

Is a mid-level dental provider model acceptable to potential patients?

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Abstract – Objective: This study aims to assess patient attitudes toward mid-level dental providers, known as dental therapists (DTs), by surveying those likely to be their patients. The recent adoption of accreditation standards by the Commission on Dental Accreditation has reignited a debate surrounding the state-by-state legalization of DTs in the United States; while the dental profession is divided on DTs, it is important to understand how potential patients may view the DT model. **Methods:** A questionnaire that asks about oral health experience, and comfort with the model of a dually trained dental therapist–hygienist, based on a provided definition, was administered to 600 patients and their waiting room companions at a large urban university-based dental clinic. **Results:** Forty percent of respondents indicated they would be comfortable being treated by a DT for all 7 of the procedures referenced, and over 75% were comfortable with each of 5 procedures. Having caps or crowns placed was the only treatment about which respondents were evenly divided. Factors associated with greater odds of comfort with various procedures include being uninsured and being under the age of 65. Uninsured patients were 1.5 to 2 times more likely than privately insured patients to accept a DT. **Conclusions:** The introduction of mid-level dental providers is a strategy that those lacking regular care appear on the whole to be comfortable with.

Key words: dental therapist; dental workforce; expanded scope of practice; mid-level provider; patient satisfaction

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Mid-level dental providers, commonly referred to as dental therapists (DTs), are members of dental teams in countries such as Australia, Canada, the United Kingdom, New Zealand, and the Netherlands. In the United States, DTs practice only in Alaska and Minnesota and were recently approved to practice in Maine. DTs provide preventive oral health services and also perform a limited set of irreversible procedures which in the United States have historically been performed only by dentists, such as preparing and placing fillings and routine extractions. They typically work in safety net or underserved settings under

the general supervision of, or in collaborative agreements with, dentists. The recent adoption of accreditation standards by the Commission on Dental Accreditation has reignited a debate surrounding the state-by-state legalization of DTs in the United States. Of the 12 states that are now exploring legislation for a new oral health workforce, 11 are considering dental hygiene-based models¹. Research indicates that DTs provide safe care, and within their scope of practice, their clinical competence is comparable to that of dentists². Moreover, there is evidence to suggest that they improve access to dental care³, an issue of

particular importance given the significant psychosocial⁴⁻⁷ and whole health⁸⁻¹¹ consequences of poor oral health, and given that the Affordable Care Act and accountable care organizations may increase demand for dental care^{12,13}. As oral health disparities continue to plague the American healthcare system¹⁴, many advocate for the introduction of DTs with the goal of increasing access, lowering costs, and improving efficiency.

Dental therapists are often described as analogous to physician assistants (PAs) or nurse practitioners (NPs), chiefly because they are licensed medical professionals with a circumscribed scope of practice, and also because their roles were established in response to healthcare access problems during times of perceived shortages or maldistributions of doctors¹⁵ and dentists¹⁶, respectively. Another similarity between these professions is the manner in which the general public's knowledge and acceptance of their role and competence has gradually evolved. Currently, DT training and scope of practice is not well understood by the US public, or even by US dentists¹⁷. Research on the US public's view of NPs and PAs conducted when these provider types were relatively uncommon suggests an analogous lack of understanding of their training and potential benefit, as well as misgivings about their full scope of practice¹⁸⁻²². Now that midlevel medical providers are commonplace, research indicates that patients are at least as satisfied with NPs and PAs as they are with physicians²³⁻²⁵. Research from the United Kingdom suggests a similar evolution with respect to DTs at the beginning of an effort to diversify the skill-mix in dentistry. While limited numbers of DTs have worked in salaried public settings in the UK since the 1960s, a program to modernize dentistry began in 2002, which included expanded training of DTs, allowing them to work in private settings. A series of studies addressed the issues of public awareness and social acceptability of DTs²⁶⁻²⁸, which found that only 10%–15% of respondents were aware of DTs, and virtually none knew their permitted duties. Once DT practice was described, however, roughly 60% of respondents were comfortable with the idea of DTs doing restorations, although they were more apprehensive about DTs treating children. In addition, it appears that certain qualifiers, specifically improved access or lowered cost, seemed sometimes to increase support.

In light of recent efforts in a number of American states to advocate for legislative changes authorizing mid-level dental practice, it is important to gain

a better understanding of the US public's feelings toward DTs; in particular, to assess the feelings of those most likely to be treated by them. In the United States, the debate over the introduction of DTs is highly charged, with opponents sometimes arguing that it will lead to a lower standard of care for already vulnerable populations²⁹. Even if the evidence suggests otherwise, to the extent the public believes such practitioners represent a second tier of care, rather than a new provider trained to a single standard of care, it will be less likely to embrace them. The degree to which DTs have the potential to improve access is thus limited by the willingness of patients to be treated by them. In this context, the purpose of the current study is to present data on present-day perceptions of dental therapists within a population most likely to be served by them.

Methods

Survey

The respondents in this study were adult patients and their waiting room companions at the University of Detroit Mercy School of Dentistry general dental clinic. This clinic is located in Detroit and serves a primarily uninsured and publicly insured population. Although not representative of all dental patients, this sample's demographic composition (Table 1) mirrors those who are likely to be

Table 1. Sample demographic characteristics

Male	39.1% (230/588)
Race ^a	
African American	42.4% (241/569)
White	42.9% (244/569)
Ethnicity	
Latino	8.4% (39/466)
Arab/Middle Eastern	10.1% (47/466)
Age	
Senior (>=65)	20.1% (116/576)
Working Age (26–64)	71.2% (410/576)
Youth (18–25)	8.7% (50/578)
Education	
HS graduate or less	30.3% (177/585)
Some college education	38.5% (225/585)
BA or more	31.3% (183/585)
Dental Insurance Status ^b	
Uninsured	37.4% (219/585)
Medicaid	29.9% (175/585)
Private	32.1% (188/585)
Have children under 18	40.5% (241/595)

^aOther possible race categories included: Indian Native American (3), Asian Pacific Islander (13); and other (60); 8 respondents checked more than one.

^bMultiple responses were allowed.

served by DTs in the American jurisdictions where it is permitted. Prior to data collection, the study was submitted for Institutional Review Board (IRB) approval at the University of Michigan and the University of Detroit Mercy, and both boards deemed the study to be exempt from IRB oversight. Potential respondents were informed about the purpose of the study, the voluntary nature of participation, the fact that participation or lack thereof would have no impact on the care they received, and the confidentiality and anonymity of their questionnaire data. Interviewers wore University of Michigan badges and stated that they were from the University of Michigan, to make it clear to potential respondents that an outside organization, not the dental clinic, was requesting participation in the survey.

The questionnaire (Appendix S1) was developed based on a review of studies on the early social acceptability of both dental and medical mid-level providers. To the extent possible, questions were drawn from commonly used dental survey tools³⁰ or adapted from previous studies^{18–22,26–28,31}. The questionnaire asked about the oral health experiences of respondents and any dependent children, any inability to receive necessary services, and the purpose of the current clinic visit. After providing a brief description of one of the prominent DT models¹, a dually trained hygienist (Appendix S2), respondents were asked about their willingness to receive various services from such a provider. If respondents indicated discomfort with any of the procedures, they were asked follow-up questions about whether certain factors might change their minds. The questionnaire was available in English, Spanish, and Arabic.

The questionnaire was administered by trained research associates over nine visits to the clinic in the summer of 2013. The method of administration rotated every other visit, between questionnaires that were self-administered and questionnaires that were read aloud by a research associate. While each method has advantages and drawbacks³², it was thought that this rotating style would provide both breadth and depth in responses. Specifically, about twice as many self-administered questionnaires could be completed in the time it took to read one aloud, although self-administered questionnaires were more likely to suffer from missing responses and potential respondent misunderstandings. Self-administered questionnaires were completed on paper and were then collected by the researcher. To protect privacy, those waiting in line

outside the clinic were only offered self-administered questionnaires. All Spanish and Arabic questionnaires were self-administered. When questionnaires were read aloud, the DT description was read verbatim, so the information received would always be the same. An attempt was made to approach every adult in the waiting room, and, on several mornings, some of those waiting in line. Respondents were free to stop at any time.

Questionnaires were offered to 778 adults and were obtained from 628, for an 81% response rate. Due to missing data on key questions of willingness to see a DT, 28 questionnaires had to be dropped. Just over one-third of the questionnaires (218) were read aloud to respondents; the rest were self-administered.

Data analysis

All statistical analyses were conducted using the statistical package STATA V.13, and the level of significance was set at 0.05. Descriptive statistics reporting respondents' demographics and the percentage stating various opinions were calculated. Logistic regression models were estimated to parse the factors associated with respondents' comfort with the idea of treatment by a DT. We present five models, with the same predictor variables but different dependent variables corresponding to specific treatments.

Results

Table 1 describes the demographic characteristics of our sample. Respondents were roughly evenly divided between being uninsured, publicly insured, or privately insured; the majority had at least some college education; and about 40% had dependent children. The dental experience of respondents is reported in Table 2. Although the majority visited the dentist at least once a year, half described the condition of their mouths as fair or poor. Nearly half said there had been a time in the last year when they or somebody in their household had skipped needed dental care, with cost being by far the most important reason. About one-third of respondents (35%) were there accompanying somebody and did not have an appointment themselves; of these, however, over 40% said they were in need of care.

Respondents were asked if they would see the proposed dually trained DT for care, and if they

Table 2. Respondents' dental experience

Frequency of dental visits ^a	
At least once a year	60.9% (365/599)
Only as needed/no regular schedule	27.5% (165/599)
Self-rated condition of teeth/gums fair or poor	50.6% (287/567)
Was there a time somebody skipped care? ^b	43.1% (258/599)
Cost	66.8% (159/238)
No time	15.6% (37/238)
Too afraid/nervous	14.3% (34/238)
Unable to find dentist who took insurance	13.9% (33/238)

^aOther possible responses included: about every 2 years, less often than every 2 years, and do not know.

^bMultiple responses were allowed. These were the top four reasons; other choices included: did not know who to call, could not get an appointment, transportation issue, lack of dependent care, some other reason, and do not know.

Table 3. Comfort with seeing a dental therapist for various procedures

Procedure	Respondent would see a DT (<i>n</i> = 600)	Respondent would take child to a DT (<i>n</i> = 241)
Filling	76.8% (461)	73.4% (177)
Extraction	59.5% (357)	66.0% (159)
Injection	76.5% (459)	66.8% (161)
Cap/Crown	52.2% (313)	47.3% (114)
Advice/Information	85.7% (514)	82.2% (198)
Explanations	83.3% (500)	83.0% (200)
Emergency	79.0% (474)	76.4% (184)
Comfortable w/all	40% (240)	39.8% (96)
Uncomfortable w/all	4.5% (27)	6.6% (16)

Note: Nonresponses were taken as 'no'; the number responding to each question ranged from 560 (caps/crowns) to 575 (fillings) for self, and from 202 (caps/crowns) to 229 (fillings) for children.

had children, whether or not they would take their children to one (Table 3). In calculating these percentages, nonresponses were treated as 'no' in the interest of presenting findings that are maximally conservative, that is, least supportive of dental therapy. For 5 of the 7 procedures, over 75% of respondents were comfortable with the idea. They were most comfortable receiving advice and information about their teeth, or explanations of treatment options, although nearly as many were comfortable with the ideas of seeing the proposed DT in an emergency, and having routine cavities filled. Indeed, 77% of respondents indicated they would be willing to have a DT fill their teeth. Caps or crowns were the only procedure over which respondents were evenly divided. Overall, 40%

were comfortable with DTs performing all seven procedures, and fewer than 10% were uncomfortable with all. Respondents were less comfortable with DTs providing injections for their children than for themselves and were more comfortable with DTs providing extractions for their children than for themselves.

Those respondents who were uncomfortable receiving even one of the listed procedures from a DT were asked whether they thought any of several potential factors might change their minds (Table 4). For each query, roughly half indicated they might reconsider. Nearly 2/3 stated they would reconsider if their dentist made the treatment plan and assured them the DT could do the work. Costing less and accepting insurance were the next two highest reasons for reconsideration. Those with children appear slightly less likely to change their minds about their children's care.

Positive response to treatment from DTs differed by administration method, with self-administered questionnaires indicating lower support than for those that were read aloud. Multivariate analyses control for administration style. Findings on comfort with the various procedures, both treating nonresponses as 'no', and excluding missing responses, are reported separately by questionnaire administration style in Appendix S3.

Odds ratios are presented in Table 5, which describes the comfort level of various demographic groups with procedures within dental therapy scope of practice. Those comfortable with all seven procedures are more likely to have skipped dental care due to cost barriers, and less likely to be seniors (relative to working age) and have a bache-

Table 4. Factors potentially affecting discomfort with dental therapists (asked of those uncomfortable with at least one procedure)

Reason	Respondent would see a DT (<i>n</i> = 367)	Respondent would take child to DT (<i>n</i> = 153)
If could get an appointment more quickly	51.0% (187)	49.0% (75)
If it cost less	60.2% (221)	56.2% (86)
If easier to get to	50.7% (186)	50.3% (77)
If accepted insurance	56.1% (206)	55.6% (85)
If dentist made plan and said ok	65.9% (242)	62.1% (95)

Note: Nonresponses were taken as 'no'; the number responding to each question ranged from 313 (took insurance) to 320 (cost less) for self, and from 128 (dentist said ok) to 133 (quicker appointment; cost less) for children.

Table 5. Comfort with receiving various procedures from a dental therapist (Odds ratio logistic regression results)

	Dependent variable				
	Fillings	Extractions	Caps/Crowns	Emergencies	All 7 ^a
Male	1.21 (0.27)	1.40+ (0.27)	1.37+ (0.26)	1.21 (0.28)	1.38+ (0.26)
Black ^b	0.94 (0.22)	1.32 (0.27)	1.60* (0.31)	0.64 + (0.16)	1.36 (0.27)
Other race ^b	0.52* (0.16)	1.04 (0.29)	0.92 (0.25)	0.36** (0.11)	0.99 (0.27)
Medicaid ^c	1.03 (0.28)	0.98 (0.23)	1.33 (0.31)	1.00 (0.28)	1.09 (0.26)
Uninsured ^c	1.88* (0.51)	1.94** (0.44)	1.44+ (0.31)	1.76* (0.50)	1.43 (0.32)
Unsure or other ins ^c	0.62 (0.25)	1.65 (0.65)	1.00 (0.38)	0.68 (0.29)	0.99 (0.39)
Youth (18–26) ^d	1.36 (0.56)	0.92 (0.30)	1.83+ (0.62)	2.15+ (0.96)	1.07 (0.34)
Senior ^d	0.56* (0.15)	0.50** (0.12)	0.53** (0.12)	1.15 (0.33)	0.51** (0.12)
HS or less ^e	0.52* (0.14)	0.96 (0.22)	0.81 (0.18)	0.46** (0.13)	0.83 (0.18)
BA or more ^e	0.48** (0.13)	0.44** (0.10)	0.60* (0.13)	0.78 (0.22)	0.52** (0.12)
Skipped care	0.99 (0.22)	1.30 (0.25)	1.57* (0.29)	1.24 (0.29)	1.50* (0.28)
Self-administered	0.34** (0.08)	0.44** (0.09)	0.64* (0.12)	0.33** (0.09)	0.65* (0.12)
Constant	11.14** (4.22)	2.08* (0.62)	0.96 (0.27)	11.23** (4.40)	0.71 (0.20)
Pseudo-R ²	0.084	0.089	0.0656	0.085	0.057
Observations ^f	553	553	553	553	553

⁺ $P < .10$.

^{*} $P < .05$.

^{**} $P < .01$.

^aAlso includes: injections, advice and information, and explanations.

^bReference category is white.

^cReference category is private insurance.

^dReference category is working age.

^eReference category is some college education.

^fAll dependent variables were coded 1 for a positive response and 0 for either a negative response or no response; 47 cases were excluded due to missing values on one or more explanatory variable.

Note: Of the 553 respondents included in the regression sample; overall, 427 (77%) would get a filling; 330 (60%) would have a tooth pulled; 289 (52%) would get a cap/crown; 439 (79%) would be seen in an emergency; and 222 (40%) were comfortable with all 7 procedures.

lor's degree or higher (relative to those with some college education). Specific procedures were associated with varying response patterns. For example, uninsured respondents were more comfortable with DTs providing fillings, extractions, and emergency care than were respondents with private insurance; in particular, they were nearly twice as likely as privately insured patients to be comfortable with a DT providing an extraction.

Discussion

Dental therapists are part of the dental team in a number of countries and a limited number of American states. Wherever they have been introduced, a primary goal has been to improve access to care. Lack of dental care has serious social and public health implications, with those living in or near poverty disproportionately impacted. Thirty-seven percent of US households report skipping care in a given year, with the uninsured twice as likely to do so³³. Poor oral health causes children to miss school and adults to miss work, resulting

in lower academic performance and lost productivity^{5,33}. Psychosocial consequences of dental problems include embarrassment, shyness, and feeling worthless, as well as reduced job prospects^{6,7}. Dental problems account for a rising number of visits to hospital emergency rooms^{34,35}, care that is not only expensive, but often limited to treatment for pain and infection, leaving underlying problems unaddressed³⁶, and diverting valuable time and resources away from problems that ERs are better able to treat³⁷.

Not only would adding a new lower-cost member to the dental team increase the number of providers, but, it is argued, it would also promote cost-effective treatment, freeing dentists to concentrate on more complex cases that take advantage of their extensive skills and training^{3,38,39}. Little is known about the actual reduction in cost, and there is no evidence to show that the addition of DTs in Minnesota has resulted in a reduction in the cost of providing care. A survey conducted for the WK Kellogg Foundation in 2011 found that 78% of respondents in a nationally representative sample supported the idea of training a new 'licensed den-

tal practitioner' to provide preventive, routine dental care to those going without⁴⁰. While this provides support for the idea of mid-level dental providers, it does not assess respondents' level of comfort with actually patronizing them for specific procedures. In fact, while existing literature examines the social acceptability of treatment from PAs and NPs when these mid-level medical providers were relatively unknown, and a series of studies from the UK sheds light on public opinion toward treatment by DTs when they were still uncommon, to our knowledge the current study is the first to ask similar questions about the acceptability of treatment by DTs in the United States, and specifically, to ask those whose demographic composition would suggest that they could be likely to be their patients.

Qualitatively, our findings are similar to those from past studies that found no more than 20% of respondents refusing all proposed treatments from a new mid-level provider, and between one-third and nearly two-thirds being comfortable with all^{18,20,22,28}. The observed variation in comfort across procedures is also similar to prior findings, in that respondents were generally least comfortable with unknown mid-levels performing procedures considered to be more invasive^{18,19}. The fact that the respondents in our study who expressed some discomfort with DTs sometimes modified their opinions, particularly if a dentist would reassure them or the provider were less costly, is also consistent with several prior studies^{18,22,26,41}, as are our estimates of correlations between comfort with specific procedures and demographic variables such as lack of insurance and being under 65. Dyer, Humphris and Robinson, for example, found that in the UK, males, younger participants, and those with perceived treatment need were more likely to find having their teeth restored by a DT acceptable, while those receiving some private treatment were more likely to find it unacceptable²⁸. Shamansky et al.²² found that respondents who said they would use NP services were 6.4 times more likely to be dissatisfied with their current health care (based in part on questions about availability and cost) than those who said they would not use an NP. Age and measures related to health or perceived need, as well as visit frequency or regularity, was found to be related to comfort with mid-levels in other studies as well^{19,21}.

It is interesting to consider why comfort with treatment by hypothetical DTs appears to be somewhat higher in our study than it was for an

already existing, albeit little known, practitioner in the UK, as well as for NPs and PAs when they were first being introduced. It may be related to the fact that most people have now had experience with hygienists and medical mid-levels, so the idea of being treated by a nondoctor is perhaps not as foreign as it once was. In addition, our sample was drawn from an underserved population at a dental clinic, which may mean it is a less healthy or more vulnerable sample than those of many other studies. An interesting extension of this work would be to explore the feelings of more affluent private practice patients.

It must be noted that positive response to treatment from DTs differed by administration method, with self-administered questionnaires indicating lower support than for those that were read aloud (71% versus 87% for fillings, for example). Although we cannot definitively explain this, there are several possible reasons. One possible reason is that the nonresponse rate to specific questions varied considerably by administration style. There were only six nonresponses to the questions about own comfort with various treatments among the 218 questionnaires that were read aloud. By contrast, among the 382 self-administered questionnaires, the number of nonresponses to specific questions about own comfort ranged from 40 (caps and crowns) to 25 (fillings). Reasons for higher rates of nonresponses in self-administered questionnaires are unknown and could perhaps be explained by low motivation to complete all questionnaire items. The decision was made to treat nonresponses as 'no' because in doing so, the findings are less supportive of dental therapy and therefore more conservative; one result of this decision is that the mean for self-administered responses is brought down, while the mean for questionnaires that were read aloud is virtually unaffected.

A second possible reason is that although the questions were designed to be neutral, it is possible those answering face-to-face might have felt approval was the 'right' answer, whereas those filling it in themselves may have been more willing to say 'no'. Yet those hearing the description read aloud might also have achieved a better understanding of dental therapy than those reading for themselves – who may then have been more inclined to say 'no'. While we have reason to suspect the questionnaires that were read aloud may be more accurate, by combining the data we

weight the estimates toward the self-administered questionnaires, which are less supportive of dental therapy.

A limitation of the current study is its use of a single dental school's patients, which circumscribes its external validity. It may be the case that our convenience sample has unique features that would distinguish it from other communities likely to be served by DTs. Responses to the demographic questions do suggest that the sample mirrors the patients who are commonly served in safety net dental settings, and future surveys in other settings may clarify the extent to which the current study is generalizable.

Until the current study, little was known about the feelings of potential patients toward mid-level dental providers in the United States. Understanding these feelings is important, as any improvement in access – and in related public health issues – depends not just on additional or better placed providers, but on the willingness of patients to be treated by them. If the segment of the population that is most likely to benefit from the introduction of a new mid-level dental provider is unwilling to be seen by them, the primary goal of introducing DTs to the dental workforce will not be met. Despite the fact that DTs do not currently practice in Michigan, and most respondents had never heard of them, the majority of respondents in our study were on the whole quite comfortable with the idea of receiving treatment from them. In fact, when asked whether 'in general, do you think it would be a good idea to let dental therapists work in Michigan?' the overwhelming response among the patients and their waiting room companions in our study (roughly 90%), was 'yes'.

Overall, we find no evidence that potential patients would on the whole perceive DTs to be providing second-tier care. Indeed, consistent with past findings, those with perceived need or lack of access are actually more likely to be comfortable with the idea. Additionally, to the extent that comfort with certain treatments is qualified, it should be noted that when NPs and PAs were first introduced in the UK and the United States, the public was also unsure about receiving certain treatments from those unknown practitioners. Comparing the opinions of potential DT patients in the United States to early opinions toward DTs in the UK, or NPs and PAs here, provides insight into how US feelings about DTs might be expected to evolve. In as much as our findings tend to mirror those of earlier studies, if such practitioners were to become

commonplace, current reservations will likely be reduced. This will particularly be the case if US dentists gain comfort with the idea, and evidence suggests that with familiarity, doctors' opinions do evolve^{3,42}. Trust in a primary care provider has been shown to impact views on the acceptability of care from other members of the medical team^{18,41}. Similarly, 2 of 3 of those respondents in our study expressing reservations with DTs felt that being told by their dentist that a DT could do the work could lead them to reconsider. If, on the other hand, opponents of this workforce model – including, at the moment, most state dental organizations and the American Dental Association, although not the American Association of Public Health Dentistry – continue to argue, despite evidence to the contrary^{2,3}, that the addition of mid-level providers to the US dental workforce will create a 'two-tiered' system of care^{29,43}, public doubt may develop where it otherwise did not exist.

The fact that so many in the United States lack access to oral health care creates serious social and public health problems. In addition to the suffering of those in need, society pays a heavy price in the form of children's learning, adults' work, misuse of hospital emergency services, worsened health outcomes, and increased medical expenses. Increasing the total number of dental providers, and more efficiently utilizing the time of highly trained physicians and dentists, are key components of most strategies to reduce barriers to care. To this end, 11 American states are currently exploring legislation for a dental hygiene-based mid-level oral health workforce¹. The current study begins to suggest that potential patients, especially those who are lacking regular care, have a significant potential to embrace this new type of provider.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Questionnaire: Opinions on Dental Care.

Appendix S2. Description of dental therapist model provided in questionnaire.

Appendix S3. Comfort with seeing a dental therapist for various procedures, by survey administration style.