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Attitudes of Mississippi Licensed Dentists and Faculty toward Dental Therapy Model

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Abstract

Incorporation of a mid-level dental provider into the oral health care system provides an opportunity for increased access to care for patients in rural or underserved areas, especially in states in which there is a lack of adequate number of dentists in rural areas. The purpose of this study was to assess the attitudes of dentists and dental faculty in Mississippi toward the dental therapy model. A survey instrument was designed with four demographic questions (age, gender, faculty status, private practice status), ten statements rated on a Likert scale assessing general acceptance of dental therapy model, and three open-ended questions assessing advantages, disadvantages and perspectives of respondents about dental therapy. After IRB approval, the survey was distributed through Qualtrics system to 567 licensed dentists and faculty in Mississippi, of which 109 respondents completed the survey (response rate of 19%). Mann-Whitney U test was used to test the null hypotheses regarding response equality between different groups (age, gender, faculty status, private practice status), with a statistical significance set at 0.05. In this study, most responses of different groups had no statistical differences ($p>0.05$). Overall, the attitudes of licensed Mississippi dentists about dental therapy were remarkably negative. Qualitative results showed that few Mississippi dentists perceive that the dental therapy model could increase access to care. However, most of the qualitative data revealed major concerns about dental therapy, including unease with insufficient education, inability to manage clinical complications, potential for reduction of quality of care, and the perception of endangering the public.

Keywords: *Dental Therapy Model; Allied Dental Education; Dental Licensure*

Introduction

The incorporation of dental therapy as a new mid-level dental provider into the oral health care system is a major topic of controversy in the United States workforce area. The idea was first suggested as a potential method to solve the problems communities and individuals face in accessing dental care [1]. Although this is a new health care topic in the United States, other countries have already implemented mid-level dental providers, such as dental therapists into the work force. The dental therapy model was first introduced in 1921 when the first training program was established in New Zealand [2]. Today, dental therapists practice in numerous countries worldwide including the United Kingdom, Canada, Australia, Netherlands, and others [3-5].

A dental therapist can be described as a member of the oral health care team who can provide evaluative, restorative, preventative and small non-invasive surgical procedures. These dental workers provide care in multiple settings including community clinics, hospitals, and private practices. In 2009, Minnesota became the first state government in the United States to license dental therapists to help meet the public need in Minnesota [6]. Dental therapists in the U.S. are currently providing care in Minnesota and Alaska [7,8] and a number of other states are considering this practice model. In Minnesota, there are two levels of dental therapy, one of which receive dual bachelor's degree in dental hygiene along with a master's degree in dental therapy, and the second level requires a master's degree and leads to certification in advanced dental therapy status and working under general supervision with a dentist [7].

In the medical field, a dental therapist is comparable to a physician's assistant (PA) or a nurse practitioner (NP). The PA model in medicine was created in 1960 to help resolve the lack of primary care doctors, as well as the need for more medical professionals, in rural areas and underserved communities [9]. The idea behind the physician assistant model was to relieve primary care physicians from routine and less complex aspects of health care, therefore, giving the more complex cases the attention of a medically licensed physician [10]. Despite the concerns about ability and qualifications of PA to practice, the PA model was established and the number of PAs in the United States has grown [11]. PAs became increasingly popular as patients began to trust their medical knowledge and advice, and early research showed that PAs were cost effective and safe providers for patients [12].

Soon after the first PA model was implemented, the first NP model was established in 1965 in Colorado. The aim was to take registered nurses and place them in an educational program that would focus on training them to become pediatric nurse practitioners. In the United States today, most NPs work in primary health care and have shown to be both cost effective and safe providers [13,14].

When the NP and PA models were first established there was disagreement between opponents and advocates of these health care models [13]. The dental therapy model is surrounded today by some of the same arguments that surrounded these models [15]. Opponents of dental therapy model point out that the post-secondary training of a dental therapist is only two years versus four years for a dentist. Advocates of dental therapy argue that dental therapists' services do not cost as much as an employed dentist and can therefore lower treatment cost, especially for patients in rural and poverty-stricken areas. Furthermore, advocates for the model argue that many children have not been able to access dental care because of the lack of general dentists and that placement of dental therapists in schools could alleviate this issue [16].

The American Dental Association (ADA) believes that a dental therapist cannot perform the procedures and daily care that a general dentist performs due to the lack of school and training [17]. The ADA has also stated that there is a critical need to connect people without access to dental care to a general dentist that will be willing to help them [17]. Some authors argue that dental therapists would only be beneficial if they were integrated into the dental community under direct supervision of a dentist [15]. Yet others believe that dental therapists should only be trained to work on children, since children seem to be one of the larger groups that lack access to dental care [18].

As the dental therapy model continue to evolve over time, the educational preparation of dental therapists is explained in the context of a working relationship between educators, legislators and educational institutions. Since faculty members would be tasked with the preparation of new dental therapists, it is essential to assess their attitudes about this model around the United States. If faculty members feel negatively toward the model it could have negative impacts on the students, along with their education and professional adjustment to the work place [19]. It is also important to assess practicing dentists' attitudes towards dental therapy since dental therapists may either be employed by dentists or practice alone completing multiple dental procedures that dentists perform on a daily basis.

The University of Minnesota School of Dentistry launched its first dental therapy program in 2009 after the Minnesota state legislature had authorized the training and practice of a dental therapists. The attitudes of faculty in Minnesota were assessed twice in 2010 and in 2014 [1,20]. The four-year follow-up demonstrated greater acceptance and reorientation on the topic of dental therapy by dental faculty

in Minnesota. As evidence of dental therapy's success continues to grow, mid-level dental workforce legislation is likely to be introduced by oral health advocates in other states [3].

As of now, the attitudes of faculty in other states have not been evaluated. One may argue that states with a significant number of rural areas, such as Mississippi, could benefit from this model. In addition, the assessment of the attitudes towards dental therapy in other states aside from Minnesota has been recommended [20].

Objective of the Study

The objective of this study was to assess the attitudes of licensed dentists and dental faculty in the State of Mississippi regarding the dental therapy model and compare these attitudes to the ones reported for Minnesota respondents. This assessment could be of value for several stakeholders such as legislators, state dental boards, dental educators, dental administrators and licensed dentists.

Methods

Study design

Before conducting the survey, a request was submitted to the Institutional Review Board (IRB) at the University of Mississippi Medical Center. This study (ID # 2018-0030) was approved and qualified for exemption status; survey dissemination and data collection began after the IRB approval.

A survey instrument was designed to collect both quantitative and qualitative data to evaluate the attitudes and perceptions of licensed dentists and dental faculty towards dental therapy. Four demographic questions (Table 1) were included at the beginning of the survey asking about respondent's age, gender, faculty status, and private practice status. The survey instrument then included ten statements about dental therapy adopted from the twenty-five item survey conducted at the University of Minnesota School of Dentistry, in which focus groups were conducted, followed by design of the questionnaire and assessment of survey's face validity [1,20]. Because we intended to add to our survey open-ended questions to collect qualitative data, we elected to choose ten items only for the quantitative part of the survey.

The survey's statements (Table 2) were rated on a Likert scale (Agree, Don't know, Disagree, NA), which is the same Likert scale used in Minnesota's study for the sake of subsequent comparison. Survey statement items included ones that assessed the attitudes of respondents regarding the role of dental therapists in solving access to care problems, perceptions regarding educating dental therapy students, attitudes regarding employing dental therapists in dental practice, and patients' and practitioners' acceptance of dental therapy.

Following the quantitative part of the survey, the following 3 open-ended questions were presented to respondents to collect qualitative data:

1. What are the advantages of the dental therapy model?
2. What are the disadvantages of the dental therapy model?
3. Provide your perspectives about the dental therapy model.

The survey instrument was tested for content validity and validated through two main methods: a) a panel of three faculty members with significant experience in survey construction provided feedback on each statement's wording and the survey's overall format and structure; and b) four respondents pilot tested the survey and provided feedback on the survey's content, clarity of items and overall

structure. Based on the feedback obtained from faculty members and respondents, the information in the survey was then modified and finalized.

Procedure

This survey was constructed electronically through Qualtrics (Qualtrics, Provo, UT, USA). An email invitation to participate in this study was sent to 567 licensed dentists and faculty members in Mississippi. This included all 79 full-time and part-time faculty members at the University of Mississippi School of Dentistry and 488 licensed dentists in private practice in Mississippi. The total number of licensed dentists in Mississippi is 1588 and the selected 488 private practitioners who received the survey represented all districts within the state.

The email included the study's purpose, scope and an embedded URL which linked study participants to the survey. Study participants were informed that the procedure involved completing an anonymous and voluntary online survey which takes approximately two minutes, and that there were no risks or benefits to participation. For privacy and protection of respondents' identity, no names, emails, practice location, or other identifying information were collected. A reminder was sent to participants who did not complete the survey after one week. The survey was open for one month for completion.

Statistical and data analyses

To analyze quantitative data collected in Qualtrics system, data were exported to an encrypted personal computer. For statistical analysis, IBM's SPSS Statistics software for Windows, version 22.0 (Armonk, NY: IBM Corp) was used. As the study sample contained two independent groups for each analysis (age of ≤ 40 years vs. > 40 years, female vs. male, dental faculty vs. non dental faculty, and working in private practice vs. not working in private practice) and the outcome variable responses were measured on an ordinal Likert scale, Mann-Whitney *U* test was used to investigate whether any statistically significant differences existed. Significance level (α) was set at 0.05.

To analyze qualitative data, all gathered comments were collated into a Word document. Qualitative data were then coded to identify the overarching themes and subthemes presented by both groups. After all qualitative data were coded in this manner, passages that shared common codes were organized together. Qualitative data were then interpreted to better understand the findings and make conclusions and recommendations. Valuable positive and negative comments made by respondents regarding dental therapy were identified.

To measure the internal reliability of the survey instrument, Cronbach's alpha was calculated using SPSS. Cronbach's alpha is a numeric score that ranges from zero to one and is used to estimate reliability of survey instruments. This score reflects the internal consistency of survey items and measures the extent to which survey items are correlated with each other. A value above 0.70 is favorable, and a value above 0.80 indicates high reliability [21]. Reliability analysis of this survey resulted in a Cronbach's Alpha score of 0.811, indicating high reliability.

Results

One-hundred and nine respondents completed the survey, with an overall response rate of 19% of those who received the survey. Demographics of study participants are presented in table 1. The response rate for dental faculty who completed the survey was 41%. Ninety-one respondents indicated that they work in private practice, whereas only 18 indicated that they do not. Because there were 32 faculty members who completed the survey (of the 79 who were invited), this indicates that 14 faculty member respondents were both faculty and private practitioners. These are either dentists in private practice with a part-time faculty employment, or full-time faculty with part-time faculty practice duties.

Characteristic	N = 109
Age	
≤ 40 years	30
> 40 years	79
Gender	
Female	40
Male	69
Faculty status	
Yes	32
No	77
Work in private practice	
Yes	91
No	18

Table 1: *Demographics of study participants.*

Table 2 presents responses to survey statements by number and percentage of total respondents to each statement. Based on the results of the Mann-Whitney *U* test, there were only two statistically significant differences found between respondents of all different demographics. First, respondents who selected that they work in private practice had significantly lower agreement with the statement "I will employ dental therapists in my practice" than respondents who do not work in private practice ($p < 0.05$). This is because most respondents who do not work in private practice selected (Don't know) whereas most respondents who do work in private practice selected (Disagree) for this statement, resulting in a statistically significant difference. In other words, this is not an opposite disposition but rather a different selection pattern on the Likert scale between (Don't know) and (Disagree) options. Second, for the statement "I believe that I have values and attitudes that I would like to pass on to dental therapy students," faculty respondents had significantly higher agreement than non-faculty ($p < 0.05$). However, the rest of the responses of different groups based on different demographics (age, gender, faculty status, private practice status) for all the other statements had no statistical differences ($p > 0.05$).

	Survey statement	Agree	Don't know	Disagree	NA/Missing
1.	I would be comfortable having a dental therapist perform authorized procedures on my patients.	19 (17.6%)	19 (17.6%)	69 (63.9%)	NA = 1 (0.9%) Missing = 1
2.	I believe that having dental therapists available will increase the number of dental practices willing to provide treatment to Medicaid and other publicly insured patients	22 (20.4%)	23 (21.3%)	63 (58.3%)	NA = 0 (0%) Missing = 1
3.	I believe that being able to delegate some work to dental therapists will make the dentist's job more satisfying.	17 (15.7%)	19 (17.6%)	72 (66.7%)	NA = 0 (0%) Missing = 1
4.	I will employ dental therapists in my practice.	10 (9.3%)	19 (17.6%)	71 (65.7%)	NA = 8 (7.4%) Missing = 1
5.	I believe dental therapists will be part of the solution to the problem of access to care in the state.	17 (15.9%)	17 (15.9%)	73 (68.2%)	NA = 0 (0%) Missing = 2
6.	I have a personal responsibility in ensuring that the dental therapy model succeeds.	10 (9.3%)	12 (11.2%)	74 (69.1%)	NA = 11 (10.3%) Missing = 2
7.	I believe that teaching dental therapy students will be an added weight in teaching load.	59 (55.1%)	35 (32.7%)	10 (9.3%)	NA = 3 (2.8%) Missing = 2
8.	Dental therapists will be readily accepted by patients in the dental school.	24 (22.2%)	33 (30.6%)	51 (47.2%)	NA = 0 (0%) Missing = 1
9.	I have a good understanding of the role of the dental therapist in dental practice.	64 (60.4%)	12 (11.3%)	28 (26.4%)	NA = 2 (1.9%) Missing = 3
10.	I believe that I have values and attitudes that I would like to pass on to dental therapy students.	33 (31.1%)	21 (19.8%)	32 (30.2%)	NA = 20 (18.9%) Missing = 3

Table 2: *Survey statements and responses, by number and percentage of total respondents (N = 109).*
Note: Percentages may not total 100% because of rounding.

To compare the attitudes of Mississippi faculty and licensed dentists reported in our study to the ones displayed by Minnesota respondents in 2010 (N = 151) and in 2014 (N = 75), the percentages of agreement to the survey statements were placed side-by-side and are displayed in table 3. In general, the higher the percentage of agreement represents higher acceptance of dental therapy, and as table 3 demonstrates, the acceptance of dental therapy by Mississippi respondents in our study were mostly lower than ones made by Minnesota respondents in both 2010 and 2014.

	Survey statement	Minnesota respondents in 2010 % Agree	Minnesota respondents in 2014 % Agree	Mississippi respondents in 2018 % Agree
1.	I would be comfortable having a dental therapist perform authorized procedures on my patients.	39.9%	59.7%	17.6%
2.	I believe that having dental therapists available will increase the number of dental practices willing to provide treatment to Medicaid and other publicly insured patients.	30.7%	43.1%	20.4%
3.	I believe that being able to delegate some work to dental therapists will make the dentist's job more satisfying.	31.3%	53.9%	15.7%
4.	I will employ dental therapists in my practice.	6.9%	24.2%	9.3%
5.	I believe dental therapists will be part of the solution to the problem of access to care in the state.	29.8%	49.2%	15.9%
6.	I have a personal responsibility in ensuring that the dental therapy model succeeds.	39.1%	52.4%	9.3%
7.	I believe that teaching dental therapy students will be an added weight in teaching load.	53.9%	33.3%	55.1%
8.	Dental therapists will be readily accepted by patients in the dental school.	31.5%	53.2%	22.2%
9.	I have a good understanding of the role of the dental therapist in dental practice.	59.5%	75.0%	60.4%
10.	I believe that I have values and attitudes that I would like to pass on to dental therapy students.	69.6%	85.9%	31.1%

Table 3: *Difference in attitudes between respondents in Minnesota in 2010 (N = 151) and in 2014 (N = 75) and respondents in Mississippi in 2018 (n = 109) to survey statements.*

There were 60 answers to the first open-ended question (advantages of the dental therapy model), 65 answers to the second open-ended question (disadvantages of the dental therapy model) and 65 answers to the third open-ended question (perspectives about the dental therapy model). Table 4 presents themes of the advantages and disadvantages and concerns about dental therapy presented by respondents. Table 5 presents selected interesting positive and negative comments made by respondents regarding dental therapy.

Advantages of dental therapy	Disadvantages and concerns about dental therapy
• Increases access to care [15] • Increases number of dental workers [3] • Increases dentist's ability to delegate more procedures [4] • Reduces treatment cost for patients [4]	• Insufficient education/training of dental therapists [26] • Reduces quality of care [21] • Creates two-tier dental care system [8] • Not needed [8] • Endangers the public [7] • Undermines the dental profession and/or dentists [6] • Does not guarantee that dental therapists will practice in remote/rural areas [6] • Inability of therapists to manage clinical complications [5] • Beneficial only to corporate dentistry [5] • Increases liability/litigations [4] • Increases cost for the dental profession [4]

Table 4: *Themes of the advantages and disadvantages/concerns about dental therapy presented by respondents (number of responses in parentheses).*

Positive comments	Negative comments
• Patients with state benefits that dentists won't accept will be treated • Quicker access to care • More patients can be treated • Dentists could work at top of their skill level while delegating small procedures • Frees up the dentist to be a doctor and less of a tech • It will come to fruition with time • It is a great opportunity • In other countries the model works well • It reduces oral health care disparities present in Mississippi	• It will make lawyers get richer • Dentists will compete with a technician • It adds to the problem • It cheapens the profession • It says that poor people deserve less quality care • It is inferior care option forced on low socioeconomic patients • Patients will confuse dental therapist with dentist • Creates more work for dentists fixing mistakes made by therapist • Encroaches upon established dental practitioners • Brings down dental education to vocational-technical type • It will eliminate the need for dentists • It would not bring in Medicaid patients that already fail their visits • It would make smart people not apply to dental school • Guidelines must be clearly drawn • Therapists would want to stay in heavily populated areas not rural • If you want to play dentist, then go to dental school • Program lacks scientific and medical background • Patients will suffer the consequences • It is not the answer to access to care • Dentistry is already difficult for dentists • Overhead will be the same regardless

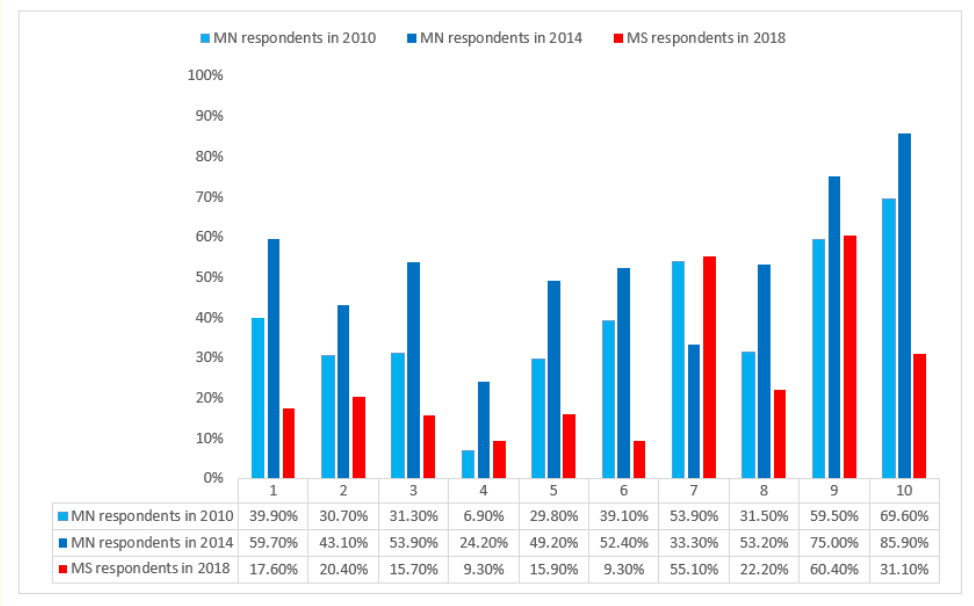
Table 5: *Interesting selected positive and negative comments made by respondents about dental therapy.*

Discussion

In this study, the attitudes and perceptions of dentists and dental faculty in Mississippi towards dental therapy were assessed and compared to the ones reported by Minnesota respondents [1,20]. It is valuable to make this assessment and comparison for several reasons.

First, dental therapy is new in the U.S. and surveys documenting the attitudes towards it are scarce. Besides the ones reported by faculty members in Minnesota we have limited to no data, and none reported qualitative data. Second, it is important to evaluate the attitudes in a state with several rural and remote areas, such as the state of Mississippi, in which a large number of underserved population reside and could perhaps benefit from dental therapists. Third, it is valuable to compare the attitudes on a significantly controversial topic such as dental therapy between respondents in a blue state (Minnesota) to respondents in a red state (Mississippi). These two groups of respondents reside in different geographic areas in the U.S. and a comparison is therefore warranted.

As table 2 demonstrate, the attitudes assessed in our study about dental therapy were remarkably negative. Figure 1 demonstrate the general acceptance of dental therapy represented by percentages of "agree" selections to each survey statement displayed by Minnesota respondents in 2010 and 2014 and by Mississippi respondents in our study in 2018. With the exception of the seventh statement "I believe that teaching dental therapy students will be an added weight in teaching load," the selection of "agree" to the survey statement generally indicates an acceptance or some sort of support of dental therapy. As figure 1 displays, Mississippi respondents in our study had overall less acceptance of dental therapy than Minnesota respondents.



	1	2	3	4	5	6	7	8	9	10
MN respondents in 2010	39.90%	30.70%	31.30%	6.90%	29.80%	39.10%	53.90%	31.50%	59.50%	69.60%
MN respondents in 2014	59.70%	43.10%	53.90%	24.20%	49.20%	52.40%	33.30%	53.20%	75.00%	85.90%
MS respondents in 2018	17.60%	20.40%	15.70%	9.30%	15.90%	9.30%	55.10%	22.20%	60.40%	31.10%

Figure 1: *General acceptance of dental therapy represented by percentages of "agree" selections to each survey statement displayed by Minnesota respondents in 2010 and 2014 (in blue), and Mississippi respondents in 2018 (in red).*

Total agreement is not expected for dental therapy. However, we found that regardless of any demographic, most faculty and private practitioners in Mississippi of any age and gender have an overall low support of dental therapy. For example, only 16% of respondents in our study believed that "dental therapists will be part of the solution to the problem of access to care in the state," whereas 68% did not. These attitudes are not consistent with the perspective of 55% the U.S. dental school deans who believed that the future of dental practice should include some sort of mid-level dental therapist or practitioner [22].

Qualitative data in our study show few positive perspectives, but numerous negative ones about dental therapy. For example, some respondents perceive that the model could increase access to care and the number of dental workers. On the other hand, most qualitative data reveal major concerns about insufficient education of dental therapists, reduction of quality of care, creation of two-tier system, endangering the public, inability of dental therapists to manage clinical complications, and several others presented in table 4 and 5.

Qualitative data reveal several alternatives to dental therapy that were proposed by some respondents. For example, eight respondents proposed that the duties of current dental auxiliaries and hygienists be expanded. Specifically, three respondents pointed to the fact that hygienists would need to be able to administer local anesthesia, a procedure that hygienists cannot perform in some states (including Mississippi).

Interestingly, one respondent stated that dental therapists in Minnesota are mainly located in larger metropolitan areas and another respondent opined that dental therapists did not increase the access to care issue in Minnesota. However, the 2009 Minnesota dental therapy law required the Minnesota Department of Health and the Minnesota Board of Dentistry conduct an assessment of the impact of dental therapy, and some initial reports suggest positive public health impacts [6]. Positive impacts include increased access by serving low-income, uninsured, and underserved patients, seeing more new patients and decreased travel time and wait times for many patients [3].

Whereas dental therapy model is intended to increase access to care for patients in rural or underserved areas, several respondents in our study have potent concerns that dental therapists could reduce the quality of care, endanger the public, and increase liability. Nevertheless, there is no research studies documenting concern about quality of dental therapists, and in fact there is evidence that dental therapists can provide safe and quality care [3]. There is success and growth of dental therapy in the U.S. and abroad [3].

In Minnesota, a state where the dental therapy model is coming to fruition, approximately half (47%) of employed therapists work in private practice setting as of 2016 [20]. In our study, only 9% of respondents agreed they "will employ dental therapists in my practice". Therefore, the acceptance and the buy-in of dental therapy in some states will undeniably be low.

Limitation of the Study

Our study has a number of limitations. First, the survey is limited to findings from one state only, and the results of this study cannot be generalized to represent perspectives of all dentists in the southern part of the United States. Second, given that dental therapy is a relatively new model in the United States, it is likely that several respondents in this study did not fully understand it and what it entails. Third, the survey did not define the role of the dental therapists or the current status of the model in different states in order to provide a background about the model to the respondents. Continued understanding of the role of dental therapy is essential, especially because only 60% in our study believed that they had "a good understanding of the role of the dental therapist in dental practice".

Areas and suggestions for future research studies on dental therapy include the longitudinal investigation of the attitudes of patients and dentists (faculty and practitioners) towards dental therapy as this model develops within the United States. Also, it would be valuable to assess the attitudes of dental hygienists about dental therapy, as well as the investigation of attitudes of dentists and dental hygienists in other areas of the United States. It would also be valuable to assess the perspective of applicants to dental school and dental hygiene programs about dental therapy and whether or not they would prefer to be admitted to this mid-level provider education as an alternative to a four-year dental, or two-year dental hygiene program.

Conclusion

Despite that dental therapy model was created to address access to care in rural and underserved areas, several of which are located in Mississippi, this model of oral health care is negatively perceived by Mississippi's licensed dentists and faculty, and few had positive perspectives about it.

Regardless of age, gender, faculty status, or private practice status, there was little enthusiasm and acceptance of dental therapy in Mississippi. Overall, the attitudes of Mississippi faculty members and private practitioner dentists about dental therapy were remarkably negative. When compared to the attitudes of Minnesota faculty perspectives in 2010 near the beginning of the implementation of this mid-level provider in Minnesota, the attitudes found in our study show an overall lower acceptance of dental therapy.

As oral health disparities continue to affect our country, further national dialogue about dental therapy between all stakeholders is necessary as well as continued assessment of the impact of dental therapy on oral and dental health status of the public.

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