

Assessing attitudes and actions of pediatric dentists toward childhood obesity and sugar-sweetened beverages

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Keywords

dentists; pediatrics; dentists; pediatric; obesity; child; patient; nutrition; attitudes; dietary sugars; early intervention (education).

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Received: 1/23/2017; accepted: 6/23/2017.

doi: 10.1111/jphd.12240

Journal of Public Health Dentistry 77 (2017) 579–587

Abstract

Objectives: Childhood obesity is a major US health concern, and oral health professionals have opportunities to participate in an interprofessional effort to intervene owing to their access to young patients and their abilities in addressing obesity-related dietary habits like consumption of sugar-sweetened beverages (SSBs). This study determined attitudes, behaviors, future intentions, and perceived barriers of pediatric dentists regarding efforts to prevent childhood obesity and reduce children's consumption of SSBs.

Methods: The American Academy of Pediatric Dentistry conducted an online electronic survey with a convenience sample of approximately 7,450 pediatric dentists and pediatric dental residents during spring 2016.

Results: Over 17 percent of pediatric dentists offer childhood obesity interventions. Of those not providing interventions, 67 percent were interested in offering obesity-prevention services. Nearly 94 percent of pediatric dentists offer information or other interventions on consumption of SSBs. Statistically significant barriers to providing healthy weight interventions were fear of offending parents, appearing judgmental, or creating parent dissatisfaction and a lack of parental acceptance of guidance about weight management from a dentist. Significant barriers to SSB interventions were sufficient time and health professional education.

Conclusions: More pediatric dentists stated they offer childhood obesity interventions than in previous surveys reporting 6 percent, but respondents suggested that a child's weight is seen as a medical rather than dental issue. Most pediatric dentists provide interventions related to consumption of SSBs, perceiving the issue as integral to their care of children.

Introduction

Childhood obesity has reached epidemic proportions among US children, evident even in young children. In 2011–2012, 32 percent of children and adolescents ages 2–18 were either overweight or obese, and 8 percent of infants and toddlers had high weight for recumbent length (1). Results of childhood obesity go beyond psychological and social burdens to include such health risk factors as high blood pressure, high cholesterol, and pre-diabetes (2). Further, the health complications of obesity do not stay in childhood. About 6 in 10 children and adolescents who are overweight develop into overweight or obese adults (3).

Increased obesity rates in children parallel increased sugar consumption. A common source of excess sugar comes from

sugar-sweetened beverages (SSBs) (4). In fact, SSBs are the single largest category of caloric intake in children ages 2–18, providing nearly one-quarter of empty calories in their average daily diet (5). The high consumption rate of SSBs is a key contributor to the obesity epidemic (4).

Along with its contribution to obesity, sugar consumption has been associated with caries development (6). According to the American Academy of Pediatric Dentistry (AAPD), frequent consumption of sugar-containing drinks (such as infant formula, juice, and soda) increases the risk of caries, and oral health professionals are encouraged to provide nutrition education in conjunction with other preventive services (7). Oral health professionals, because of their frequent contact with child patients and their educational foundation to address nutritional habits, are in a prime position

to screen for weight-related risk factors of SSB consumption and promote healthy weight in children.

Behaviors and intentions

Many pediatric dentists, general dentists, and dental hygienists offer nutrition education related to caries prevention, but few provide weight-related screening and nutrition education. In a national survey of general and pediatric dentists, about 50 percent of the respondents expressed an interest in offering obesity-related services, yet only approximately 3 percent of general dentists and 6 percent of pediatric dentists provided obesity-related interventions (8). In a related survey of pediatric dentists, nearly 70 percent reported offering caries-related nutrition education (9).

A study of North Carolina pediatric dentists found that, although more than half saw the dental office as a venue for nutrition education, only 7 percent felt comfortable discussing weight-related issues (10). In an earlier study, 80 percent of North Carolina pediatric dentists stated they provided nutrition education to parents or other caregivers of infant and toddlers, and more than 70 percent routinely asked about contents of bottles and frequency of juice consumption (11). Fifty percent of North Carolina dental hygienists reported that they are likely or extremely likely to offer nutrition education, but 80 percent said body mass index (BMI) of patients is not discussed during a dental visit (12).

Existing studies offer solid information regarding the current practices and interests of oral health professionals in providing weight- and nutrition-related interventions, but do not address services explicitly related to SSBs. Further, research differs in analysis of specific types of interventions related to obesity and nutrition.

Dental attitudes

Current literature suggests that there is generally support among oral health professionals for playing a role in the prevention of obesity and that their attitudes about this role are associated with provision of weight-related services (9). Specific to nutrition education, 56 percent of pediatric dentists agreed that parents should be able to receive nutrition education in a dental setting (10). In a national survey of the willingness of practicing general dentists to conduct medical-related screenings, Greenberg found the majority of respondents were willing to conduct screenings or refer a patient for medical consultation, but only about half were willing to measure height and weight, take blood or saliva samples, or send samples for laboratory testing (13). Cordero-Ricardo found similar patterns in pediatric dental practices. Survey respondents were more likely to do screenings, particularly if findings proved useful in care of the child. As interventions became more complex, the frequency of participation declined (14).

Parent attitudes

In a survey of pediatric dentists regarding perceived parent attitudes, 74 percent believed parents would be receptive to nutrition education in dental settings, while 54 percent thought parents would be receptive to obesity education (10). Lee *et al.* found dentists who provided only caries-related education were far more likely to worry about offending or appearing judgmental of the patient or parent than those who provided both caries- and weight-related education (9). In research with North Carolina pediatric dentists, the most prevalent perceived barriers for nutrition education to parents of infants and toddlers were a lack of parental interest and perceived difficulty in changing dietary behaviors (11).

Existing research holds that oral health professionals consider the potential to offend parents as a decisive barrier to offering weight-related education. However, according to a pilot study of healthy weight interventions for children in a dental setting, 96 percent of the parents and other caregivers thought the dental office was a good place to get information on healthy eating and exercise, and 88 percent said it was a good place to get a child's height and weight measured (15). A qualitative investigation by Swinney *et al.* lends additional support for potentially positive perceptions of parents and caregivers about weight- and nutrition education in a dental office setting (16).

Perceived control factors

Research supports that oral health professionals perceive childhood obesity as a significant health problem, but barriers hinder provision of interventions related to healthy weight, nutrition, and consumption of SSBs. Decisive perceived barriers to obesity interventions include a lack of knowledge about obesity and/or weight-loss education, lack of trained personnel, and insufficient time in the daily schedule (9). In a similar vein, dental hygienists reported the most frequently significant barriers to obesity-related education were lack of education on the topic, scheduling limitations, patient objections to additional fees, and lack of reimbursement from third-party payers (12).

The two most significant perceived barriers to nutrition-related interventions were lack of trained staff and lack of nutritional knowledge. Additional perceived barriers consisted of lack of time, lack of patient interest, inadequate reimbursement rates, and inability to charge for services (10). Current literature contains additional studies of pediatric dentists, general dentists, and dental hygienists regarding perceived barriers to obesity and nutrition education but does not address barriers unique to interventions about consumption of SSBs with parents and other caregivers of child patients (8,11,17,18).

Research questions

We were interested in these research questions:

1. What are current behaviors of pediatric dentists regarding provision of information and other interventions about healthy weight and consumption of SSBs to parents?
2. Among those not currently doing so, what is the level of interest or intention of pediatric dentists regarding providing interventions about healthy weight and the consumption of SSBs to parents?
3. What are the attitudes of pediatric dentists regarding provision of information and other interventions about healthy weight and consumption of SSBs to parents?
4. What are major barriers perceived by pediatric dentists regarding interventions about healthy weight and consumption of SSBs?
5. What factors would encourage pediatric dentists to provide healthy weight information and other interventions to parents?

Methods

Theoretical framework

The Theory of Planned Behavior (TPB) served as the theoretical framework for the survey (19). The TPB, which has been shown to accurately predict intentions to perform health behaviors, proposes that intentions and subsequent behaviors are guided by three independent determining factors: attitudes, subjective norms, and perceived behavioral control (20-22). Attitude factors refer to the degree of favorable or unfavorable evaluations of the behavior in question. Subjective norms are salient beliefs about the expectations of other people, such as patients' parents, dental colleagues, or the research community. Perceived behavioral control refers to factors influencing the perceived ease or difficulty of performing the behavior (23). The more positive the attitudes and subjective norms, and the greater the perceived behavioral control, the stronger the intention to perform the behavior (23).

Survey development

The survey was designed using items from existing surveys as often as possible. It featured a comprehensive list of potential interventions compiled from previously mentioned research, as well as additional relevant resources within dentistry (24-27). To extend the survey choices of possible weight- or nutrition-related services, interventions were also drawn from pediatrics, behavioral medicine, nutrition, and weight management (28-31). Since the majority of these studies employed Likert Scales, we followed the format to strengthen comparisons with previous research.

Following initial survey development, representatives from the National Maternal and Child Oral Health Resource Center, the American Dental Association, the American Dental Hygienists' Association, and the Santa Fe Group reviewed the survey for clarity, length, and relevance to the research area of interest. The study was reviewed and approved by the Robert Wood Johnson Foundation and the Institutional Review Board of Nationwide Children's Hospital, Columbus, OH.

Subject selection

A convenience sample of 6,400 pediatric dentists and 1,050 pediatric dental residents from across the United States in the AAPD membership database was recruited via e-mail and other electronic media outlets. (The sample of AAPD members represents over 90 percent of US practicing pediatric dentists.)

Procedure

In May 2016, AAPD sent the selected sample a personalized e-mail with a link to the survey. The e-mail described the survey's purpose and contained assurances of anonymity. If pediatric dentists chose to participate, they clicked on an Internet link in the message that directed them to the website hosted by an external company (SurveyMonkey) where they could complete the questionnaire. The site began with a consent form; participants clicked on the "I agree" consent button to acquire access to the survey.

Respondents were given 15 working days to complete the survey. Two reminder e-mails were sent, 2 weeks and 1 week before the submission deadline. In addition, an invitation to participate in the survey with the survey link was sent in three AAPD membership e-blasts during May. Survey reminders were posted on the AAPD members-only Facebook page.

For this exploratory study, statistical analyses were descriptive in nature and included standard statistics and frequency analyses. All analyses were performed using IBM SPSS Statistics (Version 20.0).

Results

Respondent demographics

From 7,450 subjects, AAPD received 1,615 responses, or a 22 percent response rate. Survey respondents were evenly divided between genders with a wide representation of ages and number of years in practice (Table 1). The most common employment situation reported was sole proprietorship of private practice in suburban locations. The respondents shared demographic characteristics of the general AAPD membership, except they tended to be younger and were more likely to be employees rather than sole owners or partners in private pediatric dental practices.

Table 1 Demographic Characteristics ($n = 1,108$)

	Response percent
Practice Location	
Urban	36
Suburban	55
Rural	13
Practice type	
Private practice	78
Academia/research	13
Public health/community clinic	8
Hospital-based clinic	11
Government	2
Corporate	3
Current employment situation	
Sole proprietor – the only owner	37
Partner – two or more owners	23
Employee	34
Independent contractor	10
Number of years practicing pediatric dentistry	
Less than 8 years	35
8-21 years	29
More than 21 years	37
Age	
Under age 30	6
Ages 30-44	45
Ages 45-59	28
Ages 60 and over	22
Gender	
Female	53
Male	47
Prefer not to say	1
Self-described weight status	
Overweight	17
Appropriate weight	78
Underweight	3
Prefer not to say	2

Behaviors and intentions

Seventeen percent of respondents ($n = 1,211$) offered childhood obesity information or other healthy weight interventions in their practices. Rated on a 1-5 scale (1 = Never, 3 = Sometimes, 5 = Always), services offered most frequently

were charting if a child showed signs of obesity (4.10), weighing patients and measuring height (3.71), and talking to parents if a child appeared overweight or obese (3.64). Services least likely to be provided were a self-administered screening tool to parents on childhood obesity (1.61), follow-up on interventions (1.81), and motivational interviewing or another behavior-modification program on weight management (2.72) (Table 2).

Of those not offering obesity interventions, 67 percent ($n = 1,096$) said they were interested in establishing a plan to advise parents on healthy weight goals for children. Intervention methods they would most consider using in order of preference were providing educational materials on childhood obesity (77 percent), noting signs of overweight or obesity in the patient record (74 percent), weighing children and measuring height (72 percent), offering referral for children identified as overweight or obese (70 percent), calculating a BMI score for children ages 2 and older (61 percent), providing parents with a self-administered screening tool (58 percent), talking to parents if a child shows signs of being overweight or obese (54 percent), and offering weight-related nutrition education in the practice (31 percent) (Table 2).

Comparing the responses of pediatric dentists who currently offer childhood obesity interventions to those who do not, preferences for types of interventions were similar, except for talking to parents. Pediatric dentists who offered obesity-related services more frequently communicated with parents about their observations; pediatric dentists who did not offer the services placed obesity-related conversations with parents far down on their lists of potential interventions.

Results demonstrated few significant differences in demographics of pediatric dentists offering childhood obesity information and other interventions. However, pediatric dentists practicing in suburban areas were less likely to offer obesity-related services ($n = 580$; 12 percent) than those in rural ($n = 123$; 22 percent) or urban ($n = 398$; 20 percent) settings.

Nearly 94 percent ($n = 1,202$) of responding pediatric dentists offer information or other interventions on consumption of SSBs. Of those not currently providing interventions,

Table 2 Obesity Intervention Methods Currently Performed. (Rating Average for Always 5, Sometimes 3, Never 1; $n = 1,211$.) If Not Performed, Would Considered Using. Mark All That Apply. (Response Percent; $n = 1,096$)

Answer options	Rating average	Response percent
Document signs of being overweight or obese in the child's chart	4.10	74
Weigh children and measure height	3.71	72
Talk to parents about observations if a child shows signs of being overweight or obese	3.64	54
Provide educational materials on childhood obesity	2.92	77
Offer a referral for children identified as overweight or obese	2.85	70
Calculate and interpret a BMI score for children ages 2 and older	2.75	61
Offer weight-related motivational interviewing or other behavior-modification programs in my practice	2.72	31
Follow up on interventions with additional contact	1.81	19
Provide parents with a self-administered screening tool for childhood obesity	1.61	58

Table 3 Intervention Methods for SSB Consumption Currently Performed. (Rating Average for Always 5, Sometimes 3, Never 1; $n = 1,202$). If Not Performed, Would Considered Using. Mark All That Apply. (Response Percent; $n = 470$)

Answer options	Rating average	Response percent
Talk to parents about my observations if a child shows signs of high risk for caries	4.86	93
Note signs of high caries risk in the child's chart	4.80	92
Provide educational materials on SSBs	3.78	94
Offer motivational interviewing or other behavior-modification programs about the consumption of SSBs in my practice	3.59	59
Provide parents with a self-administered screening tool for consumption of SSBs	2.09	72
Offer a referral to a dietitian or nutritionist for children who have high consumption of SSBs	1.55	58
Follow up on interventions with additional contact	1.42	33

93 percent ($n = 470$) reported interest in establishing a plan to advise parents about prudent SSB consumption. Services most likely to be provided were talking to parents about SSBs if a child is at risk for caries, noting caries-risk status in the patient record, and providing educational materials on consumption of SSBs. Services offered less frequently were a self-administered screening tool to parents and referral to a dietitian or nutritionist (Table 3). Analyses showed no significant demographic differences between pediatric dentists offering interventions on SSBs and those not offering them.

Pediatric dental attitudes

The majority of pediatric dentists (73 percent) agreed or strongly agreed that they have a role in helping children maintain a healthy weight. However, less than half (47 percent) expressed willingness to discuss childhood obesity with parents. Pediatric dentists offering childhood obesity interventions were more likely to believe that dentists have a role in helping children achieve healthy weight and were more willing to discuss childhood obesity issues without parents initiating the conversation ($n = 1,275$; $P < 0.0001$). A clearer clinical link between obesity and oral disease would shift the balance significantly toward pediatric dentists (88 percent) being interested in advising parents about weight management.

When the same set of queries were applied to SSBs, the vast majority of pediatric dentists (98 percent) agreed on their role of helping children have prudent consumption of SSBs, and a similar substantial number (98 percent) expressed willingness to discuss SSB consumption with parents. Comparable to the significant relationships found in obesity interventions, pediatric dentists who currently offer interventions about SSBs

were more likely to believe that dentists have a role in helping children have prudent consumption of SSBs ($n = 1,275$; $P = 0.0003$) and more willing to discuss SSB habits without parents initiating the conversation ($n = 1,275$; $P < 0.0001$).

Perceived parent attitudes

Pediatric dentists' behaviors closely echoed their beliefs about parent expectations in terms of providing services on healthy weight management. Pediatric dentists who provide healthy weight interventions agreed that parents are receptive to obesity education in dental offices, think it is important for dentists to screen for obesity, and would consider the dentist more credible ($n = 1,223$; all P -values < 0.0001).

Pediatric dentists specified distinct differences between parents' attitudes about obesity and SSB interventions. Only 14 percent agreed that parents are receptive to obesity education in the dental office, while 81 percent think parents are receptive to advice about SSB consumption. Just 7 percent agreed that parents think it is important for dentists to screen children for obesity, yet 84 percent agreed parents think it important for dentists to provide SSB education. In terms of building credibility, 21 percent of pediatric dentists thought screening for obesity would make them appear more professional/knowledgeable, and 72 percent agreed that SSB advice would increase their professional standing with parents.

The subjective norms of pediatric dentists showed a match between perceived parent attitudes and actual parent behavior. Only 9 percent ($n = 1,218$) of the pediatric dentists surveyed had been asked for advice from parents about obesity and maintaining a healthy weight for their child, while 85 percent ($n = 1,222$) had been asked for advice about SSBs. Further, the relationship between offering childhood obesity interventions and being asked about obesity by parents was highly significant ($P < 0.0001$), as was the relationship between offering SSB information and getting questions about the topic from parents ($P < 0.0002$).

The perspective of pediatric dentists about parent-related barriers ($n = 1,139$) had an equally powerful effect on offering obesity interventions. A statistically significant correlation was found between provision of obesity interventions and fear of offending parents, appearing judgmental, or creating parent dissatisfaction and a lack of parental acceptance of advice about weight management from a dentist. In fact, concerns about parent reactions to weight management interventions were chief barriers to offering obesity-related education (Table 4).

Parent acceptance of advice about consumption of SSBs was rated a less serious barrier by pediatric dentists. Over three-quarters of respondents ($n = 1,118$) deemed offending parents, appearing judgmental of parents or patients, and/or a lack of parental acceptance of advice about nutrition from a

Table 4 Barriers to Providing Healthy Weight Interventions (*n* = 1,139)

	Rating average	Chi-square
Lack of parental motivation	4.17	0.250
Lack of parental acceptance of advice about weight management from a dentist	4.15	0.0004
Fear of appearing judgmental of parents and/or child patients	4.14	<0.0001
Fear of offending parents	4.10	<0.0001
May create parent dissatisfaction with my practice	3.62	<0.0001
Lack of time in the daily clinical schedule	3.57	0.0005
Lack of trained personnel in my office to perform this service	3.54	<0.0001
Lack of personal knowledge or training about childhood obesity	3.20	<0.0001
Lack of knowledge about how to start the conversation	3.15	<0.0001
Lack of reimbursement from third-party payers	3.00	0.222
Lack of appropriate referral options	2.99	0.443
No additional fees charged to parents for the services	2.85	0.316
Lack of available patient-education materials on childhood obesity	2.82	0.058
Dietary recommendations about childhood obesity are ambiguous and/or confusing	2.66	0.026
Concern over legal risks	2.52	0.143
Lack of training in communication skills	2.44	<0.0001
May be seen by state dental board as practicing medicine	2.16	0.103

dentist as minor or no barrier to offering information or other interventions about the consumption of SSBs (Table 5).

Perceived control factors

Along with beliefs about parent attitudes, respondents were asked about other factors affecting ease or difficulty of performing obesity and SSB interventions. The most significant additional barriers to obesity education in order of importance were lack of time in the daily clinical schedule, lack of trained personnel, lack of personal knowledge or training about childhood obesity/weight education, lack of knowledge about how to start the conversation, lack of reimbursement from third-party payers, and lack of appropriate referral options. A statistically significant relationship was found between the provision of obesity interventions and ambiguous

dietary recommendations about obesity, a lack of time in the daily clinical schedule, lack of personal knowledge or trained personnel, and lack of communication training or knowledge about how to start the conversation (Table 4).

While it is valuable to know the barriers to providing obesity education, equally consequential are factors that might encourage the provision of interventions. Pediatric dentists (*n* = 1,092) chose the following incentives for obesity education, listed in order of response rate: more possible approaches that add little or no time to a dental visit, more parents asking for information about childhood obesity, more continuing education on childhood obesity, clearer clinical guidelines on nutrition and obesity, stronger clinical evidence of a link between childhood obesity and oral disease, more courses on childhood obesity for dental staff, increased

Table 5 Barriers to Providing SSB Interventions (*n* = 1,118)

	Rating average	Chi-square
Lack of parental motivation	3.26	0.070
Lack of parental acceptance of advice about nutrition from a dentist	2.38	0.005
Fear of appearing judgmental of parents and/or child patients	2.16	0.089
Lack of reimbursement from third-party payers	2.13	0.001
Lack of appropriate referral options	2.12	0.126
Not enough time in the daily clinical schedule	2.09	<0.0001
No additional fees charged to parents for the services	2.01	0.013
Fear of offending parents	2.00	0.019
May create parent dissatisfaction with my practice	1.96	0.017
Lack of trained personnel in my office to perform this service	1.87	<0.0001
Lack of available patient-education materials on consumption of SSBs	1.83	<0.0001
Lack of knowledge about how to start the conversation	1.65	<0.0001
Concern over legal risks	1.56	0.041
Lack of training in communication skills	1.56	<0.0001
Lack of personal knowledge/training about the consumption of SSBs	1.52	<0.0001
May be seen by state dental board as practicing medicine	1.45	0.024

availability of patient education materials on childhood obesity, and increased credibility and satisfaction from parents of patients.

Barriers to SSB education for respondents ($n = 1,118$) included lack of reimbursement from third-party payers, lack of appropriate referral options, not enough time in the daily clinical schedule, no additional fees charged to parents for the additional services, lack of trained personnel, and lack of available patient education materials on consumption of SSBs. Statistically significant relationships between barriers and provision of SSB interventions were focused on issues of education and time, including a lack of personal knowledge about SSB consumption, lack of training in communication skills and how to start the conversation, shortages of trained personnel, and minimal time in the daily clinical schedule (Table 5).

Discussion

This study investigated research questions related to both obesity and SSBs in pediatric dental practice, specifically pediatric dentists' current practices and intentions related to providing interventions, attitudes about behaviors, beliefs about parent perceptions, and barriers to addressing the issues. The study design offered a snapshot of the pediatric dentist respondents in terms of two professional issues – one perceived as integral to pediatric dental practice (SSBs) and the other considered interprofessional practice and peripheral to the primary role of the pediatric dentist (obesity). Survey items were structured to offer a profile of pediatric dentists' approaches in both areas, which in comparison might shed light on the direction and extent of solutions to move obesity management more into mainstream pediatric dental practice.

A comparison of respondent pool demographics with AAPD membership data suggests that those answering the questionnaire were in most ways similar to the pediatric dentist workforce, but younger and more likely to be employees. These findings indicate that obesity interventions might be moved into a more prominent position in pediatric dental practice by working with employers in private, public, and corporate settings. The overall lack of significant differences between most survey items and the demographic characteristics of respondents is both good and bad news. Consistency of responses suggests that endeavors to change practice patterns may be geared to the corps of pediatric dentists, with little necessity for individualization. Conversely, the consistency also suggests that inertia or resistance to change may be formidable, requiring more than motivation or education, as well as necessitating efforts aimed not just at the oral health profession but also at the populations it serves.

More pediatric dentists stated they currently offer childhood obesity information or other healthy weight interventions than in previous surveys – 17 percent, compared to 6

percent in 2010 (8). This increase could be attributed to greater attention to and concern about the issue of childhood obesity or could be a reflection of self-selection by respondents. Although results suggest a step forward in obesity-related interventions, the preferred methods were chosen more for simplicity and speed (providing educational materials on childhood obesity and noting signs of overweight or obesity in the patient chart) rather than proven effectiveness (offering such weight-related counseling as motivational interviewing or behavior modification). Follow-up contact with patients to see the effects of interventions was almost nonexistent. Previous studies in dentistry related to interprofessional practices found similar patterns (13,14). Simple screenings considered valuable to the oral health care of children were performed far more frequently than complex procedures outside the pediatric dental practice routine, such as taking blood or saliva samples or administering questionnaires.

In general, pediatric dentists agreed with the importance of healthy weight in a child's life and were willing to perform basic data collection to identify a problem. From that point of intervention, providers' willingness to address weight management diminished considerably. Pediatric dentists' willingness to address consumption of SSBs was in stark contrast to the vast majority (94 percent) providing information and interventions about consumption of SSBs. They did not hesitate to reach out to parents and help seek solutions to control intake of SSBs, viewing the issue as integral to their practice and care of children. In view of the findings that SSBs are a primary contributor to childhood obesity (4), education about the judicious consumption of SSBs by oral health professionals is poised as a powerful action to promote healthy weight in children.

Interventions on weight management and SSB consumption provided by pediatric dentists were strongly influenced by perceptions of parental preferences and expectations. Few agreed that parents think it is important for dentists to screen children for obesity or would be receptive to obesity education in the dental office, while the majority agreed that parents think it is important for dentists to provide education about SSBs and would be receptive to advice. Further, few found negative reactions from parents as barriers to offering interventions about consumption of SSBs, while such concerns as offending the parent, appearing judgmental, and creating parent dissatisfaction were the chief barriers to offering obesity-related education.

Since relationships between offering childhood obesity or SSB interventions and being asked about the topics by parents were highly significant, pediatric dentists might engage parents in shared decision-making rather than in unilateral "doctor knows best" posture, recognizing that parent involvement in decisions makes a strong, enduring difference. Our responses also suggest that pediatric dental interventions

are propelled by market forces. When seeking strategies to increase obesity and SSB interventions, targeting parent attitudes about receiving healthy weight information from oral health professionals would impact provision of those services. Unfortunately, a consumer campaign of this nature would require substantial resources and long-term commitment.

In addition to parental influence, primary barriers to providing interventions focused on time, training, and ambiguous dietary recommendations. Pediatric dentists pointed to a lack of time as a barrier for both obesity- and SSB-related interventions. Previous research demonstrates the value of education and training of oral health professionals, evidenced by a significant relationship between obesity-related training and a higher prevalence of both weight- and caries-related education (9). Of particular interest in this study is the emphasis not only on a lack of personal knowledge or training about healthy weight education by the pediatric dentists in the study, but a corresponding lack of knowledge about how to start the conversation. Perceived barriers of time and training suggest lower levels of priority for obesity and nutrition counseling in pediatric dental settings, since time is found and education pursued for issues seen as crucial to patient care.

Although continuing education courses on weight- and nutrition-related topics exist, they are not considered mainstream continuing education and are not always oriented to the issues identified by our respondents as barriers to the provision of weight interventions. Dental education contains little instruction on nutrition, and most advanced education is directed at the caries paradigm in both health and pediatric systemic disease.

Ironically, factors given by pediatric dentists about steps to increase provision of healthy weight information to parents were eerily similar to those given by physicians on incorporating oral health into the well-child visit (32,33). Reluctance of primary care health professionals to perform oral health procedures is often reported to be the result of deviating from the well-child medical visit pattern, adding time to the visit, or preventing the physician from completion of procedures they or the parents believe are more critical to general health.

The clear dichotomy between the incorporation of SSBs into pediatric dental practice and the low penetration of healthy weight interventions may be a manifestation of the belief by pediatric dentists that weight-management services are not related to their primary care mission. Current research is equivocal on the obesity-caries link, so a challenge exists to make healthy weight considerations a part of pediatric dental practice. The literature on oral health care of obese children identifies increased risks and additional management considerations, yet it appears from this study's results that the majority of pediatric dentists still see weight as a medical rather than dental issue.

Study shortcomings

The primary shortcomings of this study are its limited sample size and the possible self-selection bias based on interest and experience with childhood obesity and consumption of SSBs. The study is also hampered by relying on self-reported rather than observed behaviors. Many children are seen by general dentists and dental hygienists who play a crucial role in parent education and other preventive interventions. Thus, additional research with those providers, especially regarding SSB interventions, would be elucidating in terms of oral health education for US children.

Conclusions

This survey showed that healthy weight interventions are on the rise, and interventions on prudent consumption of SSBs are offered by almost all pediatric dental practices. The availability of these services is strongly parent-driven. To encourage more availability, pediatric dentists point to more possible interventions that add little or no time to a dental visit, more continuing education courses on childhood obesity, clearer clinical guidelines on nutrition and obesity, and an increased selection of courses on childhood obesity for oral health staff.

Vann *et al.* challenged all pediatric dentists to join the battle against childhood obesity. They state, "As members of the pediatric health team, we have an obligation to do so. As clinicians in frequent contact with children and parents, we have the perfect opportunity" (34). Enhanced participation by pediatric dentists and their teams in providing interventions on healthy weight and prudent consumption of SSBs will encourage not only better oral health but also better general health and well-being in children.

Acknowledgment

Support for this article was provided by the Robert Wood Johnson Foundation. The views expressed here do not necessarily reflect the views of the Foundation.

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