranged from 4.25 to 4.75, with 5 being the most positive response. Their average responses to the attitude items concerning community service ranged from 4.46 to 4.67. The responses of the students in the other three cohorts were consistently lower.

An analysis of the inter-item consistency of the six items loading on the first factor and the seven items loading on the second factor showed that these scales had high reliability (Cronbach alpha: 0.872 and 0.944, respectively). Indices for these two sets of items were therefore constructed by averaging the responses to each set of items. Figure 1 shows the average indices of the "Attitudes towards underserved patients" and "Attitudes towards community service" of the students in the four cohorts at the beginning of the school year. The first-year students' average attitude towards underserved patients was 4.51, which was significantly more positive than the average responses of the second-, third-, and fourth-year students (4.18; 4.09; 4.09; $p<0.001$). The same pattern was found for the "Attitudes towards community service" index. Again, the first-year students had the most favorable attitudes (Mean=4.58), while the second-, third-, and fourth-year students' responses were significantly less positive (Means=4.26; 4.24; 4.11; $p=0.001$).

While the data presented so far compared the responses of students in the four classes at the beginning of the school year, Table 3 provides information about the average responses of the students who responded at both the beginning and end of each academic year in each of the four classes. The number of students in each class whose responses to the beginning and end of year surveys could be matched was

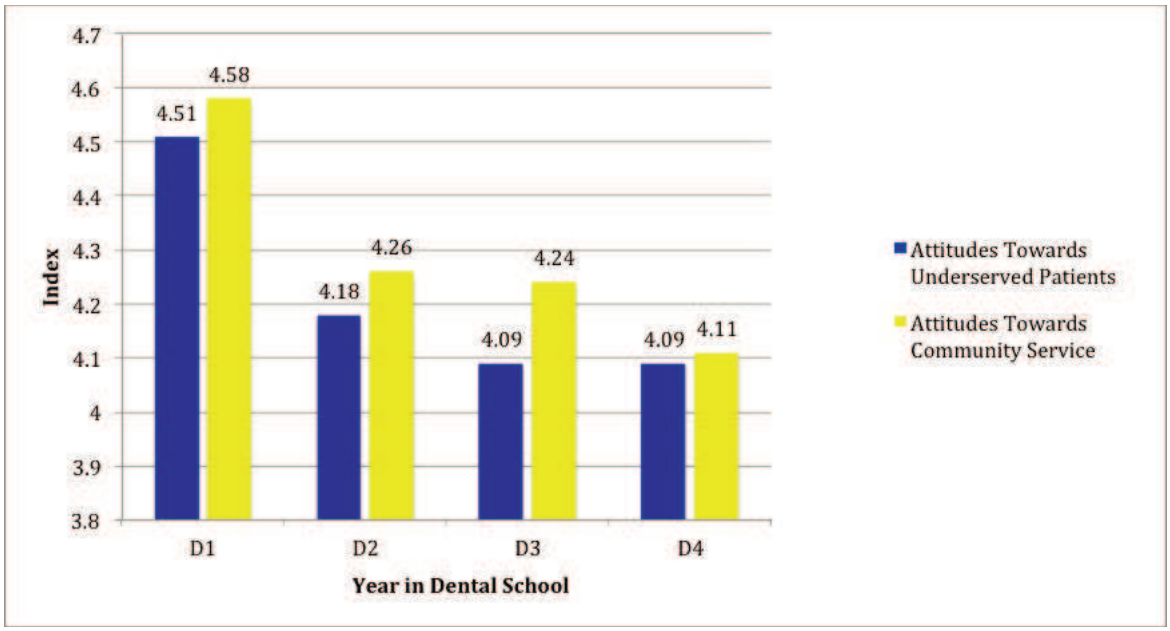

Figure 1. Average attitudes towards underserved patients and community service of participating students in four cohorts at beginning of school year (N=330)

Note: Responses were given on a five-point scale with 1=the most negative and 5=the most positive.

smaller than the number of students who responded to the first survey because the identifying information on the survey was either missing or inaccurate for some of the surveys, which therefore could not be matched. This table shows the significance level of the main effect for the independent variable "Time: beginning vs. end of year" and for the interaction effect "Time x Year in dental school" in the far right column. In addition, the significance levels for the post hoc tests used to compare the individual means of each class at the beginning and at the end of the year are presented in each cell.

The main effect "Time" was only significant for two of the six items of the "Attitudes towards underserved patients" scale. For these items, the end values were significantly less positive than the beginning of the year responses. However, overall, these attitudes had not changed significantly from the beginning to the end of the year. However, the post hoc comparisons showed that all D1 responses but one had been more positive at the beginning of the year than at the end of the year. The results for the "Attitudes towards community service" items show a similar pattern. Again, the overall changes from the beginning to the end of the school year were significant for only one of the seven items. However, the D1 comparisons of five of the seven items were significant and showed that these attitudes had also become less positive by the end of the D1 year.

In addition to analyzing differences between the beginning and end of the academic year, a second objective was to explore whether participation in voluntary community service activities would affect students' attitudes. While a total of forty-seven dental students participated in the three Taft clinics in this academic year, the only data available for analysis were for the twenty-two students who volunteered for the first event in October and for whom survey responses were available from the beginning and end of the school year (Table 4). These students were from all four years (D1: N=8; D2: N=9; D3: N=3; D4: N=2). While the D1 students were unable to volunteer previously at a Taft clinic, all but two of the other students (one D2 and one D3) had volunteered before. On the whole, the students were more positive after the Taft clinic (4.59 vs. 4.22 at the beginning) than at the beginning of the school year. However, their attitudes then became less positive

again by the end of the year (4.37; main effect "Time of year": p=0.002).

While students' voluntary participation in community service showed a short-term improvement in attitudes but no long-term effect, the effects of the required ten-week CBDE rotations of the D4 students can be seen in the results in Table 3. This table shows that the D4 students' attitudes had not

Table 3. Changes in students' attitudes from beginning to end of each year for each class and total, by mean score of students participating at both beginning and end of year (N=204)

	Time	D1 N=74	D2 N=76	D3 N=33	D4 N=21	Total N=204	p-value (time) p-value (t x year)
Attitudes towards treating the underserved							
a. Participating in community service activities is a valuable part of dental education.	Begin	4.55	4.29	4.12	4.48	4.38	n.s.
	End	4.34*	4.34	4.42	3.95	4.31	0.004
b. I like to interact with patients from different backgrounds.	Begin	4.64	4.50	4.36	4.24	4.50	0.015
	End	4.39**	4.38	4.33	4.38	4.38*	n.s.
c. In my professional life, I plan to treat a diverse patient population.	Begin	4.57	4.25	4.27	4.10	4.35	n.s.
	End	4.41*	4.33	4.15	4.00	4.29	n.s.
d. I volunteer my services to underserved patient populations.	Begin	4.19	3.86	3.76	3.81	3.96	n.s.
	End	3.97	3.96	3.85	3.67	3.92	n.s.
e. I feel better about myself when I help the underserved.	Begin	4.72	4.41	4.33	4.14	4.48	0.019
	End	4.38***	4.43	4.36	3.81	4.34*	0.027
f. I gain just as much as my patient from volunteering my work/time.	Begin	4.38	4.09	3.85	3.43	4.09	n.s.
	End	4.16*	4.01	3.82	3.52	3.99	n.s.
Index "Attitudes towards treating underserved patients" (Cronbach alpha=0.872)	Begin	4.51	4.23	4.12	4.03	4.29	0.071
	End	4.28***	4.24	4.16	3.89	4.20***	0.026
Attitudes towards community service							
a. Provides opportunities to put my knowledge to good use outside the classroom.	Begin	4.59	4.44	4.52	4.32	4.49	n.s.
	End	4.44	4.49	4.48	4.16	4.44	n.s.
b. Provides worthwhile opportunities to use my abilities to address community needs.	Begin	4.71	4.44	4.38	4.32	4.52	n.s.
	End	4.46***	4.51	4.38	4.05	4.24	n.s.
c. Increases my willingness to help communities by using my abilities and knowledge.	Begin	4.56	4.27	4.28	4.00	4.35	n.s.
	End	4.34*	4.37	4.24	3.68	4.27	0.067
d. Offers opportunities to collaborate with people of diverse backgrounds and interests.	Begin	4.66	4.45	4.24	4.21	4.47	0.044
	End	4.43**	4.47	4.07	4.11	4.36*	n.s.
e. Offers ways to connect my career interests to broaden public goals.	Begin	4.46	4.15	4.10	3.68	4.21	n.s.
	End	4.27*	4.33	3.97	3.79	4.20	0.033
f. Increases my interest in working with others to make the community a better place to live.	Begin	4.56	4.23	4.21	4.21	4.35	n.s.
	End	4.44	4.43	4.31	3.84	4.36	0.024
g. Deepens my respect for experiences and wisdom of people from backgrounds other than my own.	Begin	4.70	4.33	3.93	4.05	4.38	n.s.
	End	4.44***	4.37	4.07	3.74	4.27	0.021
Index "Community service-learning" (Cronbach alpha=0.944)	Begin	4.60	4.33	4.24	4.11	4.40	0.107
	End	4.40***	4.42	4.22	3.91	4.33	0.027

Note: Response options to all items ranged from 1=disagree strongly to 5=agree strongly. The significance levels for the post hoc tests used to compare the individual means of each class at the beginning and at the end of the year are presented in each cell.

*p<0.05; **p<0.01; ***p<0.001

Table 4. Comparisons of participating students' average responses at beginning of year, after participating in the volunteer Taft clinic, and at end of year (N=22)

Attitudes Towards Treating the Underserved	Beginning of Year	After Taft Clinic	End of Year	p-value
Participating in community service activities is a valuable part of dental education.	4.36	4.82	4.64	0.033
I like to interact with patients from different backgrounds.	4.59	4.64	4.41	0.318
I feel better about myself when I help the underserved.	4.50	4.82	4.59	0.025
I gain just as much as my patient from volunteering my work/time.	4.05	4.82	4.05	<0.001
Index "Taft clinic responses" (Cronbach alpha: 0.843)	4.22	4.59	4.37	0.002

Note: Responses were given on a five-point scale with 1=disagree strongly, 2=disagree, 3=neither agree nor disagree, 4=agree, and 5=agree strongly.

changed significantly from the beginning to the end of the school year—despite their extensive participation in community-based education.

Table 5 provides an overview of the fifty-four faculty members' responses concerning their attitudes towards the students' involvement in community activities in general and regarding their voluntary participation in the Taft clinics. The absolute majority of the faculty members were positive or very positive concerning community service-learning in general. The least positive response was regarding the statement "Participating in a community service activity would make students more likely to treat underserved patients in the future" (mean: 3.70).

Table 5. Participating faculty members' attitudes towards students' involvement in community service in general and at the Taft clinic (N=54)

How much do you agree/disagree with the statement?	1	2	Mean 3	4	5	SD
When students participate in community service:						
• they gain a valuable asset to their dental education.	6%	2%	0	26%	67%	4.46 1.023
• they benefit from working with patients from diverse backgrounds.	6%	2%	2%	22%	69%	4.46 1.041
• they can make a difference and provide benefit to the patients they serve.	6%	2%	6%	30%	57%	4.31 1.061
• they gain just as much as the patients from volunteering their work and time.	6%	2%	15%	28%	49%	4.13 1.110
• they are more likely to treat the underserved in their future.	4%	7%	30%	33%	26%	3.70 1.057
Regarding the Taft clinics at the school:						
• they allow students to put their knowledge to use outside of the classroom.	6%	4%	10%	39%	42%	4.08 1.100
• students should take the time to volunteer at these clinics.	6%	2%	10%	46%	37%	4.06 1.037
• participating in these is a valuable asset to students' dental education.	6%	2%	14%	40%	39%	4.04 1.066
• they allow students to gain more confidence in working with underserved patients.	4%	8%	10%	39%	40%	4.04 1.084
• they offer ways to connect the students' career interests to broader public goals.	4%	8%	17%	37%	35%	3.90 1.089
• they allow students to improve their skills in working with underserved patients.	6%	8%	19%	29%	39%	3.87 1.189

Note: Responses were given on a five-point scale with 1=disagree strongly, 2=disagree, 3=neither agree nor disagree, 4=agree, and 5=agree strongly.

However, the majority agreed/strongly agreed with this statement.

The faculty responses concerning the students' voluntary participation in the Taft clinic were overwhelmingly positive. High percentages agreed or strongly agreed that the students should take the time to volunteer at these clinics (83 percent), that the Taft clinics allow the students to put their knowledge to use outside of the classroom (81 percent), and that participating in these clinics is a valuable asset to the students' dental education (79 percent) and allows them to gain more confidence in working with underserved patients (79 percent). In addition, 72 percent agreed or strongly agreed that the Taft clinics offer ways to connect the students' career interests to broader public goals, and 68 percent agreed or strongly agreed that this type of activity improves students' skills concerning working with underserved patients.

Discussion

The first objective of this study was to explore how students in the four years of the dental curriculum differed in their attitudes towards underserved patients and community service-learning at the beginning and end of each school year. The most striking finding was that the first-year dental students held the most positive attitudes at the beginning of the year. However, by the end of the year, their attitudes had become significantly less positive. This loss of idealism deserves attention. Research with medical students[27,28] and interns/residents[29] documented a similar loss of idealism over the course of predoctoral and graduate programs. In the dental setting, Holtzman and Seirawan[18] talked about loss of idealism over the course of dental education programs, and Habibian et al.[20] discussed the decline of attitudes in this context. If dental education has the goal of educating future dentists with a strong sense of civic responsibility, the causes of this loss of idealism need to be understood in order to prevent a decline of willingness to treat underserved patients over the course of the curriculum. Future research needs to focus on this problem and explore the impact of such factors as dental students' increasing educational debt rates,[17,30] as well as specific challenges in treating underserved patients. For example, a lack of oral health literacy of some of these patients might negatively affect dentists' sense of building rapport with their patients and having successful patient-dentist encounters. Ultimately, these challenges could interfere with dental students' and dentists' level of comfort when providing care and their willingness to interact with certain groups of patients.[9]

The second objective of this study was to investigate how dental students' attitudes towards underserved patients and attitudes towards community service-learning changed as a function of participating in required vs. voluntary community service. The senior dental students are required to spend ten weeks in community-based settings. If this required CBDE was having a positive effect on students' attitudes, these seniors' attitudes should have been more positive at the end compared to the beginning of their final year. However, as Table 3 showed, no significant positive changes in the students' responses were found. To the contrary, the average index "Attitudes towards underserved patients" actually became slightly more negative at the end of the academic year (4.29 vs. 4.20; $p<0.001$). While this difference is small, it should nevertheless raise an interest in gaining a better understanding of why no positive changes occurred. Previous studies found support for the fact that dental education can contribute to overcoming access to care issues because research repeatedly demonstrated that dental education indeed shaped dentists' professional attitudes and behavior concerning providing care for underserved patients.[5-10] Community-based education is one major opportunity to create a deeper understanding of these issues.[11-13] Being exposed to experiences in the community allows dental students to develop more positive values and competence concerning treating underserved patients.[14] Despite all this evidence for the positive value of required community-based learning,[15-19] some studies found no positive or even a negative impact on students' willingness to treat underserved patients.[10,20] One potential moderating factor might be the type of experiences students have. For example, Valentine and Inglehart found that the more severe the problems that dental students encountered when treating patients covered by Medicaid, the less they enjoyed treating these patients, and the less likely they were to intend to provide care for them in the future.[10] One question in response to these findings is how to best educate dental students about the context of these patients' lives and thus help them develop a deeper understanding of the causes of the problems these patients face. Future research could explore whether interprofessional education with social work, medical, and nursing students would improve the outcomes of community-based educational experi-

ences.[31] A second moderating factor could be how well the community-based education was structured and organized. For example, Rohra et al. showed that the better structured CBDE experiences had been, the more likely alumni were to work with underserved patients in the long run.[11]

In our study, voluntary participation in community service-learning resulted in a short-term improvement of dental students' attitudes. However, this short one-day experience, not surprisingly, did not result in a long-term change. Future research should therefore explore if longer and more involved voluntary community-based activities would affect dental students more positively in the long run and also how prior volunteering experiences would affect these responses.

The final objective of this study was to assess dental faculty members' attitudes towards community service-learning. The findings showed that a strong majority held very positive attitudes towards community service-learning in general and the volunteer activities involved in the Taft clinics. However, it should be a concern that 8 percent of the faculty respondents held rather negative attitudes towards community service-learning and the volunteer activities. Faculty members are opinion leaders who can affect students' attitudes. Future research should explore the reasons why some faculty members seemed to be opposed to community service-learning and/or treating underserved patients. Of special interest is the question whether part-time faculty members who work in their own private practices and merely spend half a day or a day per week in dental school clinics might be fully informed about the value of community-based education. In addition, if some faculty members, for example, share their own beliefs that private practices suffer financial loss when providing care for patients covered by Medicaid, such opinions might affect dental students' evaluations of these situations.

This study had several limitations. First, these data were all collected at one dental school. Other dental schools might approach educating their students about providing care for underserved patients in a different way and might thus achieve different outcomes. Second, the community-based activities consisted of a one-day voluntary activity and ten weeks of required CBDE in one specific year of the curriculum. Other activities such as mission trips to other countries or differently structured voluntary or CBDE programs might impact students' attitudes in a more persistent way. Future research should therefore explore the effect of different types of community-based education. In addition, it would be worthwhile to investigate whether previous volunteering activities in high school, college, or dental school affected students' attitudes. Concerning the required CBDE, it seems possible that the length of this rotation could also affect students' attitudes. For example, a shorter required community rotation would not affect the students' work in the dental school setting with their own patients as much as a ten-week (or even longer) required activity. In addition, our school's students were only sent for one or a maximum of two weeks to each of the community-based sites. It might be possible that spending longer periods of time in the same sites would allow the students to gain a deeper understanding of the social and cultural setting in which they become immersed. Future research should therefore analyze how the different types of required community-based education used by various U.S. dental schools shape their students' attitudes.

One additional limitation was that it was difficult to match responses to the survey at the beginning of the year with responses at the end of the year. The students were asked to write their mother's birthday on each survey to allow matching of their responses, while keeping the responses anonymous. However, quite a number of students did not write a date on the survey or wrote different dates. Their data could therefore not be matched. This fact explains why the number of responses in Table 2 (which presents the beginning of the year results) differs from the number of responses of each class in Table 3. However, a comparison of the means at the beginning of the year in Tables 2 and 3 showed that these scores did not differ substantially.

A further limitation is the fact that the response rate of the D4 students was relatively low compared to the other three cohorts. This fact however is directly related to the required CBDE in which these students participate because it takes them out of the dental school environment where the surveys were administered in classes. Response rates to electronically distributed surveys tend to be much lower than to paper-pencil surveys. A review reported that web-based surveys tend to have a low response rate and that this response rate to electronic surveys declined over the past years considerably.[32] A recent study that compared response rates to surveys mailed vs. electronically administered to dentists found that mailed response rate (28 percent) was far better than for web-based surveys (11 percent).[33] In consideration

of these results, the D4 response rate was actually acceptable.

Finally, the response rate of the faculty members was only around 35 percent. This might be due to the fact that the topic of the survey was related to clinical activities. Classroom-based faculty members might have been less likely to respond.

Conclusion

In this study, D1 students at the beginning of their dental education were significantly more positive towards providing care for underserved patients and towards community service than students in the older cohorts. However, a loss of idealism seemed to occur from the beginning of the D1 year to the end of the D1 year. A short voluntary community service-learning activity led to a short-term improvement of the participating students' attitudes. However, a longer required community-based educational experience did not result in positive changes. Faculty members were overwhelmingly positive concerning community service activities. Nevertheless, future research should explore the reasons why certain faculty members held rather negative attitudes in this context.

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