Interprofessional perceptions of dental providers' engagement in childhood obesity prevention

Anna Mowell

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Committee:

Michelle M Averill

Jason A Mendoza

Beth Ogata

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Abstract

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Anna Mowell

Chair of the Supervisory Committee:

Michelle M Averill

Department of Environmental and Occupational Health Sciences

Background: Pediatric dental professionals offer basic dietary guidance on the prevention of dental caries; however, there has been a public health call to action for further engagement in childhood obesity prevention.

Objective: To explore how registered dietitian nutritionists and primary care providers perceive the initiation of weight-, nutrition-, and health-related conversations in a pediatric dental setting.

Design: Cross-sectional study design using an online survey and mixed methods analysis to understand perceptions of dental engagement in various forms of childhood obesity prevention.

Participants/setting: One hundred and twenty registered dietitian nutritionists (RDNs) and primary care providers (PCPs: medical doctors, physician assistants, nurse practitioners) were recruited by clinicians practicing in the Puget Sound region of Washington State through relevant electronic listservs. Respondents were eligible by self-identification as an RDN or PCP.

Results: The sample (n=120) consisted of 97 RDNs and 23 PCPs. Beliefs about the extent to which pediatric dental health providers should engage in childhood obesity prevention varied.

Seventy two percent of participants felt comfortable with pediatric dental health providers addressing nutrition topics that relate to oral health, whereas 25% of participants felt comfortable with them offering broader nutrition recommendations. Qualitative analysis revealed three themes and nine subthemes detailing areas of concern about dental engagement in childhood obesity prevention, suggestions for appropriate engagement, and opportunities for interprofessional collaboration. Concern over pediatric dental health providers discussing child weight was highly prevalent, though PCPs displayed a greater openness to this and other forms of dental engagement overall.

Conclusion: Interprofessional education, training, and collaboration are needed to understand appropriate forms of childhood obesity prevention across different settings of care. Dental professionals seeking to engage in preventive efforts should continue to recommend avoidance of cariogenic foods/beverages, though further research is needed to understand their role in broader forms of dietary guidance and health conversations with families.

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INTRODUCTION

With roughly 19.3% of children and adolescents ages 2-19 years considered obese, childhood obesity remains a public health priority due to its prevalence, potential health consequences, and disproportionate impact on racial and ethnic minorities in the United States.[1–3] Leading health organizations recommend comprehensive childhood obesity prevention and treatment efforts, with recent studies demonstrating the greatest strength of evidence for multi-setting treatment interventions compared to those conducted in a single setting.[4,5] Similarly, experts in the field of childhood obesity prevention have highlighted the role of multi-level community-based programs and other multi-sector initiatives for effective prevention.[6,7] The current body of evidence suggests that effective preventive programs include both physical activity and dietary components and are coordinated across community/school, primary care, and home/family-based settings.[6] To date, there is moderately strong evidence to suggest that school-based prevention programs are effective, while evidence regarding the feasibility or effectiveness of prevention programs conducted in primary care settings and other health care contexts is comparatively sparse.[4,8] Regardless, the role of health care providers in childhood obesity prevention is well recognized, suggesting an opportunity for partnership amongst front-line health care providers to strengthen multidisciplinary prevention.[9]

Public health officials are increasingly turning toward the dental office as an opportunity for basic health screening and health promotion.[10] Research suggests that there are multidirectional relationships between oral health, systemic health, and nutrition; however, the exact relationship between obesity and dental caries remains unclear.[11] Despite inconsistent evidence of a direct association between obesity and dental caries, both are considered multifactorial health phenomena with significant dietary components.[12,13] Thus, a common-risk-

factor approach provides a window of opportunity for dental professionals to engage in childhood obesity prevention efforts through basic nutrition guidance and/or healthy lifestyle conversations with families.[14–16]

The American Academy of Pediatric Dentistry (AAPD), the American Dental Association (ADA), and the American Dental Hygienists' Association (ADHA) all have policies encouraging dental professionals to recommend healthy food choices and limited consumption of added sugars, particularly those found in sugar-sweetened beverages, when speaking with patients.[13,17,18] However, there is little formal guidance provided beyond the recommendation to follow national dietary guidelines, and research on the implementation of these policies is sparse.[14] Many pediatric dental professionals offer basic nutrition education related to the prevention of dental caries, but there has been a call to action for further engagement.[19,20] The Robert Wood Johnson Foundation (RWJF) is a recognized leader of national efforts to promote healthy weight in children.[20] In 2016, RWJF sponsored a national conference titled *Healthy Futures: Engaging the Oral Health Community in Childhood Obesity Prevention*, which convened a diverse group of stakeholders to explore potential strategies for dental professionals to engage in childhood obesity prevention.[20] Proposed strategies included conducting research to determine the best ways to incorporate childhood obesity screening and prevention content into dental education and dental practice settings.[20]

Health care professionals engaging in conversations around weight, dietary habits, or healthy lifestyle practices must be mindful of word choice, messaging content, and delivery.[21,22] There is ample opportunity for well-intentioned health messaging to invoke harm, especially when overtly weight-related.[23] Children, adolescents, and adults with overweight/obesity may experience weight discrimination and weight-based stigmatization ranging from subtle judgment

to overt bullying.[24] Research indicates that weight bias is particularly prevalent amongst health care providers, leading patients with overweight/obesity to feel stigmatized and subsequently less likely to seek care.[21] Furthermore, the experience of weight stigmatization has been shown to diminish quality of life and increase risk of adverse health outcomes.[23,24] In light of this, the prevailing assumption that weight-centric obesity management and prevention strategies are appropriate or effective is increasingly being challenged in public health discourse.[25,26] Given the call to action for dental engagement in childhood obesity prevention, it is imperative to explore the potential implications of initiating health screening and healthy lifestyle conversations in a pediatric dental setting. This study aims to i) assess how registered dietitian nutritionists (RDNs) and primary care providers (PCPs) involved in pediatric nutrition care perceive the role of pediatric dental health providers in promoting healthy weight and dietary habits in children; ii) explore best practice recommendations for pediatric dental health providers seeking to engage in healthy lifestyle conversations in a dental setting; and iii) identify opportunities for positive interprofessional collaboration and coordination of care.

METHODS

Survey Development

The online survey questions were developed based on findings from semi-structured phone interviews conducted with 10 RDNs in the Puget Sound region of Washington State that explored perceptions of dental engagement in childhood obesity prevention. Interviewed RDNs represented four Washington clinics that serve diverse patient populations, including underrepresented and minority populations. Thematic analysis of interview transcripts revealed broad themes around dental-initiated healthy lifestyle conversation content, appropriate boundaries, avoidance of weight stigma, and strategies for increased interprofessional collaboration (Appendix A: Supplemental Findings). These themes were then used to develop a survey targeting a wider population of health care providers who directly participate in some aspect of pediatric nutrition care.

The survey consisted of three descriptive characteristic questions, six multi-part closed-ended questions, and four open-ended follow-up questions for concepts that were determined to need a greater depth of response based on complexities revealed from the informant interviews (Appendix B: Supplemental Survey). Participants were asked to use a scale of one to five to rate their level of agreement or comfort with statements about childhood obesity prevention in health care, weight measurement in dental settings, and proposed topics for healthy lifestyle conversations in dental settings. Participants were also asked to provide an open-ended response explaining their ratings on statements about health care providers' roles in identifying children at risk for obesity, the discussion of diet or delivery of nutrition advice in a dental setting, and the extent to which healthy lifestyle promotion falls within the pediatric dental scope of practice. A survey draft was circulated at a national nutrition conference with no critical feedback provided.

Recruitment and Participants

A purposive sampling method was used to recruit RDNs and PCPs who were involved in the direct provision of pediatric nutrition care services throughout the region. Recruitment was conducted over a five-month period with the assistance of local clinicians with experience in dietetics, pediatric care, or public health practice who agreed to distribute the online survey to professional practice groups and practicing clinicians through relevant electronic listservs. Participants received an email containing a link to the survey and a brief message explaining the study's purpose. Survey completion occurred anonymously on a voluntary basis, and participation was not incentivized. The University of Washington Institutional Review Board determined the study qualified for exempt status.

Data Analysis

One hundred and fifty-four participants with diverse professional backgrounds completed the survey between March and July 2019. Mental health professionals, registered nurses, social workers, dietetics students, and clinicians practicing outside of the United States were excluded from data analysis (n = 34) to maintain consistency with the study objectives. The final sample consisted of 120 participants who self-identified as an RDN or PCP (i.e., medical doctor, physician assistant, nurse practitioner).

A mixed-methods design was utilized to achieve the study purpose and allow deeper exploration of complex phenomena through quantitative and qualitative analysis.[27,28] Quantitative analysis was conducted using univariate frequency distributions to identify response patterns across closed-ended survey questions assessing the participant’s level of comfort or agreement with various statements. Qualitative analysis was conducted using a multi-step process of inductive iterative coding to understand a priori and emergent themes. Qualitative

analysis occurred through Dedoose, a cross-platform research application through which two study team members independently coded the qualitative survey data, then verified and resolved discrepancies. Codes represented concepts from the response data and survey questions. Researchers used thematic analysis to analyze the coded responses and identify themes and subthemes across participants and codes.[29] After identifying themes and subthemes, the research team selected representative quotes for each theme.

Effective qualitative inquiry involves a process of continuous movement between study design and implementation to ensure methodological rigor and congruence between study objectives, recruitment, and data collection, analysis, and interpretation.[30] Verification mechanisms were woven into each phase of the study. All study team members received training in qualitative methods and completed Dedoose online training modules. Purposive sampling was used to achieve efficient and effective thematic saturation, and researcher data interaction was maximized to ensure methodological rigor.[31] Researchers engaged in reflective thought exercises and consulted scientific literature throughout all study phases to remain conscious of personal biases, values, and experiences they brought to the study.

RESULTS

The survey sample consisted of 120 individuals practicing in Washington State (n=65) and 22 other states across the country (n=55). The descriptive characteristics are shown in Table 1. Eighty-one percent (n=97) of participants were RDNs, of which 37% (n=36) worked primarily with pediatric populations. Nineteen percent (n=23) of participants were PCPs, of which 78% (n=18) served pediatric populations. The survey garnered a particularly strong response from clinicians working in eating disorders and clinicians supporting the Health at Every Size (HAES) movement, a weight-neutral approach to care that addresses the unique social challenges arising from weight bias and weight stigma.[26,32]

Table 1. Descriptive characteristics of 120 RDNs and PCPs participating in an online survey on childhood obesity prevention in dentistry

Variable	N	% of sample
Profession		
Registered dietitian nutritionist	97	81
Primary care provider	23	19
State of Practice		
Washington	65	54
Other	55	46
Practice Area		
Pediatric	54	45
General adult	17	14
Eating disorders	40	33
Generalist	3	3
Other	6	5
Total	**120**	

Participants were asked to identify the extent to which they felt that initiating healthy lifestyle promotion falls within the pediatric dental scope of practice. The majority of survey participants (55%) indicated that dental-initiated healthy lifestyle promotion falls within the pediatric dental scope of practice when it is related to oral health, with a smaller segment of participants (8%) indicating that it is within the scope of practice regardless of the relation to oral health. In contrast, 37% of participants felt that dental-initiated healthy lifestyle promotion fell

completely outside of the pediatric dental scope of practice. Beliefs around scope of practice varied by profession, with PCPs showing greater acceptance of dental involvement. Seventy-four percent (74%) of PCPs felt that healthy lifestyle promotion fell within the pediatric dental scope of practice, compared to just 61% of RDNs. Further differences were evident when analyzing the data by profession. Whereas 22% of PCPs indicated that healthy lifestyle promotion falls within the pediatric dental scope of practice regardless of the content's relation to oral health, only 5% of RDNs felt the same.

Participants were asked to identify specific topics that they would feel comfortable with a pediatric dental health provider addressing with a patient or patient's family. These topics were presented in a closed-ended survey question asking participants to select all applicable answers. Nutrition topics related to oral health were selected most frequently, with 72% of participants indicating that they would feel comfortable with pediatric dental health providers discussing cariogenic food/beverage choices and 67% of participants indicating that they would feel comfortable with pediatric dental health providers discussing cariogenic food and beverage choices plus healthier alternatives. In contrast, just 25% of participants noted that they would feel comfortable with a pediatric dental health provider offering general nutrition recommendations. There were noteworthy differences in response frequencies based on beliefs around scope of practice (Table 2). Participants who felt that the pediatric dental scope of practice includes healthy lifestyle conversations regardless of relation to oral health (n=10) selected the widest range of acceptable discussion topics, including weight. However, the majority of surveyed participants (76%) expressed discomfort with pediatric dental health providers measuring or discussing weight.

Table 2. Raw count of selected survey responses for healthy lifestyle conversations in pediatric dentistry based on scope of practice beliefs of a sample of 120 registered dietitian nutritionists and primary care providers				
Topics that participants felt would be appropriate for a pediatric dental health provider to address with a patient or patient's family	**Count**			
	Outside scope (n=44)	In scope: Dental related (n=66)	In scope (n=10)	Total
Nutrition-related dental care	17	54	10	81
Cariogenic food/beverage choices (i.e. sugar sweetened beverages)	18	58	10	86
Cariogenic food/beverage choices and healthy alternatives	12	58	10	80
General nutrition recommendations	0	21	9	30
General nutrition and general healthy lifestyle recommendations	0	19	10	29
Weight in the context of general health status	0	9	5	14
None- not comfortable with dentists doing any of the above	18	3	0	21

Many reasons for varying opinions on acceptable forms of dental engagement were provided through open-ended survey responses. Participants were asked to rate and explain their level of comfort with pediatric dental health providers initiating discussion of diet or delivering nutrition advice. Participants also explained the rationale behind their beliefs on scope of practice. Three themes and nine subthemes emerged from these qualitative responses (Table 3).

Theme 1. Concerns with healthy lifestyle and nutrition conversations in a dental setting

The first theme identified concerns around integrating nutrition and healthy lifestyle conversations into pediatric dental practice. Potential dental involvement was received with hesitation for several reasons, characterized into five subthemes displayed in Table 3. Scope of practice was a prevalent concern, in addition to lack of training. Participants emphasized the complex nature of nutrition and weight conversations, noting that extensive training and counseling skills are required to adequately address these topics. In addition, participants expressed concern over pediatric dental health providers' lack of eating disorders expertise, noting the potential to invoke harm. Examples of potential harms included increased risk of

eating disorders, weight stigmatization, weight discrimination, feelings of shame, and potential avoidance of care. Some of these harms related to the pervasive presence of diet culture, which participants feared could lead pediatric dental health providers to inadvertently endorse weight bias, demonize foods, and spread misinformation that does not constitute evidence-based nutrition. Lastly, participants cited time as a major barrier to conducting nutrition and healthy lifestyle conversations in a dental setting, emphasizing that adequate time is needed for these conversations.

Theme 2. Suggestions and specifications for appropriate dental engagement

The second theme explored suggestions for how pediatric dental health providers can appropriately discuss nutrition and healthy lifestyles with a patient or patient's family. Participants provided limited suggestions for appropriate engagement, which were characterized into two main subthemes (Table 3). Participants indicated that sensitive messaging is critical. Sensitive messaging avoids discussion of weight-related topics and instead focuses on behavior. Participants also noted that any conversation regarding nutrition and healthy lifestyles should first relate to oral health.

Theme 3. Opportunities for interprofessional collaboration

The third theme revealed opportunities for interprofessional collaboration. Interprofessional collaboration was broadly characterized into two major subthemes (Table 3). Participants noted that there may be an opportunity to coordinate care due to the relationship between nutrition, oral health, and systemic health. Pediatric dental health providers can be part of a coordinated care team and can reinforce positive health messages. However, participants underscored the importance of referral to a PCP or RDN, especially when there are specific nutrition-related concerns.

Table 3. Themes, subthemes, and representative quotes identified through open response to survey questions regarding nutrition conversations in a dental setting and pediatric dental scope of practice.	
Theme	**Representative Quote**
Theme 1: Concerns with dental engagement	
Scope of practice *Lack of training or expertise* *Potential to cause harm* *Normative diet culture* *Time barrier*	**"**There is a lot of nuance involved in speaking with parents and families regarding their children's weight. I often hear families in my office who have heard from other providers something about their child's weight that either alarmed them or insulted them...I find it hard to believe that dental providers will have enough time in an appointment or training on this topic to consistently provide accurate and appropriate information. I also find that other medical providers at times provide information for families that is more suited to traditional diet culture or adult weight management instead of using the standard of care for children such as division of responsibility." ID 104 (Registered dietitian nutritionist)
Theme 2: Suggestions and specifications for appropriate dental engagement	
Sensitive messaging *Ground in oral health*	"Again it depends on the sensitivity and approach of the provider in discussing healthy lifestyle practices without weight bias and what they are talking about. Discussing diet is a natural fit for dentists." ID 94 (Primary care provider) "While I think it is important to identify children who could benefit from discussion about lifestyle intervention, I think it is important to have across the board advice given to the patient from a credentialed provider. I think discussing general health would be fine, going into specifics about dietary habits seems to me to be out of scope of practice. Nutrition is a changing field and dental providers are not required to stay up to date on topics. Sensitivity in language with pediatric population is also incredibly important." ID 88 (Registered dietitian nutritionist)
Theme 3. Opportunities for interprofessional collaboration	
Coordination of care *Importance of referral*	"Everything we do to and in our bodies is connected. Healthy body, healthy teeth is all connected." ID 119 (Registered dietitian nutritionist) "Brief information sharing on the effects of cariogenic foods and proper oral hygiene or complementary anti-cariogenic foods should be the limit of any nutrition education given by dental providers. Referrals can be provided to registered dietitians for any subsequent counseling or education" ID 64 (Registered dietitian nutritionist)

Coordination of care and referrals emerged as two potential methods of interprofessional collaboration during qualitative data analysis. Other ideas for interprofessional collaboration were offered in a survey question asking participants to indicate items that might increase their level of support for pediatric dental health providers engaging in healthy lifestyle conversations (Table 4). The majority of participants responded by selecting from the pre-specified list of responses, indicating that continuing education and interprofessional training sessions would be beneficial. Some participants answered "other" and utilized open-ended text to further underscore the importance of referrals. The most commonly selected response, however, indicated that nothing could be done to increase support for dental engagement (Table 4).

Table 4. Survey responses indicating potential ways to increase support from registered dietitian nutritionists and primary care providers for dental engagement in healthy lifestyle promotion

Response	Count
Nothing; not appropriate	51
Continuing education	44
Interprofessional training sessions	49
Comfortable as is	2
Other	18

DISCUSSION

The purpose of this study was to explore how RDNs and PCPs perceive the initiation of weight-, nutrition-, and health-related conversations in a pediatric dental setting. To our knowledge, this study is novel in that it examines this topic from the perspective of health professionals directly involved in the provision of nutrition-related care. Our data offer preliminary insight for opportunities to enhance a relatively underutilized form of interprofessional collaboration between RDNs and pediatric dental health providers.

Interprofessional practice and coordination of care require collaborative thinking and alignment within and across different areas of practice.[33] Researchers within the field of dentistry have assessed the attitudes and perceptions of dental professionals on their role in healthy lifestyle promotion and/or childhood obesity management and prevention.[34] These studies suggest that the majority of dental professionals already offer nutrition education related to sugar-sweetened beverage intake and caries prevention, a practice that aligns with the current dental scope of practice and overlaps with common obesity prevention strategies.[13,17,18,35] The data also suggest that there is general support in dentistry for further engagement in nutrition and health conversations.[34] Outside of dentistry, beliefs about the extent to which dental professionals should engage in broader conversations on nutrition and healthy lifestyle practices may vary. Our results indicate that from the perspective of nutrition and primary care providers, nutrition-related conversations in a pediatric dental setting are most appropriate when related to oral health. The majority of RDNs and PCPs felt comfortable with pediatric dental health providers initiating conversation about cariogenic food and beverage choices and offering recommendations for healthier alternatives, whereas less than one-third felt comfortable with pediatric dental health providers giving broader nutrition recommendations. Key reasons driving

this difference included fear of promoting disordered eating patterns and non-evidence-based nutrition recommendations, both of which were more prevalent concerns amongst RDNs than PCPs. Overall, PCPs were more open to dental engagement than were RDNs. This may result from the fact that PCPs have more frequent contact with pediatric dental health providers through referrals. The implications of this finding, though beyond the scope of this study, suggest a need for greater understanding and collaborative efforts amongst RDNs and professionals across different health care settings.

Our results suggest that substantial training is needed to deliver appropriate nutrition education. This reveals an opportunity for RDNs to use their expertise to shape public health efforts and collaborate with other health care professionals seeking to integrate dietary counseling into practice. Currently, dominant public health nutrition discourse revolves around a weight-centered health paradigm that is legitimized by anti-obesity policies and programs for screening, surveillance, and health promotion efforts.[36] Despite the general dearth of evidence on childhood obesity prevention efforts conducted in health care settings, there is continued interest in strengthening primary prevention efforts amongst PCPs and nonphysician providers.[8] In a national survey conducted by the AAPD in 2016, the majority of pediatric dentists (73%) agreed that they have a role in helping children maintain a healthy weight, though many reported barriers to implementation such as fear of offending parents and lack of knowledge about how to start the conversation.[34] Communication of weight concerns with patients and caregivers is a recognized challenge and weight bias is a well-documented phenomenon in health care.[37,38] Inappropriate delivery of weight-centric health messaging has been shown to contribute to internalized weight stigma, which subsequently increases one's risk of adverse physical, behavioral, and psychological health outcomes.[24] In addition to feelings of body-related shame,

guilt, and low self-esteem, stigmatized individuals experience heightened risk of anxiety, substance abuse, depression, and other psychological conditions.[24,39] Recent research also suggests that weight stigma and weight discrimination contribute to behavioral coping mechanisms and physiological processes that lead to increased weight gain and poorer metabolic health.[40–42] Furthermore, perceived weight-based discrimination has demonstrated an association with higher levels of C-reactive protein and has been shown to explain over one-quarter of the prospective association between obesity and declining metabolic health.[43,44]

Given the growing body of evidence suggesting negative health outcomes associated with weight stigma and weight-based discrimination, it is imperative to consider the limitations and potential harms of weight-based prevention efforts prior to dental engagement in conversations surrounding child weight.[36,37] According to our findings, measuring or discussing weight in a pediatric dental setting is not perceived as an appropriate form of childhood obesity prevention because weight is not a behavior and does not serve as a reliable proxy for child health. Instead, it is suggested that pediatric dental health providers can engage with families by providing general counseling to avoid cariogenic food and drinks. This strategy helps decrease the risk of obesity and is appropriate for all populations regardless of weight. If there are concerns about unhealthy weight status or dietary habits, pediatric dental health providers should refer the child to an RDN or PCP for a full assessment and individualized nutrition intervention. The lack of consistent referral mechanisms for dental professionals currently limits the extent to which this interprofessional practice can feasibly occur. It also creates a dental silo, thus hindering a mutual understanding of scope of practice between pediatric dental health providers and RDNs. Efforts to overcome this barrier are warranted and require strengthened interprofessional education and communication.[45,46]

Limitations

Our results do not provide a true representative sample of Washington State providers because we were unable to capture extensive input from PCPs or adequate representation from RDNs and PCPs working with underserved and rural communities. Furthermore, given an unintended survey dissemination via social media, our results may not fully represent the breadth of perspectives of RDNs and PCPs practicing in Washington State. With research revealing the potential risks of weight stigma and weight-based discrimination, the manner in which health professionals approach weight and obesity has become increasingly dichotomized.[26] Relative to other areas of practice, our survey received strong participation from HAES-aligned clinicians and RDNs working in eating disorders. The use of the word "obesity" throughout this survey elicited a negative response from many participants, who noted the stigma associated with this terminology. It is possible that participants interpreted the wording of our survey to suggest that pediatric dental health providers would be approaching families from a lens of childhood obesity treatment rather than a lens of population-wide obesity prevention and health promotion. Therefore, this study does not offer insight on how RDNs and PCPs perceive dental involvement in nutrition and health conversations outside of the context of childhood obesity, and therefore cannot be used to provide guidance on appropriate nutrition recommendations for pediatric dental health providers seeking to engage in nutrition education or basic health promotion. Further research is needed to assess health care professional perceptions of dental conversations about nutrition, physical activity, screen time, and other forms of healthy lifestyle education that are not related to overweight and obesity.

CONCLUSION

Moving forward, there is a clear need for greater interprofessional education, training, and establishment of a shared conceptual model of childhood obesity prevention, as distinguished from weight-based interventions. Despite recognized limitations, this study may be the first to explore perceptions of conducting weight, nutrition, and health conversations in a pediatric dental setting amongst RDNs and PCPs. Our results suggest that there is widespread variation in how RDNs and PCPs perceive the utility and appropriateness of dental engagement, with emergent discrepancies across professional practice specialties. Given the increasingly recognized role of nutrition in systemic health coupled with the public health movement to integrate basic dietary counseling into more settings of care, a standardized framework for other health care professionals seeking to engage in basic nutrition conversations is warranted.[11,47] Based on our study findings, childhood obesity prevention efforts and health conversations should focus on healthy behaviors and should not include measurement or discussion of weight. This aligns with the true purpose of primary prevention, which is meant to hold relevance for all populations and is not selectively offered based on body size. Pediatric dental health providers seeking to participate in childhood obesity prevention should continue to offer advice related to avoidance of cariogenic food and beverages, which serves a dual purpose of obesity and caries prevention and also promotes better child health.[48] Broader conversations with general nutrition recommendations may be appropriate if related to oral health and offered consistently to all patients. As integral members of interprofessional teams in health care, education, and research, RDNs can play an active role to develop continuing education and training opportunities that facilitate best practices surrounding nutrition and healthy lifestyle conversations in dentistry and other health care settings.[33,49]

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APPENDICES

Appendix A: Supplemental Findings

Interprofessional Perceptions of Childhood Obesity Prevention in Dentistry
Supplemental Findings from the Pilot Study

The primary objective of this pilot study was to investigate how registered dietitian nutritionists (RDNs) perceive childhood obesity prevention efforts and general healthy lifestyle promotion in dentistry. A five-question semi-structured interview was utilized to achieve this purpose. Interview questions explored the perceived utility of measuring weight in general health care settings and initiating conversations about nutrition, lifestyle, and weight with families during routine dental visits. Further questions explored how healthy lifestyle promotion could be implemented positively and appropriately within a dental setting, as well as potential opportunities and barriers to increased interprofessional collaboration. All interviews were recorded and transcribed for thematic analysis. The interview data revealed themes about the utility and harms of weight measurements, suggested conversation content for dental professionals, and strategies for increased collaboration between dental and nutrition professionals. Themes, subthemes, and illustrative quotes are noted in Table 1, and each theme is detailed below. These themes provided the foundation for the development of the online survey in the primary analysis.

Supplemental Table 1. Themes and subthemes identified through semi-structured phone interviews with registered dietitian nutritionists practicing in four different clinics throughout the Puget Sound region of Washington State	
Weight Measurements Utility of weight measurements Potential harms	"Values on different body sizes & different weights [that] can cause a lot of internalized pain and weight stigma that can affect children well into adulthood." -RDN 8
Suggested Dental Conversation Content Oral health only Oral health and overlapping nutrition Oral health and basic health promotion	"Similar recommendations that are beneficial for oral health can definitely translate to general wellness and health." -RDN 6
Interprofessional Collaboration Opportunities Barriers	"Establishing a relationship with their dietitian or having one in their practice or just having a regular one they refer to who can do that messaging when it's necessary to go to the next step" -RDN 1

Weight Measurements

When asked about measuring weight in general health care settings, interviewed RDNs noted that weight measurement can be used as a tool to monitor growth over time. However, there were concerns about measuring weight to use it for the purpose of weight management or initiating health promotion. These concerns were expressed about weight measurement in both general health care settings and dental settings but concerns about the potential harms of weight measurement were more prominent in discussion about dentistry specifically.

Utility

Single weight measurements are not necessarily a valid indicator of child health. A series of weight measurements can be used to monitor a child's growth trajectory and track trends over time. This practice requires trained interpretation. Importantly, weight measurements should not be used for weight management in children.

Potential Harm

Measuring a child's weight may contribute to weight stigma, which may lead to avoidance of care in dentistry and other health care settings. Concerns about breaching dental scope of practice were prevalent, especially with regard to weight-related conversations.

Suggested Dental Conversation Content

Each RDN was asked to identify appropriate topics for nutrition and healthy lifestyle conversations in dentistry. Suggested conversation content varied considerably and was conceptualized on a continuum ranging from conversations related to oral health only to conversations about general health regardless of the relation to oral health. Three distinct levels of dental engagement were identified.

Oral Health Only

Conversations conducted in dental settings should only relate to oral health. If there is a connection between oral health and dietary habits, the conversation should center around aspects of dental care only. Examples of nutrition-related dental care might include recommending that patients rinse with water after consuming sugary beverages or foods.

Oral Health and Overlapping Nutrition

Conversations conducted in dental settings can include nutrition if there is a natural connection to oral health. The conversation should be primarily grounded in oral health but can include nutrition-related topics if relevant. Examples of this level of dental engagement include discussing cariogenic food/beverage choices and potentially offering broader nutrition recommendations for healthier alternatives.

Oral Health and Basic Health Promotion

Conversations conducted in dental settings may incorporate basic health promotion topics, such as dietary, physical activity, and screen time habits. Some registered dietitians felt that this level of dental engagement may include weight-related conversations if provided in the context of overall health rather than obesity.

Interprofessional Collaboration

Interviewed RDNs noted that they have limited contact with dental professionals but indicated that there may be an opportunity for coordination of care through the use of referrals. Other identified opportunities included informal collaboration through onsite visits and nutrition consultations. Several barriers were also noted. While coordinated care was recognized as a gold standard, the lack of colocation and referral mechanism limits the extent to which dental professionals can directly refer to RDNs. This "dental silo" may also hinder a mutual understanding of their scope of practice. Other identified barriers included lack of time, staff, and resources to incorporate childhood obesity prevention and health promotion efforts into routine dental visits.

Appendix B: Supplemental Survey

Online Provider Perception Survey from Primary Analysis

According to the *Delineation of Privileges* specified by the American Academy of Pediatric Dentistry, core pediatric dentistry practice may include preventive services such as dietary counseling. However, there is no formally defined scope of practice to the best of our knowledge. We are interested in understanding your opinion of how dental health providers might promote healthy lifestyles during pediatric dental visits.

What type of healthcare professional are you?
a. Dietitian
b. Provider (e.g. MD, PA, ARNP)
c. Nurse
d. Pharmacist
e. Other - Please specify

Which of the following best describes the patient population with whom you most frequently work?
a. General Adult
b. Pediatric
c. Eating Disorders
d. Weight Management
e. Other - Please specify

In which state do you currently practice?
[Open Response]

First, we want to learn about your practices,
Please rate the extent to which you agree with the following statements:
1a) *I believe that pediatric health care providers should identify children at risk for childhood obesity.*

1 - Completely Disagree 2- Somewhat disagree 3 - Neither agree nor disagree 4 - Somewhat agree 5 - Completely agree

[Open Response] - Please provide reasoning for your rating above.

1b) *In my practice, I consider weight to be an important indicator of overall child health.*

1 - Completely Disagree 2- Somewhat disagree 3 - Neither agree nor disagree 4 - Somewhat agree 5 - Completely agree

1c) *Weight measurement contributes to weight stigma in children.*

1 - Completely Disagree 2- Somewhat disagree 3 - Neither agree nor disagree 4 - Somewhat agree 5 - Completely agree

Next, we want your opinion on the potential scope of pediatric dental health providers initiating healthy lifestyle promotion with a patient or patient's family,

2) Currently, some pediatric dental health providers routinely measure weight and height for vital signs and/or medication dosing calculations. How comfortable would you be with this weight measurement being used as a screening tool to initiate healthy lifestyle promotion in a dental setting?

1 - Very Uncomfortable 2- Uncomfortable 3 - Neutral 4 - Somewhat Comfortable 5 - Completely Comfortable

3) Please rate the extent to which you agree with the following statements regarding pediatric dental practices:

3a) *I am comfortable with pediatric dental health providers initiating discussion of general healthy lifestyle practices with the patient or patient's family.*

1 - Completely Disagree 2- Somewhat disagree 3 - Neither agree nor disagree 4 - Somewhat agree 5 - Completely agree

3b) *I am comfortable with pediatric dental health providers initiating discussion of diet with the patient or patient's family.*

1 - Completely Disagree 2- Somewhat disagree 3 - Neither agree nor disagree 4 - Somewhat agree 5 - Completely agree

[Open Response] - Please provide reasoning for your rating above.

3c) *I am comfortable with pediatric dental health providers delivering nutrition advice during discussion with the patient or patient's family.*

1 - Completely Disagree 2- Somewhat disagree 3 - Neither agree nor disagree 4 - Somewhat agree 5 - Completely agree

[Open Response] - Please provide reasoning for your rating above.

3d) *I am comfortable with pediatric dental health providers initiating weight-related discussions with the patient or patient's family.*

1 - Completely Disagree 2- Somewhat disagree 3 - Neither agree nor disagree 4 - Somewhat agree 5 - Completely agree

3e) *I am comfortable with pediatric dental health providers engaging in weight-related discussions if it is initiated by the patient or patient's family.*

1 - Completely Disagree 2- Somewhat disagree 3 - Neither agree nor disagree 4 - Somewhat agree 5 - Completely agree

4) Please check all of the following topics that you would be comfortable with a pediatric dental health provider addressing with a patient or patient's family:
Please check all that apply

- Nutrition-related dental care
- Cariogenic food/beverage choices (i.e. sugar sweetened beverages)
- Cariogenic food/beverage choices and healthy alternatives
- General nutrition recommendations
- General nutrition and general healthy lifestyle recommendations
- Weight in the context of general health status
- None - I am not comfortable with dentists doing any of the above

5) To what extent do you think that initiating healthy lifestyle promotion falls within pediatric dental scope of practice?

1 - Outside dental scope 2- Within dental scope when related to oral health 3 - Within dental scope regardless of relation to oral health

[Open Response] Please provide reasoning for your rating above.

6) What, if anything, could increase your level of support of pediatric dental health providers initiating healthy lifestyle promotion with a patient or patient's family?
Please check all that apply

a. Nothing; it is not appropriate for dental health providers to initiate healthy lifestyle promotion with a patient or patient's family
b. Continuing education for dental health providers
c. Interprofessional training sessions for dental health providers
d. I am comfortable without additional education, workshops, or training
e. Other (free text response)