Interest In Pursuing The Specialty Of Periodontology: A Perspective From Pre-doctoral Periodontal Directors And Periodontics Residents

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A thesis submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Masters of Science in the School of Dentistry (Periodontology).

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Abstract

Imani Edward Lewis, DDS: Interest in pursuing the specialty of periodontology: A perspective from pre-doctoral periodontal directors and periodontics residents (Under the direction of Antonio Moretti, DDS, MS, Salvador Nares, DDS, PhD, and Ceib Phillips, PhD)

Interest in periodontics as a career by dental students remains low compared to other dental clinical specialties. The purpose of this research is to report the perceived value of periodontal education and general enthusiasm toward periodontics, characterize pre-doctoral periodontal curricula and modes of instruction utilized by dental schools in the United States, and to investigate the main factors that influence pre-doctoral dental students to pursue periodontics as a career. The participants in this study were pre-doctoral periodontal directors and periodontics residents. The directors associated greater resident involvement in the pre-doctoral program with increased barriers to a career in periodontics. Residents reported a favorable relationship with periodontal faculty and exposure to periodontics procedures among factors that impacted career choice. The results of this study may increase interest in periodontics and improve dental education. This study may also assist programs, schools, and professional organizations in strategic recruitment and planning.

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Thesis Introduction

Periodontology is one of nine dental specialties recognized by the American Dental Association (ADA). A periodontist has been defined by the American Academy of Periodontology (AAP) as a dentist specialized in the prevention, diagnosis, and treatment of diseases affecting the gingiva and supporting structures of the teeth, and in the placement of dental implants.[1] Periodontics, in the United States, was officially recognized as a specialty of dentistry in 1947. The first university-based programs for the training of specialists in periodontics were established at Columbia University, University of Michigan, and Tufts University in the late 1940s.[2] Within the next decade, these one year programs expanded into two-year programs. At that time, graduates were only conferred a certificate of periodontology. Presently, there are over fifty university- and hospital-based graduate periodontics programs located within the United States. All of these programs are three years in length, and graduates receive a certificate in the specialty of Periodontics. Many programs also require the completion of a master's degree.

Periodontitis has classically been described as an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both [2]. Although

considered the primary etiology of periodontal disease, bacterial biofilm alone is insufficient for the development and progression of periodontal disease.[3] In 1999 at the World Workshop of Clinical Periodontics, an updated classification system for periodontal diseases and conditions was developed.[4]

Periodontal disease progression can be modified by a complex interplay of several factors. The host immune response has been deemed essential in the clinical expression of periodontitis.[5,6] Associations have also been made with periodontal infection and diabetes,[7-9] cardiovascular diseases,[10-12] stroke,[13,14] respiratory diseases,[15] kidney diseases,[16] obesity,[17] osteoporosis,[18] and adverse pregnancy outcomes.[19,20] The negative impact of behavioral patterns, such as cigarette smoking, on the periodontium in the U.S. population has been described.[21] The influence on genetic variation and periodontal disease has also been reported.[22]

Epidemiological studies have attempted to determine the prevalence of periodontitis within the U.S. population. Variances in results have been credited to inconsistencies in the clinical definition of periodontal disease. When the U.S. Public Health Service defined periodontitis as the identification of at least one site with clinical attachment loss (CAL) of ≥ 2 mm, approximately 80 percent of adults were affected.[23] When the third National Health and Nutrition Examination Survey (NHANES III) defined periodontitis as at least one site of CAL of ≥ 4mm, the prevalence declined to 50 percent.[23] When periodontal disease was defined as CAL of ≥ 6 mm, the prevalence dropped to less than 20 percent[24] Using pockets of ≥ 4 mm to define periodontal disease, Oliver et al. reported 30 percent of the adult population met the criterion on at least three to four teeth.[25] Regardless of how

periodontal disease has been defined, a significant proportion of the U.S. population experiences destructive loss of periodontal supporting tissues. These patients must be identified and appropriately managed by dental professionals.

In 1984, the American Association of Dental Schools developed guidelines for pre-doctoral student education in periodontal disease management and referral. These changes were designed to encourage dental educators to modify pre-doctoral dental school curricula to provide more exposure and training to pre-doctoral students to manage and treat early to moderate periodontal disease.[26] These actions expanded the scope of practice of general dentistry, resulting in a greater number of general dentists performing more extensive periodontal procedures including: scaling and root planing, crown lengthening, and pocket reduction surgery.[27]

In the 1990s, periodontics was presented with two distinct, but related challenges. The specialty was experiencing a decrease in the number of applications to post-doctoral periodontal programs, and practicing periodontists reported that the number of referrals from general dentists was also declining. Leaders of the AAP speculated these trends were due to the alterations in guidelines of the American Association of Dental Schools and an increase in the length of periodontal residency programs from two to three years.[26]

In order to examine these concerns, the AAP commissioned a study entitled "Determinants of Predoctoral Students Interests in Specialty Training in Periodontics & An Examination of Periodontal Referrals from General Dentists." This study was

conducted in 1997 by Dr. Thomas Konrad from the Cecil G. Sheps Center for Health Sciences, at the University of North Carolina at Chapel Hill. Konrad completed a nationwide survey that sampled a cohort of pre-doctoral third-year dental students (n=936), post-doctoral periodontal residents (n=482), periodontal program directors and department chairs (n=132), and practicing general dentists (n=1,286).[28]

Konrad's analysis suggested several factors that may be responsible for the decline in both quantity and quality of applicants to periodontics:

- increased numbers of post-doctoral general dentistry programs;
- increased length of the post-doctoral periodontal programs;
- increased financial debt from pre-doctoral education in combination with the minimal stipends available for post-doctoral periodontal programs;
- an increase in numbers of underserved areas leading to greater need for opportunities for general dentists;
- the effect of determinants of specialty choice and job satisfaction;
- the effect of the greater distribution of the applicant pool on specialty choice

Konrad reported that the tendency of general dentists to refer to a periodontist was most critically impacted by the availability of a referral network and a positive interaction with periodontal faculty while in dental school. Evidence that better pre-doctoral educational preparation in periodontics alone decreased the willingness of general dentists to refer to a periodontist was limited.

The American Dental Association's (ADA) 2005-2006 *Survey of Advanced Dental Education* supported the suspicions of the AAP. Interests from pre-doctoral

dental students to pursue periodontics declined from 2003-2006. The number of applications received and first year enrollment for the nine dental specialties, general practice residency (GPR) programs, and advanced education in general dentistry (AEGD) programs were also compared in this study. The number of applications received from those interested in pursuing periodontics as a career was much less compared to some of the other clinical specialties.[29] A more recent publication illustrated an increase in the number of applicants to periodontics from 2006-2009; however, the level of interest in periodontics remains well behind the other specialties.[30]

A comprehensive assessment of pre-doctoral periodontal education and its impact on pre-doctoral dental students' choice to pursue a career in periodontics has not been reported in the literature. The aims of this study were to: investigate the main factors that influence pre-doctoral dental students to pursue periodontics as a career, to report the perceived value of periodontal education and general enthusiasm toward periodontics, and to characterize pre-doctoral periodontal curricula and modes of instruction (clinical and didactic) utilized by dental schools within the United States**.**

This study was completed by a national survey of pre-doctoral periodontal directors and first year periodontics residents. Survey methods outlined by Salant and Dillman were used.[31] One hundred and fifty-four post-doctoral periodontics students were sampled. Eighty-two surveys were returned, resulting in an individual response rate of 53 percent and an institutional response rate of 57 percent. Fifty-six pre-doctoral directors were included in this study. Forty-one surveys were

returned for a response rate of 73 percent. The response rates for each group was acceptable compared to what has been published in the literature.[32]

Third-year pre-doctoral dental students were also invited to participate; however, insufficient data was collected to be included in this analysis. Only 19 percent of responses were received. Pre-doctoral periodontal directors were sampled because they have the responsibility of establishing and implementing the periodontics curriculum at their institution. The participation of first-year periodontics residents were sought because they chose to pursue a career in periodontics and have a high recall bias of their dental school experience.

Pre-doctoral directors associated the presence of a graduate periodontics program and moderate to substantial involvement of periodontics residents in the pre-doctoral program with increased barriers to a career in periodontics ($p<0.001$). Periodontics residents reported a favorable relationship with periodontal faculty and being encouraged to perform surgical periodontal procedures ($p=0.01$) among positive factors that influenced career choice.

The outcomes of this study may identify factors that potentially will increase interest in periodontics and improve dental and, in particular, periodontal education. Additionally, the results of this study may assist programs, schools, and professional organizations in strategic recruitment and planning.

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Interest in pursuing the specialty of periodontology: A perspective from pre-doctoral periodontal directors

Introduction and Literature Review

The American Dental Education Association (ADEA) recently established competencies for general dentists designed to emphasize the connections between periodontal disease and systemic disease.[1] Specifically, curriculum reform surrounding the relationship between periodontal infection and negative systemic health outcomes have gained substantial interest.[2] Even with the increased emphasis in the pre-doctoral curriculum on the importance of periodontal health, pre-doctoral dental student interest in pursuing a career in periodontics and enrollment in graduate periodontics programs remains low compared to some of the other dental specialities.[3,4] A total of 1,270 applications were submitted to periodontics residency programs and 171 students were enrolled in 2005-06. That same year, 10,077 applications were submitted to orthodontics programs, 7,131 to oral surgery programs, and 5,052 to pediatric dentistry programs.[3] In 2008-09, the number of applications to periodontics residency programs increased slightly to 1,654 and 180 students were enrolled.[4]

In medicine, student background, ability, and personality have been suggested as factors that impact career choice.[5] In 1995, Bland et al. suggested

that student career choice was associated with three factors: student characteristics, type of school, and students' perception of medical specialty characteristics.[6] In dentistry, studies examining factors that influence dental specialty career choice have mainly involved orthodontics and pediatric dentistry. Intellectual stimulation/challenge and passion for orthodontics were cited as being influential in the choice of a career in orthodontics.[7] The decision to become an orthodontist was made by 42 percent of the respondents while in dental school; 33 percent decided after completing dental school; and 24 percent had already decided before entering dental school.[7] Faculty interaction with residents, availability of salary or stipend, and amount of clinical experience while in dental school, were among factors that influenced the decision of choosing a pediatric dentistry residency.[8] To date, no similar studies have been reported in periodontics.

The purpose of this study was to characterize the pre-doctoral periodontal curricular structure and modes of instruction (clinical and didactic) used by dental schools within the United States and to assess the perceptions of pre-doctoral periodontal program directors regarding pre-doctoral student career choice. The outcomes of this study may potentially assist periodontics programs in increasing pre-doctoral student interest in pursuing a career in periodontics. Moreover, it may assist programs, schools, and professional organizations in strategic recruitment and planning.

Methods and Materials

A cross-sectional survey of pre-doctoral periodontal program directors, approved by the Institutional Review Board at the University of North Carolina at Chapel Hill (UNC-CH), was conducted between September 2009 and January 2010. The survey, developed in Teleform format, consisted of 18 close-ended or Likert-scale items focused on institutional characteristics and the perceptions of pre-doctoral periodontal directors.

Instrument development and testing

Survey questions were derived from a previously published work by Konrad[9] and were adapted to meet the research aims. The survey was organized into six sections: 1) demographics and institutional characteristics; 2) pre-doctoral curriculum structure; 3) the number of pre-doctoral students enrolling in a graduate periodontics program; the perceptions of the pre-doctoral directors regarding 4) the periodontal faculty's clinical and research expertise; 5) the attitudes of dental students toward periodontics, and 6) barriers that prevent Doctorate of Dental Surgery (DDS) students from pursuing periodontics as a career.

Data Collection

The survey was mailed to all pre-doctoral training directors in accredited University-based periodontal programs (18 private and 38 public) within the U.S as reported by the American Academy of Periodontology (AAP). Canadian institutions were excluded. The survey methods outlined in Salant and Dillman[10]

were used as a guide. A cover letter describing the study, the questionnaire, and a postage-paid return envelope were sent to each pre-doctoral director. A follow-up letter was mailed approximately three weeks later to the directors who had not responded. A third contact letter, along with another copy of the questionnaire, was sent to non-respondents three to four weeks after the second letter. The surveys were numerically coded to protect the anonymity of respondents. A linkage file was maintained to prevent replicate mailings to respondents. The admissions office of each institution was contacted by phone to obtain the average DDS class size. This information was used with the number of students reported by the pre-doctoral director as enrolling in a periodontal graduate program to estimate the institution's residency enrollment rate. The linkage file was destroyed after the third mailing.

Analysis

Because of the small sample size, all Likert-scale responses were dichotomized as agree (strongly agree / agree) or disagree (disagree / strongly disagree) prior to analysis. Fishers Exact tests were performed to assess the effect of institutional characteristics, curricular structure, and the pre-doctoral director's perception of faculty expertise at the DDS institution and student attitudes on the residency enrollment rate and barriers to students pursuing periodontics as a career choice. Level of significance was set at 0.05.

Results

Surveys were distributed to 56 pre-doctoral periodontal directors. Forty-one completed surveys were returned, a response rate of 73 percent. The non-response rates from private (28%) and public institutions (26%) were approximately equal. The majority (60%) of the pre-doctoral directors have held their directorships for greater than four years. Sixty-nine percent of the responding directors were employed at public institutions. Eighty percent of the respondent institutions have a graduate periodontics program. The estimated enrollment rate in periodontal residency programs was less than 1 percent for 10 percent of the institutions. The data from only two directors (5%) suggested a periodontal graduate enrollment rate that exceeded 5 percent of the pre-doctoral class size.

Although all institutions use a traditional lecture format in the pre-doctoral curriculum, most use other modes of instruction as well. Fifty-one percent reported Integrated Medical Sciences with the majority combining this approach with Problem-based learning, General practice model, and/or Case-based instruction. Only three institutions reported traditional lecture as the only method of instruction. Overall, the average number of faculty providing pre-doctoral periodontal instruction were four full-time periodontists, six part-time periodontists, and six periodontics residents. Private institutions reported utilizing more part-time periodontists than public institutions (eight versus five). For institutions with a graduate program, private institutions also rely more heavily on

periodontics residents to provide instruction than public institutions (ten versus six).

The majority (58%) of institutions provide more than three didactic courses in the pre-doctoral curriculum while only 28 percent reported providing more than three pre-clinical laboratory courses. Faculty/student interaction in didactic courses typically began in the first year of dental school (75%) while only 37 percent reported faculty/student pre-clinical interaction within the first year of training. Very few institutions (17%) have dental students treat their first periodontal patient within the first year of dental school (Table 1). Sixty-five percent of the pre-doctoral periodontal directors consider the surgical expertise of the periodontal faculty to be excellent.

Forty-four percent of the directors considered the periodontics faculty at their institutions had established a level of expertise in research. The majority (83%) of the faculty serve as research mentors to pre-doctoral students (Table 1). Despite this trend, only 20 percent rated the faculty research mentorship of pre-doctoral students as excellent. Moreover, only 12 percent considered pre-doctoral student involvement in periodontal research as excellent.

When asked about their perceptions of the attitudes held by pre-doctoral dental students toward periodontics (Table 2), 85 percent of the directors agreed that pre-doctoral students believed periodontics was an essential part of comprehensive care and 90 percent agreed that students were able to appropriately identify and refer periodontal patients. However, only 29 percent of

the directors agreed that students considered periodontics to be a desirable career option. An overwhelming majority of the directors agreed that the length of residency training (68%), tuition expense of residency (85%), amount of educational debt (98%), and limited post-doctoral stipend opportunity (90%) all negatively impact the willingness of pre-doctoral students to pursue a career in periodontics. Pre-doctoral periodontal directors also listed a lack of comprehensive understanding of periodontics upon graduation from dental school (34%) and negative experiences during pre-doctoral training (17%) as barriers (Table 3).

For the institutions with a graduate program, 91 percent of the directors considered periodontics residents as good resources for the pre-doctoral students for the diagnosis and treatment of periodontal conditions. Eighty-eight percent reported that residents were utilized to oversee clinical instruction of pre-doctoral students and 88 percent reported that periodontal residents and pre-doctoral students work as a team during the treatment of periodontal patients. Only 42 percent reported that residents provided didactic instruction (Table 4).

None of the institutional characteristics, curricular structure factors, or perceptions of the pre-doctoral directors regarding the faculty or pre-doctoral student attitudes or barriers were statistically significantly associated with the estimated enrollment rate of DDS students into graduate periodontal programs ($P > 0.48$). Interestingly, the proportion of the pre-doctoral directors who perceived the most barriers to periodontics as a career choice was significantly higher ($P< 0.001$) for those from an institution with a graduate program compared to those

from an institution without a graduate program (Figure 1). Considering only those institutions with a graduate periodontal program, pre-doctoral directors who perceived the greatest resident involvement in the pre-doctoral program were more likely to agree that a higher number of barriers to pursuing periodontics as a career existed for DDS students ($P<0.001$) Fig 2.

Discussion

Among the limitations of this study were the limited sample size (41 completed surveys received, 73 percent response rate) and very few institutions without graduate periodontics programs responded (n=8). As a result, it was challenging to make definitive comparisons between institutions with/without advanced training programs in Periodontics.

Konrad in 2000 suggested that periodontics is a specialty that is attractive as a career to up to 20 percent of third-year dental students[9] and yet the number of applicants to graduate periodontal programs is considerably lower than other specialty programs.[3,4] Very few of the pre-doctoral directors (37.5%) in this study reported more than three DDS students entering graduate periodontal programs. Pre-doctoral periodontal directors were surveyed because they have direct contact with the pre-doctoral students and are responsible for establishing the pre-doctoral periodontal curriculum at their institutions. They are in position to report their perceptions of the attitudes of pre-doctoral students toward periodontics, as well as, encourage DDS students pursue a career in periodontics.

Although all participating institutions in this study use a traditional lecture format, most use other modes of instruction in their pre-doctoral curriculum as well. Problem-based learning, Case-based learning, and Patient-based learning are among the most popular education methods to teach the principles of evidence based dentistry.[10] In addition to assisting educators transmit dental

knowledge, these modes of instruction have been shown to positively affect patient care outcomes. Although these modes may not affect general dental knowledge, Thammasitboon reported that students who participated in Problem-based learning were significantly better in communicating with patients, critical thinking, independent learning, performance in small group settings, self assessment, and team work than those students who were educated using traditional lecture format.[12] In a comparison of preclinical and pre-doctoral periodontics performance, Rich et al. discovered that students that experienced problem-based teaching performed better than those that received traditional lecture instruction on midterm Objective Structured Clinical Examinations (OSCE) and final OSCE examinations.[13] Richards et al. suggested that interdisciplinary, case-based learning increased students' appreciation of the complexity of patient care and of a patient-centered, culturally sensitive approach to diagnosis and treatment planning.[14] This could prove helpful in increasing student appreciation of the connections between periodontal disease and systemic disease[1,2] and therefore, potentially, students' interest in a career in periodontics.

Mentorship has been identified as a factor that can positively influence career choice in dentistry.[15] Hempton et al. contends that sustaining the quality of and growth of periodontics depends on a constant influx of talented individuals to both practice periodontics and educate future members of the profession.[16] The Department of Periodontology at Tufts University School of Dental Medicine (TUSDM) has implemented a culture of mentorship designed to increase the

interest of pre-doctoral students in periodontology and graduate student interest in teaching through graduate student mentorship of each other, pre-doctoral students during clinical experiences, and the participation in a periodontal study club that is sponsored by private specialty practices and local dental societies.[16] The overwhelming majority (83%) of the directors reported serving as research mentors to pre-doctoral students, and 88 percent expressed pre-doctoral students collaboration with periodontal residents during patient care.

In his analysis of pre-doctoral students, Konrad identified the presence of a graduate periodontics program, sense of team work between periodontics residents and pre-doctoral students, and strong faculty student interaction as factors that tend to foster interest in a career in periodontics.[9] The results of this survey do not support these findings. In fact, the pre-doctoral directors associated the presence of a graduate periodontics program and, considering only those institutions with a graduate program, strong resident interaction with pre-doctoral students with an increased number of barriers to pursuing periodontics as a career ($p<0.001$).

The findings of this study suggest that the role of residents in pre-doctoral education may need to be deemphasized. Residents should not be used as surrogates for experienced educators. Greater efforts shall be made in the recruitment, development, and retention of full- and part-time faculty who are experienced and passionate about teaching.

Future studies should go beyond the perceptions of the pre-doctoral directors and assess the opinions of pre-doctoral dental students and periodontal residents. Qualitative assessments of pre-doctoral periodontal education should also be completed.

Table 1. Curriculum structure of pre-doctoral periodontics programs

Variable	N	%	N	%
# of Didactic Courses in Periodontics	0-3 Courses		>3 Courses	
	17	43	23	58
# of Preclinical Laboratory Sessions in Periodontics	0-3 Sessions		>3 Sessions	
	29	73	11	28
Faculty/Student Interaction (Didactic Courses)	In 1st Year		After 1st Year	
	30	75	10	25
Faculty Student Interaction (Clinical Supervision)	In 1st Year		After 1st Year	
	15	37	26	63
Dental students treat first perio patient	In 1St Year		After 1st Year	
	7	17	34	83
Perio Faculty as Research Mentors to Predoctoral Students	Yes		No	
	33	83	7	18
Presence of Perio Residency Program	Yes		No	
	32	80	8	20

Table 2. Directors' perception of the attitudes of pre-doctoral students at their dental school

Perception of Predoctoral Students' Attitudes	Agree		Disagree	
	N	%	N	%
Periodontics is obstacle to comprehensive care	20	49	31	51
Perio patients referred --students don't like completing periodontal procedures	9	22	21	78
Students able to identify and refer patients with advanced periodontal needs	37	90	4	10
Resist referring perio patients -- ensure completion of restorative requirement	16	41	23	59
Encouraged to perform surgical periodontal procedures	32	78	9	22
Periodontics is an essential part of comprehensive care	35	85	6	15
Periodontics is a desirable career option	12	29	29	71

Table 3. Directors' perception of barriers that may prevent pre-doctoral dental students at their institution from pursuing a career in periodontics

Perceived Barriers	Agree		Disagree	
	N	%	N	%
3-year commitment for training	28	68	13	32
Tuition Expense	35	85	6	15
Student loan balance	40	98	1	2
Limited postdoctoral stipend	35	90	4	10
Negative experience with periodontics	7	17	34	83
Lack of comprehensive understanding of periodontics	14	34	27	66

Table 4. Considering only those institutions with a graduate program, directors' perception of graduate periodontics program at their dental school

Perception of graduate periodontics program	Agree		Disagree	
	N	%	N	%
Residents teach in pre-doctoral didactic courses	14	42	19	58
Residents oversee pre-doctoral clinical treatment	28	88	4	13
Residents are good resources for periodontal diagnosis and treatment	30	91	3	9
Residents and pre-doctoral students work as a team during surgical therapy	29	88	4	12
Little interaction between residents and pre-doctoral students	20	49	21	51

Figure 1. Bivariate analysis of presence of graduate periodontics program and perception of barriers to a career in periodontics ($p<0.001$)

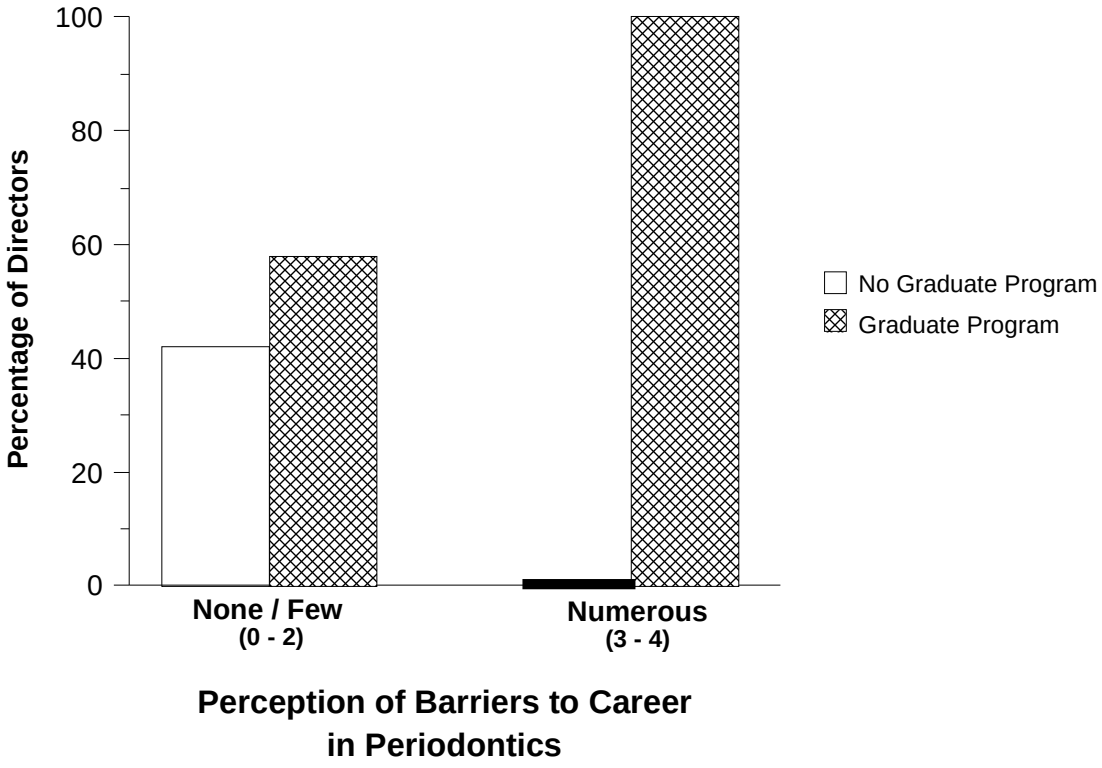
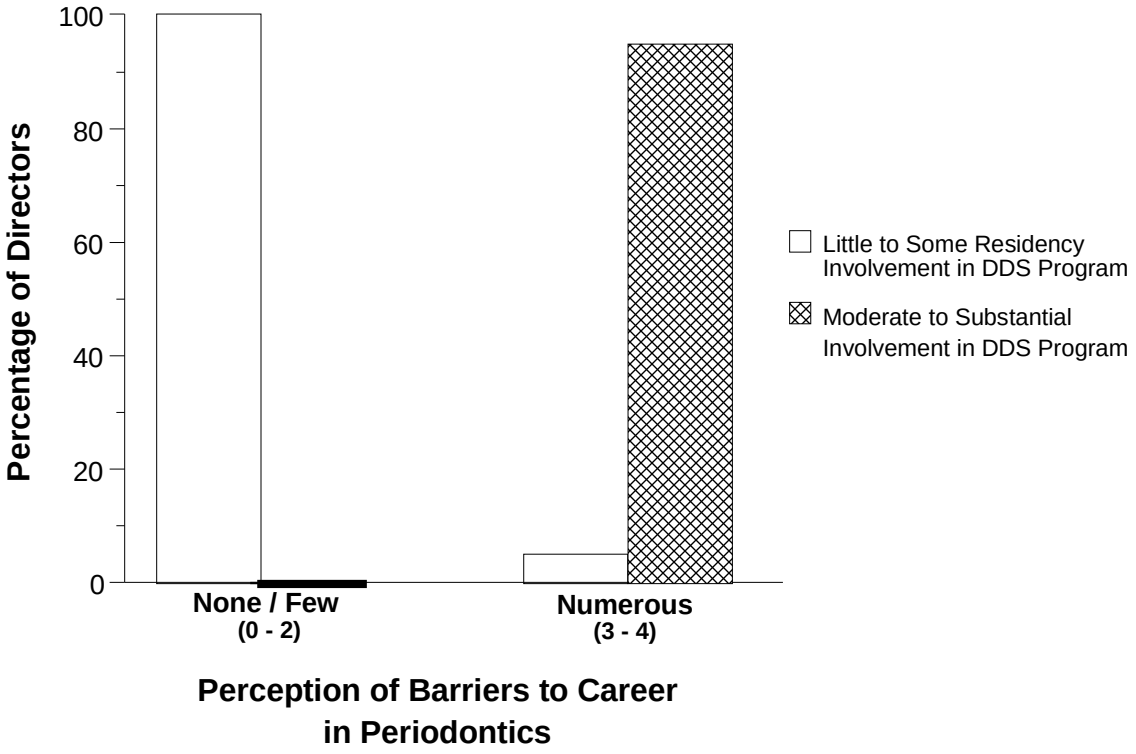


Figure 2. Bivariate analysis of resident interaction with pre-doctoral students and perception of barriers to a career in periodontics (p<0.001)



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Interest in pursuing the specialty of periodontology: A perspective from periodontics residents

Introduction and Literature Review

In 1984, the American Association of Dental Schools developed guidelines for pre-doctoral student education in periodontal disease management. These changes were designed to encourage dental educators to modify pre-doctoral dental school curricula to provide more exposure and training to pre-doctoral students to manage and treat early to moderate periodontal disease.[1] These actions expanded the scope of practice of general dentistry, resulting in a greater number of general dentists performing more extensive periodontal procedures including scaling and root planing, crown lengthening, and pocket reduction surgery.[2] These changes as well as an increase in the duration of periodontal programs from two to three years are perceived to have potentially negatively impacted enrollment of students into advanced education programs in periodontics in the 1990s.[3]

The overall ratio of general dentists to specialists has remained relatively constant over time. Total enrollment for each of the recognized dental specialties, except oral and maxillofacial pathology, periodontics, and prosthodontics, increased from 1990-2000.[3] A period of declining interest in periodontics was

experienced from 2003-2006 according to the American Dental Association's (ADA) 2005-2006 *Survey of Advanced Dental Education.*[4] A recent publication illustrated a slight increase in the number of applicants and enrollment in graduate periodontics programs from 2006-09.[5] Despite this current trend, the desire of students to pursue a career in periodontics appears inferior when compared to some of the other dental specialties. A total of 1,270 applications were submitted to periodontics residency programs and 171 students enrolled in 2005-06.[4] That same year, 10,077 applications were submitted to orthodontics programs, 7,131 to oral surgery programs, and 5,052 to pediatric dentistry programs.[4] In 2008-09, the number of applications to periodontics residency programs increased to 1,654 and 180 students enrolled.[5]

In the dental profession, studies examining factors that influence dental specialty career choice have mainly focused on orthodontics and pediatric dentistry. In an evaluation of orthodontic residents, intellectual stimulation/challenge and passion for orthodontics have been cited as being influential.[6] The decision to become an orthodontist was made by 42 percent of the respondents while in dental school; 33 percent decided after completing dental school; and 24 percent had already decided before entering dental school.[6] Faculty interaction with residents, availability of salary or stipend, and amount of clinical experience, while in dental school, were among factors that influenced the decision of choosing a pediatric dentistry residency.[7] To date, no similar studies have been reported in periodontics.

The objectives of this study were 1) to characterize the pre-doctoral periodontal curricula and modes of instruction (clinical and didactic) used by the dental schools at which the residents received their pre-doctoral training; 2) to report the general enthusiasm of pre-doctoral students toward periodontics at the dental school at which the residents received their pre-doctoral training as perceived by the residents; and 3) to assess factors that influenced post-doctoral periodontics residents to pursue this specialty as a career.

The outcomes of this study may identify factors that will aid graduate periodontics programs in increasing interest in periodontics residency and periodontics as a career. This study may also assist programs, schools, and professional organizations in strategic recruitment and planning.

Methods and Materials

A cross-sectional survey of first year periodontics residents, approved by the Institutional Review Board at the University of North Carolina at Chapel Hill (UNC-CH) School of Dentistry, was conducted between September 2009 and January 2010. The survey, developed in Teleform format, consisted of 16 close-ended or Likert-scale items focused on institutional characteristics and the perceptions of the residents.

Instrument development and testing

Survey questions were derived from a previously published work by Konrad[8] and were adapted to meet the stated research aims. The survey was organized into six sections: 1) demographics; 2) curriculum structure and teaching modalities used at the institution where the Doctor of Dental Surgery Degree (DDS) or its equivalent was earned; and the residents' perception of the 3) clinical and research expertise of the periodontal faculty at their DDS institution; 4) attitudes of pre-doctoral dental students toward periodontics at their DDS institution; 5) influences that attracted respondents to pursue periodontics as a career; and 6) future profession plans after completion of periodontics residency.

Data Collection

The survey was mailed to all post-doctoral training directors in accredited University-based periodontal programs (14 Private and 33 Public) within the U.S as reported by the American Academy of Periodontology (AAP). Each director

was asked to distribute the surveys directly to each first-year resident at their program. Completed surveys were returned by the advanced program director. The number of first-year residents at each program was provided by the AAP. Canadian, hospital, and military periodontal programs were excluded.

The survey methods outlined in Salant and Dillman[9] were used as a guide. A cover letter describing implied consent and the study, the survey, and a postage-paid return envelope was sent to each post-doctoral periodontal director. A follow-up letter was mailed approximately three weeks later to the directors who had not responded. A third contact letter, along with another copy of the survey, was sent to non-respondents three to four weeks after the second letter. The surveys were numerically coded to protect the anonymity of the institution and the respondents. A linkage file was maintained to prevent replicate mailings to respondents. The linkage file was destroyed after the third mailing.

Analysis

Fishers Exact tests were performed to assess the effect of demographic (age and prior experience to residency), curricular structure (number of didactic and preclinical courses), perception of faculty expertise at the DDS institution (research and clinical), and perception of student attitudes at the DDS institution on each of the career decision items. For the bivariate analyses, the response options for the decision choices were combined as disagree (strongly disagree or disagree) or agree (agree or strongly agree). Level of significance was set at 0.05.

Results

One hundred and fifty-four surveys were mailed to 47 University-based postdoctoral periodontal programs. Eight-two surveys from first-year residents were returned for a resident response rate of 53 percent. No responses were received from six private institutions and 13 public institutions yielding an institutional response rate of 57 percent.

Sixty percent of the residents were male. Seventy-two percent of respondents received their DDS (or its equivalent) training from a public university. Thirty-eight percent reported graduating within the top 10 percent of their DDS class. Almost half (47%) reported owing over $100K in educational debt prior to entering specialty training. The majority (56%) of the respondents did not enter directly into periodontics residency after dental school (Table 5). Eighteen percent practiced as a general dentist prior to entering specialty training. The remainder completed advanced training in a general dentistry residency (AEGD/GPR), served in the Dental Corps in one of the Armed Services, and/or earned a master's degree or PhD.

Although virtually all (99%) of the residents reported that their pre-doctoral institutions used traditional lecture format, 57 percent reported the use of Case-based learning. Eighteen percent reported the use of all listed approaches (lecture, seminar, required readings, problem-based learning, and laboratories) except distance learning. Approximately 40 percent (37.5%) of the first-year

residents reported completing more than three periodontal didactic courses during pre-doctoral training (Table 6).

Forty-four percent of the residents described the periodontal faculty research activities at their pre-doctoral institutions as excellent but only 30 percent reported receiving excellent faculty research mentorship. In contrast, 62 percent of the respondents described the quality of the clinical periodontal training provided at their DDS institution as excellent. Fifty percent reported excellent multidiscipline interaction as well. However, only 22 percent had more than three pre-clinical periodontics laboratory sessions.

When asked about their perceptions of the attitudes held by pre-doctoral students at the residents' pre-doctoral institution towards periodontics (Table 7), 72.8 percent of the residents believed their classmates regarded periodontics as an essential part of comprehensive care; however, 70 percent of the residents were not confident that their classmates were able to appropriately identify and refer periodontics patients. Sixty-nine percent stated that pre-doctoral students liked completing periodontal procedures, but only 50 percent thought that DDS students were encouraged to perform surgical periodontal procedures. A minority of respondents (30%) believed that pre-doctoral students at their DDS institutions consider periodontics a desirable career option.

When asked to describe the factors that influenced their decision to pursue a career in periodontics, 94 percent reported the desire to help people by treating their periodontal disease; 86 percent cited exposure to periodontal

procedures, and 77 percent reported a favorable relationship with the periodontal faculty. Training in dental implants was a factor for 48 percent of the residents and 61 percent found the prestige of being a specialist appealing. Only 12 percent had a friend/relative who is a periodontist and 4 percent reported that periodontics was not their first choice of specialty (Table 8).

Neither age, number of didactic course devoted to periodontics, or the perception of periodontics as a "desirable career option" were associated with any of the influences on the career choice and none of the demographic, faculty expertise, curricular, or perception factors were related to "exposure to periodontal procedures" as a reason for entering a residency ($P>0.06$). Previous experience prior to residency was the most consistent explanatory factor on the influences on career choice. Those with previous experience were significantly more likely to cite dental implantology as a reason for choosing periodontics and marginally more likely to cite "prestige" while those with no prior experience were significantly more likely to cite "a favorable relationship with periodontal faculty and marginally more likely to cite "earning a comfortable living" as important influences on their career choice (Table 9, Figure 3) Residents who chose "ability to help people" tended to be influenced by the residents' positive perceptions of the clinical expertise of the faculty at their respective DDS institutions ($P<0.001$). All of the residents (100%) who perceived their undergraduate faculty as clinically excellent in at least two of the attributes (multi-disciplinary interaction, clinical instruction, surgical expertise) agreed that a desire to help people was an important career choice. Encouragement of DDS

students to perform surgical procedures (P<0.01), and to be involved in pre-doctoral research (P=0.05) (Figure 3) were positive factors for citing “a favorable relationship with periodontal faculty while in dental school.” Interestingly, of those residents who reported having three or more preclinical sessions, only 38 percent citing “prestige” as an influence while 72 percent of those who had fewer than three cited “prestige” as an influence. Perception of faculty research expertise was not a positive factor on the desire to learn implant dentistry as an influence on career choice. Only 34 percent of those who rated at least two of the faculty research attributes (activities, expertise, and mentorship) as excellent while 60 percent of those who rated none or only one faculty research as excellent cited dental implantology as an influence on career choice.

Discussion

Pre-doctoral dental student interest in pursuing a career in periodontics and enrollment in graduate periodontics programs remains low compared to some of the other dental specialities.[4,5] First year periodontal residents were surveyed because they have chosen a career in periodontics and would be expected to have a reasonable recall of their dental school experience. Thirty percent of the respondents thought that their dental school classmates viewed periodontics as a desirable career option. As reported in our previous study, this perception was shared by pre-doctoral periodontal program directors. Twenty-nine percent of the directors perceived that pre-doctoral students find periodontics to be a desirable career option. In addition, the pre-doctoral directors perceived that the presence of a graduate program and greater resident involvement in the pre-doctoral program was associated with an increased number of barriers to pursuing periodontics as a career.

In medicine, student background, ability, and personality have been suggested as factors that impact career choice.[10] In 1995, Bland et al. suggested that medical student career choice was associated with three factors: student characteristics, type of school, and students' perception of medical specialty characteristics.[11] Males who were exposed or involved with surgery during medical school and were active experiential learners were more likely to enter a surgical residency.[12] The first-year periodontal residents who responded to this survey were more likely to be male (60%), have attended a public dental school (72%), had a favorable relationship with periodontal faculty (77%), and

had dental experience or training after completion of a DDS or equivalent program (56%).

Sixty-two percent of the residents considered the clinical instruction of the periodontal faculty clinical instruction to be excellent. In a SWOT (strengths, weaknesses, opportunities, and threats) evaluation of pre-doctoral education at twenty dental schools, from the perspective of dental students, Henzi reported that clinical instruction was the most frequently expressed strength.[13] Irby proposed four key factors that differentiate excellent clinical faculty from others: 1) serves as a positive role model of a competent and compassionate health care provider, 2) provides effective supervision and mentoring for leaders, 3) employs a varied and dynamic approach to teaching, and 4) is a supportive person.[14] The importance of clinical faculty as positive role models is supported by the association between the residents' positive perception of faculty clinical expertise at their respective DDS institution and the reasons for choosing periodontics as a career reported by the first-year residents, specifically the desire to help people, and the favorable relationship with periodontal faculty as a pre-doctoral student.

Student perception of learning environment can also impact the dental school experience and career choice. Zakariasen et al. described an effective learning environment in dental school as one that has a positive interactive instructor, "big picture" instruction that focuses on relevant material, demonstrations, peer interaction, and a culture that values more than performance.[15] Murphy adds that the learning environment can be improved by

educators being aware of differing student learning styles to assist effectiveness of their methods of instruction.[16]

Several modes of instruction were reported to be utilized in periodontal instruction. The most common were lecture (99 percent), Case-based learning (57 percent) and Problem-based learning (45 percent). Although Thammasitboon did not find that Problem-based learning impacted general dental knowledge, significant differences ($p<0.05$) between students educated using problem-based learning and those using traditional lecture format were found for communication with patients, critical thinking, independent learning, performance in small group settings, self assessment, and team work.[17] In a comparison of preclinical and pre-doctoral periodontics performance, Rich et al. discovered that students that experienced problem-based teaching performed better than those that received traditional lecture instruction on midterm OSCE and final OSCE examinations.[18]

The dental profession is experiencing a shortage of faculty. The American Dental Education Association (ADEA) has expressed concerns about faculty retention and recruitment.[19] Similar concerns are shared within the periodontal community. Among the dental specialties, periodontics had the most drastic increase in vacant faculty positions, increasing from twenty-five in 2000-01 to forty-five in 2001-02.[20] Lack of periodontal faculty within the dental schools may lead to incomplete understanding of the scope of periodontics and its role in clinical practice.[19] The overwhelming majority (86.6%) of the residents plan to enter into private or associate practice within the U.S. Sixty percent reported that

they also aspire to an academic position, either part-time or full-time. To address faculty shortages in times of economic restraint, efforts have been made to attract and increase reliance on adjunct faculty.[19] This strategy, among others, may address shortages in "faculty man-power" but may also compromise continuity of patient care. The findings of this study could positively impact the shortage of faculty to teach both pre- and post-doctoral periodontics.[20]

A career in periodontics is attractive to a select minority of dental students. The most important influences on career choice are the desire to help people by treating their periodontal disease, exposure to periodontal procedures, and a favorable relationship with periodontal faculty. The desire to place dental implants and financial comfort moderately impacted career choice. The number of didactic courses devoted to periodontics had no effect. Institution specific efforts should be made to cultivate the relationship between periodontal faculty and students. For example, periodontal faculty should be more open to serving as research mentors and should actively encourage students to perform periodontal surgical procedures. Such efforts will allow dental educators to gain better knowledge of the profile of students interested in periodontics and will lead to strategic recruiting of students interested in periodontics as a career. Future studies should directly access the perceptions of the pre-doctoral dental students.

The study was limited by the inability to determine if the respondents' dental training was received within the United States. In periodontics advanced education programs, the number of U.S. and Canadian enrollees and graduates

has decreased, while the number of enrollees and graduates that are not U.S. or Canadian citizens has increased.[3]

Table 5. Post-doctoral periodontics student demographics

Variable	N	Percent (%)
Gender		
Male	48	60
Female	32	40
Year of DDS graduation		
2009	34	41
Other	48	59
Class rank at DDS graduation		
Top 10%	31	38
Other	51	62
Total Education Loans Owed at DDS graduation		
0-100K	41	53
> 100K	37	47

Table 6. Characteristics of pre-doctoral periodontics program at institution from which the residents graduated

Variable	N	Percent (%)
Type of Institution where received DDS		
Public	54	72
Private	21	28
# of Didactic Courses in Periodontics		
0-3	50	62.5
>3	30	37.5
#of Preclinical Sessions in Periodontics		
0-3	64	78
>3	18	22

Table 7. Residents' perception of attitudes of pre-doctoral dental students toward periodontics at the dental school from which they graduated

Perception of Pre-doctoral Student Attitudes	Agree N	Agree %	Disagree N	Disagree %
Periodontics is an essential part of comprehensive care	59	73	22	27
Able to identify and refer patients with advanced periodontal needs	23	30	55	70
Encouraged to perform surgical periodontal procedures	40	50	40	50
Periodontics is a desirable career option	24	30	56	70
Referred periodontal patients because they do not like completing periodontal procedures	24	31	54	69
Resisted referring periodontal patients to ensure completion of restorative requirement	38	49	40	51
Periodontics is an obstacle to comprehensive care	37	45	45	55

Table 8. Factors that influenced decision to pursue specialty training in periodontics

Influences on Decision	Strongly Agree		Agree		Disagree		Strongly Disagree	
	N	%	N	%	N	%	N	%
Favorable relationship with periodontal faculty	30	37	33	40	18	22	1	1
Exposure to periodontal procedures	26	32	44	54	9	11	2	3
Help people by treating their periodontal disease	22	27	55	67	5	6	0	0
Dental implantology	14	17	25	31	38	46	5	6
Attracted to prestige of being a specialist	12	16	37	45	27	33	5	6
Periodontist earn a comfortable living	6	7	45	56	27	33	3	4
Relative/friend is a periodontist	4	5	6	7	30	37	41	51
Did not want to be a general dentist	3	4	29	35	31	38	19	23
Did not get into specialty of choice	0	0	3	4	15	19	63	78

Table 9. Bivariate analysis of explanatory variables and periodontics decision factors (p-values)

	Help People	Earn Comfortable living	Exposure to Perio Procedures	Favorable Relationship with perio faculty	Attracted to prestige	Dental Implants
Age	0.58	0.16	0.32	0.65	0.23	0.61
Previous Experience	0.65	0.06	1.00	**0.01**	0.06	**0.01**
# didactic course	0.63	1.00	0.73	0.78	0.81	0.06
#preclinical sessions	0.58	1.00	1.00	0.33	**0.02**	0.58
Faculty Research Expertise	1.00	1.00	1.00	1.00	1.00	**0.04**
Predoc Student Involvement in research	0.36	0.81	0.71	**0.01**	0.15	0.16
Faculty Clinical Expertise	**0.01**	0.81	1.00	1.00	0.34	1.00
Encouraged to perform surgical procedures	0.15	0.60	0.67	**0.01**	1.00	0.80
Positive career	1.00	1.00	0.71	0.56	0.61	0.31

Figure 3. Influence of previous experience on periodontal career choice

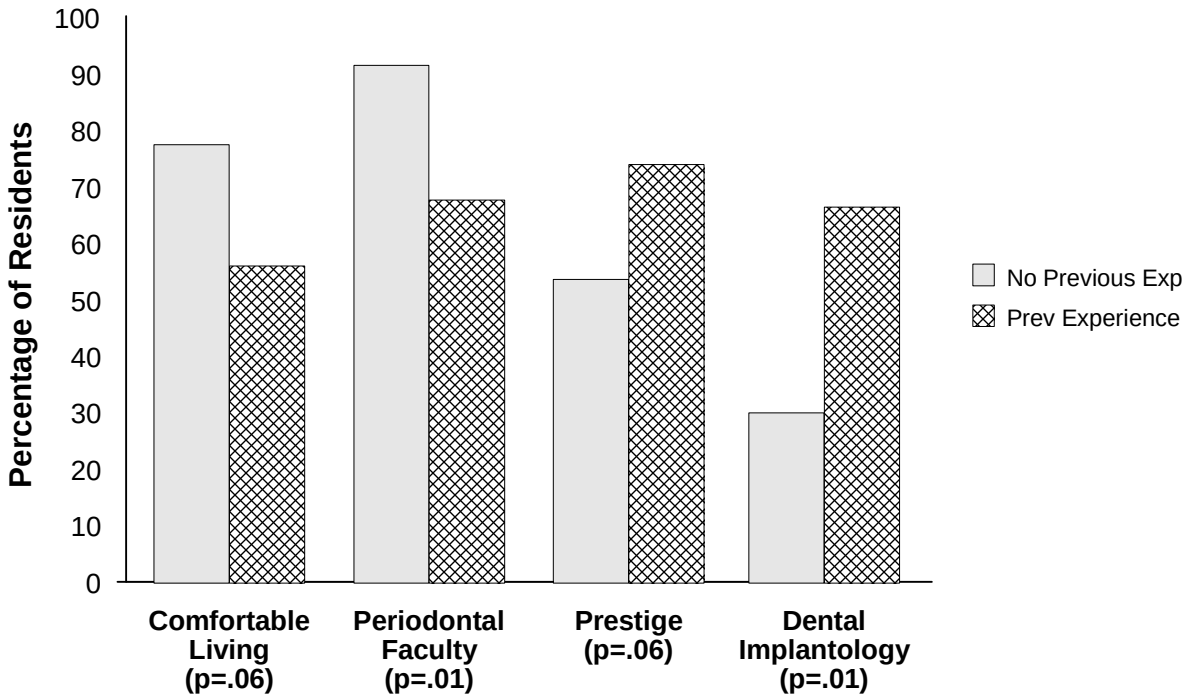
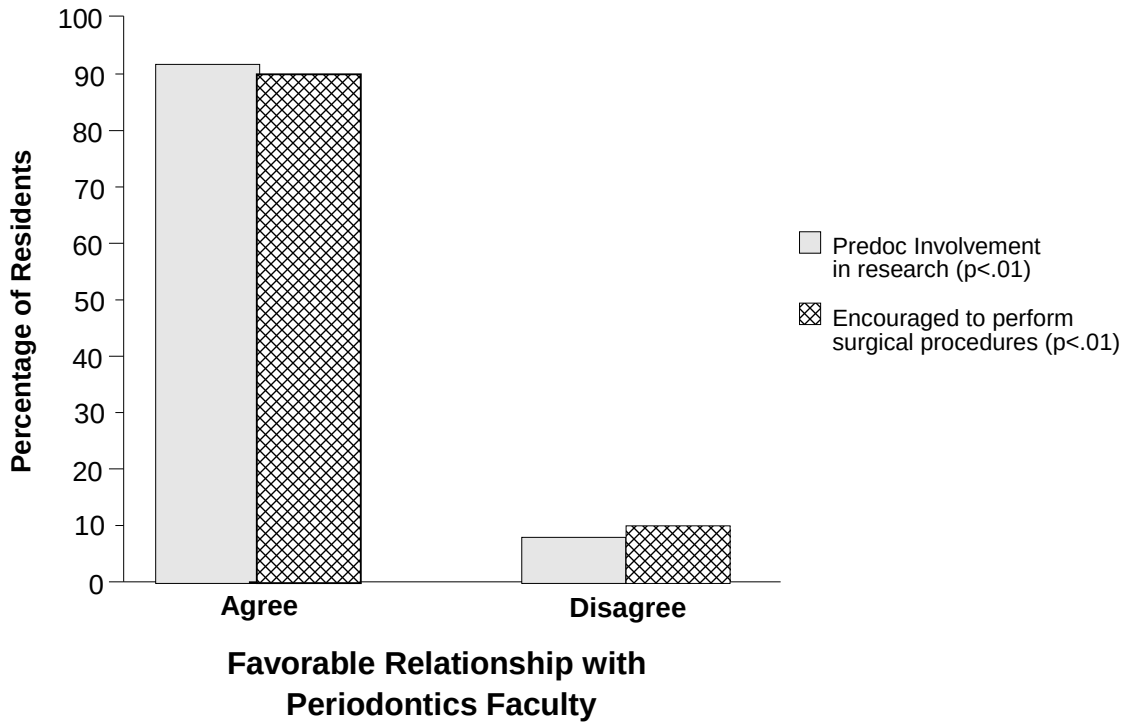


Figure 4. Favorable relationship with periodontics faculty



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Appendix A. Confidential survey of pre-doctoral periodontal directors

UNC SCHOOL OF DENTISTRY

CONFIDENTIAL SURVEY OF PREDOCTORAL PERIODONTAL DIRECTORS

ID #: ☐☐☐☐

1. Is your institution? ○ Public ○ Private

2. How many years have you held your current position?

○ Less than 1 year ○ 1-2 years ○ 3-4 years ○ 5-6 years ○ More than 6 years

3. The predoctoral dental curriculum at your institution utilizes the following Periodontal teaching modalities: (choose ALL that apply.)

○ Formal lecture
○ Seminars
○ Required readings (Text book/scientific journals)
○ Other (Electives, Internships) Explain: _____

4. The predoctoral dental curriculum at your institution has the following structure: (choose ALL that apply.)

○ Traditional Discipline/Lecture Based Instruction
○ Integrated Medical/Dental Sciences
○ Problem-Based Learning
○ General Practice Model
○ Case-Based Teaching
○ Computer Based/Distance Learning

5. Altogether, how many didactic courses in the predoctoral dental curriculum devote the majority of course content to Periodontics?

○ 0 ○ 1 ○ 2-3 ○ 4-5 ○ 6 or more

6. Altogether, how many preclinical sessions or laboratory courses in the predoctoral dental curriculum devote the majority of course content to Periodontics?

○ 0 ○ 1 ○ 2-3 ○ 4-5 ○ 6 or more

7. How would you rate the following research characteristics of your Periodontics department / division?

	Excellent	Good	Poor
Faculty Research Activities	○	○	○
Faculty Research Expertise	○	○	○
Faculty Research Mentorship	○	○	○
Predoctoral Student Involvement in Periodontal Research	○	○	○

8. How would you rate the clinical characteristics of your Periodontics department / division?

	Excellent	Good	Poor
Faculty Clinical Instruction	○	○	○
Faculty Surgical Expertise	○	○	○
Interaction with other Disciplines/Departments	○	○	○

Revised 02/2009

CONFIDENTIAL SURVEY OF PREDOCTORAL PERIODONTAL DIRECTORS - Page 2 | **ID #:**

9. Periodontal faculty and dental students interact during which years of matriculation for the following activities?

Didactic courses: ○ 1-4 ○ 1-2 ○ 1-2-3 ○ 3-4 ○ 2-3 ○ 2-3-4

Clinical Supervision: ○ 1-4 ○ 1-2 ○ 1-2-3 ○ 3-4 ○ 2-3 ○ 2-3-4

10. Dental students treat their first Periodontal patient: ○ Year 1 ○ Year 2 ○ Year 3 ○ Year 4

11. Do Periodontal faculty act as research mentors to predoctoral students? ○ Yes ○ No

12. Within the last two years, how many DDS graduates from your school entered a Periodontics residency program?

○ 0 ○ 1 ○ 2-3 ○ 4-5 ○ 6 or more

13. The following questions relate to your perception of the attitudes of predoctoral dental students at your dental school. Indicate one response for each question.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. Periodontics is regarded by many predoctoral dental students as an obstacle to comprehensive care.	○	○	○	○
b. Many predoctoral dental students refer patients with periodontal problems because they do not like performing periodontal procedures.	○	○	○	○
c. Most predoctoral dental students are able to identify and refer patients with advanced periodontal needs.	○	○	○	○
d. Many predoctoral dental students resist referring patients with periodontal problems to ensure fulfillment of restorative and prosthodontic requirements.	○	○	○	○
e. Predoctoral dental students are encouraged to perform surgical periodontal procedures.	○	○	○	○
f. Periodontics is regarded by many predoctoral dental students as an essential part of comprehensive care.	○	○	○	○
g. Periodontics is regarded by many predoctoral dental students as a desirable career option.	○	○	○	○

14. Below are possible "barriers" that may prevent predoctoral dental students at your dental school from pursuing a career in Periodontics. Indicate your level of agreement that each item is a barrier.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. 3-year commitment to earn certificate	○	○	○	○
b.Postdoctoral tuition expense	○	○	○	○
c. Student loan balance at end of predoctoral training	○	○	○	○
d. Limited postdoctoral stipend opportunity	○	○	○	○
e. Negative experience with Periodontics during predoctoral training	○	○	○	○
f. Lack of comprehensive understanding of Periodontics	○	○	○	○

CONFIDENTIAL SURVEY OF PREDOCTORAL PERIODONTAL DIRECTORS - Page 3 | **ID #:**

The following questions relate to the Periodontal teaching faculty at your dental school.

15. The teaching faculty that provides periodontics instruction to predoctoral dental students at your school consists of: Please indicate which type of faculty and the number.

- ○ Full-time Periodontist ☐☐
- ○ Part-time Periodontist (instruct at least once/month) ☐☐
- ○ Postdoctoral Periodontal students ☐☐
- ○ Full-time Dental Hygienist ☐☐
- ○ Part-time Dental Hygienist (instruct at least once/month) ☐☐
- ○ Full-time General Dentist ☐☐
- ○ Part-time General Dentist (instruct at least one/month) ☐☐

16. The following questions relate to your perception of students entering graduate Periodontics programs. Please indicate your level of agreement with the following statements. Indicate one response for each question.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. The top dental school graduates are entering general practice rather than pursuing specialty training.	○	○	○	○
b. The top dental school graduates are choosing another specialty over Periodontics.	○	○	○	○

17. Does your institution have a graduate Periodontics program? ○ Yes (Continue) ○ No (End)

18. Please try to characterize the graduate Periodontics program at your dental school by indicating your agreement or disagreement with the statements. Indicate one response for each question.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. Periodontal postdoctoral students teach in the didactic courses to predoctoral students.	○	○	○	○
b. Periodontal postdoctoral students oversee clinical treatment performed by predoctoral students.	○	○	○	○
c. Periodontal postdoctoral students are good sources of information about diagnosis and treatment of periodontal conditions.	○	○	○	○
d. Periodontal postdoctoral and predoctoral students work as a team during the surgical phase of periodontal treatment.	○	○	○	○
e. There is little interaction between Periodontal postdoctoral students and predoctoral dental students.	○	○	○	○

THANK YOU!

Appendix B. Confidential survey of post-doctoral periodontal students

UNC SCHOOL OF DENTISTRY

CONFIDENTIAL SURVEY OF POSTDOCTORAL PERIODONTAL STUDENTS

ID #: ☐☐☐☐

1. Year born? 19☐☐ **2. Year graduated as DDS?** 20☐☐ **3. Gender?** ○ Female ○ Male

4. Name of Institution:

School where you received your dental degree: _____

Was your DDS/DMD institution? (choose ONE) ○ Public ○ Private

5. Upon graduation from dental school, your rank in class was? (choose ONE)

○ In the top 10% ○ In the top 25% ○ Other ○ Don't know

6. Upon graduation from dental school, how much in total education loans did you owe? (choose ONE)

○ $ 0-50K ○ $ 50-100K ○ $ 100-150K ○ $ 150-200K ○ $ >= 200K

7. Prior to your entrance into periodontal specialty training, did your experience include? (choose ALL that apply.)

○ Working as a general dentist in a private/group specialty practice
○ Advanced training in general dentistry (GPR/AEGD)
○ Dental Corps in one of the Armed Services
○ Public Health Service/Indian Health Service/National Health Service Corps
○ Masters Degree or Ph.D. training in related field (public health, biological science)
○ None of the above

8. Which of the following Periodontal teaching modalities did your predoctoral dental curriculum include? (choose ALL that apply.)

○ Formal lecture
○ Seminars
○ Required readings (Text book/scientific journals)
○ Preclinical laboratories
○ Distance learning modules
○ Case-based learning
○ Problem-based learning
○ Other (Electives, Internships) Explain: _____

9. Altogether, how many didactic courses in your predoctoral dental curriculum devoted the majority of course content to Periodontics?

○ 0 ○ 1 ○ 2-3 ○ 4-5 ○ 6 or more

10. Altogether, how many preclinical sessions or laboratory courses in your predoctoral dental curriculum devoted the majority of course content to Periodontics?

○ 0 ○ 1 ○ 2-3 ○ 4-5 ○ 6 or more

Revised 02/2009

CONFIDENTIAL SURVEY OF POSTDOCTORAL PERIODONTAL STUDENTS - Page 2 | **ID #:**

11. How would you rate the following research characteristics of the Periodontics department in your predoctoral dental school?

	Excellent	Good	Poor
Faculty Research Activities	○	○	○
Faculty Research Expertise	○	○	○
Faculty Research Mentorship	○	○	○
Predoctoral Student Involvement in Periodontal Research	○	○	○

12. How would you rate the clinical characteristics of the Periodontics department in your predoctoral dental school?

	Excellent	Good	Poor
Faculty Clinical Instruction	○	○	○
Faculty Surgical Expertise	○	○	○
Interaction with other Disciplines/Departments	○	○	○

13. The following questions relate to your perception of the attitudes of predoctoral dental students toward Periodontics at the dental school from which you graduated. Indicate one response for each question.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. Periodontics was regarded by many predoctoral dental students as an obstacle to comprehensive care.	○	○	○	○
b. Many predoctoral dental students referred patients with periodontal problems because they did not like performing periodontal procedures.	○	○	○	○
c. Most predoctoral dental students were able to identify and refer patients with advanced periodontal needs.	○	○	○	○
d. Many predoctoral dental students resisted referring patients with periodontal problems to ensure fulfillment of restorative and prosthodontic requirements.	○	○	○	○
e. Predoctoral dental students were encouraged to perform surgical periodontal procedures.	○	○	○	○
f. Periodontics was regarded by many predoctoral dental students as an essential part of comprehensive care.	○	○	○	○
g. Periodontics was regarded by many predoctoral dental students as a desirable career option.	○	○	○	○

CONFIDENTIAL SURVEY OF POSTDOCTORAL PERIODONTAL STUDENTS - Page 3 | **ID #:**

14. The following questions relate to the applicant pool for Periodontal postgraduate programs. Please indicate your level of agreement with the following statements. Indicate one response for each question.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. The top dental school graduates are entering general practice rather than pursuing specialty training.	○	○	○	○
b. The top dental school graduates are choosing another specialty over Periodontics.	○	○	○	○
c. Requiring three years of training for a certificate in Periodontics is overly burdensome and discourages dental students from considering Periodontics as a specialty.	○	○	○	○

15. The following questions pertain to factors related to your decision to pursue specialty training in Periodontics. Indicate how important each factor was in making your decision to pursue Periodontal specialty training. Indicate one response for each question.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. I wanted to help people by treating their periodontal disease.	○	○	○	○
b. A close relative or family friend is (was) a Periodontist.	○	○	○	○
c. I knew that Periodontists earn a very comfortable living.	○	○	○	○
d. My interest in Periodontics was shaped by my exposure to periodontal procedures in dental school.	○	○	○	○
e. My interest in Periodontics was shaped by a favorable relationship with Periodontal faculty member(s) in dental school.	○	○	○	○
f. I did not want to be a general dentist.	○	○	○	○
g. I was attracted by the prestige of being a dental specialist.	○	○	○	○
h. I chose Periodontics because I did not get into the specialty program of my choice.	○	○	○	○
i. Dental implantology is the most attractive aspect of Periodontics today.	○	○	○	○

16. Upon completion of your Periodontal postdoctoral program, what are your professional plans? (choose ALL that apply.)

- ○ Solo private practice in the USA
- ○ Associate private practice in the USA
- ○ Solo private practice outside the USA
- ○ Associate private practice outside the USA
- ○ Periodontal practice in the Armed Forces
- ○ Academic position (Full-time/Part-time)
- ○ Further training (e.g., MPH or Ph.D.)
- ○ Other

THANK YOU!