Perceptions and Attitudes of Dental Hygiene Educators About the Establishment of Doctoral Education Programs in Dental Hygiene

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Abstract

Purpose: To assess the perceptions and attitudes of dental hygiene (DH) educators at selected colleges and universities regarding the establishment of doctoral educational programs in DH in the United States.

Methods: An online survey of DH educators at the 58 U.S. schools offering baccalaureate or master's degree programs was used to assess participants' perceptions and attitudes regarding the following: need to establish doctoral programs in DH, interests in supporting their development, potential barriers and facilitators, and goals/motivators of potential enrollees. Percentages of respondents selecting each response were calculated for each survey item and responses of selected items analyzed for significant differences.

Results: Of 608 potential participants, 203 completed the survey for a 33% response rate. More than half the respondents strongly agreed and a quarter more agreed that a DH doctoral program was needed to relate equitably with doctoral graduates of other health-related disciplines and to expand the DH body of knowledge by conducting discipline-specific research. A majority indicated likely interest in supporting the development of both clinically oriented and research-based doctoral programs. Significantly ($p<0.01$) more respondents with doctorates were interested in developing doctoral programs than those with a master's degree as their terminal degree. Respondents identified shortages of qualified educators and interested enrollees as primary barriers. Facilitators included support from the American Dental Education Association and the American Dental Hygienists' Association. Becoming a better researcher and an institutional administrator were perceived as chief motivations.

Conclusion: The majority of DH educators perceived that doctoral educational programs in DH are needed to advance the DH profession.

Keywords: dental and dental hygiene workforce models, dental hygiene, educational concepts and theory, faculty development, professional development/team building, doctoral education in dental hygiene

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Introduction

The profession of dental hygiene (DH), in contrast to other health professions and disciplines, has not established doctoral programs in the United States to prepare their graduates to engage in discipline-specific research, education, and practice.[1] DH education at the doctoral level, which would be parallel to that of other disciplines and professions, could increase the credibility of the DH profession.[2,3] Interprofessional collaboration is a driving force behind state-of-the-art health care delivery, and doctoral prepared dental hygienists could improve interprofessional patient care by bringing dental hygiene's unique perspective to the collaborative team.[1,4] Dental hygienists, prepared with skills and interdisciplinary experiences at the doctoral level, could contribute to solving many of the oral health care challenges facing our nation.[4,5] However, doctoral programs in DH necessary to prepare graduates for these roles do not exist.[4,5,6,7,8]

Preparing dental hygienists to conduct rigorous discipline-specific research would be another goal and purpose of doctoral programs in DH.[5] A critical mass of DH researchers and scholars could facilitate networking and sharing of common interests, contributing to an expansion of the unique body of knowledge needed for the growth of the profession.[2,5] Dental hygienists could pursue doctoral de-

Table I: Demographic Characteristics of Respondents, by Percentage and Number of Respondents

Gender, n=182	% (n)
Male	4 (7)
Female	96 (175)
Age, n=181	
26-30	2 (4)
31-35	9 (17)
36-40	9 (17)
41-45	7 (13)
46-50	10 (18)
51-55	10 (18)
56-60	23 (42)
61-65	22 (40)
66-70	6 (11)
71-75	1 (1)
Race/Ethnicity, n=185	
Afro-Caribbean or African American	2 (4)
East Asian or Asian American	2 (3)
Latino or Hispanic American	6 (10)
Middle Eastern or Arab American	1 (1)
Native American or Alaskan Native	2 (3)
Non-Hispanic White or Euro-American	88 (157)
South Asian or Indian American	1 (2)
Other heritage	3 (5)

grees in their own discipline, as in the case of other professionals.[5] Recently, it was reported that 77% of students from master of science programs in DH in the United States agreed that doctoral education in DH is needed, 89% agreed that doctoral programs are important for the profession, and 62% professed interest in applying to clinical doctoral programs.[1]

Because the perceptions and attitudes of DH educators regarding the establishment of doctoral programs in DH had not been identified, we created an online survey to answer the following research questions: What are the perceptions and attitudes of DH educators regarding the needs for establishing doctoral programs in DH? Are DH educators interested in initiating or supporting doctoral programs at their own or other institutions? Are DH educators interested in assisting with the development of models and curricula for doctoral programs at the national level? What barriers and facilitators do DH educators perceive may influence the development of such programs, and what goals do they perceive would motivate a dental hygienist to pursue a doctoral degree in DH?

Methods and Materials

The Institutional Review Board of the University of California, San Francisco approved the study. A 17-item online survey instrument was distributed to 608 DH educators and program administrators currently employed at the 58 universities and colleges throughout the United States that offer baccalaureate or master's degree programs in DH. These venues are more likely to support doctoral education programs, and responses of this particular group represent the perceptions of possible applicants to DH doctoral programs.

To assess the respondent's perceptions and attitudes regarding needs for establishing doctoral programs in DH, a 5-point Likert response scale was used, Strongly Agree to Strongly Disagree. To assess the participants' interests in developing and/or supporting the establishment of either research-based or clinically oriented doctoral programs, a 5-point Likert response scale was used, Very Unlikely to Very Likely, and merged Very Unlikely with Unlikely responses and Very Likely with Likely responses in the table. The participants' perceptions concerning barriers and facilitators that may influence the establishment of doctoral programs in DH, and which goals might provide significant motivation for dental hygienists to pursue a doctoral degree, were assessed by the respondents selecting the top 3 they considered to be key from a list of factors. Respondents were encouraged to comment on each of the topics. A convenience sample of DH educators (5 from a master of science in DH program, and 6 from an entry-level DH program) assessed the acceptability and feasibility of the survey. Modifications were made, based on their feedback.

A request to participate in the study was distributed electronically to DH educators using email addresses acquired from the institutions' websites. The invitation described the purpose of the study and provided instructions for giving informed consent and links to the survey instrument. Qualtrics,[9] a survey software program, tabulated responses of the participants and calculated frequencies (percentages) of responses to each survey item. The chi-square statistical analysis test was used to determine significant differences between the responses of participants with a doctorate and those with a master's degree as their terminal degree. The level of statistical significance was set at the alpha level of 0.05.

Results

Of the 608 potential respondents, 203 completed the online survey for a 33% response rate. The

majority of respondents were female, non-Hispanic White, and between the ages of 56 and 65 (Table I). Over half of the respondents had master's degrees, and approximately 20% held doctorate degrees. Most had been employed as DH educators for between 11 and 20 years and were members of the American Dental Hygienists' Association (ADHA) and the American Dental Education Association (ADEA) (Table II).

The vast majority (84%) of responding DH educators agreed or strongly agreed that the greatest need for establishing doctoral programs in DH was to relate equitably with doctoral graduates of other health-related disciplines (Table III). The highest percentage of respondents selected "strongly agree" to this need statement. Most respondents (80%) agreed the need to expand the body of knowledge for the DH profession by conducting discipline-specific research was important, again with the greatest percentage selecting "strongly agree." The fewest number of respondents agreed that the need to develop measures to improve the oral health of the country's varied populations, especially those underserved, constituted a need for establishing doctoral education programs in DH.

The majority of participants responded that they were more likely to support development of a doctoral program at an institution other than their own for both types of programs, research-based and clinically oriented (Table IV). The second-strongest response indicated the likelihood that they would assist with the development of models and curricula for doctoral programs in DH at the national level, again for both research-based and clinically oriented programs. The numbers of respondents likely to be interested in initiating a research-based doctoral program at their own institution ($p=0.002$), and assisting with models and curricula for such a program at the national level ($p=0.000$), were significantly higher for respondents with doctorates than for those with a master's degree as their terminal degree (Table V). Also, respondents with doctoral degrees were significantly ($p=0.022$) more likely than those with master's degrees to assist with models and curricula for clinically oriented programs (Table VI). Among the 38 respondents with doctorates, 25 reported interest in initiating research-based doctoral programs (68%), while only 21 were interested in initiating clinically oriented programs (55%). These values were significantly different ($p=0.006$).

Table VII lists the barriers that the respondents perceived would pose the 3 most meaningful challenges to establishing doctoral programs in DH. A substantial percentage of respondents selected a shortage of qualified educators (49%) and a shortage of interested enrollees (42%) as the greatest challenges. A number of respondents expressed other challenges and barriers; for example, concerns about career opportunities for the graduates of a doctoral program and about advantages provided by a doctoral education in DH, rather than in other disciplines.

The respondents chose "support from ADEA" as the greatest facilitator to support establishment of a doctoral program in DH, followed by "support by approval or advocacy from the ADHA" and "financial support from the ADHA" (Table VIII). The fewest respondents chose "interest from DH students" and

Table II: Professional Responsibilities and Educational Background of Study Participants, by Percentage and Number of Respondents

Position/Primary Duties in DH Program, n=182	% (n)
Administrative	19 (35)
Teaching/educational	81 (147)
Lecture-based/didactic	28 (50)
Clinical	15 (27)
Equally distributed	57 (103)
Educational Background*	
Baccalaureate degree	74 (135)
Master's degree in DH	33 (60)
Master's degree, non-DH discipline	54 (97)
Degree in Dental Science	3 (5)
EdD degree	10 (18)
PhD degree	11 (20)
Years as an Educator, n=181	
0-5	20 (37)
6-10	23 (42)
11-20	30 (54)
21-30	14 (25)
31-40	10 (18)
40+	3 (5)
Professional Organization Memberships*	
American Dental Hygienists' Association	90 (163)
American Dental Education Association	82 (148)
American Association of Public Health Dentistry	7 (12)
American Dental Association	1 (1)
Other organizations	20 (37)
No memberships in any organization	2 (4)

*Participants selected as many as applied

Table III: Perceptions of Respondents Regarding Needs for Establishing Doctoral Education Programs in Dental Hygiene, by Percentage and Number of Respondents

Perceived need for establishing doctoral education programs in dental hygiene	Strongly Agree % (n)	Agree % (n)	Neutral % (n)	Disagree % (n)	Strongly Disagree % (n)
Relate equitably with doctorates of other health-related disciplines, n=196	58 (113)	26 (51)	8 (16)	6 (12)	2 (4)
Expand the body of knowledge for DH profession by conducting discipline-specific research, n=196	51 (100)	29 (57)	8 (15)	9 (18)	3 (6)
Enhance ability to attract funding to support large-scale studies for oral health promotion and disease prevention, n=195	43 (83)	38 (74)	13 (25)	5 (10)	2 (3)
Increase appreciation for the expertise of the dental hygienist and value of DH profession in the minds of the public, n=195	42 (83)	29 (56)	12 (23)	12 (23)	5 (10)
Facilitate interprofessional collaboration among health care professions, n=195	39 (77)	32 (62)	16 (31)	9 (18)	4 (7)
Prepare dental hygienists with the knowledge and skills to conduct research at institutions of higher education, n=197	35 (79)	40 (79)	12 (23)	9 (17)	5 (9)
Investigate and address issues related to oral health care promotion and disease prevention, n=196	33 (65)	35 (68)	13 (25)	14 (27)	6 (11)
Develop measures to improve oral health of country's varied population, especially the underserved, n=196	32 (62)	36 (70)	14 (28)	14 (27)	5 (9)

"support from practicing clinical dental hygienists" as motivators or facilitators.

The desire to "become a better researcher" was perceived as one of the 3 most important goals or motivators for a dental hygienist to pursue a doctoral degree in DH (Table IX). "Becoming an institutional administrator" was selected as the second most important.

Discussion

Needs for Doctoral Education in Dental Hygiene

The need for doctoral education in DH has been a topic of serious discussion for more than 20 years.[2,10] In this study, the majority of respondents agreed that establishing doctoral education programs in DH is needed and for all of the 8 reasons proposed in the survey. The need to "relate equitably with doctorates of other health-related disciplines" was perceived as the most important by the greatest percentage of respondents.

For collaborative models to be effective, participating professionals should have equal levels of educational achievement.[4,7,10] A terminal degree at the master's level may be insufficient to enhance the DH practitioner's ability to work with other doctorates of the collaborative team,[3,11] or support consideration of dental hygienists for employment in many positions of leadership, research, and health care administration.[2]

Participants also perceived a related need, to "facilitate interprofessional collaboration among health care professions," as important. With increased focus on collaborative efforts among health care disciplines, dental hygienists have a distinct role as experts on maintaining oral health.[12] Interprofessional collaboration and education programs are possible antidotes to the persistent problems in health care delivery in this country.[11,12] However, many interprofessional education programs do not include dental hygienists,[11] perhaps due to their insufficient educational qualifications. If dental hygienists are to be working in interprofessional environments as leaders in administration and research, additional skill sets are required to formally bring DH beyond clinical expertise. Moreover, dental hygienists will need to master the arts of forecasting, evidence-based decisionmaking, critical thinking, and negotiation to be visionaries and credible members of the interprofessional team.[2,13] A doctoral education would provide these skills.

The second most predominant perceived need

Table IV: Respondents' Interests in Research-Based and Clinically Oriented Dental Hygiene Doctoral Programs, by Percentage and Number of Respondents

Doctoral program	Interest	Likely % (n)	Undecided % (n)	Unlikely % (n)
Research-based	Initiating/developing program at respondent's institution, n=199	40 (78)	25 (50)	36 (71)
	Supporting development at another institution, n=198	66 (132)	17 (34)	16 (32)
	Assisting with models and curricula for national level program, n=199	57 (113)	16 (31)	28 (55)
Clinically oriented	Initiating/developing program at respondent's institution, n=194	49 (96)	17 (34)	33 (64)
	Supporting development at another institution, n=193	69 (132)	14 (27)	17 (34)
	Assisting with models and curricula for national level program, n=191	58 (111)	16 (31)	27 (49)

for doctoral education was to "expand the body of knowledge for the DH profession by conducting discipline-specific research." The population in the United States is increasing, and so is the need for increasingly sophisticated methods, technology, theories, and delivery systems of health care to properly care for the growing number of people with health problems.[6,10,12] A research infrastructure is required to conceptualize DH in its current state of development by critical analysis of existing theories and methods, enabling discussion and dissemination of the results and findings to support systematic addition to our scientific base of knowledge.[8] An important component of an infrastructure is a substantial number of professionals trained and actively participating in discipline-specific research.[8]

In 1993, the ADHA Council on Research developed the first ADHA National Research Agenda and published a white paper to guide research efforts in the profession.[14] Other organizations interested in promoting research efforts in DH conducted studies, held research conferences, and created additional infrastructure improvements for research in the discipline. Unfortunately, despite the numerous improvements initiated in the 1990s, DH research

Table V: Respondents' Interests in Research-Based DH Doctoral Programs per Terminal Educational Degree Earned, by Percentage and Number of Respondents

Interest	Degree	Very Likely % (n)	Likely % (n)	Neutral % (n)	Unlikely % (n)	Very Unlikely % (n)	Total (n)
Initiating program at respondent's institution *	Doctorate	39 (15)	26 (10)	8 (3)	13 (5)	11 (4)	37
	Master's	14 (17)	21 (26)	24 (30)	22 (27)	19 (23)	123
Supporting development at another institution	Doctorate	47 (18)	29 (11)	13 (5)	3 (1)	5 (2)	38
	Master's	33 (41)	38 (48)	13 (17)	8 (10)	8 (10)	126
Assisting with models and curricula for a national level program **	Doctorate	63 (24)	13 (5)	8 (3)	5 (2)	8 (3)	38
	Master's	23 (28)	33 (40)	15 (18)	18 (22)	12 (15)	123

* Significantly more respondents with a doctorate than a master's as a terminal degree (p=0.003)
**Significantly more respondents with a doctorate than a master's as a terminal degree (p<0.001)

Table VI: Respondents' Interests in Clinically Oriented DH Doctoral Programs per Terminal Educational Degree Earned, by Percentage and Number of Respondents

Interest	Degree	Very Likely % (n)	Likely % (n)	Neutral % (n)	Unlikely % (n)	Very Unlikely % (n)	Total (n)
Initiating program at respondent's institution	Doctorate	34 (13)	21 (8)	24 (9)	11 (4)	11 (4)	38
	Master's	23 (29)	26 (32)	12 (15)	23 (29)	15 (19)	124
Supporting development at another institution	Doctorate	37 (14)	37 (14)	11 (4)	8 (3)	8 (3)	38
	Master's	31 (38)	40 (49)	12 (15)	8 (10)	8 (10)	122
Assisting with models and curricula for a national level program *	Doctorate	50 (19)	116 (6)	16 (6)	11 (4)	8 (3)	38
	Master's	28 (35)	31 (39)	15 (18)	16 (20)	10 (12)	124

* Significantly more respondents with a doctorate than a master's as a terminal degree (p=0.022)

did not advance to the level hoped, with much of the research confined to isolated pilot studies rather than theory-based research.[5] The first decade of the twenty-first century brought new research agendas, meetings, and conferences; however, the profession has yet to obtain full recognition of its potential to conduct valuable discipline-specific research, linking DH with the underlying foundation of health science.[6] One of the main stumbling blocks may have been the lack of doctoral educational programs in DH.[6]

Interestingly, fewer respondents (35%) strongly agreed with the need to "prepare dental hygienists with knowledge and skills to conduct research at institutions of higher education" than to "expand the body of knowledge by conducting discipline-specific research" (51%). Perhaps they perceived that the students in master of science degree programs in DH are already conducting research at the institutions at which they are enrolled or that the phrase "conduct research at institutions of higher education" unduly restricts DH research to a university setting.

The third-strongest response was the perceived need to "enhance the ability to attract funding to support large-scale studies for oral health promotion and disease prevention." Obtaining funding for multisite and large-scale studies requires having pilot data and establishing an area of expertise or a track record that is compatible with the research priorities of the funding agencies.[8] This takes time and requires enabling dental hygienists to build a research career path to be competitive.[6,8] As has occurred in the nursing profession, the DH profession should increase its efforts on valuing and building their research infrastructure, joining the mainstream scientific communities, and increasing its visibility in all aspects of professional activities, to establish priorities for funding and directives to target research projects.[8]

The need to "increase appreciation for the expertise of the dental hygienist and value of the dental hygiene profession in the eyes of the public" was the fourth-strongest need reported. DH is not considered a true profession by some, not meeting "the strict interpretation of a profession since it lacks autonomy and self-regulation."[15] Dental hygienists have a history of commitment to education, dental disease prevention, and oral health care.[6] However, their work has largely been restricted to the confines of private dental practice, limiting the appreciation for the expertise and value of the discipline by the public and other health care providers.[3]

The perceived need to "investigate and address issues related to oral health promotion and disease prevention" would require training leaders to examine and research evolving health care needs in the United States and assist with development of new public health care programs in those areas related to oral health. Oral health care policies and other issues affecting the DH profession should be determined by groups that include dental hygienists, but are currently determined by groups of professionals educated in other disciplines which may have different priorities.[10]

The fewest number of respondents agreed that doctoral education was needed to "develop measures

Table VII: Perceptions of Respondents Regarding the Top 3 Challenges or Barriers to Establishing Doctoral Programs in Dental Hygiene in the United States

Perceived Challenges and Barriers, n=183	% (n)
Shortage of qualified educators	49 (90)
Shortage of interested enrollees	42 (76)
Objections from the American Dental Association	38 (69)
Lack of support from institutional administrators	37 (67)
Objections from practicing dentists	31 (57)
Lack of federal and state grants	27 (49)
Lack of leaders, advocates, "movers and shakers"	27 (49)
Lack of support from dental school educators	26 (48)
Lack of support from professional organizations	15 (28)
Lack of support from the American Dental Education Association	15 (28)
Lack of support from DH educators	9 (16)
Objections from practicing clinical dental hygienists	7 (13)

Respondents selected their top 3 perceived challenges

Table VIII: Perceptions of Respondents Regarding the Top 3 Facilitators to Establishing Doctoral Programs in Dental Hygiene in the United States

Perceived Facilitator or Supporter, n=179	% (n)
Support from the American Dental Education Association	54 (96)
Support by approval or advocacy from the American Dental Hygienists' Association	47 (83)
Financial support from the American Dental Hygienists' Association	43 (76)
Support from public health programs and organizations	38 (67)
Support from dental hygiene educators	37 (66)
Support from educational institutions	33 (58)
Financial support from federal and state grants	25 (44)
Interest from dental hygiene students	16 (28)
Support from practicing clinical dental hygienists	11 (20)

Respondents selected their top 3 perceived facilitators

to improve oral health of the country's varied and underserved population." The reason for this lower perception of need may be due to a misunderstanding of the survey item. Dental hygienists are among those health care professionals frequently involved in community programs, school-based oral health care programs, health fairs, and volunteer work in socioeconomically disadvantaged and underserved areas.[16] It is conceivable that respondents interpreted this involvement as the "need" referred to in this question and, understandably, may have considered it sufficiently met. However, the intent was to ask whether doctoral education was needed to prepare dental hygienists to partner with other health care disciplines to develop measures to solve problems related to lack of access to health care in the United States for the underserved, rural, uninsured, and low-income populations. In 2003, the Surgeon General urged the public, health professionals, and policymakers to improve efforts to increase affordability and accessibility of oral health care to the underserved.[17] For this purpose, doctoral-prepared dental hygienists would be qualified and able to bring a unique and valuable perspective to the interdisciplinary table.[5,18]

Interests in Research-Based and Clinically Oriented Doctoral Programs in Dental Hygiene

The respondents expressed their interest in initiating and/or developing two different types of doctoral programs: research-based and clinically oriented. The majority responded that they would likely support development at another institution, rather than initiating either program at the respondent's institution. These respondents appear to be aware of the issues involved during an undertaking of this complexity, such as competing policies, organizational structure, environmental assessments, funding, and political climate, to name a few, and possibly perceive the numerous barriers and futility of such an endeavor at their own institution. The respondents may also fear that a doctoral program would compete with the institution's current program(s) for funding of expenses, such as facilities and personnel, or they may not want to assume a leadership role, because of time commitments to other interests. Their interest in doctoral education may be limited to the concept that the DH profession would benefit from such a program, and they would be supportive as long as it is at another institution.

By contrast, more than half of the respondents with doctorates were "Likely" or "Very Likely" interested

Table IX: Perceptions of Respondents Regarding the Top 3 Goals or Motivations for Dental Hygienists to Pursue a Doctoral Degree in Dental Hygiene

Perceived Goal or Motivator, n=182	% (n)
Become a better researcher	59 (108)
Become an institutional administrator	51 (93)
Become a better educator	41 (75)
Fulfill a personal dream	41 (74)
Increase salary	37 (67)
Become a DH program director	27 (49)
Become an executive in the oral health product industry	21 (38)
Expansion of clinical practice opportunities	20 (36)

Respondents selected their top 3 perceived goals or motivations

in initiating doctoral programs at their own institution, as well as supporting development of programs at another, and assisting with models and curricula for both types of programs. These results indicate that the respondents with doctorate degrees might be more interested in assuming leadership roles in establishing doctoral programs. These DH educators have personally experienced the doctoral education process and are familiar with the essential components of doctoral curricula—journal clubs, seminars, oral qualifying examinations, and most importantly, independent research. They also would possess a realistic assessment of the need for sufficient quantity and quality of faculty. In summary, these are the DH educators who would be critical to the establishment of doctoral programs. In this group of doctorates, there were a few who expressed less likelihood of involvement with developing programs. Perhaps the reluctance is due to their age: one third of the respondents in our study were over 60 years of age.

Our finding that doctoral-educated respondents were more likely interested in initiating a research-based educational program, rather than one clinically oriented, may have been due to their familiarity with this type of program and/or their opinion that research-based, doctoral-prepared dental hygienists would best assist the advancement of DH science.

Perceptions of Barriers

Of the top 3 barriers or challenges to establishing doctoral education programs, the "shortage of qualified educators" able to teach in these programs was the predominant choice of the respondents. Doctoral programs are faculty-intensive, with educators exceedingly involved in supervising research projects and editing dissertations, among other things. Ideally these educators would be dental hygienists with doctoral degrees, so that they could teach research skills and guide research in a direction related to dental hygiene. Currently, the number of these individuals is small. In this study, only 38 respondents (21%) had earned doctorate degrees (EdDs and PHDs). Increasing the number of this highly educated population is a great challenge, primarily because the majority of the current entry-level DH students graduate with an associate degree. Advancing from an associate degree to a doctoral degree might seem an insurmountable task to most dental hygienists. Raising the entry-level requirement for professional practice from an associate to a baccalaureate degree would be an important first step to developing a pipeline for any advanced degrees. More DH master's degree programs have been established in recent years, increasing the number of dental hygienists with master's degrees. This group would be the greatest source of doctoral program students and, ultimately, doctoral program faculty.

Financial concerns may have been a major reason for the respondents' perception that the "shortage of interested enrollees" would be a barrier. Obtaining a doctoral degree is a significant financial investment. Many dental hygienists would most likely continue to work while obtaining their degrees in order to meet their financial obligations. Online or hybrid programs could increase the feasibility of working simultaneously, and might prevent the students from having to relocate or disrupt their personal lives. Increased funding in terms of fellowships and scholarships could offset or partially reduce the cost of tuition. According to the study by Tumath and Walsh, the shortage of interested enrollees was not a barrier to enrollment in clinically oriented doctoral programs.[1] In that study, 62% of students enrolled in master of science DH programs professed interest in applying to clinical doctoral programs. Fewer students (38%) were interested in pursuing a research-based doctorate degree, which suggests less interest in conducting discipline-specific research. This is a concern because dental hygienists with research-based doctoral degrees would be needed as university professors to prepare more dental hygienists with doctoral degrees.

The third-ranked barrier, "objections from the American Dental Association," might be addressed by communication with the dental community concerning the value of doctorate-level dental hygienists as dental health professionals, emphasizing their ability to fulfill some of the needs discussed previously. Respondents from the Tumath and Walsh study indicated that practicing dentists may object less to the de-

velopment of a research-based doctoral degree than a clinically oriented degree.[1] Perhaps the possibility of competition is a factor in the perceived lack of support. Creation of clinically oriented doctoral degree dental hygienists, with the ability to utilize the research process and evidence-based decisionmaking to provide and/or manage comprehensive, individualized care to patients in a variety of settings, would have the potential to eliminate the need for supervision by dentists.[10] Introduction of this new member to the dental team could create a power paradigm shift within the dental profession and may make it necessary to advocate for changes in the dental practice acts in the states where the changes occur.[19] A review of the legislative process, and the example provided by the Minnesota Dental Hygienists' Association and its stakeholders, provides direction for states across the country who wish to advocate for increased access to oral health care for the underserved through more flexible licensure laws.[19]

The next-ranked barrier, "lack of support from institutional administrators," may be based on the respondents' knowledge of the politics or attitudes of the administration where they are employed, and a reason that fewer respondents were interested in initiating a doctoral program at their own institution than supporting development of a program at another. Perhaps they have worked with a leader plagued by the "Queen Bee Syndrome," a spectacle rooted in self-centered motivations.[20] Instead of being supportive of "subordinates" and DH goals, the Queen Bee is a nemesis and a barrier to the achievement and advancement of other women, especially if they are members of a group, such as dental hygienists, to which she initially belonged and perceives herself to have outgrown.[20]

Perceptions of Facilitators

More than half of our respondents selected the ADEA as the greatest support or facilitator for developing doctoral programs, whose mission is "to lead institutions and individuals in the dental educational community to address contemporary issues influencing education, research, and delivery of oral health care for the overall health and safety of the public."[21] Not surprisingly, support from the ADHA, financially and by approval and advocacy, was also among the top facilitators perceived to support doctoral education for the DH profession. The ADHA has continually supported advancement of the discipline through higher education with a vision that includes preparing dental hygienists for research, leadership, and interprofessional collaboration.[14,22]

Interestingly, a low percentage of respondents perceived that DH students and practicing clinical dental hygienists would provide support or encouragement in developing doctoral programs from which they might benefit. Practicing clinical dental hygienists were also perceived as not being a barrier or objector; it seems they are perceived to have no position regarding this issue. This perception may be because most of these dental hygienists graduated with an associate degree and may lack interest in advanced degrees. Extolling the value and benefits of advanced education to DH students during their entry-level programs may encourage them to continue their education.

Perceptions Regarding Goals

Of the top 3 goals or motivations for a dental hygienist to pursue a doctoral degree, the respondents' most prevalent choice was to "become a better researcher," which may relate to the perceived second-most important need for doctoral education: "expand the body of knowledge for the DH profession by conducting discipline-specific research." Research-intensive activities are necessary for mentoring and developing independent mastery of the skills necessary for methodical, innovative research, which would likely require more time than is available in educational programs other than those conferring a doctoral degree.

The next highly rated goal was to "become an institutional administrator." Dental hygienists with doctorates in other disciplines have often held administrative positions. However, institutional administrators with doctorates in DH may be more supportive of dental hygienists and assist in meeting the perceived strong need to "relate equitably with doctorates of other health-related disciplines." These leaders would be more inclined to support the goals of DH, while researching important questions central to the discipline and extending these inquiries across disciplinary lines. Institutional administrators with leadership styles that not only realize their own needs but, more importantly, also benefit the DH community are essential for the success of our discipline.

Demographic Characteristics

The majority of respondents in our study were 56-65 years old. This range was consistent with the findings of Collins and coworkers who studied full-time faculty in baccalaureate programs, revealing that 56% were aged 50 or more, with a mean of 50.2 ± 8.4.[23] The target population in our study and that of Collins' was limited to educators at programs offering baccalaureate and master's degrees. These positions would likely require clinical dental hygiene experience and advanced education, as indicated by our data that 21% had doctorates and 68% had a master's degree as their terminal degree. The age range may indicate that these respondents might have practiced clinical dental hygiene for many years

prior to entering DH education. Dental hygienists leave clinical practice to teach for many reasons such as limited scope of practice, repetitive work, lack of promotional opportunities, and subservient treatment. There may be younger dental hygiene educators at these institutions who did not respond to the survey because, as beginning educators, they may have been overwhelmed with their academic responsibilities.

Limitations

A limitation in our study was the fact that our study population consisted of DH educators, who often have a passionate interest in furthering education. Furthermore, we surveyed only educators from institutions offering baccalaureate and master's degrees in DH. DH educators from 2-year associate degree programs may have had different opinions. Another limitation was the lack of a clear definition of a clinically oriented doctoral degree, which may have created confusion for the respondents. Based on roles described in the literature, this clinically oriented doctoral degree dental hygienist may be a mid-level oral health practitioner who could provide care in a variety of settings under general supervision of physicians and dentists[1] or one educated to direct advanced clinical programs in a variety of health care delivery models or systems.[2] Our intent was to distinguish it from a doctoral program that focused on research and education, rather than the clinical aspects of the dental hygiene discipline.

Conclusion

The need for doctoral education in DH is supported by this study. The majority of responding DH educators from baccalaureate and master's degree doctoral programs in the United States agreed that the establishment of doctoral education in DH would fulfill a number of important discipline and societal needs. Although the respondents indicated the likelihood of supporting its development, they appeared realistic about the potential barriers and challenges that might hinder doctoral DH education. Regardless, these programs are needed to prepare dental hygienists to conduct discipline-specific research, generate new knowledge and theories important to the dental hygiene profession, and address the numerous concerns related to oral health care in our country. These exciting career paths should be available for dental hygienists who desire challenge in their personal and professional lives, as well as advancement in their chosen discipline. Many professions have advanced their educational models to include doctoral education, and it is widely recognized that the time has come for the dental hygiene profession to do the same.[2,7,10,12,15,22]

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References

1. Tumath UG, Walsh M. Perceptions of dental hygiene master's degree learners about dental hygiene doctoral education. J Dent Hyg. 2015;89(4):210-218.

2. Gurenlian JR, Spolarich AE. Advancing the profession through doctoral education. J Dent Hyg. 2013;87(Supp l) 20-22.

3. Boyd LD, Henson HA, Guerlian JR. Vision for the dental hygiene doctoral curriculum. Access. 2008;22(5):16-19.

4. Fried J. Interprofessional collaboration: if not now, when? J Dent Hyg. 2013;87(Suppl):41-43.

5. Walsh MM, Ortega E. Developing a scholarly identity and building a community of scholars. J Dent Hyg. 2013;87(Suppl 1):15-19.

6. Bowen D. History of dental hygiene research. J Dent Hyg. 2013;87(Suppl 1):5-22.

7. Walsh MM. Raising the bar; making the case. Dimensions (Suppl). 2014;12(11):44-45.

8. Forrest JL, Spolarich AE. Building a research infrastructure. J Dent Hyg. 2010;84(1):11-13.

9. Qualtrics software, Version 60526, of Qualtrics Research Suite. Copyright © 2015. Provo, UT, USA. http://www.qualtrics.com.

10. Henson HA, Gurenlian JR, Boyd LD. The doctorate in dental hygiene: has its time come? Access. 2008;22(4):10-14.

11. Vanderbilt AA, Isringhausen KT, Bonwell PB. Interprofessional education: the inclusion of dental hygiene in health care within the United States—a call to action. Adv Med Educ Pract. 2013;4:227-229.

12. U.S. Department of Health and Human Services, Health Resources and Services Administration, Transforming Dental Hygiene Education, Proud Past, Unlimited Future: Proceedings of a Symposium. Rockville, Maryland: U.S. Department of Health and Human Services, 2014. [Cited 2015 May 31]. Available at: https://www.adha.org/resources-docs/AS2014-cehandouts/19CLL21-TH_PM_Transforming_Dental_Hygiene.pdf

13. Boyd LD, Bailey A. Dental hygienists' perceptions of barriers to graduate education. J Dent Hyg. 2011;75(8):1030-1037.

14. Spolarich AE, Davis C. Peterson-Mansfield S, et al. The ADHA National Research Agenda: White Paper by the ADHA 1993-94 Council on Research. J Dent Hyg. 1994;68(1):26-29.

15. Boyleston ES, Collins MA. Advancing our profession: are higher educational standards the answer? J Dent Hyg. 2012;86:168-178.

16. Conklin KV, Essex G, Rowe DJ. Factors influencing California dental hygienists' involvement in school-based oral health programs. J Dent Hyg. 2016;90(4):234-243.

17. US Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General—Executive Summary. Rockville, MD: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000 [cited 2015 May 31]. Available from: http://www.nidcr.nih.gov/DataStatistics/SurgeonGeneral/Report/ExecutiveSummary.htm

18. American Dental Hygienists' Association. Dental Hygiene: Focus on Advancing the Profession [Internet]. 2005 June [cited 2015 Apr 6]. Available from: www.adha.org/resources-docs/7263_Focus_on_Advancing_Profession.pdf

19. Gadbury-Amyot CC, Brickle CM. Legislative initiatives of the developing advanced dental hygiene practitioner. J Dent Hyg. 2010;84(3):110-113.

20. Walsh MM, Ortega E, Heckman B. Dental hygiene's scholarly identity and roadblocks to achieving it. J Dent Hyg. 2015;89(Suppl 1):9-12.

21. American Dental Education Association: The Voice of Dental Education [Internet]. Home page mission statement [cited 2015 May 30]. Available from: http://www.adea.org/about_adea/Pages/default.aspx

22. American Dental Hygienists' Association: National Dental Hygiene Research Agenda [Internet]. Revised March 2007 [cited 2015 May 20]. Available from: https://www.adha.org/resources-docs/7111_National_Dental_Hygiene_Research_Agenda.pdf

23. Collins MA, Zinskie CD, Keskula DR, Thompson AL. Characteristics of full-time faculty in baccalaureate dental hygiene programs and their perceptions of the academic work environment. J Dent Educ. 2007;71(11):1385-1394.