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Attitudes of Virginia Dentists Toward Dental Therapists

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ATTITUDES OF VIRGINIA DENTISTS

TOWARD DENTAL THERAPISTS

by

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ABSTRACT

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Purpose: The purpose of this study was to determine perceptions of Virginia (VA) dentists toward Mid-Level Dental Providers, specifically dental therapists (DT), and determine if American Dental Association (ADA) membership affected attitudes. Methods: After IRB approval, data was collected with an online survey sent to 1208 VA dentists. Participants responded to 11 Likert type scale questions ranging from 1 (strongly disagree) to 7 (strongly agree) assessing their attitudes toward DTs. Participants also responded to questions regarding the appropriate level of education and supervision of a DT, as well as five demographic questions. Two multiple linear regression models were used to determine (1) if years of practice and comfort in allowing the DT perform procedures predict tolerance toward DTs and (2) if membership in the ADA and comfort allowing the DT perform procedures predict tolerance toward DTs. Statistically significant differences for Likert type scale questions were determined using a one-sample t-test and compared to a neutral rating of 4.

Results: An overall response rate of 12% was obtained (n=145). Most participants were males (73%), members of ADA (84%), and over the age of 40 (65%). Results suggest that most participants did not perceive (M= 1.90, $p<0.001$) a DT was needed in Virginia, and did not support (M= 2.08, $p<0.001$) legislation for a dental therapist model. Most participants (M=2.01, $p<0.001$) were not comfortable having a dental therapist perform authorized procedures or ever

employing one in their practice (M=1.82, $p<0.001$). Comfort having a DT perform authorized procedures (β= .63, $p<0.001$), but not years of practice (β= -.09, $p=0.18$), was significantly associated with support for a DT. Additionally, a lower tolerance towards DTs was associated with an increased likelihood membership in the ADA (β= .14, $p=0.04$). Conclusions: Virginia dentists surveyed have negative attitudes toward DTs. Findings support the need for more research with a larger and more diverse sample.

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CHAPTER I

INTRODUCTION

The 2000 report, *Oral Health in America: A Report from the Surgeon General*, highlighted the importance of oral health to general health.[1] The Surgeon General referred to oral disease as a "silent epidemic," stating that poor oral health can lead to other serious medical complications, and it is understood that overall health and well-being are linked to oral health.[1] The 2000 report listed the lack of access to care as one of the major barriers to achieving optimal oral health.[1] Many Americans face multifaceted barriers, including limited income, lack dental insurance coverage, and or live in underserved areas where there is a shortage of dental professionals leading to disparities in oral health care.[1]

In response to the 2000 Surgeon General's report, new workforce models have been developed for dental hygienists to extend their scope of practice.[2] The American Dental Hygienists' Association (ADHA) defines a mid-level oral health practitioner as, "A licensed dental hygienist who has graduated from an accredited dental hygiene program and who provides primary oral health care directly to patients to promote and restore oral health…"[3] The most common mid-level oral health practitioner is the dental therapist (DT). In 2009, Minnesota signed the first dental therapist workforce model into law.[2] The Minnesota DT is a mid-level dental provider (MLDP) who provides both preventive and restorative procedures under the supervision of a licensed dentist in underserved settings or dental health professional shortage areas (DHPSA) within the state.[4] Since 2009, 10 other states have signed into law dental therapist workforce models, and 6 states are currently pursuing a similar workforce model.[2] Currently, Minnesota is the only state with DTs in practice; however, Vermont Technical

College is working to develop a dental therapy program. In Maine, legislation was passed in 2014; however, there are no DTs currently practicing in the state.

According to the Health Resources and Services Administration (HRSA), approximately 56 million people in the United States live in a designated DHPSA.[5] To exacerbate the problem of access to oral health care, research has projected that by 2025, all states are expected to have a shortage of dentists.[8] A 10% increase in the demand, but only a 6% percent supply of dentists is expected nationally by 2025.[8] On the other hand, it is projected that there will be an oversupply of dental hygienists.[8] By 2025, a 10% increase in demand, but 28% increase in supply of dental hygienists nationally is projected.[8] It is possible that dental health professional shortage areas could be reduced if the roles of dental hygienists were expanded to compensate for the shortage of dentists. In Virginia, there are 99 designated dental health professional shortage areas.[5] In 2013, the Virginia Department of Health Behavioral Risk Factor Surveillance Survey found that 31.7% of Virginians reported not having their teeth cleaned within the previous year.[7] Moreover, 37.7% Virginians reported not having dental insurance to cover routine dental care.[6] An expansion in the role of the dental hygienist, such as the dental therapy workforce model, could be a potential solution to the projected shortage of dentists in Virginia.

Research has shown mixed attitudes and opinions towards DTs joining the dental team.[9-15] In 2015, the American Dental Association (ADA) released a statement regarding accrediting dental therapy education programs, which states, "The ADA believes it is in the best interests of the public that only dentists diagnose dental disease and perform surgical and irreversible procedures."[15] A survey of Minnesota dentists found concerns about the level of education and training DTs receive, with only 31% reporting they would trust the quality of work performed.[9] In Tennessee, 50% of dentists reported DTs could provide care in the underserved areas;

however 61% believed DTs would have a negative impact on the dental field.[11] In a 4-year follow-up survey of dental school faculty, there was a 20% increase in those who reported feeling comfortable with DTs providing care for their patients. This study also found a 20% decrease in dental faculty members reporting a need for significant oversight of DTs.[12,13] A MLDP, such as a DT, could be one solution to address the access to dental care problem in Virginia.

Statement of the Problem

Access to dental care has shown to be a significant problem in our country and in Virginia specifically.[5,6,7] A potential solution for increasing the access to dental care for Virginians is a DT. The purpose of this study was to assess the attitudes of Virginia dentists toward DTs. Furthermore, the attitudes of dentists would reveal if they believe there is a need for a DT and the potential impact in the state. Attitudes were assessed using a researcher developed questionnaire, "The Attitudes of Virginia Dentists Toward a Mid-Level Dental Provider." This study attempted to answer the following research questions:

1. What are the attitudes of Virginia dentists towards a DT?
2. Are years of practice and comfort in allowing a DT to perform procedures statistically associated with tolerance toward the DT?
3. Is membership in the American Dental Association (ADA) and comfort in allowing a DT to perform procedures statistically associated with tolerance toward the DT?

Significance of the Problem

Oral health and general health are interconnected. Many oral diseases and conditions, such as dental caries and periodontal disease, are preventable.[1] Poor oral health can lead to many

other serious medical complications; therefore, it is important that all Americans have access to dental care.[1] The shortage of dental health professionals in Virginia poses a barrier for Virginians in accessing dental care.[5] Alternative workforce models, such as the dental therapy model, should be explored in the state to address this issue. The support of dentists for the dental therapy workforce model, and mid-level providers in general, is needed. Dentists must have positive attitudes because they will help train dental therapy students and work in collaboration with and supervise them upon graduation.[12,13,16] Attitudes of dentists may impact future legislation if it is determined that a DT is needed in Virginia. Research describing the attitudes of dentists toward DTs have been conducted in other states; however, no studies have assessed the attitudes of Virginia dentists.[9-14] To address this gap in the literature, this study investigated the attitudes of Virginia dentists toward a DT and determined whether they support a DT in the state.

Definition of Terms

For the purpose of this study, the following terms were defined as:

- Dentist- licensed dental health professional who provides restorative services by treating diseases of the gums and teeth
- Dental hygienist- licensed dental health professional who works under the supervision of a dentist to provide preventative services, treat periodontal disease, and provide oral health education to promote oral health
- Mid-level dental provider- licensed dental hygienist who provides primary oral health care directly to patients, and is also trained to perform restorative care such as placing fillings and minor extractions, such as the dental therapist

- Dental therapist- mid-level dental provider who work under the supervision of a dentist to perform preventive oral health care and restorative care, as outlined by the state, primarily to underserved populations
- Attitudes- a belief or way of thinking about a certain idea that influences one's behavior
- Professional membership- membership in the American Dental Association (ADA)
- Underserved population- minorities and those who experience health disparities
- Underserved area- a geographic location or population that demonstrates a shortage of health professionals (either medical, dental, or mental health professionals)
- Likert Scale- a psychological measurement device that is used to gauge attitudes, values, and opinions
- The Attitudes of Virginia Dentists Toward a Mid-Level Dental Provider Questionnaire- An instrument adopted from a survey used to assess the attitudes of Virginia dentists toward a mid-level dental provider[13,14]

Hypotheses

The following null hypotheses were tested at the 0.05 level:

$H0_1$: There is no statistically significant association between dentists' tolerance toward a DT when comparing years of practice and comfort of dentists in allowing a DT to perform procedures as measured by "The Attitudes of Virginia Dentists Toward a Mid-Level Dental Provider" questionnaire.

$H0_2$: There is no statistically significant association between American Dental Association members compared to non-members when comparing dentists' tolerance toward a DT and comfort in allowing a DT to perform procedures as measured by "The Attitudes of Virginia Dentists Toward a Mid-Level Dental Provider" questionnaire.

CHAPTER II

REVIEW OF THE LITERATURE

With over 185,000 licensed dental hygienists in the United States, new workforce models have been developed to expand the traditional scope of practice.[2] The MLDP, commonly known as a DT, is a dental hygienist with an expanded scope of practice who can work outside the traditional dental office setting. The DT was first added in Minnesota in 2009 to access those in underserved populations.[17] DTs are trained to provide preventive oral health care and restorative procedures such as placing restorations and minor extractions under the supervision of a licensed dentist.[4,18,19] DTs are limited to practicing in underserved population settings.[20]

The level of education and training of DTs is important, and the Commission on Dental Accreditation (CODA) adopted standards for dental therapy education programs.[9] The standards require accredited programs to be comprised of three academic years of full-time instruction or the postsecondary equivalent.[21] Curriculum of dental therapy programs should provide graduates the competence to perform services under supervision in their scope of practice as outlined by the state.[21] DTs are trained to perform preventive services similar to those of dental hygienists in addition to restorative services. Examples of content to be covered in curriculum of a CODA accredited program include simple extraction of erupted primary teeth, preparation and placement of direct restorations, preparation and placement of preformed crowns on primary teeth, and indirect and direct pulpal capping.[21]

In Minnesota, dental therapy students can become licensed as the traditional DT or certified as an advanced dental therapist (ADT).[22] The traditional DT provides care under general or indirect supervision depending on the procedure; however, the ADT can perform all services under general supervision.[17] Indirect supervision requires the supervising dentist to authorize the

procedure and be present during treatment; whereas, general supervision requires authorization from the supervising dentist, but the dentist does not have to be present. ADTs are DTs who have a master's degree and have 2000 hours of documented practice.[17] The University of Minnesota School of Dentistry offers a dual Bachelor of Science degree in Dental Hygiene and Master of Dental Therapy degree to allow graduates to perform hygiene and dental therapy procedures.[22] Students in this program learn dental procedures with dental students and dental hygiene procedures with dental hygiene students in a "team-based" environment.[20]

The scope of practice of DTs varies based on state laws and regulations. The first dental therapy legislation was passed in Minnesota, followed by Maine and Vermont.[2] Minnesota's legislation specifies DTs can only practice in settings that serve low-income, underserved populations, or in dental health professional shortage areas.[4] Similarly, Maine limits practice settings to community facilities, hospitals, public health settings that serve underserved populations, or private practices that primarily serve patients in the MaineCare program or are underserved adults.[19] Vermont legislation does not specify practice settings; however, the supervising dentist must outline the setting and populations to be served in a collaborative agreement.[18] All three states require DTs to have a collaborative written agreement with a licensed dentist in the respective state, who assumes all responsibility for services authorized and performed by the DT.[4,18,19] Vermont specifically requires DTs have 1,000 hours of direct patient care under supervision prior to entering a collaborative agreement.[18] Minnesota limits the number of collaborative agreements a dentist can enter to no more than five; whereas in Vermont, the limit is two agreements.[4,19]

The level of supervision required for DTs varies across all three states. In Minnesota, DTs can practice under general or indirect supervision depending on the procedure.[4] In Vermont,

DTs are permitted to work under general supervision, but in Maine, DTs are only allowed to provide care under direct supervision of the collaborating dentist.[18,19] All three states permit DTs to oversee other dental team members if written in the collaborative agreement, but there is variation in the personnel type and number a DT can oversee.[4,18,19] For instance, Vermont DTs can supervise two hygienists, assistants, or a combination of both; whereas in Minnesota, they can only supervise a maximum of four licensed or non-licensed dental assistants.[4.18] Maine allows DTs responsibility of two dental hygienists and three unlicensed persons in any one setting.[19]

DTs can perform both preventive and restorative procedures under the specified supervision outlined by the state. Permitted preventive procedures include the same procedures as licensed dental hygienist.[4,18,19] DTs are not trained to perform scaling and root debridement in dental therapy courses; however, DTs who are dually licensed as a dental hygienist and DT can perform this procedure. Restorative procedures in all three states include cavity preparation and placement of restorations, nonsurgical extractions of teeth, and crown placement within certain parameters outlined by each state law.[4,18,19] Minnesota permits preventive services, assessments, temporary restorations, atraumatic restorative therapy, tooth reimplantation, as well as local anesthesia and nitrous oxide to be performed under general supervision.[4] More invasive procedures, such as emergency palliative treatment of dental pain, cavity preparation, restoration of primary and permanent teeth, placement of temporary and preformed crowns, and recementing of permanent crowns must be performed under indirect supervision.[4] Minnesota limits extractions to only primary teeth; whereas, Vermont and Maine permit dental therapists to extract primary teeth and nonsurgically extract periodontally diseased teeth.[4,18,19]

A dental therapy workforce model allows DTs to perform both preventive and restorative procedures to increase the access of dental care in underserved populations.[2,23] In Minnesota specifically, DTs are paid less than the dentist to perform basic procedures, which may be a cost-effective benefit.[23] Blue and Kaylor examined DTs in practice in Minnesota and found they practice in dental health professional shortage areas, providing care to those uninsured or on public insurance.[23] They also found dentists performed less restorative and preventive procedures and more complex procedures outside the DTs' scope of practice.[23] In Vermont, it is required that a DT be a licensed dental hygienist and a graduate of a CODA accredited dental therapy program.[18] The expanded scope of practice of a dually licensed DT would allow them to complete both hygiene and dental therapy procedures. In turn, this could lead to an expansion of care to underserved populations. Barriers to accessing dental care negatively impact both oral and systemic health. Many dental diseases can be prevented with adequate access to dental care.[1] Studies suggest oral disease is a significant problem in the United States and Virginia specifically is affected.[6,7,26,27] Between 2011-2013, 44.7% of American adults age 30 and older had periodontitis.[27] The prevalence of periodontitis during those years was higher among those with increasing poverty levels and less education.[27] The 2014 Behavioral Risk Factor Surveillance Survey revealed that 40.8% of Virginians reported having lost at least one permanent tooth due to tooth decay or periodontal disease.[26] In 2013, the majority of uninsured Virginian patients were those who made less than $25,000 per year.[6] Many Americans have limited, or do not have, dental insurance, which prevents them from seeking dental care.[1]

Inadequate access to dental care for the underserved leads to an increase in emergency room visits for non-traumatic dental-related care.[29] In 2008-2010, dental caries was related to 57% of all emergency room visits.[29] Among those who utilized the emergency department for

dental-related conditions, 40.5% were uninsured and 71% were low-income. [29] Between 2008-2010, $2.7 billion charges in the hospital setting were for dental-related visits.[29] Emergency department utilization for non-traumatic dental conditions among Nevada residents increased by 2.2% from 2009-2015 (19.2% and 21.4%, respectively).[30] Uninsured and Medicaid patients were one to two times more likely than those privately insured to seek care from the emergency room for dental-related conditions.[30] Zhou et. al concluded that those who are uninsured are less likely to seek preventive dental care; instead, they wait until dental conditions are severe and visit the emergency department for care.[30]

According to the Health Resources and Services Administration (HRSA), there are over 6,000 designated dental health professional shortage areas in the country.[5] In Virginia alone, there are 99 dental professional shortage areas.[5] In order to eliminate this shortage designation, estimates indicate an additional 9,000 dental practitioners would be needed in Virginia.[5] The shortage of dental health professionals is expected to rise and by 2025, it is expected that the demand for dentists will not meet the supply nationally.[8] A 6% national increase is expected in the supply of dentists, but a 10% increase in demand for dental services in anticipated.[8] The unequal distribution of dentists also contributes to the shortage problem with low numbers of dentists in some rural and urban areas.[24] Even in large urban areas with an adequate supply of dentists, low-income families and the uninsured have difficulty in accessing dental care due to financial limiations.[25]

In contrast to dentists, there is expected to be a national oversupply of dental hygienists by 2025.[8] Projections suggest there will be a 28% increase in the supply of dental hygienists with only a 10% increase in demand.[8] The oversupply of dental hygienists could be beneficial in accessing the underserved population if the roles are expanded as in the dental therapist

workforce model. The shortage of dentists could be compensated by expanding the roles of a dental hygienist. The Federal Trade Commission (FTC) has stated their support for the dental therapist in improving the access to dental care for underserved populations.[28]

While the dental therapist workforce model is in the beginning stages, the projected impact is promising and could benefit Virginia in DHPSAs. According to the Minnesota Department of Health, DTs are seeing more patients who are publicly insured, or in underserved areas.[31] The addition of DTs in Minnesota practices have allowed for more underserved patients to receive care. Minnesota patients who have been seen by DTs report a decrease in wait and travel time to receive dental care.[31] Studies of DTs practicing in Minnesota reveal they provide the simple restorative procedures, while the dentist focuses on the more complex procedures.[23,32,33] This collaborative model to patient care allows the dentist to focus on more complex procedures outside of the DTs' scope of practice. In Minnesota, a 69% net savings was found in employing a dental therapist to complete the same procedure a dentist would perform.[32]

The PEW Charitable Trusts investigated the impact of DTs in Minnesota finding that practices employing DTs were able to provide care to the underserved population, while still generating a profit for the practice.[33] This increase in profit was attributed to recare and new patient visits, to include the Medicaid insured.[33] The potential financial impact of DTs in practice has been explored; however, a major concern of some dentists is the safety and quality of procedures performed by DTs. According to the Minnesota Department of Health 2014 report, there have been no complaints filed related to patient safety when receiving care from a DT.[31] In general, DTs in Minnesota are practicing safely, while also narrowing the gap to accessing dental care among underserved populations.[23]

Attitudes toward DTs are mixed among dental professionals and students.[35] Research conducted by Blue et. al found the majority of dental students questioned the knowledge of dental therapy students.[35] Dental students believed the knowledge of basic science among dental therapists would be less than that of dentists.[35] They also did not believe the DT would produce quality work, nor would they be a cost-effective benefit in the dental practice.[35] Overall, first and second year dental students reported negative attitudes towards the DT; however, they also reported not having a clear understanding of the role of the DT.[35] This could indicate that negatives attitudes toward DTs arise due to a lack of knowledge of their role in the dental professional team.

The attitudes towards DTs among dentists are mixed.[11-14,37] In a study conducted by Lopez, Blue, and Self, researchers examined the attitudes of dental faculty toward DTs in Minnesota.[13] There was a 55% response rate among faculty, and the majority were males, over the age of 40, and primarily taught dental courses.[13] Fifty-eight percent of faculty reported a good understanding of the dental therapy model, and 69% reported having sufficient knowledge to respond to the survey.[13] Thirty percent reported a DT would be part of the solution to access to dental care in the state, but 44% disagreed with this statement.[13] Thirty-six percent of faculty members reporting being comfortable having a DT perform procedures on patients and 30% disagreed; however, only 3% percent of participants reported they were likely to employ a DT in their practice.[13]

Self et al., conducted a follow-up study four years later to determine if the attitudes among the same population changed.[12] The initial study was conducted when legislation for DTs was new. Overall, there was a significantly greater acceptance of DTs in 2014 when compared to 2010.[12] In the follow up study, only 75 faculty members responded for a 30% response rate.[12]

Almost 50% of respondents supported the idea of DTs as a solution for accessing the underserved population, compared to only 30% in 2010.[12,13] Sixty percent of participants would feel comfortable having a DT perform procedures on patients, compared to only 40% agreeing with this statement in 2010.[12] In addition, a greater percentage of faculty members who also worked in private practice reported feeling comfortable delegating procedures to DTs in 2014 when compared to findings from 2010.[12] The findings from these two studies reveal more positive attitudes toward DTs among dental faculty over the course of four years.

A 2012 survey of Minnesota dentists found slightly different attitudes than the Minnesota dental faculty members.[9] Researchers randomly sampled 1000 dentists with a response rate of 55%.[9] Results indicated 61% of respondents were somewhat or moderately familiar with the DT.[9] A majority of participants supported DTs performing reversible procedures; however, most did not agree with the DT performing irreversible procedures, such as cavity preparations and primary extractions.[9] Only 31% of the participants reported trusting the quality of work performed by DTs, and 31% questioned the quality of work and care provided by DTs.[9] Attitudes among dentists varied based on practice settings and geographic location. Those working in group practices and non-profit clinics were more likely to have positive attitudes toward DTs.[9] Those working in non-profit clinics reported the least amount of barriers and demonstrated the greatest interest in potentially hiring a DT in the future.[9] In addition, dentists in urban areas were more likely to believe DTs would impact the access to care when compared to dentists in rural areas.[9]

In other states across the U.S., attitudes among dentists toward DT have been found to be more negative than those in Minnesota.[11,14,37] A 2016 survey was conducted to assess the attitudes of 1,127 Tennessee dentists towards the DT with a response rate of 40%.[11] The majority

of participants were males, working in solo practice, with an average of 26.9 years in practice.[11] Sixty-seven percent reported being a little to moderately familiar with the DT, and 14% reported never hearing of a DT.[11] More than 50% of respondents agreed DTs could provide care in underserved areas; however, 61% reported believing DTs would have a negative impact on the dental profession.[11] This implies the potential benefit of DTs in accessing the underserved population is acknowledged, but the support for them from Tennessee dentists is limited. In 2017, only 38% of dentists in the Pacific Northwest reported believing there was a need for a DT in 2017.[14] A similar study was conducted among Mississippi dentists.[37] The researchers sent the survey to 567 licensed dentist, of which 109 responded, yielding a 19% response rate.[37] Overall, Mississippi dentists reported a negative perception toward the dental therapy workforce model.[37] Respondents believed the model could be a potential solution for the issue of access to dental care; however, they still questioned the education and quality of care performed by DTs.[37] Overall, the results from these studies among dentists reveal mixed attitudes toward the DT.[11,14,37]

Among dental hygienists, research has found more positive attitudes towards the MLDP.[14,36] Dental hygienists in both Oregon and the Pacific Northwest reported a need for a mid-level provider.[14,36] In a 2017 study conducted in Oregon, 1,213 dental hygienists were mailed a survey to assess their attitudes toward a MLDP.[36] With a response rate of 36%, results revealed that dental hygienists who were members of the American Dental Hygienists Association (ADHA), had an expanded practice permit, and believed their current scope of practice was limited, expressed an interest in the MLDP.[36] Forty-six percent of ADHA members believed their scope of practice was limited compared to 35% of non-members.[36]A correlation was also found among years of practice and attitudes toward the mid-level dental provider.

Dental hygienists with more years of practice were more likely to report an interest in expanding their scope of practice.[36] In total, 59% of participants believed a MLDP was needed and of the 59%, 43% reported an interest in becoming one.[36]

In 2017, Ly et al., surveyed dentists and dental hygienists to determine their opinions about a DT in the Pacific Northwest.[14] Two hundred twenty dentists and 187 dental hygienists were invited to participate; however, a total of 86 hygienists responded to the survey for a 46% total response rate, and 84 dentists responded for a 38% total response rate.[14] The majority of participants practiced in Oregon, followed by Washington, and Idaho.[14] Sixty-eight percent of dental hygiene participants believed there was a need for a DT; whereas, only 38% of dentists believed there was a need.[14] In addition, 82% of dental agreed that a DT is an important part of the dental team; whereas, only 51% of dentists agreed with the statement.[14] Approximately 75% of dental hygienists reported an interest in becoming a DT.[14] Both studies reveal an interest and perceived need for a DT among dental hygienists in the Pacific Northwest.[14,36]

CHAPTER III

METHODOLOGY

A descriptive survey design was used to examine attitudes of Virginia dentists toward a DT. Following Institutional Review Board (IRB) approval, the investigator designed questionnaire "Attitudes of Virginia Dentists Toward a Mid-Level Dental Provider," was sent via email to a convenience sample of 1208 Virginia dentists purchased from an online email database (dentistlistpro.com). The instrument was adopted with permission from a previously validated survey and included additional researcher developed questions.[13] An introductory statement was included at the beginning of the survey to inform participants that voluntary informed consent was understood upon return of the survey. Eleven questions from the survey assessed attitudes of participants toward a DT using a seven-point Likert type scale ranging from 1 (strongly disagree) to 7 (strongly agree). The seven-item scale shows adequate internal reliability with a Cronbach's coefficient alpha of $\alpha = 0.73$. Seven of the eleven questions focused on general attitudes of dentists toward the DT, and the remaining four questions focused on attitudes of dentists toward a DT related to the participant's dental practice.

In addition, participants were asked to respond to the appropriate level of supervision and education for the DT, if they accommodated the underserved population, two open-ended questions about potential advantages and/or disadvantages to a DT, as well as five demographic questions (gender, age, years of practice, predominant practice setting, and professional membership). A panel of dental hygiene faculty reviewed the additional questions on the survey to establish content validity and clarity of instructions. Modifications to the researcher developed questions were made based on the panel's review. The University IRB reviewed and approved as exempt the protocol prior to the commencement of the study.

Qualtrics (Qualtric Labs, Provo, Utah), an online questionnaire software, was used to create the survey for online distribution with three reminders sent over six weeks. Descriptive statistics were used to analyze response frequency and statistically significant differences of Likert-type scale questions were determined using a one-sample t-test and compared to a neutral rating of 4. Significance was set at the .05 level. Open-ended questions were transcribed and qualitatively analyzed by coding responses according to distinct ideas. Responses from the open-ended questions were coded based on reported advantages and disadvantages of a DT. All coding was reviewed by a colleague prior to frequency analysis to establish content validity and reliability. A multiple linear regression model was used to determine the relationship between respondents' years of practice, comfort in having a DT perform authorized procedures, and tolerance toward a DT. Additionally, a multiple linear regression was performed to determine if membership in the ADA and comfort in having a DT perform authorized procedures predicted tolerance toward a DT.

CHAPTER IV

RESULTS

Of the 1208 licensed dentists in Virginia invited to participate, 145 completed the online survey for a response rate of 12%. The majority of participants were male (73%), over 40 years of age (65%), and worked in either a solo (54%) or group (37%) dental practice. Most participants (64%) reported practicing dentistry for more than 20 years, with 29% reporting practicing between 10-19 years. Only 7% of participants reported practicing for less than 10 years (Table I). The vast majority of participants (84%) reported ADA membership, and 75% reported accommodating the underserved in their practice (Table I).

A seven-point Likert type was used to assess the attitudes and general perceptions of participants toward the DT (Table III). A one-sample T-test was used to determine statistically significant differences of Likert-type scale questions compared to a neutral rating defined as a score of 4.0 (Table IV). Results revealed participants did not perceive (M= 1.90, SD= 1.48) a DT was needed in Virginia (d= -2.10, 95% CI [-2.35 to -1.86], $t(144)= -17.11$, $p< 0.001$). Additionally, respondents were significantly more likely to disagree (M= 2.08, SD= 1.56) than agree a DT could be part of the solution to access to care problems in Virginia (d= -1.92, 95% CI [-2.17 to -1.66], $t(144)= -14.83$, $p<0.001$). Similarly, more respondents disagreed (M= 2.08, SD= 1.85) than agreed that it is important for Virginia to adopt legislation for a dental therapist model (d= -1.92, 95% CI [-2.23 to -1.62], $t(144)= -12.56$, $p<0.001$).

Most participants (M= 4.88, SD= 2.14) indicated an understanding of the services DTs may perform (d= .88, 95% CI [.53 to 1.23], $t(144)= 4.96$, $p<0.001$); however, most participants did not agree (M= 2.74, SD= 1.65) evidence supported DTs can perform high quality work (d= -1.26, 95% CI [-1.53 to -.99], $t(144)= -9.19$, $p<0.001$). Additionally significantly more

respondents agreed than disagreed (M= 4.63, SD= 2.19) that the public will think the dentist is less important if DTs are permitted to perform a wide range of procedures (d= .63, 95% CI [.28 to .99], $t(144)= 3.49$, $p=0.001$). Most respondents (M= 4.53, SD= 2.36) indicated DTs should be restricted to practicing in acknowledged underserved areas in Virginia (d= .53, 95% CI [.14 to .92], $t(144)= 2.71$, $p=0.007$).

Statistically significant differences were found when analyzing respondents' attitudes toward DTs relating to their dental practice. The vast majority of participants disagreed (M= 2.01, SD= 1.66) with being comfortable having a DT perform authorized procedures on their patients (d= -1.99, 95% CI [-2.26 to -1.71], $t(144)= -14.42$, $p< 0.001$). Respondents were more likely to disagree than to agree (M= 2.09, SD= 1.56) that delegating some work to a DT would improve their job satisfaction (d= -1.91, 95% CI [-2.17 to -1.65], $t(144)= -14.51$, $p< 0.001$). Results suggest most Virginia dentists disagree (M= 2.33, SD= 1.82) with a potential cost-effective addition of employing DTs in their dental office (d= -1.67, 95% CI [-1.97 to -1.37], $t(144)= -11.05$, $p< 0.001$). Most participants were more likely to disagree (M= 1.82, SD= 1.50) with employing a DT in their practice (d= -2.18, 95% CI [-2.43 to -1.93], $t(144)= -17.51$, $p<0.001$).

In regard to supervision of a DT, most respondents (70%) indicated direct supervision should be required with 20% indicating general supervision would be acceptable. Opinions of education required for a DT varied with just over half (58%) of respondents indicated a Master's Degree would be the appropriate level of education for DTs and 34% indicated a Bachelor's Degree would be appropriate (Table II). Of the 145 participants, 66 participants responded to the open-ended question on potential advantages of DTs and 73 responded to the open-ended question on potential disadvantages. Responses concerning potential advantages were

categorized according to the following themes: expanding care to the underserved (41%), lower costs for patients (4%), generate profit for the dental office (4%), care to Medicaid patients (2%), and no potential foreseen advantages (45%). Similarly, responses regarding potential disadvantages were further categorized into the following themes: safety concerns for the patient (21%), lower quality of care (38%), difficulty differentiating between complex and simple procedures (7%), lack of willingness to practice in underserved populations (10%), competition with patient pool (21%), and negative public perception of DTs (4%) (Table V).

A multiple linear regression analysis was conducted to determine if participants' years of practice and comfort in having a DT perform authorized procedures were statistically associated with participants' tolerance toward a DT (Table VI). For this analysis, comfort ratings were defined by responses to the Likert scale statement, 'I would be comfortable having a dental therapist perform authorized procedures on my patients.' Ratings of tolerance was defined by responses to the statement, 'A mid-level dental provider is needed in Virginia.' Results from the linear combination of years of practice and comfort having DT perform authorized procedures revealed 39% of variance in ratings of tolerance toward a DT ($F(2, 142)= 45.23$, $p<0.001$). The analysis showed that comfort having DT perform authorized procedures ($\beta= .63$, $p<0.001$, 95% CI [.44, .68]), but not years of practice ($\beta= -.09$, $p=0.18$, 95% CI [-.32, .06]), was significantly associated with tolerance toward a DT. Therefore, the null hypothesis ($H0_1$) was rejected. Virginia dentists who indicated a decreased comfort in having DTs perform authorized procedures are more likely to be intolerant toward a DT.

A second multiple linear regression analysis was completed determine if an association existed between participants' membership in the ADA and comfort in having a DT perform authorized procedures with participants' tolerance toward a DT (Table VII). For this analysis, the

ratings were defined by the same responses to statements as defined in the previous analysis. Results from the linear combination of membership in the ADA and comfort having a DT perform authorized procedures revealed 40% of variance in ratings of tolerance toward a DT ($F(2, 142)= 47.30$, $p<0.001$). Both membership in the ADA ($\beta= .14$, $p=0.04$, 95% CI [.03, 1.07]) and comfort in having a DT perform authorized procedures ($\beta= .62$, $p<0.001$, 95% CI [.44, .67]) were statistically associated with tolerance toward DTs, rejecting the null hypothesis ($H0_2$). Participants who indicated membership in the ADA and decreased comfort in having DTs perform authorized procedures were more likely to be intolerant toward a DT.

CHAPTER V

DISCUSSION

Disparities in oral health care continue to affect many racial and ethnic groups in the U.S. Socioeconomic status, gender, geographic location, and access to care are important contributors to these disparities.[38] Use of alternative workforce models, such as the DT, is a suggested way for increasing access to care to underserved populations and has been successfully implemented in states such as Alaska and Minnesota.[20] DTs were developed to address the shortage of dentists and growing demand for dental care, while also lowering the cost of care.[20] With the ever-changing diverse population and growing demand for dental care, it is important that alternative workforce models are explored to modernize access to dental care for underserved populations. Because of the projected shortage of dental health professionals in Virginia and a projected increase in the underserved, demands for dental services will continue to rise.[5] To increase the number of dental professionals available in underserved areas, policy makers in VA are exploring the DT as a role for dental hygienists and as a way of increasing access to care for underserved populations. This study, which evaluated the perspectives of a convenience sample of VA dentists toward the DT, found favorable attitudes were lacking.

When analyzing attitudes towards DTs in practice, the majority of responses were overwhelmingly negative. Results suggest participant dentists are not potentially open nor willing to add a DT to their practice, nor do they support legislation for a DT in Virginia. Importantly, over one half of participants strongly disagreed with every survey statement concerning DTs. In addition, most respondents did not believe a DT could be part of the solution of access to care in VA. As the majority of respondents were members of the ADA, respondents' attitudes seem to be in line with organized dentistry, which is opposed to dental therapists. The

ADA does not support dental therapists because they do not believe there is enough evidence to support improvements in oral health when treatment is provided by dental therapists.[39] Additionally, the ADA is concerned about cost of training and licensure, as well as overpopulation of dental therapists in urban areas instead of underserved and rural areas.[39] Similarly, Abdelkarim et. al., found overall negative attitudes among Mississippi dentists toward the dental therapy workforce model with a small percentage supporting the potential impact on access to care.[37]

The majority of participants agreed they understood the services dental therapists perform. This suggests Virginia dentists are knowledgeable, to some extent, of the limited services DTs can perform, but still have negative attitudes toward DTs. In a similar study, Mehta and Erwin found the majority of Tennessee dentists surveyed were a little to moderately familiar with dental therapists; however, results indicated very little support for dental therapists in practice.[11] The perception of dentists by the public after the addition of a DT is a concern among dentists. Over half of respondents agreed the public would perceive dentists to be less important if DT were allowed to perform a wide range of procedures. This suggests Virginia dentists believe the addition of DTs in practice would have a negative impact on the role of the dentist. Similarly, Blue et. al., found Minnesota dentists were concerned that DT would interfere with patient relationships with dentists and lead to a loss of respect.[9] Interestingly, a follow-up study among Minnesota dental faculty showed once there was exposure to DTs there was a significantly greater acceptance.[12] Results suggest dentists may possess unfavorable attitudes toward a DT because of unfounded concerns from a lack of familiarity and exposure to a DT. Another explanation for the negative attitudes of respondents might be potential competition for

the patient pool. Dentists may fear they will lose patients to mid-level providers who can provide similar care at a lower cost.

Whether or not restrictions should be placed on where a DT can practice was supported by half of participants agreeing DTs should be restricted to acknowledged underserved areas in Virginia, while the other half disagreed or remained neutral. Interestingly, when asked if a DT was needed in VA, over 80% of respondents disagreed, but only 50% agreed they should be restricted to underserved areas. An explanation for this finding could be some believe if DTs are permitted to practice, they should not be restricted to only the underserved, but allowed in all practice settings. Open-ended responses revealed an overwhelming amount of "no potential advantages" to a DT in Virginia. Among potential disadvantages, "lower quality of care" was the most frequently cited. These findings relate to the responses to the Likert-scale statement "There is evidence dental therapist can perform high quality work," where the majority of the participants disagreed with this statement. Responses suggest Virginia dentists are uncertain about education and training of DTs to provide quality care to patients.

In addition to lower quality care, safety concerns for the patient was also noted as a major theme among potential disadvantages. Many participants questioned the knowledge and ability of DTs to perform procedures in a safe manner. Similarly, Blue et al., found the majority of Minnesota dentists did not trust the quality of work performed by dental therapists.[9] Likewise, Abdelkarim et. al., found Mississippi dentist survey participants also questioned the education and quality of care performed by dental therapists. These findings suggest a major barrier for dentists accepting DTs is their uncertainty about the quality of education and training DTs have before entering the workforce. As CODA has developed accreditation standards, programs are required to ensure proficiency of dental therapy graduates in services permitted by the respective

state dental practice act;[21] therefore, dental therapy students graduating from an accredited program have been determined to be proficient in providing permitted services. There have not yet been any accredited dental therapy programs; however, both programs in Minnesota were developed prior to the development of CODA standards, but they served as models and meet the standards.[40] In Minnesota, dental therapists must pass the same clinical competency exam as dentists for the services they are permitted to provide in order to become licensed.[40]

Results suggest participants do not believe there is evidence to support the need for DTs or evidence that supports the quality of work provided by DTs. Because DT is relatively new in the U.S, there is not extensive research examining the impact, quality, and safety of DT practice; however, Catalanotto conducted a review of 74 publications of dental therapy worldwide, and none supported the idea dental therapy was unsafe or led to substandard care.[41] In 2014, the Minnesota Department of Health and Board of Dentistry released a report of the early impacts of DT in Minnesota.[31] As of 2014, there were no complaints filed related to patient safety.[31] In addition, DT were providing care to low-income, uninsured, and uninsured patients.[31] More recently as of 2018, there were 86 licensed DT in Minnesota, and none were disciplined for quality of care or safety concerns.[40] Furthermore, in 2017, 93% of DT were employed compared to only 74% in 2014.[40] The field of dental therapy is continuously growing in Minnesota and the early positive impacts of DT in the state are evident. These same positive results are likely in other states, including Virginia.

When asked about the appropriate level of education for a DT, the majority of respondents supported a Master's degree, while 34% supported a Bachelor's Degree. These results are similar to Ly et. al., who found over 70% of dentist participants believed a Master's or Bachelor's degree should be the required level of education for a dental therapist.[14] Both

programs in Minnesota award graduating dental therapists a Master's degree.[20] In terms of supervision, an overwhelming majority (70%) of Virginia participants believed direct supervision should be required for a DT. This is of concern because direct supervision requirements in Virginia, could negatively impact access to care for disadvantaged populations. In contrast, Ly et. al., found half of Pacific Northwest dentists supported direct supervision, while the other half supported general supervision for DT.[14] General supervision would allow for the collaborative dentist to prescribe and approve the treatment provided by the DT, but not be present during treatment. CODA does not establish supervision requirements; instead, this is outlined by the state dental practice act.[21] For example, Minnesota's dental practice act outlines the specific procedures that can be provided under general supervision and those that require indirect supervision.[4] A possible explanation for participants' support for direct supervision could be related to their quality of care and safety concerns related to dental therapists in practice. This could negatively impact the overall purpose of a dental therapists in expanding access of dental care in areas where there are shortages of dental health professionals.

Interestingly, years of practice was not found to be a predictor in tolerance toward a DT; however, comfort was. Ratings of tolerance was defined by responses to the statement 'A mid-level provider is needed in Virginia.' Participants who were uncomfortable in having a DT perform authorized procedures were more likely to be intolerant toward a DT. These results disagree with the idea that some dentists may never use a DT in practice; however, they may still support DTs. For an example, a dentist may never hire a DT because they do not have enough treatment chairs, supplies, or a large enough practice, but could still support the need for DTs in settings that could benefit from them. In this study, participants who were uncomfortable with DTs were also intolerant to DTs practicing in Virginia, which suggests even those dentists who

would not potentially hire a DT would not support a DT in the state altogether. Based on this analysis, the comfort of Virginia dentists would have to be increased in order for them to be tolerant toward the idea of DT in any setting. In terms of the results and responses from open-ended questions, Virginia dentists would need evidence of quality care performed by DT and the services they can provide.

In contrast, both membership in the ADA and comfort in having a DT perform authorized procedures were predictors of tolerance toward a DT. Those who were members of the ADA and uncomfortable in having a DT perform authorized procedures in their practice were more likely to be intolerant toward a DT. This is not a surprising finding considering the ADA's negative position on DTs.[15,39] Because the majority of participants (84%) were members of the ADA, it is expected they would support their position. Overall, more research should be conducted to evaluate the longitudinal impact of DTs in practice. In turn, there could be an increase in comfort and a potential increase in tolerance, defined as a need for a DT in Virginia, toward DTs among Virginia dentists if evidence proved favorable toward a DT. The initial positive impact of DTs in Minnesota should be an example of the potential DTs have to combat against the shortages of dental health professionals and access underserved populations.

LIMITATIONS

Several limitations could have influenced results of this study. The convenience sample and low response rate limit the generalization of results. The purchased email list could have had address errors and some licensed Virginia dentists might not have received the email to participate. Future studies should mail paper surveys directly to licensed Virginia dentists to ensure all current dentists are invited to participate in the study. There was not a representative population of female or younger dentists and future studies should have a more representative

sample of dentists in Virginia to increase validity and reliability of results. Additionally, dentists who did not favor a dental therapist could have been more likely to respond, resulting in an overrepresentation of negative attitudes. This study focused on the attitudes of Virginia dentists toward DTs but did not investigate the knowledge-based of dentists. Future studies should determine the knowledge-base of dentists about DTs and how this influences attitudes and support. Future studies should also assess the attitudes of Virginia dentists toward DTs after more research is published about the impact of DTs in other states. Finally, attitudes of Virginia dental hygienists should be studied in future research to compare with the attitudes of Virginia dentists.

CHAPTER VI

CONCLUSIONS

Findings suggest there is limited support and overall negative attitudes toward DTs among Virginia dentists who participated in this study. Based on the results, the majority Virginia dentists would not be open to training dental therapy students nor would they be willing to work in collaborative agreements with DTs because they do not believe they are needed. Furthermore, barriers to the acceptance of DTs relate to the uncertainty about quality of care and safety for the public. As the majority of participants were members in the ADA, results suggest Virginia dentists agree with the beliefs of organized dentistry and do not support the potential benefit of DTs in Virginia. It is possible that an increase in the familiarity of DTs and more exposure to DTs in practice would lead to more favorable attitudes toward DTs among Virginia dentists. Findings support the need for more research with a larger and diverse sample population. Results from this study provide insight on the overall attitudes and perceptions of Virginia dentists toward DTs as an addition to the dental team in Virginia. Information revealed from this study may help policymakers in making decisions about alternative workforce models for dental hygienists to help increase access to dental care for underserved populations.

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Table I: Demographic Data by Number and Percentage of Total Participants (N= 145)

	Number	Percentage
Gender		
Male	106	73%
Female	32	22%
Do not wish to disclose	7	5%
Age (years)		
Under 29	1	1%
29-39	21	14%
40-49	40	28%
Over 50	83	57%
Years Practicing Dentistry		
Less than 10	10	7%
10-19	42	29%
20-29	30	21%
More than 30	63	43%
Predominant Work Setting		
Community/Public Health	1	1%
Education	7	5%
Free/Safety Net Clinic	2	1%
Group Practice	55	38%
Solo Practice	78	54%
Other	2	1%
American Dental Association Membership		
Yes	122	84%
No	23	16%
Accommodation of Underserved in Practice		
Yes	109	75%
No	36	25%

Table II: Participants' Responses to Proposed Level of Supervision and Education Required for a DT by Number and Percentage (N=145)

	Number	Percentage
Level of Supervision That Should be Required For A DT		
Direct	102	70%
General	29	20%
Indirect	14	10%
No Supervision Needed	0	0%
Level of Education That Should be Required For A DT		
Certificate	6	4%
Associate's Degree	5	3%
Bachelor's Degree	50	34%
Master's Degree	84	58%

Table III: Percentage Scores of Respondent's Perceptions of DTs (N=145)

	1. Strongly disagree	2.	3.	4.	5.	6.	7. Strongly agree	Total
A mid-level dental provider is needed in Virginia.	**62.76%** (91)	**13.10%** (19)	**9.66%** (14)	**7.59%** (11)	**2.76%** (4)	**1.38%** (2)	**2.76%** (4)	145
A mid-level dental provider, such as a dental therapist, could be part of the solution to the problem of access to care in Virginia.	**53.79%** (78)	**19.31%** (28)	**8.97%** (13)	**8.28%** (12)	**4.83%** (7)	**2.07%** (3)	**2.76%** (4)	145
It is important for Virginia to adopt legislation for a dental therapist model.	**64.83%** (94)	**11.72%** (17)	**4.83%** (7)	**4.14%** (6)	**4.14%** (6)	**4.83%** (7)	**5.52%** (8)	145
I have an understanding of the services dental therapists may perform.	**11.72%** (17)	**8.28%** (12)	**7.59%** (11)	**11.03%** (16)	**8.97%** (13)	**18.62 %** (27)	**33.79%** (49)	145
There is evidence dental therapists can perform high quality work.	**33.79%** (49)	**14.48%** (21)	**17.24%** (25)	**21.38%** (31)	**7.59%** (11)	**2.07%** (3)	**3.45%** (5)	145
The public will think the dentist is less important if dental therapists are allowed to perform a wide range of procedures.	**14.48%** (21)	**7.59%** (11)	**10.34%** (15)	**9.66%** (14)	**15.17 %** (22)	**11.03 %** (16)	**31.72%** (46)	145
Dental therapists' practice should be restricted to acknowledged underserved areas in Virginia.	**20.69%** (30)	**4.14%** (6)	**8.97%** (13)	**15.17%** (22)	**6.21%** (9)	**8.28%** (12)	**36.55%** (53)	145
I would be comfortable having a dental therapist perform authorized procedures on my patients.	**61.38%** (89)	**15.86%** (23)	**3.45%** (5)	**8.97%** (13)	**3.45%** (5)	**3.45%** (5)	**3.45%** (5)	145
Being able to delegate some work to a dental therapist would make my job more satisfying.	**55.17%** (80)	**17.24%** (25)	**8.97%** (13)	**8.97%** (13)	**4.14%** (6)	**2.76%** (4)	**2.76%** (4)	145
Having dental therapists in my practice will be a cost-effective addition to the dental office.	**50.34%** (73)	**17.24%** (25)	**10.34%** (15)	**9.66%** (14)	**2.07%** (3)	**4.14%** (6)	**6.21%** (9)	145
I would employ a dental therapist in my practice.	**66.21%** (96)	**13.79%** (20)	**7.59%** (11)	**4.83%** (7)	**2.76%** (4)	**1.38%** (2)	**3.45%** (5)	145

Table IV: One Sample *t*-test Results Comparing Mean Values of Virginia Dentist Responses to Neutral Rating

	Test Value = 4					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
A MLDP is needed in Virginia.	**-17.113**	**144**	**.000**	**-2.103**	**-2.35**	**-1.86**
A MLDP, such as a dental therapist, could be part of the solution to the problem of access to care in Virginia.	**-14.829**	**144**	**.000**	**-1.917**	**-2.17**	**-1.66**
It is important for Virginia to adopt legislation for a dental therapist model.	**-12.558**	**144**	**.000**	**-1.924**	**-2.23**	**-1.62**
I have an understanding of the services dental therapists may perform.	**4.961**	**144**	**.000**	**.883**	**.53**	**1.23**
There is evidence dental therapists can perform high quality work.	**-9.189**	**144**	**.000**	**-1.255**	**-1.53**	**-.99**
The public will think the dentist is less important if dental therapists are allowed to perform a wide range of procedures.	**3.491**	**144**	**.001**	**.634**	**.28**	**.99**
Dental therapists' practice should be restricted to acknowledged underserved areas in Virginia.	**2.713**	**144**	**.007**	**.531**	**.14**	**.92**
I would be comfortable having a dental therapist perform authorized procedures on my patients.	**-14.423**	**144**	**.000**	**-1.986**	**-2.26**	**-1.71**
Being able to delegate some work to a dental therapist would make my job more satisfying.	**-14.512**	**144**	**.000**	**-1.910**	**-2.17**	**-1.65**
Having dental therapists in practice will be a cost-effective addition to the dental office.	**-11.052**	**144**	**.000**	**-1.669**	**-1.97**	**-1.37**
I would employ a dental therapist in my practice.	**-17.513**	**144**	**.000**	**-2.179**	**-2.43**	**-1.93**

Table V: Open Ended Responses Concerning Potential Advantages and Disadvantages of Dental Therapists

	Number	Percentage
Potential Advantages (N=66)		
Expanding care to the underserved	27	41%
Lower costs for patients	4	6%
Generate profit for the dental office	4	6%
Care to Medicaid patients	1	2%
No potential advantages	30	45%
Potential Disadvantages (N=73)		
Safety concerns for the patient	15	21%
Lower quality of care	28	38%
Difficulty differentiating between complex and simple procedures	5	7%
Lack of willingness to practice in underserved populations	7	10%
Competition with patient pool	15	21%
Negative public perception of Dental Therapists	3	4%

Table VI: Summary of Multiple Linear Regression Analysis for Years of Practice and Comfort Ratings

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	*t*	Sig.
Constant	1.170	.320		3.656	.000
Years of Practice	-.132	.097	-.090	-1.361	.176
Comfort	.558	.059	.626	0.499	.000

Note: Dependent Variable: A MLDP is needed in Virginia.

Table VII: Summary of Multiple Linear Regression Analysis for ADA Membership and Comfort Ratings

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	*t*	Sig.
Constant	.142	.342		.414	.679
ADA Membership	.551	.263	.136	2.099	.038
Comfort	.554	.058	.621	9.549	.000

Note: Dependent Variable: A MLDP is needed in Virginia.

APPENDIX A

SURVEY/QUESTIONNAIRE

GENERAL INSTRUCTIONS: Please respond to all items on the survey. After you have finished completing the survey, click on the "submit responses" button. Do not use your arrow keys to navigate each question. You will not be able to backtrack. Voluntary informed consent is understood by completion of the survey. All responses will be anonymous and reported in group form only.

CONTACT INFORMATION: Questions regarding the purpose or procedures of this research project should be directed to Adaira Howell at ahowe016@odu.edu and/or Professor Lynn Tolle at ltolle@odu.edu. If you have any questions or concerns about your rights as a research participant, please contact Dr. Tancy Vandecar-Burdin, the current Institutional Review Board (IRB) chair, at 757-683 3802 at Old Dominion University. The IRB, a university committee established by federal law, is responsible for protecting the rights and welfare of research participants.

Q1 Please indicate your level of agreement with the following statements about a mid-level dental provider defined as a licensed dental hygienist who has graduated from an accredited dental hygiene program who provides primary oral health care directly to patients, and is also trained to perform restorative care such as placing restorations and minor extractions:

	Strongly disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly agree (7)
A mid-level dental provider is needed in Virginia. (1)	○	○	○	○	○	○	○
A mid-level dental provider, such as a dental therapist, could be part of the solution to the problem of access to care in Virginia. (2)	○	○	○	○	○	○	○
It is important for Virginia to adopt legislation for a dental therapist model. (3)	○	○	○	○	○	○	○
I have an understanding of the services dental therapists may perform. (4)	○	○	○	○	○	○	○
There is evidence dental therapists can perform high quality work. (5)	○	○	○	○	○	○	○
The public will think the dentist is less important if	○	○	○	○	○	○	○

dental therapists are allowed to perform a wide range of procedures. (7)							
Dental therapists' practice should be restricted to acknowledged underserved areas in Virginia. (8)	○	○	○	○	○	○	○

Q14 Please indicate your level of agreement with the following statements about a mid-level dental provider related to your dental practice:

	Strongly disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly agree (7)
I would be comfortable having a dental therapist perform authorized procedures on my patients. (1)	○	○	○	○	○	○	○
Being able to delegate some work to a dental therapist would make my job more satisfying. (2)	○	○	○	○	○	○	○
Having dental therapists in my practice will be a cost-effective addition to the dental office. (4)	○	○	○	○	○	○	○
I would employ a dental therapist in my practice. (5)	○	○	○	○	○	○	○

Q2 What level of supervision should be required for a mid-level dental provider?

- ○ Direct Supervision (1)
- ○ General Supervision (2)
- ○ Indirect Supervision (3)
- ○ No supervision needed (4)

Q3 What level of education should be required for a mid-level dental provider?

- ○ Certificate (1)
- ○ Associate's Degree (2)
- ○ Bachelor's Degree (3)
- ○ Master's Degree (4)

Q4 What would be potential **advantages** of a mid-level dental provider in Virginia?

_____

_____

_____

_____

_____

Q5 What would be potential **disadvantages** of a mid-level dental provider in Virginia?

_____

_____

_____

_____

_____

Q13 I accommodate the underserved in my practice.

- Yes (1)
- No (2)

Q9 Are you a member of the American Dental Association?

- Yes (1)
- No (2)

Q12 What gender do you most identify with?

- Male (1)
- Female (2)
- Do not wish to disclose (3)

Q6 What is your age?

- ○ < 29 (1)
- ○ 29-39 (2)
- ○ 40-49 (3)
- ○ 50+ (4)

Q7 How many years have you been practicing dentistry?

- ○ < 10 years (1)
- ○ 10-19 years (2)
- ○ 20-29 years (3)
- ○ 30+ years (4)

Q8 What is your predominant work setting?

- ○ Community/Public Health (1)
- ○ Education (2)
- ○ Free/Safety Net Clinic (3)
- ○ Group Practice (4)
- ○ Solo Practice (5)
- ○ Other (6) _____

Q15 Please provide any additional comments.

_____

_____

_____

_____

_____

APPENDIX B

IRB EXEMPTION

OFFICE OF THE VICE PRESIDENT FOR RESEARCH

Physical Address
4111 Monarch Way, Suite 203
Norfolk, Virginia 23508
Mailing Address
Office of Research
1 Old Dominion University
Norfolk, Virginia 23529
Phone(757) 683-3460
Fax(757) 683-5902

DATE:	October 19, 2019
TO:	Susan Tolle, BSDH, MS
FROM:	Old Dominion University Health Sciences Human Subjects Review Committee
PROJECT TITLE:	[1510446-1] Attitudes of Virginia Dentists Toward the Mid-Level Dental Provider
REFERENCE #:	
SUBMISSION TYPE:	Amendment/Modification
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	
REVIEW CATEGORY:	Exemption category # 2

Thank you for your submission of Amendment/Modification materials for this project. The Old Dominion University Health Sciences Human Subjects Review Committee has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact Harry Zhang at 757-683-6870 or qzhang@odu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Old Dominion University Health Sciences Human Subjects Review Committee's records.

VITA

NAME: Adaira Latrece Howell RDH, BSDH, MS(c)
ADDRESS: 2011 Health Sciences Bldg.
Norfolk, VA 23529

EDUCATION:

In Progress	Old Dominion University G. W. Hirschfeld School of Dental Hygiene Norfolk, Virginia Master of Science, Dental Hygiene
2018	Old Dominion University G. W. Hirschfeld School of Dental Hygiene Norfolk, Virginia Bachelor of Science, Dental Hygiene

EXPERIENCE:

Academic Experience:

2019-present	Adjunct Clinical Faculty – School of Dental Hygiene, Old Dominion University
2018-2019	Graduate Teaching Assistant – School of Dental Hygiene, Old Dominion University

Private Practice Experience:

2018-present	The Art of Dentistry—Registered Dental Hygienist (as needed)
2018-present	Perez Dental Group—Registered Dental Hygienist (as needed)

TEACHING:

Courses taught at Old Dominion University:

Spring 2020	DNTH 306 Dental Hygiene Services II; Adjunct Clinical Faculty DNTH 309 Oral Radiology II; Adjunct Clinical Faculty DNTH 418 Dental Hygiene Services V; Adjunct Clinical Faculty
Fall 2019	DNTH 411 Dental Hygiene Services IV; Adjunct Clinical Faculty DNTH 415-515 Research Methods; Higher Education Research Assistant

HONORS, AWARDS, AND PRIZES:

2018	Outstanding College Scholar from the College of Health Sciences
2018	Gene Hirschfield School of Dental Hygiene Academic Achievement

MEMBERSHIP IN PROFESSIONAL SOCIETIES:

2016-Present	American Dental Hygienist' Association
2018-Present	Alpha Eta National Honor Society for Allied Health Professionals