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Dental Students' Perceptions of Dental Hygienists' Education and Scope of Practice

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A thesis

presented to

the faculty of the Department of Allied Health Sciences

East Tennessee State University

In partial fulfillment

of the requirements of the degree

Master of Science in Allied Health

---

by

Cynthia Metzger

May 2022

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Keywords: dental health education, dental intra-professional collaboration, dental teams, oral-systemic link, access to dental care, integration of oral health

ABSTRACT

Dental Students' Perceptions of Dental Hygienists' Education and Scope of Practice

by

Cynthia Metzger

Oral health is strongly correlated to systemic health. Dental professionals play a significant role in addressing the oral health and prevention of disease for populations in the United States. The U.S. government considers dental hygienists as part of the solution to access to care problems, so federal attention focuses on restrictive dental hygiene scope of practice rules in each state. State dental boards, comprised mainly of dentists, make regulations for dental hygienists' scope of practice based on their perception of dental hygienists' education. This study explored fourth-year dental students' perceptions of the dental hygienist's education and scope of practice. This research found that while dental students felt that the dental hygienist would be a positive addition to their future practices, they did not wholly understand the rigors of dental hygiene education. In addition, dental schools may need to educate on the differences between direct and general supervision.

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DEDICATION

I dedicate this work to my incredible husband, Michael, whose quiet strength and steadfast commitment move mountains. Thank you for your stalwart support and encouragement as I moved mine.

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I want to express a profound appreciation to my committee for your body of expertise and guidance as I move through this thesis process. When I chose this program, one of the primary deciding factors was to have Dr. Deborah Dotson as my committee chair. There are no words to express how much I appreciate your hours of mentorship and guidance with unyielding support as I navigated through the perils of this project. I more than ever want to be like you when I grow up. Dr. Randy Byington, I cannot thank you enough for challenging my thinking about healthcare and its complicated issues. You helped mold me into a better healthcare advocate. Dr. Landon Shields, thank you for your help in making me a better writer.

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Chapter 1. Introduction

The evidence of the link between oral and systemic health conditions continues to emerge with expanding research (Shin & Bowers, 2020). The increasingly high cost of healthcare and the rising number of uninsured and underinsured for health in the United States seem to be regular conversation topics in the news. Prevention has always been a focus of public health, and the COVID epidemic has spotlighted many areas in dentistry needing improvement (Brian & Weintraub, 2020). Healthy People 2030 cites oral health as a priority for good health (US DHHS, 2020). Preventive non-surgical dental care methods are vital for the good of public health to ensure financially sustainable improvement in systemic population health (Brian & Weintraub, 2020).

Dentists and dental hygienists are the primary dental health care delivery providers in the United States. The general dentist's role focuses more on acute dental care, such as diagnosing dental disease and oral pathology, treating dental infections, performing restorative procedures for caries and trauma, and surgical procedures in the teeth, bone, and soft tissues of the oral cavity (American Dental Association [ADA], 2021, para. 4). Dental hygienists in the United States tend to focus more on prevention and chronic care. These include preventive oral health and nutrition education, assessments of systemic and oral health conditions, removal of deposits from all surfaces of the teeth to reduce oral bacterial load, and non-surgical periodontal treatments and maintenance (ADA, 2021, para. 2). Both roles are vital for successful patient dental care.

Dental and dental hygiene students often train separately, which impedes collaboration during the learning phase of dental and dental hygiene training, limiting the understanding of each separate profession's education and practice scope. There is evidence that dental students

perceive dental hygienists as assistants to the dentist (Brame et al., 2015). Dental hygiene students train to evaluate, assess and create a dental hygiene diagnosis to provide preventive care and maintenance, thereby considering themselves more independent professionals (Brame et al., 2015).

Dental students are our country's future dentists. A dental student who is not aware of the dental hygienist's education or licensing requirements increases the possibility that the dental hygienist will be underutilized and undervalued in their practices once they enter the workforce (Reinders et al., 2017). Lack of job satisfaction and reduced supply of dental hygienists are results of mismanaged dental hygienists. One study concluded that dental students felt that dental hygienists are the same as dental assistants, harboring doubts about the dental hygienists' competency in practice (Reinders et al., 2017).

Dentistry and medicine have long enjoyed autonomy within their work and authority over the auxiliary workers in medicine and dentistry. A profession's definition is an occupation of specialized knowledge distinguished by independence, power, and status (Adams, 2004). Dental hygiene started in New England with "dental nurses," providing preventive dental care to the public. By 1915, the Fones School of Dental Hygiene educated graduates to work in public health settings. Dentists began employing dental hygienists because of the value of their services. Soon, the idea of "direct access to patients" was stymied due to the regulation of state dental boards (Newkirk & Slim, 2015).

The state boards of dental examiners regulate the dental hygiene profession in all states except California, which has its own regulating dental hygiene board. The purpose of each state board of dentistry is to ensure that the public is safe (Tennessee Department of Health, n.d.). They make policies for licensure requirements, such as adequate education requirements from

CODA-accredited dental hygiene schools, completion of the National Board Dental Hygiene Exam, and completion of a clinical live patient board exam. The state boards of dental examiners may also regulate under what conditions the dental hygienist may practice. Most scopes of practice and supervision requirements require that dental hygienists work directly with a dentist, limiting access to care for the public.

In 2010, the Federal Trade Commission (FTC) brought a suit against the North Carolina Board of Dentistry because they felt that dentists on the state board of dental examiners created the policy to serve their financial self-interest before the interest of the population's safety. The Supreme Court took up the case to determine whether the regulating board was operating in the public interest in their financial interest (Newkirk & Slim, 2015).

The often-repeated reason for the state regulating boards to limit dental hygienists' scope is that they are not qualified to work independently due to lack of education (Reinders et al., 2017). One wonders if those in control of the regulatory body understand the dental hygienist's knowledge and skills. It is challenging to change dentists' perspectives who have a financial interest in limiting the dental hygienist's ability to work anywhere but under their supervision. I am suggesting that perhaps dental students have not yet built that bias into their perspectives. The updated view may require starting with the dental student's education.

Statement of Problem

The CDC's (2020) position in *Oral Health and COVID-19: Increasing the Need for Prevention and Access* suggests that dental hygienists should have a more significant role in addressing the growing need for access to oral health care due to its impact on systemic health (Brian & Weintraub, 2020). Policy changes could allow dental hygienists to utilize their training and clinical skills to better access care and education opportunities. Suggestions such as the

extended scope of practice and independent practice are tangible solutions to make oral healthcare more accessible to communities at a lower cost (Reinders et al., 2017).

Regulation of the dental hygiene profession is by state dental practice acts overseen by each state dental board. California is the only state in the United States with a Dental Hygiene Board separate from the Dental Board. The Tennessee Board of Dentistry is composed mainly of dentists with little representation from the dental hygiene profession. There have been changes in the scope of practice for dental hygienists over the years. It has been slow and requires convincing the dentists that it will help the populations that need dental care without impacting the earning power of the dentists. The CDC states that easing these restrictions on the scope of the dental hygienist's practice would allow for better direct access to dental care for our populations (Brian & Weintraub, 2020).

The purpose of the governing dental board of each dental profession is to ensure safety for the public and not to protect the financial status of those who own businesses in the provision of dental care. Some of the barriers to the possibility of the scope of practice changes for dental hygienists have been with dentists' attitudes that they would no longer have control over the profession of dental hygiene. They fear an economic loss in their practices (Reinders et al., 2017). Some dentists feel that the dental hygienist does not have enough education and could harm the public (Reinders et al., 2017). Newly graduated dentists have significant financial concerns when they graduate from dental school. What dental students know about the dental hygienist's education and licensing requirements in dental school could impact their perceptions of utilizing their skills once they become licensed dentists. Some voting dentists on the state board of dentistry feel that dental hygienists are unqualified to deliver preventive care within their scope of practice under general supervision to our populations (Newkirk & Slim, 2015).

Purpose of the Study

This project aimed to determine what dental students in Tennessee perceive as the dental hygienist's education and licensing requirements. Determining whether the dental hygienist's education and licensing requirements are a part of the dental student's required curriculum was established through the dental curriculum (The University of Tennessee Health Science Center [UTHSC], 2022). This knowledge helped determine if dental students knew dental hygienists' education and licensing requirements were in their curriculum during their time at UTHSC. If novice dentists feel that dental hygienists lack knowledge post-graduate, then data collection would require another study. The data interpretation helped determine if an academic intervention is needed and the intervention's placement.

This study examined Tennessee fourth-year dental students' perceptions of dental hygienists' educational levels and licensing requirements, then compared that data with the current state-regulated education and licensure requirements for dental hygienists. The null hypothesis was dental students are fully aware of the dental hygienist's educational and licensing and scope of practice requirements. The research hypothesis was that dental students were not aware of the dental hygienist's educational, licensing, and scope of practice requirements.

Significance of the Study

The Tennessee Board of Dentistry defines direct supervision as "a continuous presence of a supervising dentist within the physical confines of the dental office when the dental hygienist is performing lawfully assigned duties and functions. General supervision means that a dentist must be available for consultation but does not need to be on the premises" (FindLaw Staff, 2021, para. 2 & 3). The licensing requirement of direct supervision makes it difficult for the dental hygienist to work anywhere other than the dental office. Removing the need for direct

supervision by a dentist will allow dental hygienists to provide cost-effective preventive oral health services (Reinders et al., 2017) to areas that lack a dentist. The dental hygienist can refer to a dentist for treatment within the scope of practice of the dentist.

This study's significance establishes a baseline for understanding dental students' perceptions as they experience dental school. Perhaps future studies may determine attitude shifts that impact the decisions made by the boards of dentistry that regulate the scope of practice of dental hygienists, affecting their ability to deliver preventive oral healthcare to the population without the dentist's direct supervision.

Theoretical/Conceptual Framework

In typical dental practices, the dentist is the doctor who is responsible for delegating allowable tasks to the dental hygienist. Reinders et al. (2017) discussed the attitudes of dentists and dental hygienists regarding the extended scope of practice and independent practice. The results illustrated in their systematic review were that dentists and dental hygienists both had positive attitudes towards increasing the dental hygienist's scope of dental hygiene practice. The dentists did not have a favorable view of the independent practice of the dental hygienist. Reinders et al. suggested this loss of control of the treatment as a possible reason for the resistance to independent practice. Another suggestion was that dentists hold a higher status within the dental community. If dental hygienists are allowed independent practice, the dental hygienist may no longer play a subordinate role within the dental professional hierarchy. The other suggestion was that dentists perceive a threat to the quality of care provided due to doubts about the dental hygienists' competence to provide dental hygiene care without direct supervision (Reinders et al., 2017).

A Michigan study showed that many dentists were not delegating all of the dental hygienist's tasks within their practices (Mishler et al., 2018). The higher the dentist's regard for the contributions of the dental hygienist, the more they assigned tasks. This study recognized a gap in the literature to data that compares the dentist's knowledge of the allowable contributions of the dental hygienist and what tasks they allow their dental hygienists to perform. In this study, the dentists with more experience rated the contributions of the dental hygienist higher than those with less experience with regards to diagnostic and adjunctive services within their practices (Mishler et al., 2018).

A developing theory based on continuing research in dental education is that it is time to get dental professional students out of the traditional silos and instead allow dental and dental hygiene students to learn in parallel while in school. There is value in having them learn together in school so that the sense of teamwork and collaboration translates into the practice settings (Satter et al., 2020). Intraprofessional education between dental and dental hygiene students provides an understanding of the different roles within dentistry. Mutual respect develops as each develops their professional skills, role models, and responsibilities, translating into private practice after graduation (Kersbergen et al., 2020). The problem most cited in Kersbergan et al. (2020) survey was that most dental professionals in private practice had not had intradisciplinary experiences. The new graduates could not practice their skills working together as they learned in school because their employers and coworkers had not discovered them when they were dental students.

Research Questions

The research questions for this study were as follows:

1. What are the perceptions of Tennessee fourth-year dental students about the education of dental hygienists?
2. What are the perceptions of Tennessee fourth-year dental students about dental hygienists' roles and licensing requirements?

Limitations and Delimitations

This study's limitations were the availability of dental students and their willingness to participate in this study. The study was planned to include both dental schools in Tennessee, but only one participated, thus lowering the potential number of participants. The dental students could have potentially been influenced by the bias of others, including their professors. The study group could share the same biases due to their geographic region.

The delimitations are that the study was confined to Tennessee fourth-year dental students because they are about to graduate. Fourth-year dental students have limited time due to their academic and clinical responsibilities. I assumed that those who responded were being truthful. They will have had the opportunity to learn about the dental hygienist's education and licensing requirements because they are close to graduation.

Definition of Terms

- **Direct access** to dental care is defined by the American Dental Hygienist's Association (ADHA) as "the ability of a dental hygienist to initiate treatment on their assessment of a patient's needs without the specific authorization of a dentist, treat the patient without the presence of a dentist, and maintain a provider-patient relationship" (ADHA, 2021, para.1).
- **Direct supervision** of a dental hygienist in the state of Tennessee means that there is a continuous presence of a supervising dentist within the physical

confines of the dental office when the dental hygienist is performing lawfully assigned duties and functions (FindLaw Staff, 2021, para.2).

- **General supervision** defines instances when the dentist is not on the premises while the dental hygienist performs procedures. The dentist has personally diagnosed the conditions for treatment and authorized the procedures. The dentist will also evaluate the dental hygienist's performance (FindLaw Staff, 2020).
- **State Boards of Dentistry** are synonymous with the State Board of Dental Examiners. It is an agency created by the state legislature, and it governs qualifications for the practice of dentistry, dental hygiene, and dental assisting in each state. California is the only state that has a self-regulating dental hygiene board.
- **Commission on Dental Accreditation (CODA)** is the agency that develops and administers educational standards for dental and dental hygiene educational programs (Commission on Dental Accreditation, 2021, para.2).

Chapter 2. Literature Review

The accessibility of healthcare in the United States has long been in various stages of reform and fraught with many hurdles. Insurance companies have long been the center of the healthcare compensation model that has been the backbone of the American healthcare system for decades. The Affordable Care Act (ACA) of 2010 provides affordable medical insurance for more Americans. There have been years of literature and publications on the link between oral health and systemic health (Fitzpatrick & Duley, 2012), which points to the quality of oral health impacting the quality of systemic health. In 2010, an additional $40 million in federal funding was allotted through the ACA for children's dental services through Medicaid and CHIP programs (Naughton, 2014). Yet, access to oral healthcare and oral health disparities are still an obstacle in today's field of dentistry (Mertz & Glassman, 2011). The government and private industry, the two major players in healthcare, see that the increasing costs of healthcare are unsustainable and are considering workforce redesign to address the access to care disparities (Mertz & Glassman, 2011). There must be a better way to provide access to so many underserved areas.

Access to Care

The Centers for Disease Control and Prevention noted in a recent U.S. Public health response to COVID-19 and Chronic Disease Supplement that those heavily impacted by COVID-19 were also at higher risk for oral health diseases (Brian & Weintraub, 2020). Dental caries is still the most chronic childhood disease, with 32.7% untreated (Brian & Weintraub, 2020). Periodontal disease, an inflammatory disease of the gums and bone surrounding the dentition, is making its mark with national data indicating that 42% of adults over 30 years old have periodontitis (Centers for Disease Control and Prevention, 2013). Periodontal disease is

strongly correlated to many systemic diseases such as cardiovascular disease, diabetes, dementia, adverse pregnancy outcomes, respiratory infections, rheumatoid arthritis, chronic kidney disease, and cancer (Nazir, 2017).

There are 59 million Americans who live in areas experiencing a dental healthcare shortage in the United States today (Rehan, 2020). The definition of Health Professional Shortage Areas (HPSA) is an area with a population to provider ratio of 5000 to one (Rehan, 2020). Rehan (2020) noted that while the accessibility issues for lack of dental providers in HPSA areas are a problem, the cost of treatment and the perceived importance of good oral health also contribute to barriers to care. According to Rehan, dental schools are graduating enough dentists. Yet, they tend to saturate urban areas rather than areas of need, making the maldistribution of dental providers part of the problem. Changing payment models to more preventive outcomes-based models may be a solution to the problem. Preventative measures will help shape dentistry in the coming years, including shifting auxiliary personnel into preventive roles to reduce treatment costs (Rehan, 2020).

Dentists, dental hygienists, and dental assistants make up the clinical aspect of most dental practices. The dentist and dental assistant's work focuses mainly on acute care procedures, while the dental hygienist predominantly works alone, focusing on prevention and chronic care management. The dentist and the dental hygienist jobs are two sides of the same coin in focus and skill, but both comprise essential aspects of effective dental practice. Restrictive state licensing boards operated by dentists are viewed by Healthy People 2030 as a barrier to a workforce that is educated and trained to manage the prevention and chronic care needs of the population (U.S. Department of Health & Human Services [US DHHS], 2020). State dental boards reject the increased scope of dental hygienists' practice to address the access to care

problem because of their perception that dental hygienists lack enough education to access, evaluate, and create a treatment plan for a patient without direct supervision from a dentist (Hopcraft et al., 2008). Dentists' attitudes and knowledge regarding dental hygienists' education are essential to understand when evaluating legislative decisions for dental healthcare practitioners' scope of practice. Tracking dental students' and dentists' attitudes towards resistance to expanding the scope of dental hygienists' practice is vital to understand when pinpointing the need for dentists' education of the future (Fitzpatrick & Duley, 2012).

Healthy People 2030

The U.S. Department of Health and Human Services (US DHHS) created an advisory committee to determine a health initiative with goals and objectives to promote the American population's health and well-being. The Healthy People 2030 initiative bases its vision on four decades of national data towards promoting health and well-being for all Americans. Through federal collaboration with state and community projects that target systemic and dental diseases, reducing risk factors such as smoking, high cholesterol, obesity, and increasing childhood vaccinations, actions can improve the community's health outcomes (USDHH, 2020, October 8). The involvement of private and nonprivate diverse stakeholders is vital to achieving health for all. The challenge for Healthy People 2030 is to achieve total health potential for everyone in the United States. Many of the dental objectives for Healthy People 2030 focus on preventive measures for caries, periodontal disease, and missing teeth (USDHH, 2020, October 8).

Health literacy is how individuals can understand health services and outcome potentials to make informed decisions about their health ("National Action Plan to Improve Health Literacy: Summary," 2010). The improvement of personal health literacy in this country will require the education of the public and healthcare practitioners to address current health issues.

Organizational health literacy will require an understanding of the data collected and documented improvement of health outcomes. The change of policies is always on the list of suggestions for change, but it will take research and time to develop (*History of Health Literacy Definitions | Health.Gov*, n.d.). Organizational literacy may be crucial for change in legislative state boards' restrictions regarding the scope of practice for dental hygienists, releasing them to contribute to the solutions to the access to care problem (US DHHS, 2020, December 3).

Dental Hygienists' Roles

Dental hygienists are dental healthcare professionals whose primary roles have developed and expanded over the years. Today, the focus of the dental hygienist within the dental healthcare setting is accessing and evaluating for dental diseases, such as caries and periodontal disease, and promoting preventive interventions such as fluoride, non-surgical periodontal therapy, and education for prevention of oral health problems (American Dental Hygienists' Association [ADHA], 2020, p. 18). They have a more holistic approach to preventing and treating oral diseases through their assessment and evaluation methods. Part of the treatment plan is long-term oral health maintenance once stability is maintained. Dental hygienists are competent to regularly perform oral examinations to evaluate for potential caries, oral pathologies, and periodontal disease and establish working treatment plans (Erdenborg et al., 2020). The Healthy People 2030 initiative suggested that dental hygienists play a more significant role in delivering dental healthcare to the population (US DHHS, 2020, July 24). Dental hygienists feel capable of carrying out the duties of their profession (Ross et al., 2009). Dentists and dental students have reported a poor understanding of the dental hygienists' education and capabilities, contributing to a negative attitude towards them (Ross et al., 2009). In one study, fewer than 1/3 of the responding dental students understood the duties and roles of

dental team members. Even knowing they lacked knowledge, the dental students did not value the dental hygienist's role in a clinical setting (Ross et al., 2009).

One idea is to allow dental students to collaborate with dental hygiene students while in school. They can see each other's roles and responsibilities within the dental healthcare setting. The literature points to positive collaborative relationships once in dental practice (Leisnert et al., 2012). It is possible to increase the knowledge of competencies of both dental and dental hygiene professions by allowing the students to work collaboratively while in academic clinical settings, reducing the gap in dental students' knowledge of the education of the dental hygienist (Leisnert et al., 2012).

Teamwork in the provision of dental services has been vital to the success of oral health outcomes. Dental education is hoping to place a broader focus on providing intra-professional training between dental and dental hygiene students to provide a more holistic way of looking at patients for dental students while increasing dental hygienists' competencies in assessment evaluation (Leisnert et al., 2012: McGregor et al., 2018). It is difficult to say why dental hygienists approach patients' treatment planning and treatment through a more holistic lens, but these views were successful and translated to dental students who worked with them (Leisnert et al., 2012).

Education of the Dental Hygienist

The dental hygienist's education is currently at entry-level of 3.5 years of academic and clinical training, resulting in an associate's degree (Jokiaho et al., 2018). University programs provide a baccalaureate degree. The American Dental Hygienists' Association supports the baccalaureate degree program for entry-level dental hygienists (ADHA, 2020, p. 23.) Dental hygienists have prerequisites in speech, English, mathematics, statistics, psychology, and

sociology. Basic sciences requirements are part of the curriculum, such as chemistry, biology, organic chemistry, anatomy, physiology, pathology, and pharmacology. Required dental sciences consist of dental anatomy, dental materials, oral pathology, local anesthesia (in all but a few states), radiography, etc. Also included are dental hygiene courses, such as oral health education and preventive counseling, patient management, community dental health, geriatric patient care, etc. Students spend a significant amount of time practicing patient management skills (ADHA, 2021).

In most states in the United States, dental hygiene licensure requires graduation from a CODA accredited dental hygiene school, successful completion of the Dental Hygiene National Board exam, successful completion of a live patient board exam required by the state, and successful completion of an ethics and jurisprudence exam. Each state has requirements for mandated continuing education.

Task Division and Attitudes Toward Each Other's Role

Dental hygienists are trained and qualified to handle many tasks and feel competent to perform various skills. Literature suggests that dentists are often not aware of the extensive training of dental hygienists and, as a result, are unwilling to permit the performance of tasks for which dental hygienists are qualified, resulting in dentists performing tasks they are overqualified to perform (Jokiaho et al., 2018). Professional underutilization results when dentists are unwilling to allow dental hygienists to perform functions for which they are trained and qualified. Jokiaho et al. (2018) suggested that the barrier to utilizing the complete skills of the dental hygienist stems from a lack of awareness of professional competence and training.

The literature points towards the practical skill of the dental hygienist in educating and motivating the patient (Thevissen et al., 2017). Oral hygiene instruction (OHI) and patient

motivation (PM) are vital due to the prevalence of periodontal disease. Thevissen et al. (2017) compared general dentists and periodontists who did not employ dental hygienists to the outcomes of patients of those who did. The results showed that the dental hygienists' primary focus is prevention, and they are skilled at patient education and management (Thevissen et al., 2017). Most dentists in the study reported that they were not as successful as the hygienist at motivating patients with the homecare necessary for better dental health (Thevissen,et al.). In this study, general dentists cited that they did not have time to provide oral hygiene instruction or patient motivation techniques. Therefore, they did not deliver adequately despite being in their treatment plan (Thevissen et al., 2017). The overall suggestion by Thevissen et al. (2017) is that the value of the dental hygienist in private practice is more than just clinical skills.

Some dentists and dental hygienists have collaborative relationships that are effective in divisions of tasks. While most dentists agree that patient motivation for patient compliance is vital for better oral health outcomes, dentists tend to focus more on restorative treatments with a larger financial reward than dental hygienists who focus on long-term preventive care (Thevissen et al., 2017). A Danish study by Hach et al. (2017) showed that dentists were willing to increase the delegation of dental-related tasks to dental hygienists. Still, the jobs were different depending on whether they were publicly funded or privately funded. Hach et al. noted that dental hygiene tasks were delegated more to children in public dental healthcare situations. In contrast, in private dental practice, the functions delegated were more focused on adults. A chairside dental assistant was afforded to the dentist but not to the dental hygienists for the same tasks (Hach et al., 2017).

The idea of intradisciplinary training in educational settings has had some positive outcomes. Many dental schools do not teach dental students about dental hygienists' roles or

offer interaction with dental hygiene students (Brame et al., 2016), which may influence the dentists' lack of willingness to assign more tasks to the dental hygienist (Kersbergen et al., 2020). Knowledge of dentists' and dental hygienists' functions in a team setting can be taught in an academic environment that provides an understanding of education and competencies (Kersbergen et al., 2020). Failure to acknowledge each other's areas of expertise can cripple the effectiveness of the team. Most dental and dental hygiene students do not have intradisciplinary teamwork opportunities while in school, and those that did are not working with dental professionals who had training (Kersbergen et al., 2020).

Reinders et al. (2017) investigated dental students' perceptions of dental hygienists' scope of practice before and after intra-professional education. In the beginning, dental students perceived those dental hygienists were assistants to dentists. Dental hygiene students considered themselves separate dental professionals with different skills (Reinders et al., 2017). Collaboration training between dental and dental hygiene students is vital to ensure task distribution is most efficient in dental practice (Reinders et al., 2017).

Many dental programs do not teach team leadership, conflict resolution, and other management skills. Therefore, learning to foster relationships with allied health professions, such as dental hygiene, would improve dental practices (McGregor, 2018). For example, one survey showed that of the respondents, 73% of dental students and 84% of dental assisting students considered the function of allied dental health professionals (dental hygienists and dental assistants) to be in a supportive role to the dentist (Brame et al., 2015). Since dental hygienists primarily work independently, dental hygiene students see themselves as more independent (Brame et al., 2015).

Barriers to Collaboration between Dentists and Dental Hygienists

There are historical stereotypes within the field of dentistry. Dental hygienists have long been working in a subordinate role to dentists. The profession of dental hygiene has expanded over the years (Hopecraft et al., 2008). Dentists strongly oppose the concept of independent practice of dental hygienists. These dentists cite their concerns as a lack of education for dental hygienists and the potential of inflicting harm on the public (Hopcraft et al.,2008).

The delivery models seem to focus on the state regulating board's direct or indirect supervision requirements. Direct supervision requires that the dentist be on the premises and direct the tasks provided by the dental hygienist. Those who work in states with "direct supervision" laws cannot work in any setting independently of a dentist. Even though many dentists strongly believe that dental hygienists do not have adequate training to practice without a dentist's supervision, there is no evidence of increased risk to public health and safety for dental hygienists who work independently (Hopcraft et al., 2008). Most dental hygienists believe themselves competent to deliver dental hygiene services under the general supervision of a dentist. A significant barrier to the dental hygienist's autonomy is bureaucratic restrictions in the state of employment due to outdated notions of inadequate dental hygiene training and education (Catlett, 2016).

Licensure

Each state has its governing state board of dental examiners that regulates the practice act for dentistry, dental hygiene, and dental assisting in their state. The state dental boards regulate the dental hygiene profession within their particular state, even though the Council on Dental Accreditation (CODA) sets forth educational accreditation standards for dental hygiene. The purpose of state dental boards is to protect the public's health and safety (Kleiner, 2016). Most

state dental boards are composed of dentists who may be more likely to favor making decisions based on economics for dentists rather than addressing dental hygienists' concerns. There is no evidence to support that dental hygienists lack the education or competence to expand their practices to manage access to care within their scope of practice (Newkirk & Slim, 2015). Federal agencies are now looking at state rules and regulations instated by state dental boards. One of the economic problems with regulation by occupations such as doctors or dentists is that they often regulate licenses of the allied health fields. The results may raise prices due to the perception of increased demand by restricting allied health practitioners resulting in higher income for those practitioners and less income for lower-income practitioners (Kleiner). It is now a less cost-effective provision of healthcare services for all.

Conclusion

Even with the Affordable Care Act of 2010, oral healthcare and disparities still vex the field of dentistry. Since research suggests that dental students lack knowledge of dental hygienists' education and scope of practice, it is understandable that they are unsure how to utilize their skills and knowledge when they graduate. Evidence also shows better collaboration between dental and dental hygiene students while in professional school suggests that this may carry over into private practice settings, resulting in improved utilization of the dental hygienist's skills and training (McGregor, 2018). Most dental schools and dental hygiene schools do not provide opportunities for intradisciplinary training. State licensing boards are primarily composed of dentists who direct the scope of practice of dental hygienists. A lack of awareness of the extent and depth of the dental hygienist's education and skillset could potentially prevent the utilization of dental hygienists to possibly be a part of the solution to the access to oral healthcare issue in the United States.

Chapter 3. Methodology

Overview

The purpose of the Tennessee State Board of Dentistry is to ensure the health, safety, and welfare of Tennesseans by providing that dental healthcare professionals are qualified to practice in Tennessee (Tennessee Board of Dentistry, n.d.). Seven dentists, two dental hygienists, one dental assistant, and one citizen member compose the Tennessee Board of Dentistry. Their collective votes determine requirements for the dental hygienists' licensure qualification and scope of practice in Tennessee. Since most voting board members are dentists, those critical decisions require that dentists understand the dental hygienist's education and training for safe practice parameters. This quantitative, non-experimental, cross-sectional study examined some Tennessee fourth-year dental students' knowledge and attitudes of dental hygienists' education and scope of practice.

Research Questions

The research questions for this study were as follows:

- What are the perceptions of Tennessee fourth-year dental students about the education of dental hygienists?
- What are the perceptions of Tennessee fourth-year dental students about dental hygienist's roles and licensing requirements?

Research Design

This study's design was a cross-sectional study of fourth-year dental students at the University of Tennessee Health Science Center College of Dentistry (UTHSC). Several attempts were made to include Meharry Medical College School of Dentistry, but they were unable to participate during the time of the study. A cross-sectional study was appropriate because the data

collected helped determine the prevailing characteristics of fourth-year dental students at UTHSC as they were about to enter their final semester in dental school.

This type of research looks at a variable at one point in time so that future researchers may later compare data. A survey can garner extensive data from a large population, providing more significant statistical potential. The study's validity relies on self-reporting, which depends on the participants attending the survey (Jones et al., 2013). Since this cross-sectional study measures a specific outcome at one point, it can also provide a base for more research in the future and perhaps include data from other dental school programs. The cross-sectional study's disadvantages are that it may only explain the inferred causation of the outcome instead of conclusions about the causation (Weng & Cheng, 2020).

Study Population

This study's population was the senior classes at the University of Tennessee Health Science Center (UTHSC) College of Dentistry in Memphis, TN. Fourth-year dental students will be graduating withing one more semester and will be among the future licensed dentists in Tennessee. I obtained permission from the Assistant Dean at UTHSC, Dr. Marc Scarbecz, to pursue this study. (Appendix B).

Survey Instrument

I designed a three-part questionnaire to answer the questions of the study, beginning with the establishment of informed consent as the first encounter. After the informed consent, the first part of the questionnaire was a short establishment of demographic information of the respondents. Evaluation of fourth-year dental students' perceptions of dental hygienist's education in Tennessee was the second part. The participant's perceptions of the dental hygienist's roles and licensing requirements in Tennessee compiled the third part.

The questionnaire asked respondents to answer using the five-part Likert-like scale to indicate their degree of agreement or disagreement with a statement. There were three demographic questions, eleven education questions, and fifteen scopes of practice questions on the survey. The purpose of the demographic questions was to determine gender, whether the dental student intended to work as a dentist in Tennessee after graduation, and what plans they had for dentistry practice after graduation if they knew. A five-point Likert-type scale ranging from one, strongly disagree to five, strongly agree was used for the rest of the questionnaire in two sections labeled "perceptions of the education of dental hygienists" and "perceptions of the scope of practice of dental hygienists." Eleven questions on the survey focused on the knowledge of different dental hygiene education areas. Fifteen inquiries were about dental students' attitudes about dental hygienists' scope of practice in their future work as dentists.

A panel of ETSU dental hygiene faculty consisting of three dental hygienists and one dentist reviewed the survey before submission to ensure clarity of content and instructions. They each offered suggestions for better understanding and refinement. I modified the questionnaire based on the panel's review.

Data Collection Procedures

I chose to collect data through a survey questionnaire designed to determine the understanding of dental students' specific knowledge of the dental hygienist education and scope of practice in Tennessee. An email requesting preliminary permission to survey the fourth-year dental students was sent to the University of Tennessee Health Science Center School of Dentistry (see Appendix B). The data collection instrument chosen was a survey questionnaire to maintain all respondents' confidentiality and maximum convenience (See Appendix A). The survey administration began at the end of the in the Fall Semester of 2021 for fourth-year dental

students at the University of Tennessee Health Science Center (UTHSC) College of Dentistry in Memphis, TN.

After obtaining permission for the study, the survey instrument (see Appendix A) was uploaded into the Qualtrics Online Survey software to link to the fourth-year dental students via email for ease of participation. I sent an email to Dr. Scarbecz to forward to the dental students to keep the survey anonymous and reduce any risk of personal identifiers connected to the participants to be exposed (See Appendix C). This email included an explanation of the survey and informed consent information, including contacting me, Dr. Deborah Dotson (committee chair), and ETSU's IRB department. The survey's instructions stated that entering the survey assumed implied consent. The instructions indicated that they were permitted to answer questions they chose, and if they decided not to complete the survey, they could delete it altogether. There is no requirement that they participate in the survey. All survey information would be secured and destroyed after data entry. The survey would take 15 minutes or less to complete.

The Qualtrics Online Survey Platform provided the survey administration and data collection device. Qualtrics Online Data Platform also exported data directly to SPSS software for analysis.

Data Analysis Procedures

Survey data were analyzed using independent samples to determine differences in how the dental students responded to knowledge and attitude questions and to evaluate whether there is a relationship between the dental students' knowledge and attitudes about the dental hygienist's education and scope of practice. The data were descriptive showing the percentage of responses

as they relate to the research questions. I calculated the frequency and percentage for each question. All testing was conducted at a 95% confidence level

Chapter 4. Results

There is growing evidence in the scientific literature about the association between oral health and systemic health (Kilian et al., 2016). US citizens lack access to dental care, yet dental hygienists are trained and licensed to manage many of these issues. Still, state dental boards govern dental hygienists' direct access to care for patients in many states (Naughton, 2014). Dentists control the state dental boards and, therefore, dental hygienists' licensure and scope of practice in each state except California. Consequently, it is essential to understand dentists' perceptions of dental hygienists' education and scope of practice, beginning with what they know right before they graduate from dental school.

The purpose of this study was to determine what fourth-year dental students at the University of Tennessee Health Science Center College of Dentistry (UTHSC) and Meharry Medical College School of Dentistry perceive as the dental hygienists' education and licensing/scope of practice requirements in the state of Tennessee. The following questions were the focus of this study:

1. What are the perceptions of fourth-year dental students at UTHSC and Meharry Medical College School of Dentistry about the education of dental hygienists?
2. What are the perceptions of fourth-year dental students at UTHSC and Meharry Medical College School of Dentistry about dental hygienists' roles and licensing requirements?

It should be noted that the study was limited to the UTHSC due to Meharry's inability to participate.

Data Collection Overview

Fourth-year dental students answered a formatted electronic questionnaire survey at the University of Tennessee Health Science Center School of Dentistry. The survey had three sections:

1. Demographics
2. Evaluation of the dental students' perceptions of the education of the dental hygienist in Tennessee
3. Evaluation of the dental students' perceptions of the scope of practice of the dental hygienist in Tennessee.

The inclusion criterion required all respondents to be fourth-year dental students at the University of Tennessee Health Science Center School of Dentistry (UTHSC), physically in the United States while participating in the survey, and 18 years or older.

Research Partner Establishment

An introductory email to establish a relationship with each dental school to obtain prior permission to permit their dental students access to the survey for data collection. Marc Scarbecz, DDS and assistant Dean at UTHSC, responded. After sending him a copy of the survey, he arranged a phone meeting to discuss the project. During that meeting, he granted permission and informed me of the protocol at UTHSC for research at their institution.

The survey was emailed to 101 fourth-year dental students at UTHSC. Sixty-one students began the process by clicking the survey link, and failure to answer the survey questions excluded five participants. The total number of respondents who participated in the entire survey beyond the demographic section was fifty-six (N=56), 55.4% of the total fourth-year dental students at UTHSC.

Demographics

Of the 60 qualified participants, 30 were male (50%), 28 were female (46.7 %), and 2 (3.3%) preferred not to say. The majority of the respondents (46.7%) planned to practice in Tennessee, 18.3% planned to practice in Arkansas, 33.3% planned to practice in other areas, and 1.7% did not intend to practice dentistry.

Descriptive Results

The following two sections address the research questions and present descriptive data.

Perceptions of the Education of the Dental Hygienist

Question 1 of the survey asked if the dental students felt that the dental hygienist had sufficient education to practice dental hygiene today. None strongly disagreed of the 56 respondents (N=56), while two (3.6%) disagreed. Fourteen (25%) responded they did not know. Thirty-one agreed (55.4%), and nine (16.1%) strongly agreed. Forty (71.5%) respondents agreed or strongly agreed (Table 1).

Table 1

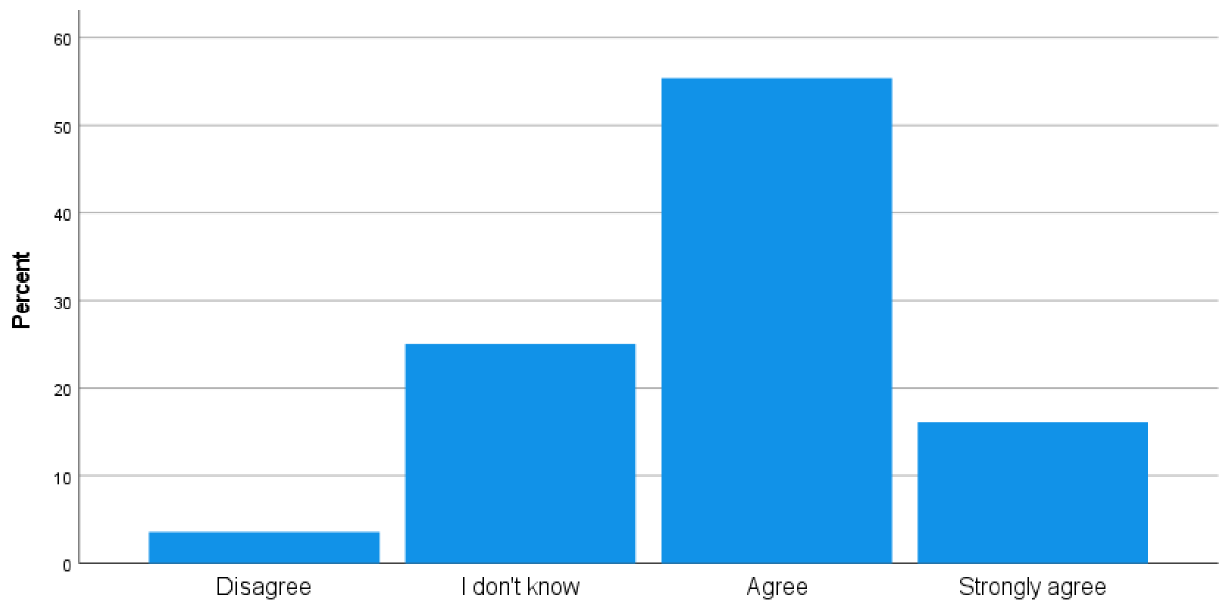
Perceptions of the Education of the Dental Hygienist- Dental Hygienists have Sufficient Education to Practice Dental Hygiene Today

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	3.3	3.6	3.6
	I don't know	14	23.0	25.0	28.6
	Agree	31	50.8	55.4	83.9
	Strongly agree	9	14.8	16.1	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 2 of the survey asked if the dental hygienists must go to college for two years to earn an associate degree in dental hygiene before licensure. Out of 56 respondents (N=56), one (1.6%) strongly disagreed, while two (3.6%) disagreed. Thirteen (23.2%) did not know. Thirty (53.6% agreed), and ten (17.9%) strongly agreed. Forty (71.5 %) participants agreed or strongly agreed, while three (5.4%) disagreed or strongly disagreed (Figure 1).

Figure 1

Perceptions of the Education of the Dental Hygienist- Dental Hygienists Must go to College for 2 Years to Earn an Associate Degree in Dental Hygiene before Licensure

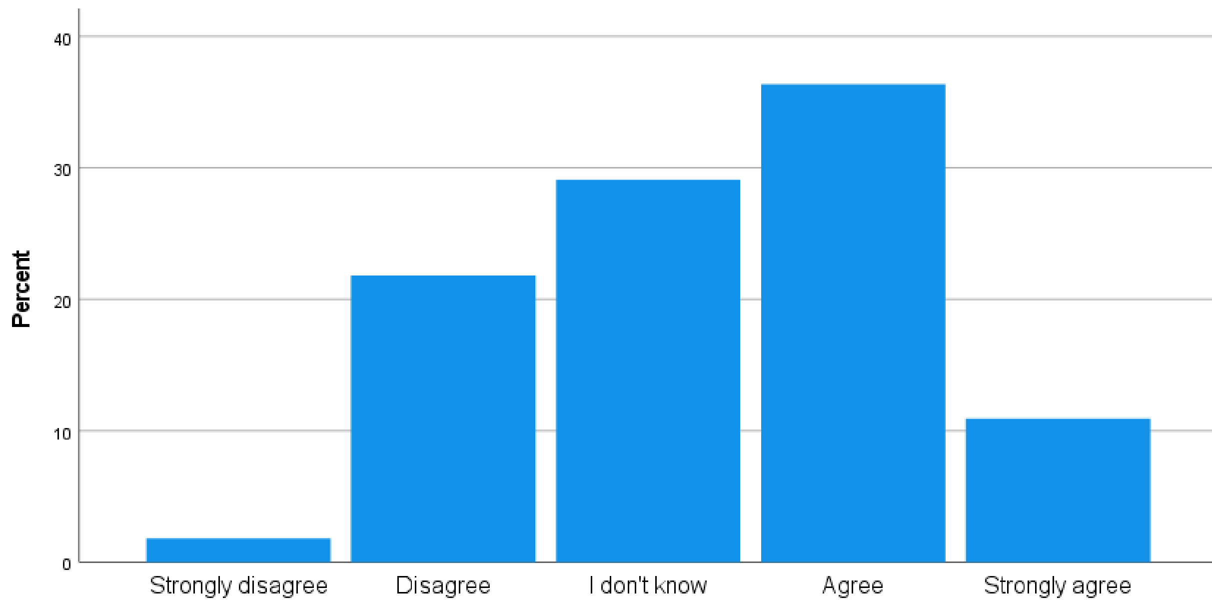


Question 3 of the survey asked if the dental students thought the dental hygienist should be required to have a bachelor's degree at entry level for their current scope of practice before licensure. Out of 55 participants (N=55), one (1.8%) strongly disagreed, while twelve (21.8%) disagreed. Sixteen (29.1%) did not know. Twenty (36.4%) agreed, while six (10.9%) strongly

agreed. Twenty-six participants (42.6%) agreed or strongly agreed, while thirteen (23.6%) participants disagreed or strongly disagreed (Figure 2).

Figure 2

Perceptions of the Education of the Dental Hygienist-Dental Hygienists Should Be Required to have a Bachelor's Degree at Entry Level for their Current Scope of Practice in Tennessee



Question 4 of the survey asked if the dental students thought the dental hygienists' education included biomedical sciences such as anatomy, physiology, biochemistry, microbiology, immunology, maxillofacial pathology, nutrition, and pharmacology. There were no respondents that strongly disagreed out of 56 respondents (N=56), and five (8.9%) respondents disagreed. Sixteen (28.6%) did not know. Twenty-eight (50%) respondents agreed, while seven (12.5%) strongly agreed. Thirty-five (62.5%) participants agreed or strongly agreed (Table 2).

Table 2

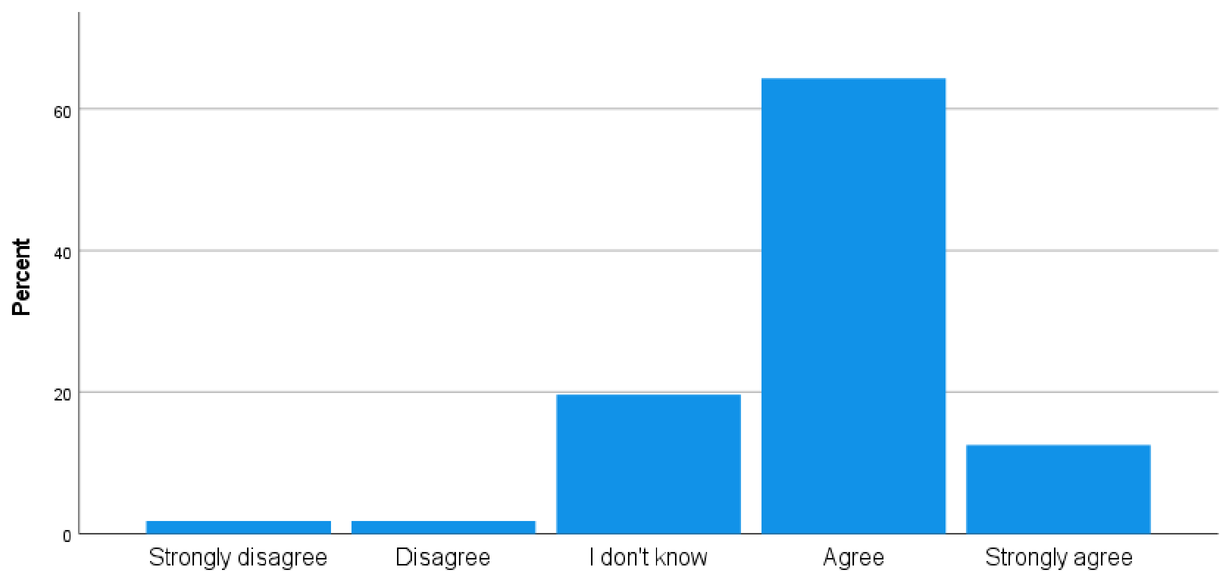
Perceptions of the Education of the Dental Hygienist-A Dental Hygienist's Education Includes Biomedical Sciences such as Anatomy, Physiology, Biochemistry, Microbiology, Immunology, Maxillofacial Pathology, Nutrition, and Pharmacology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	8.2	8.9	8.9
	I don't know	16	26.2	28.6	37.5
	Agree	28	45.9	50.0	87.5
	Strongly agree	7	11.5	12.5	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 5 of the survey asked if a dental hygienists' education included dental sciences such as tooth morphology, head & neck oral anatomy, oral embryology and histology, oral pathology, radiography, periodontology, pain management, and dental materials. One (1.8%) participant strongly disagreed and disagreed, respectively. Eleven (19.6%) did not know. Thirty-six (64.3%) respondents agreed, and seven (12.5%) strongly agreed. Forty-three (76.8%) respondents agreed or strongly agreed (Figure 3).

Figure 3

Perceptions of the Education of the Dental Hygienist-A Dental Hygienist's Education Includes Dental Sciences such as Tooth Morphology, Head & Neck Oral Anatomy, Oral Embryology and Histology, Oral Pathology, Radiography, Periodontology, Pain Management, and Dental Materials.



Question 6 of the survey asked if the dental hygienists' education includes dental hygiene sciences such as oral health education and preventive counseling, health promotion, patient management, special needs provisions, medical and dental emergencies, legal and ethics education, and infection/hazard control management. Out of 56 respondents (N=56), none indicated strongly disagree or disagree. Six (10.7 %) responded that they did not know. Thirty-six (64.3%) answered that they agreed, and fourteen (25%) responded strongly agreed. Fifty respondents (89.3%) agreed or strongly agreed (Table 3).

Table 3

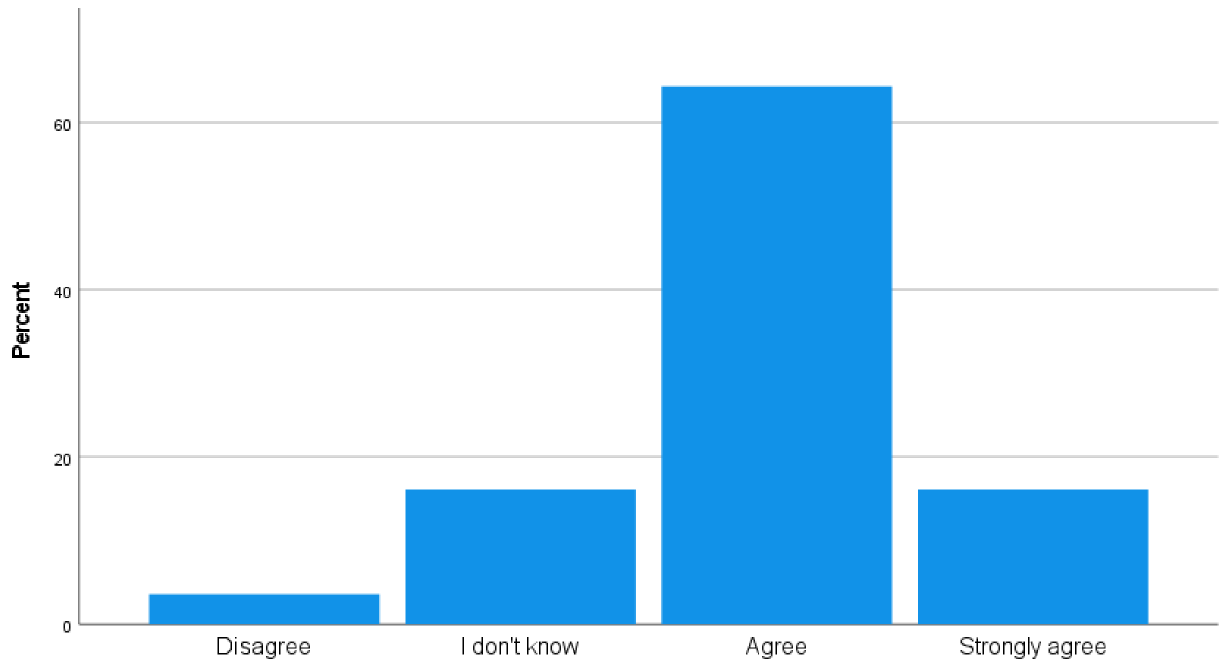
Perceptions of the Education of the Dental Hygienist- the Dental Hygienists' Education Includes Dental Hygiene Sciences such as Oral Health Education and Preventive Counseling, Health Promotion, Patient Management, Special Needs Provisions, Medical and Dental Emergencies, Legal and Ethics Education, and Infection/Hazard Control Management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't know	6	9.8	10.7	10.7
	Agree	36	59.0	64.3	75.0
	Strongly agree	14	23.0	25.0	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 7 of the survey asked if the dental hygienists have training in managing periodontal disease's acute and chronic aspects. Out of 56 respondents (N=56), there was no indication of a strongly disagree response, and two (3.6%) disagreed. Nine (16.1%) did not know. Thirty-six (64.3%) agreed, while nine (16.1%) strongly agreed. Forty-five (80.4%) respondents agreed or strongly agreed (Figure 4).

Figure 4

Perceptions of the Education of the Dental Hygienist- Dental Hygienists have Training in the Management of Acute and Chronic Aspects of Periodontal Disease



Question 8 of the survey asked if the dental hygienist could educate and motivate patients to manage oral health to prevent oral and systemic disease. Out of 56 responses (N=56), there was no indication of any strongly disagree or disagree responses. Four (7.1%) responded that they did not know. Twenty-eight (50%) answered that they agreed, while twenty-four (42.9%) strongly agreed. Fifty-two (92.9%) participants agreed or strongly agreed (Table 4).

Table 4

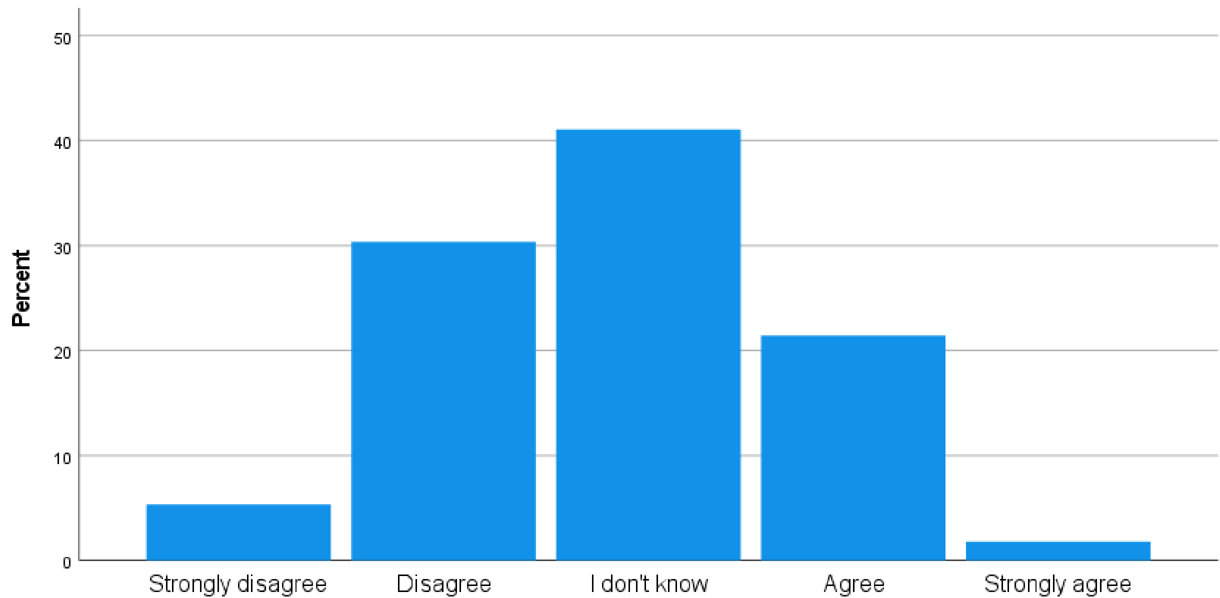
Perceptions of the Education of the Dental Hygienist- Dental Hygienists can Educate and Motivate Patients to Manage Oral Health to Prevent Oral and Systemic Disease

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't know	4	6.6	7.1	7.1
	Agree	28	45.9	50.0	57.1
	Strongly agree	24	39.3	42.9	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 9 of the survey stated that dental hygienists do not use all their training and education in their clinical practice of dental hygiene. Three (5.4%) of the 56 respondents (N=56) strongly disagreed, while seventeen (30.4%) respondents disagreed. Twenty-three (41.1%) did not know. Twelve (21.4%) agreed, while one (1.6%) strongly agreed. Twenty (35.8%) respondents disagreed or strongly disagreed, while thirteen (23.2%) agreed or strongly agreed (Figure 5).

Figure 5

Perceptions of the Education of the Dental Hygienist- Dental Hygienists Do Not use All Their Training and Education in their Clinical Practice of Dental Hygiene



Question 10 of the survey stated that dental hygienists should work under the general supervision of a licensed dentist with their current education. Out of 56 respondents (N = 56), one respondent (1.8%) strongly disagreed, while two (3.6%) respondents disagreed. Sixteen (28.6%) respondents did not know. Twenty-six (46.4%) agreed, while eleven (19.6%) strongly agreed. Thirty-seven (66%) agreed or strongly agreed, while three (5.4%) disagreed or strongly disagreed (Table 5).

Table 5

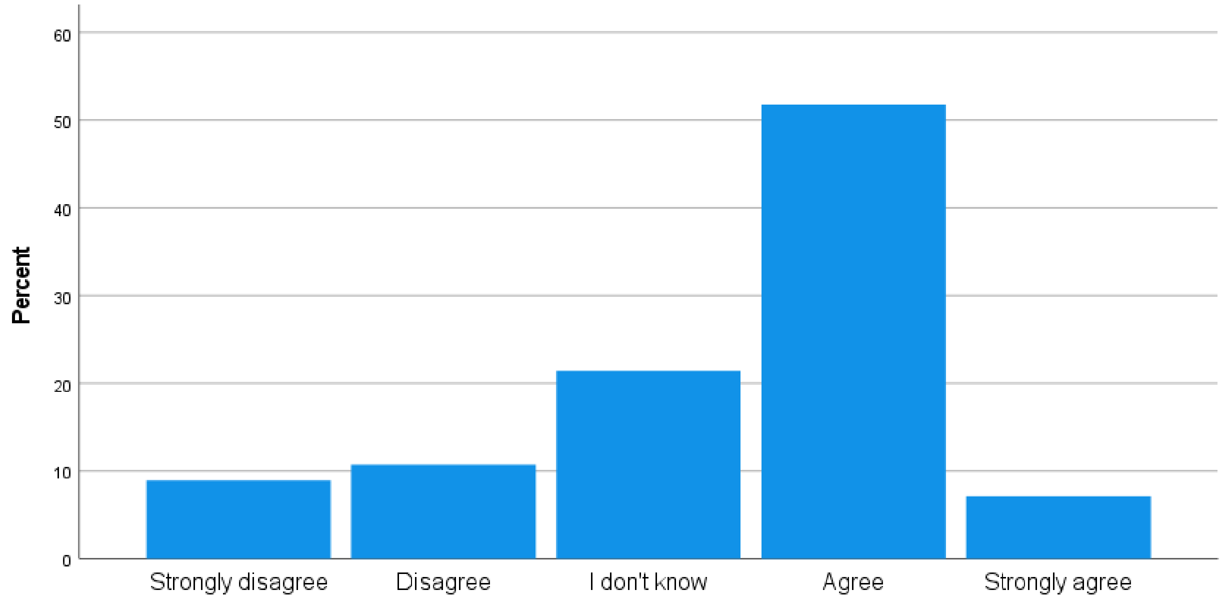
Perceptions of the Education of the Dental Hygienist- With their Current Education, Dental Hygienists should Work under the General Supervision of a Licensed Dentist

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.6	1.8	1.8
	Disagree	2	3.3	3.6	5.4
	I don't know	16	26.2	28.6	33.9
	Agree	26	42.6	46.4	80.4
	Strongly agree	11	18.0	19.6	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 11 of the survey asked the respondents if the dental hygienists should go into dental health professional shortage areas to do exams and send referrals to a licensed dentist for needed treatment. Of the 56 respondents (N=56), five (8.9 %) of the respondents strongly disagreed, while six (10.7%) disagreed. Twelve (21.4%) did not know. Twenty-nine (51.8%) agreed, while four (7.1%) strongly agreed. Eleven (19.6%) either disagreed or strongly disagreed, while thirty-three (58.9%) either agreed or strongly agreed (Figure 6).

Figure 6

Perceptions of the Education of the Dental Hygienist- Dental Hygienists should go into Dental Health Professional Shortage Areas to Do Exams and Send Referrals to a Licensed Dentist for Needed Treatment.

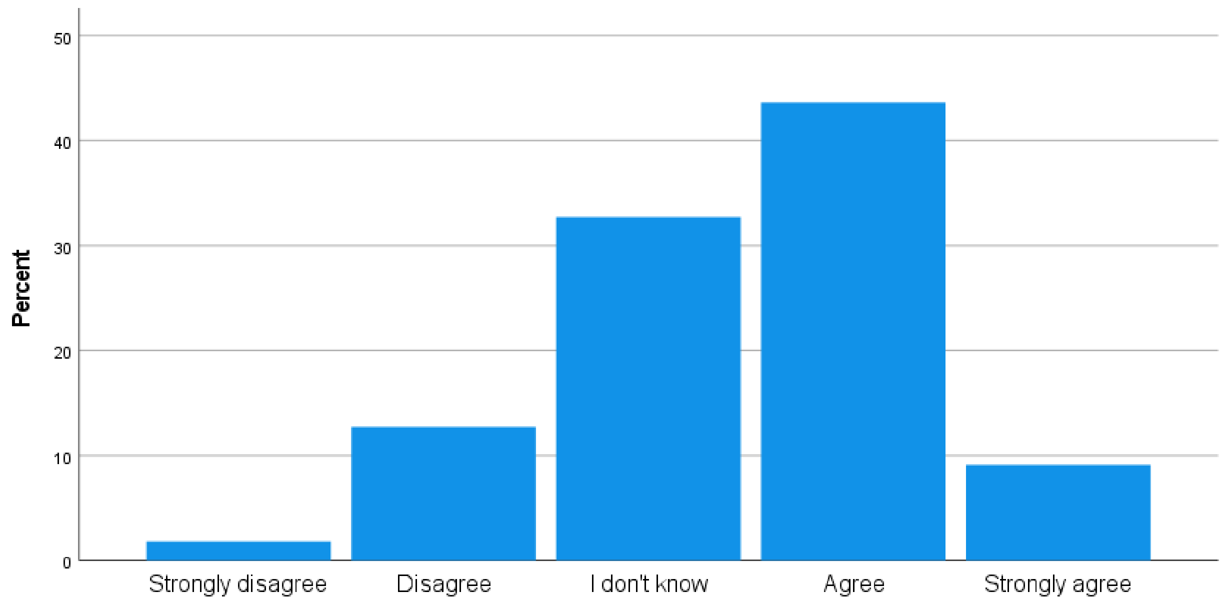


Perceptions of the Licensing and Scope of Practice of the Dental Hygienist

Question 12 of the survey stated that the respondents understood the dental hygienist's role and scope of practice in Tennessee. Out of a total of 55 respondents (N=55), one (1.8%) strongly disagreed, while seven (12.7%) disagreed. Eighteen (32.7%) did not know. Twenty-four (43.6%) agreed, and five (9.1%) strongly agreed. Eight (14.5%) disagreed or strongly disagreed, while 29 (52.7%) agreed or strongly agreed (Figure 7).

Figure 7

Licensing and Scope of Practice of the Dental Hygienist-I Understand the Role and Scope of Practice of the Dental Hygienist in Tennessee



Question 13 of the survey stated that a dental hygienist should be a part of the dental practice teams. Out of 56 (N=56) respondents, none disagreed or strongly disagreed, and two (3.6%) did not know. Twenty-five (44.6%) agreed, while twenty-nine (51.8%) strongly agreed. Fifty-four participants (96.4%) agreed or strongly agreed (Table 6).

Table 6

Licensing and Scope of Practice of the Dental Hygienist-A Dental Hygienist Should be a Part of the Dental Practice Teams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't know	2	3.3	3.6	3.6
	Agree	25	41.0	44.6	48.2
	Strongly agree	29	47.5	51.8	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 14 of the survey stated that the dental hygienist's role is the same as a dental assistant. Out of 55 respondents (N=55), twenty-five (45.5%) strongly disagreed, while twenty-eight (50.9%) disagreed. Two (3.6%) did not know. There were no responses that agreed or strongly agreed. Fifty-three participants (996.7%) disagreed or strongly disagreed (Table 7).

Table 7

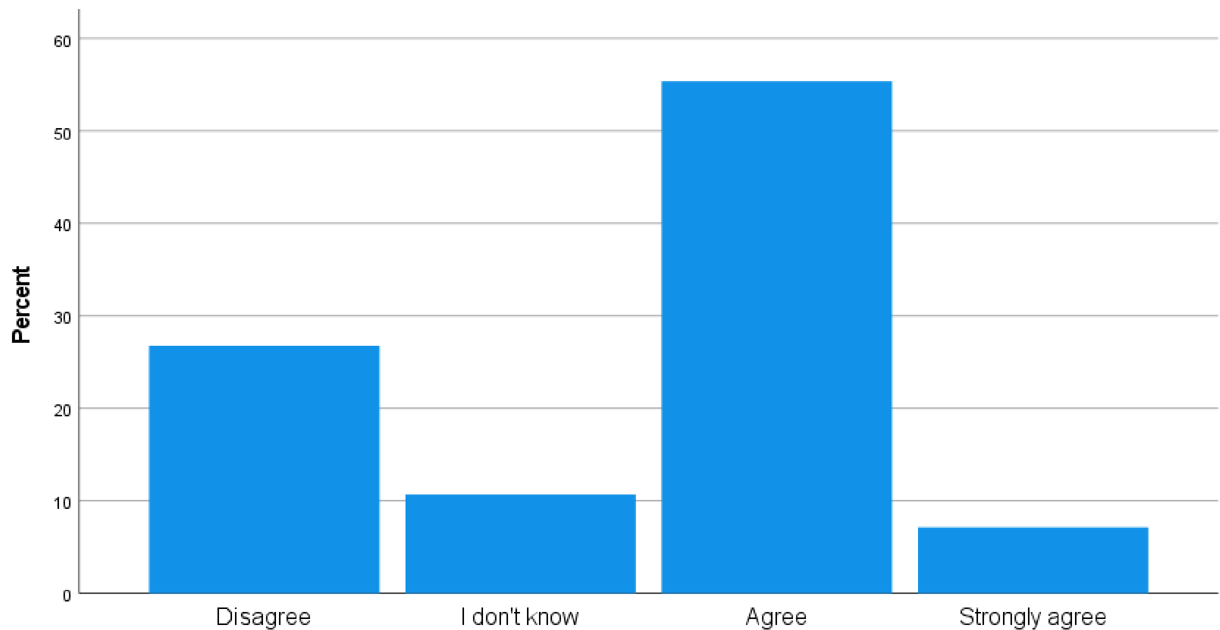
Licensing and Scope of Practice of the Dental Hygienist-The Role of a Dental Hygienist in Dental Practice is the Same as a Dental Assistant

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	25	41.0	45.5	45.5
	Disagree	28	45.9	50.9	96.4
	I don't know	2	3.3	3.6	100.0
	Total	55	90.2	100.0	
Missing	System	6	9.8		
Total		61	100.0		

Question 15 of the survey stated that the main job of the dental hygienist is to clean teeth. Out of 56 respondents (N=56), there were no strongly disagree responses, and fifteen (26.8%) disagree responses. Six (10.7%) did not know. Thirty-one (55.4%) agreed, while four (7.1%) strongly agreed. There were thirty-five (62.5%) agree and strongly agree responses (Figure 8).

Figure 8

Licensing and Scope of Practice of the Dental Hygienist-The Main Job of the Dental Hygienist is to Clean Teeth



Question 16 of the survey stated that a dental hygienist should always work under the direct supervision of a licensed dentist. Of the 56 respondents (N=56), there were no strongly disagree responses, and seven (12.5%) disagree responses. Thirteen (23.2%) did not know. Twenty-six (46.4%) agreed, and ten (17.9%) strongly agreed. Thirty-six (64.3%) responded agreed or strongly agreed (Table 8).

Table 8

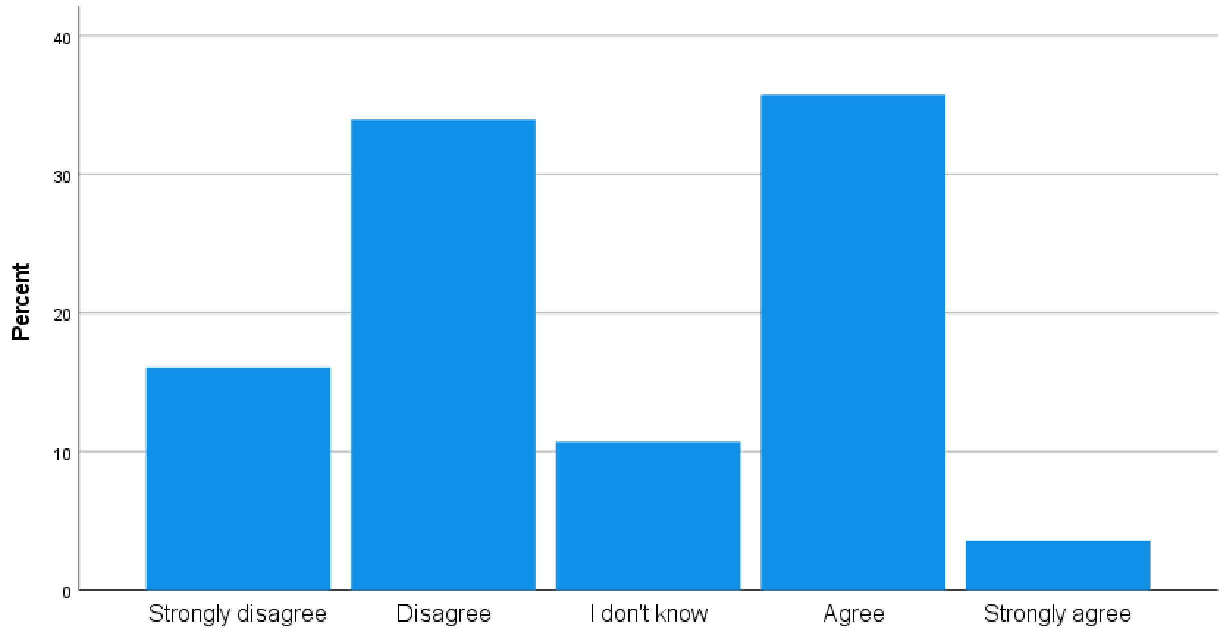
Licensing and Scope of Practice of the Dental Hygienist-A Dental Hygienist Should Always Work under the Direct Supervision of a Licensed Dentist

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	11.5	12.5	12.5
	I don't know	13	21.3	23.2	35.7
	Agree	26	42.6	46.4	82.1
	Strongly agree	10	16.4	17.9	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 17 of the survey stated that dentistry and dental hygiene are similar. Out of 56 respondents (N=56), nine (16.1%) strongly disagreed, while nineteen (33.9%) disagreed. Six (10.7%) did not know. Twenty (35.7%) agreed, while two (3.6%) strongly agreed. Twenty-eight (50%) disagreed or strongly disagreed, while twenty-two (39.7%) agreed or strongly agreed (Figure 9).

Figure 9

Licensing and Scope of Practice of the Dental Hygienist-The Practice of Dentistry and Dental Hygiene are Similar



Question 18 of the survey stated that a dental hygienist should administer local anesthetic under the dentist's direct supervision. Out of 56 participants (N=56), one (1.8%) strongly disagreed, while none disagreed. Three (5.4%) did not know. Forty-two (75%) agreed, while ten (17.9%) strongly agreed. Fifty-two (92.9%) agreed or strongly agreed (Table 9).

Table 9

Licensing and Scope of Practice of the Dental Hygienist- A Dental Hygienist Should Administer Local Anesthetic Under the Dentist's Direct Supervision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.6	1.8	1.8
	I don't know	3	4.9	5.4	7.1
	Agree	42	68.9	75.0	82.1
	Strongly agree	10	16.4	17.9	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 19 of the survey stated that a dental hygienist should administer and monitor nitrous oxide under direct supervision. Out of 56 participants (N=56), one (1.6%) strongly disagreed, while three (5.4%) disagreed. Four (7.1%) did not know. Forty-two (75%) agreed, while six (10.7%) strongly agreed. Four (7.2%) disagreed or strongly disagreed, and forty-eight (85.7%) agreed or strongly agreed.

Table 10

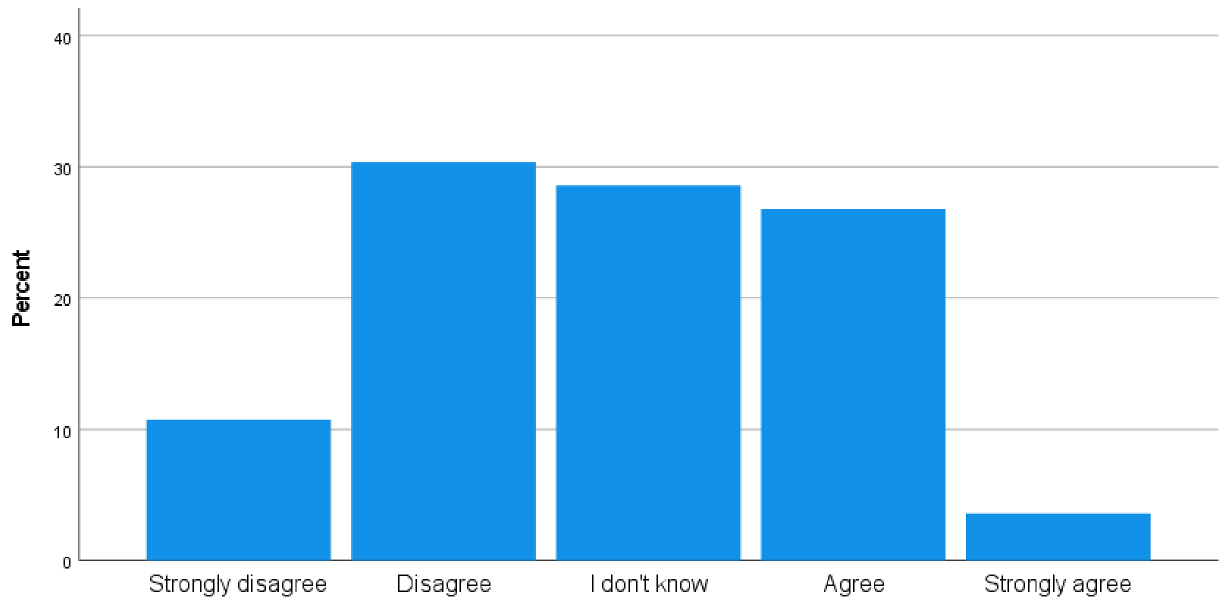
Licensing and Scope of Practice of the Dental Hygienist- A Dental Hygienist Should Administer and Monitor Nitrous Oxide under Direct Supervision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.6	1.8	1.8
	Disagree	3	4.9	5.4	7.1
	I don't know	4	6.6	7.1	14.3
	Agree	42	68.9	75.0	89.3
	Strongly agree	6	9.8	10.7	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 20 of the survey stated that dental hygienists should utilize lasers for areas within their scope of practice. Out of 56 participants (N=56), six (10.7%) strongly disagreed, while seventeen (30.4%) disagreed. Sixteen (28.6%) did not know. Fifteen (26.8%) agreed, while two (3.6%) strongly agreed. Twenty-three (41.1%) participants strongly disagreed or disagreed, while seventeen (30.4%) agreed or strongly agreed (Figure 10).

Figure 10

Licensing and Scope of Practice of the Dental Hygienist-A Dental Hygienist Should be Allowed to Utilize Lasers for Areas Within their Scope of Practice



Question 21 of the survey stated that periodontal disease treatment and management would be necessary for the respondent's future dental practice. Out of 56 participants (N=56), there were no strongly disagree or disagree responses. Four (7.1%) did not know. Thirty-six (64.3%) agreed, while sixteen (28.6%) strongly agreed. Fifty-two (92.9%) participants responded agreed or strongly agreed (Table 11).

Table 11

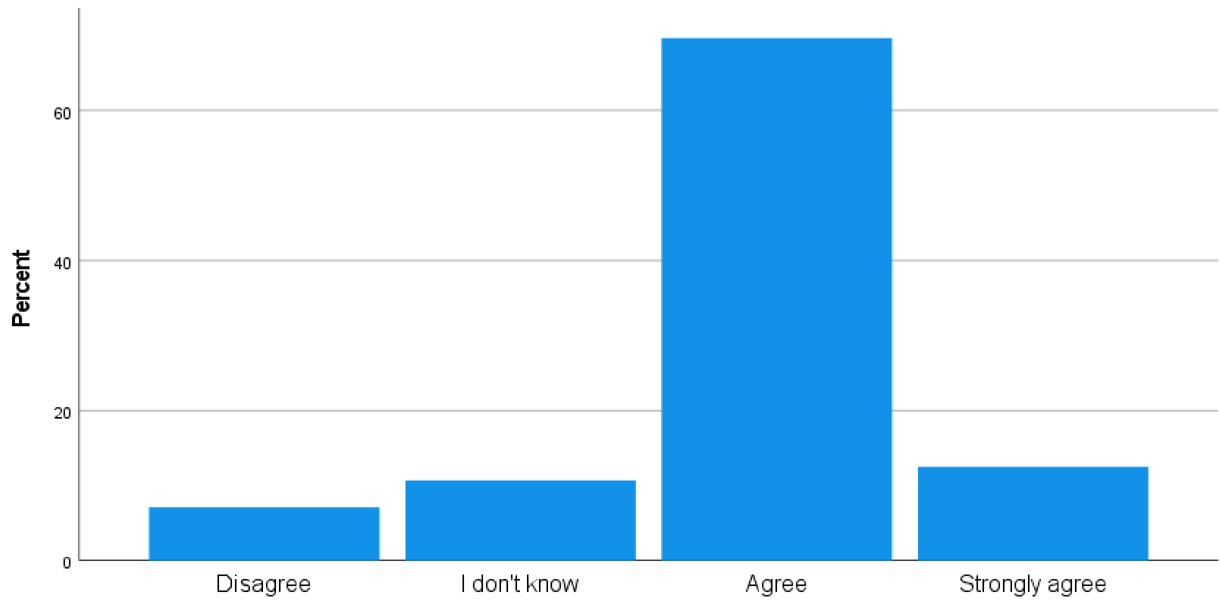
Licensing and Scope of Practice of the Dental Hygienist-In My Future Dental Practice, Periodontal Disease Treatment and Management will be Necessary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't know	4	6.6	7.1	7.1
	Agree	36	59.0	64.3	71.4
	Strongly agree	16	26.2	28.6	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 22 of the survey stated that dental hygienists could recognize caries, periodontal disease, and oral pathologies. Out of 56 respondents (N=56), none strongly disagreed, while there were four (7.1%) who disagreed. Six (10.7%) did not know. Thirty-nine (69.6%) agreed, while seven (12.5%) strongly agreed. Forty-six (82.1%) agreed or strongly agreed (Figure 11).

Figure 11

Licensing and Scope of Practice of the Dental Hygienist-Dental Hygienists can Recognize Caries, Periodontal Disease and Oral Pathologies



Question 23 of the survey stated that the dental hygienist plays a positive role in the respondent's future practice in dentistry. Out of 56 respondents (N=56), none strongly disagreed or disagreed. Two (3.6%) did not know. Twenty-six (46.4%) agreed, while twenty-eight (50%) strongly agreed. Fifty-four ((96.4%) agreed or strongly agreed (Table 12).

Table 12

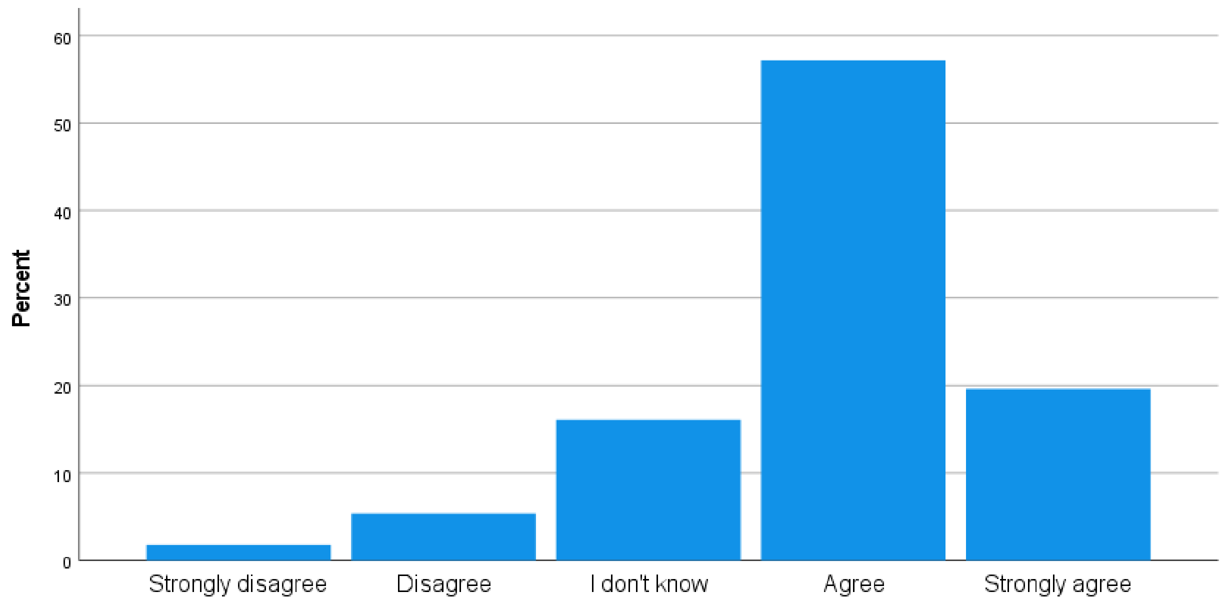
Licensing and Scope of Practice of the Dental Hygienist-A Dental Hygienist Plays a Positive Role in the Success of my Future Practice in Dentistry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't know	2	3.3	3.6	3.6
	Agree	26	42.6	46.4	50.0
	Strongly agree	28	45.9	50.0	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Question 24 of the survey stated that the respondent would want to delegate more tasks to the dental hygienist when practicing dentistry. Out of 56 respondents (N=56), one (1.8%) strongly disagreed, while three (5.4%) disagreed. Nine (16.1%) did not know. Thirty-two (57.1%) agreed, and eleven (19.6%) strongly agreed, while four (7.2%) disagreed or strongly disagreed. Forty-three (76.7%) agreed or strongly agreed (Figure 12).

Figure 12

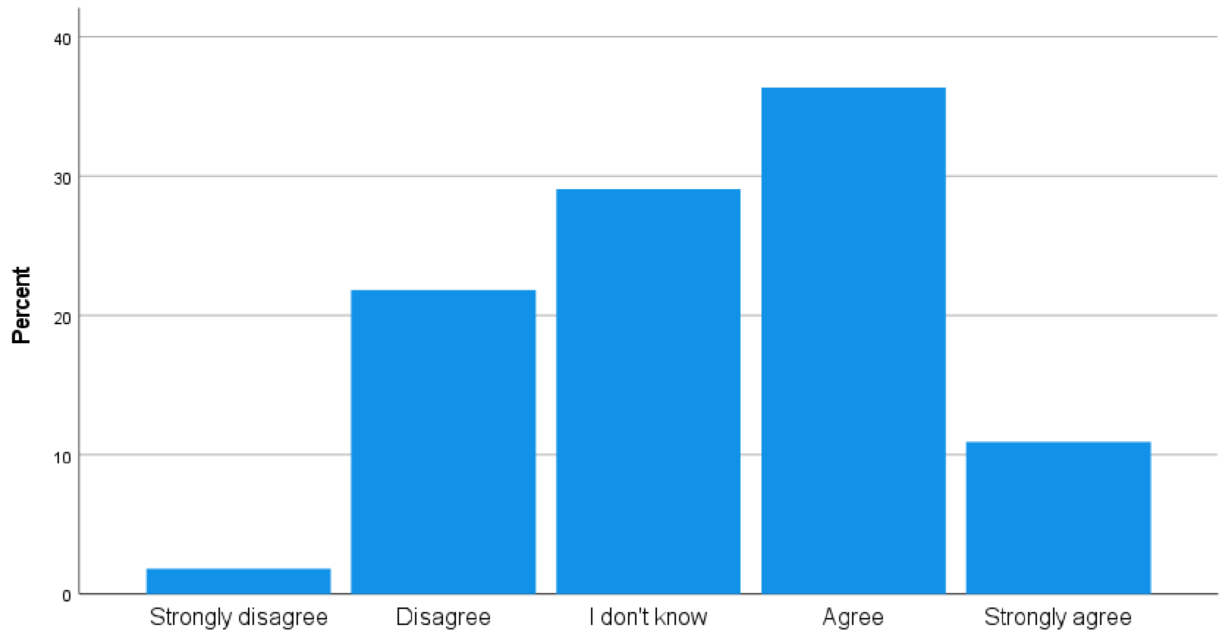
Licensing and Scope of Practice of the Dental Hygienist-I Want to Delegate More Tasks to Dental Hygienists When I Start to Practice Dentistry



Question 25 of the survey stated that dentists should not be held responsible for the dental hygienist's practice. Out of 56 respondents (N=56), four (7.1%) strongly disagreed, while thirty-one (55.4%) disagreed. Ten (17.9%) did not know. Ten (17.9%) agreed, while one (1.8%) strongly agreed. Thirty-four (62.5%) disagreed or strongly disagreed, while eleven (19.7%) agreed or strongly agreed (Figure 13).

Figure 13

Licensing and Scope of Practice of the Dental Hygienist-Dentists Should Not be Held Responsible for the Practice of the Dental Hygienist



Question 26 of the survey stated that the respondent wanted to practice dentistry in collaboration with a dental hygienist. Out of 56 respondents (N=56), none disagreed or strongly disagreed. Six (10.7%) did not know. Thirty-three (58.9%) agreed, while seventeen (30.4%) strongly agreed. Fifty (89.3%) respondents agreed or strongly agreed (Table 13).

Table 13

Licensing and Scope of Practice of the Dental Hygienist-I Want to Practice Dentistry in Collaboration with a Dental Hygienist

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't know	6	9.8	10.7	10.7
	Agree	33	54.1	58.9	69.6
	Strongly agree	17	27.9	30.4	100.0
	Total	56	91.8	100.0	
Missing	System	5	8.2		
Total		61	100.0		

Summary

The purpose of collecting these data was to determine the perceptions of fourth-year dental students in Tennessee regarding the education, licensing, and scope of practice of the registered dental hygienist in Tennessee. The majority of the Tennessee State Board of Dentistry comprises dentists with a small minority of dental hygienists. The current legislation in Tennessee requires that dental hygienists work under the direct supervision of a dentist except in the instance of public health or nursing homes. Data are necessary to determine if there is a need for additional training to help dentists understand the dental hygienist's education, role, and scope of practice.

Chapter 5. Summary, Discussion, Conclusions, and Recommendations

Summary

Given the evidence of the link between oral and systemic health (Shin & Bowers, 2020) and the increasing cost of healthcare in general, oral health prevention and non-surgical dental care methods are a vital part of impacting systemic health (Brian & Weintraub, 2020). Dentists and dental hygienists are primary dental health providers, with dentists focusing on the acute care of dentistry and dental hygienists focusing on dentistry's chronic care (ADA, 2021). Collaboration between dentists and dental hygienists is necessary to address the oral health needs of the public. State dental boards composed primarily of dentists regulate the scope of practice for dental hygienists in all states except California. This study was designed to investigate the fourth-year dental students' perception of the dental hygienist's education and scope of practice in Tennessee.

Discussion

The UTHSC fourth-year dental students' demographics were 50% male and 46.7% female, with 3.3% preferring not to say. The majority planned to practice in Tennessee (46.7%), with the rest planning to practice in other states or areas.

What are the perceptions of Tennessee fourth-year dental students about the education of dental hygienists?

Most respondents (71.5%) agreed or strongly agreed that dental hygienists have sufficient education to practice dental hygiene today, with 25% reporting that they did not know (Table 1). Forty out of fifty-six participants (71.5%) felt that the dental hygienist must go to college for two years to get an associate degree (Figure 1) to qualify for state licensure. Jokiaho et al. (2018) suggest that an average of 3.5 years is required to earn an associate's degree from a CODA-

accredited associate degree program in dental hygiene. A less robust response met the suggestion that a bachelor's degree should be entry-level in dental hygiene, with 42.6% agreeing and 23.6% disagreeing (Figure 2). These data could suggest that dental students may not fully understand the depth of education required to become a dental hygienist.

The data show that 62.5% agreed that dental hygienists' education includes biomedical sciences and dental sciences, with 28.6% not knowing (Table 2). Figure 3 illustrates that 76.8% agreed that dental hygienists have education in dental sciences, with 19.6% not knowing. A much more robust response, 89.3% agreeing and 10.7% not knowing, is illustrated in Table 3 to the statement that dental hygiene education includes dental hygiene sciences. The educational questions included the subjects in biomedical sciences, dental sciences, and dental hygiene sciences. Most dental students (80.4%) agreed that dental hygienists have training in managing acute and chronic aspects of periodontal disease (Figure 4). The data are encouraging since Table 11 reported that periodontal disease treatment and maintenance would be essential for the respondent's future practices. Most respondents were confident that dental hygienists could recognize caries, periodontal disease, and oral pathologies (Figure 11). In addition, the respondents seemed to be more aware of the dental hygiene sciences and management of periodontal disease than the biomedical and dental science education.

There was a very high affirmative response rate (92.9%) that the respondents felt that dental hygienists' training is to educate and motivate patients to manage oral health and prevent disease (Table 4). When asked if dental hygienists use all of their training and education in clinical practice of dental hygiene, the responses were nearly equal between agree, don't know, and disagree (Figure 5). These data suggest that the respondents may not fully understand the dental hygienist's role in clinical practice.

An interesting finding in the data was comparing what the respondents perceived dental hygienists working under general or direct supervision with their current education. For example, when asked about dental hygienists working under general supervision, 66% agreed, 28.6% did not know, and 5.4% disagreed (Figure 14). When asked about dental hygienists working under direct supervision, the answers were similar, with 64.5% agreeing, 23.2% not knowing, and 12.5% disagreeing (Table 15). Supervision means that the dentist has personally diagnosed the conditions for treatment and has authorized procedures of the dental hygienist. Direct supervision means the dentist is on the premises while the dental hygienist performs their lawfully assigned duties, while general supervision means that the dentist may not on the premises (FindLaw Staff, 2020). However, the similarities in the data suggest that the fourth-year dental students are not clear on the difference between direct and general supervision for dental hygienists by a licensed dentist.

Figure 14

Perceptions of the Education of the Dental Hygienist-With Their Current Education, Dental Hygienists Should Work under the General Supervision of a Licensed Dentist

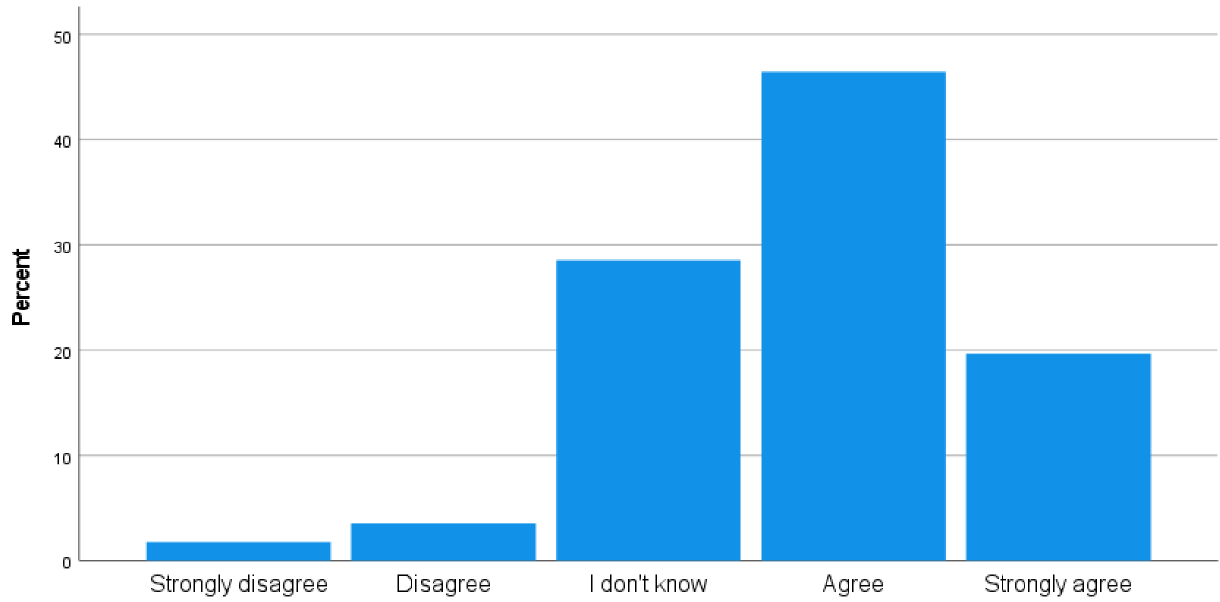
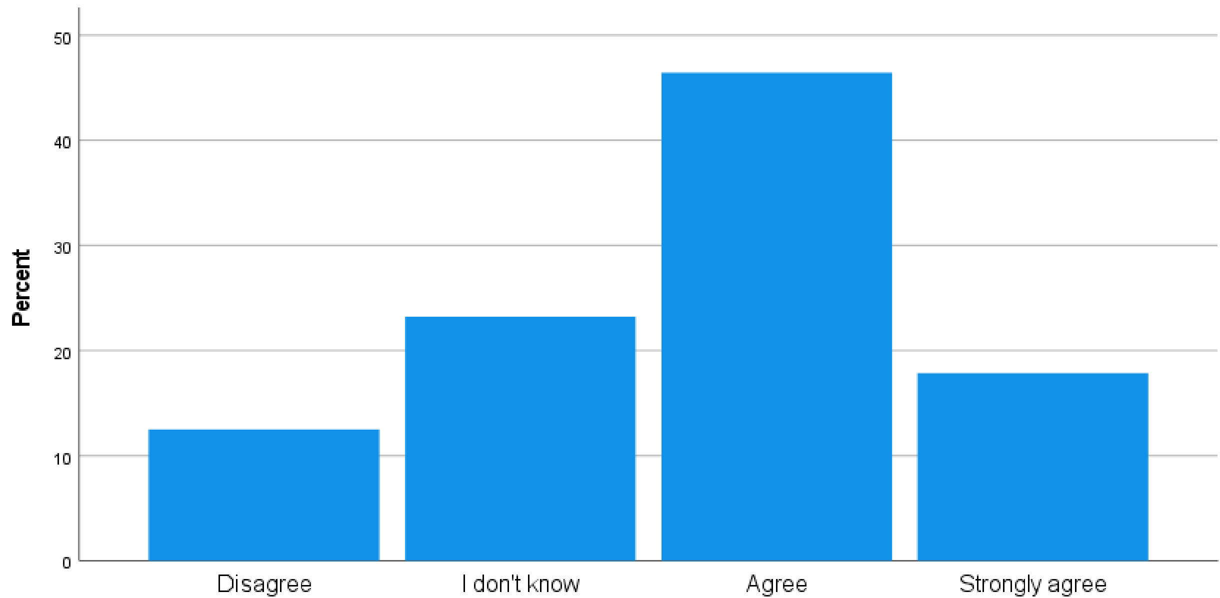


Figure 15

Licensing and Scope of Practice of the Dental Hygienist-A Dental Hygienist Should Always Work under the Direct Supervision of a Licensed Dentist



Chapter 1 discussed the adverse health outcomes of reduced dental and preventive oral health care access in the United States (Brian & Weintraub, 2020). Suggestions that utilizing dental hygienists in these areas to provide access to dental care or referral to appropriate dentists for treatment would lower healthcare costs to communities and better preventive health options (Reinders et al., 2017). Policy revisions changing dentists' direct supervision to general supervision can allow more access to dental desert areas by a dental hygienist that is more accessible and at a lower cost (Reiners et al., 2017). If dental students are unclear about the difference between direct and general supervision, perhaps the dentists on the state dental boards are also unclear.

What are the perceptions of Tennessee fourth-year dental students about dental hygienists' roles and licensing requirements?

Over half (52.7%) of the fourth-year dental student respondents reported that they understood the dental hygienist's role and scope of practice in Tennessee, while 14.5% did not, and 32.7% did not know (Figure 7). Most of the participants (96.4%) agreed that the dental hygienist should be a part of dental practice teams (Table 6). A comparable number disagreed that the dental hygienist is the same as the dental assistant (Table 7), contrary to the data collected in Reinders et al. (2017) study that pointed to dentists and dental assistants considering the dental hygienist's primary role is to assist the dentist. Over sixty-two percent (62.5%) of the study sample believed that the dental hygienist's primary job was to clean teeth, while 26.8% did not think that was their primary job, and 10.7% did not know (Figure 8). Dental prophylaxis (often labeled "a cleaning" in laymen's terms) is a task often delegated to the dental hygienist, although it is far from the only duty a dental hygienist does during treatment.

Over half of the respondents disagreed that dentistry and dental hygiene are similar, meaning that dental students are aware of the differences in the dental hygienist's job. Perhaps some of the dental students are already dental hygienists. In addition, 10.7% stated they did not know, and 39.7% reported that they thought dentistry and dental hygiene were similar (Figure 9).

The data were similar to the statements that dental hygienists should be allowed to administer local anesthesia (92.9%) (Table 9) and administer nitrous oxide (85.7%) (Table 10) under the dentist's direct supervision. These skills are already legal to those dental hygienists trained and licensed for those tasks. When it came to laser usage by dental hygienists within their scope of practice, the data were the same with those who agreed, disagreed, and didn't know. Figure 10 illustrates that 41.1% of participants disagreed, 28.6% did not know, and 30.4%

agreed. However, some respondents may not be aware that dental hygienists' usage of lasers is only within their scope of practice. Dental hygienists are only permitted to utilize lasers for areas where they are licensed and trained. Only licensed dentists are allowed to cut hard or soft tissue. Those who agreed may already be educated on the dental hygienist's scope of practice or may already be a dental hygienist who is now in dental school.

Table 10 illustrates the data from the participants mostly agreeing (92.9%) that periodontal disease treatment and management will be necessary for their future practices. Most of them (82.1%) agreed that dental hygienists could recognize caries, periodontal disease, and oral pathologies (Figure 11). Over half of the respondents (62.5%) felt that they should be held responsible for the activities of the dental hygienist. Still, it is unclear whether they require direct supervision to achieve that goal. Most of the participants (76.7%) responded that they feel that a dental hygienist would play a positive role in the success of their future practice (Table 12), and 89.3% wanted to practice dentistry in collaboration with a dental hygienist (Table 13).

Conclusion

This study highlights fourth-year dental students' perceptions of dental hygienists regarding their education and scope of practice in Tennessee. The study was positive in that the data seemed to illustrate that the respondents had a positive attitude towards dental hygienists. Jokiaho et al. (2018) suggest that a barrier to utilizing the complete skills of the dental hygienist stems from a lack of awareness of professional competence and training. These dental students are not fully aware of the depth of the dental hygiene education or the lawful scope of practice of the dental hygienist. In addition, the study showed areas of opportunity for improvement in the education of dental students with relation to the different roles within the practice of dentistry.

Although the data illustrates that the fourth-year dental students perceive the educational rigor of the dental hygienist, they also believe that education may be completed in two years instead of the 3.5 years minimum training to meet the CODA mandated requirements. Therefore, they do not feel as strongly that a dental hygienist should have a bachelor's degree at entry-level.

Fourth-year dental students may require clarification between direct and general supervision within their state. Changes in legislation could significantly impact access to care in Tennessee. Dental students and dentists would benefit from understanding that dental hygienists still will work within their scope of practice, which is dental hygiene and not dentistry.

Recommendations

A suggestion for future research would be to replicate this study with other dental schools simultaneously to gather data to assess the perceptions of dental students in the future. For example, a study could be statewide or include many or all states. Some respondents may not have taken this study seriously, which could explain an outlier in the data. Some participants may already be dental hygienists. With data from other schools, regions could make comparisons and compare to state legislation.

Suggestions for improvement for both dental and dental hygiene education include the concept of intradisciplinary training in educational settings (Brame et al., 2016). Having dental and dental hygiene students interact as they are learning may influence the understanding of the competencies and role of the dentist and dental hygienist within a practice setting, thereby helping promote a more collaborative environment (Kersbergen et al., 2020).

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APPENDICES

Appendix A: Survey Instrument

By clicking the ENTER button after you answer these three questions, you are consenting to take the survey voluntarily. The survey should take 15 minutes or less to complete. Please answer the following questions. Entry into survey implies informed consent.

- I am 18 years of age or older.

Yes	No

- I am a fourth-year dental student.

Yes	No

- I am physically in the United States while engaging in this survey.

Yes	No

Fourth Year Dental Student Questionnaire

Directions: Please respond to each item on the survey that is most likely to apply. When finished, please click the "SUBMIT" button. Entry into the survey implies voluntary consent to take the survey, that you are a fourth-year dental student, 18 years of age or older, and physically present in the United States while taking part in this survey. All responses will be confidential and reported as group data. Your answer can not be traced to you, and all responses will be destroyed after data analysis. This survey will take approximately 15 minutes to complete. Thank you for your participation.

Demographic questions:

1. Gender:

Male	Female	Other	Prefer not to disclose

2. I plan to practice dentistry in Tennessee after I graduate.

Yes	No

3. I plan to: (Choose as many as apply)

Buy a practice
Work as an associate in private practice with an option to buy into the practice
Work as an employee for a corporate dental practice
Work for a private company
Work in Public Health
Teach or do research

I do not plan to practice dentistry
I am unsure of my plans

Perceptions of the education of the dental hygienist

1. Dental hygienists have sufficient education to practice dental hygiene today.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

2. Dental hygienists must go to College for two years to earn an Associate degree in dental hygiene before licensure.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

3. Dental hygienists should be required to have a bachelor's degree at entry level for their current scope of practice in Tennessee.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

4. A dental hygienist's education includes biomedical sciences, such as anatomy, physiology, biochemistry, microbiology, immunology, maxillofacial pathology, nutrition, and pharmacology.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

5. A dental hygienist's education includes dental sciences such as tooth morphology, head & oral anatomy, oral embryology and histology, oral pathology, radiography, periodontology, pain management, and dental materials.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

6. A dental hygienist's education includes dental hygiene sciences such as oral health education and preventive counseling, health promotion, patient management, special needs provisions, medical and dental emergencies, legal and ethics education, and infection/ hazard control management.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

7. Dental hygienists have training in the management of the acute and chronic aspects of periodontal disease.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

8. Dental hygienists can educate and motivate patients to manage oral health to prevent oral and systemic disease.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

9. Dental hygienists do not use all their training and education in their clinical practice of dental hygiene.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

10. With their current education, dental hygienists should work under general supervision.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

11. Dental hygienists should go into dental health professional shortage areas to do exams and send referrals to a licensed dentist for needed treatment.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

Licensing and Scope of Practice (roles) of RDH

1. I understand the role and scope of practice of a dental hygienist in Tennessee.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

2. A dental hygienist should be a part of dental practice teams.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

3. A dental hygienist's role in dental practice is the same as a dental assistant.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

4. The main job of the dental hygienist is to clean teeth.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

5. A dental hygienist should always work under the direct supervision of a licensed dentist.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

6. The practice of dentistry and dental hygiene are similar.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

7. A dental hygienist should be allowed to administer local anesthetic under the direct supervision of the dentist.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

8. A dental hygienist should be allowed to administer and monitor nitrous oxide under the dentist's direct supervision.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

9. A dental hygienist should be allowed to utilize lasers for areas within their scope of practice.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

10. In my future dental practice, periodontal disease treatment and management will be necessary.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

11. Dental hygienists can recognize caries, periodontal disease, and oral pathologies.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

12. A dental hygienist plays a positive role in the success of my future practice in dentistry.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

13. I want to delegate more tasks to dental hygienists when I start to practice dentistry.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

14. Dentists should not be held responsible for the practice of the dental hygienist.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

15. I want to practice dentistry in collaboration with a dental hygienist.

Strongly Disagree	Disagree	I Don't Know	Agree	Strongly Agree

Appendix B: Initial Contact for Permissions

Dear Dr. Scarbecz,

Greetings!

My name is Cindy Metzger, and I am a registered dental hygienist from Knoxville, TN. I've been working clinically for 40 years and am also an adjunct clinical faculty at East Tennessee State University. I am also working on my thesis to finish a master's degree in Allied Health with plans to graduate in December 2021. My focus is on education with training in administration.

I have had the benefit of watching dentistry evolve over my years of clinical experience. Evidence of the link between oral and systemic health keeps growing. Medicine is having much success with healthcare outcomes by utilizing interdisciplinary teams. I would like to see dentists and dental hygienists on those medical teams. There is much to do to address the access to care problem. Various suggestions and plans are circulating. Any viable strategy for a solution will involve collaboration between dentists and dental hygienists, understanding each profession's education and scope of practice.

My research involves gathering data from fourth-year dental students in Tennessee from both UTHSC and Meharry College of Dentistry. The survey asks the dental students what they know about the education and scope of practice of dental hygienists in Tennessee. The survey has 29 questions and should take less than 15 minutes to complete.

Are you the person who can work with me to gather this data from your fourth-year dental students? Or can you direct me to the person I should contact? I am pleased to connect with you to discuss if you would like.

Thank you very much for your time.

Cindy Metzger, RDH, BSDH

metzgerc@etsu.edu
865-660-0502

Appendix C: Participant Letter and Informed Consent

Date

Dear Fourth Year Dental Student,

My name is Cindy Metzger. I am a registered dental hygienist and an allied health graduate student at East Tennessee State University. I ask you to participate in a research study about your perceptions of the dental hygienist's education and scope of practice in Tennessee. This brief electronic survey is 29 questions that will take no longer than 10-15 minutes of your time. Your participation is entirely voluntary. You may decide to quit at any time by simply not submitting the survey, and you may skip questions. The survey is completely anonymous, and there is no way of tracking your survey submission to you. Qualtrics, the online survey platform, will not be collecting any identifiable information about you. The East Tennessee State University (ETSU) Institutional Review Board (IRB) and people on this research project (Cindy Metzger, principal researcher, and Dr. Deborah Dotson, committee chair) can view the anonymous records.

If you have any questions about this study or research-related queries or problems, please feel free to contact me, Cindy Metzger metzgerc@etsu.edu, or my committee chair, Dr. Deborah Dotson dotsond@etsu.edu. An Institutional Review Board (IRB) is overseeing this research. An IRB is a group of people who perform an independent review of research studies. You may also contact the ETSU Institutional Review Board at 423-439-6054 or IRB@etsu.edu for any questions you may have about your rights as a research participant.

By submitting your survey, you are consenting to participate in this study. The link to the survey is at the bottom of this email. Thank you for your participation. I truly appreciate you making my research project possible!

Best regards,

Cindy Metzger, RDH, BSDH
Allied Health Graduate Student/Principal Researcher
865-660-0502
metzgerc@etsu.edu

LINK LINK LINK LINK

VITA

CYNTHIA METZGER

Education:	M.S. Allied Health, East Tennessee State University, Johnson City, Tennessee, 2022
	B.S. Dental Hygiene, East Tennessee State University, Johnson City, 2019
	A.S. Dental Hygiene, University of Mississippi Medical Center, Jackson, MS, 1981
Professional Experience:	Clinical Instructor, Department of Dental Hygiene, East Tennessee State University, Johnson City, TN, 2019-2022
	Graduate Assistant, East Tennessee State University, College of Clinical and Rehabilitative Health Sciences, 2019-2020
	Clinical Dental Hygienist, Knoxville, Tennessee, 2000-present
	Delegate for Tennessee Dental Hygienists' Association, 2019-2022
	Secretary for Knox Area Dental Hygienist's Association 2019-2021
	Owner and Manager of Jan Nielsen Development, Knoxville, TN 2002-2016
	Clinical Dental Hygienist, Jackson, Mississippi, 1987-1990
	Clinical Dental Hygienist, Mobile, Alabama, 1984-1987
	Clinical Dental Hygienist, Panama City, Florida, 1981-1984