A scoping review of skills and tools oral health professionals need to engage children and parents in dietary changes to prevent childhood obesity and consumption of sugar-sweetened beverages

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Abstract

Objectives: Increased consumption of sugar-sweetened beverages (SSBs) has been linked to obesity. Obesity now affects one in six children in the United States. The purpose of this scoping review is to identify and review published studies that discuss skills and tools oral health professionals can use with children (under age 12) and their parents to encourage dietary changes to aid in preventing childhood obesity and reducing consumption of SSBs.
Methods: Key search terms were identified and used to examine selected databases via PubMed, EMBASE, CINAHL, and Cochrane Database of Systematic Reviews. A total of 637 records were identified. After duplicates were removed and records were screened for eligibility, 33 remained. Six met established inclusion/exclusion criteria and were included in the review.
Results: Only two full-text articles included dental-office-based weight interventions. Patient response to education on healthy habits and weight maintenance in the dental setting was favorable. Literature supports oral health professionals expanding their role in health care delivery by offering nutrition and physical activity recommendations to prevent and/or reduce chronic disease. Active listening and motivational interviewing were techniques identified to promote beneficial lifestyle changes.
Conclusions: There is limited research on behavior modification tools and skills that have been effectively implemented in the dental setting to decrease risk of obesity. Oral health professionals are uniquely positioned to address consumption of SSBs and promote positive dietary habits for improved weight management. Future studies are needed to identify effective techniques that techniques that oral health professionals can integrate into preventive patient care.

Introduction

Childhood obesity prevalence in children and adolescents ages 2–19 in the United States was 17 percent in 2011–2014, with the prevalence of morbid obesity being 5.8 percent during the same time period (1). The etiology of childhood obesity is multifactorial and complex, influenced by families' knowledge, values, habits, and beliefs; quality of school lunches, children's access to fresh fruits and vegetables, and the safety of the environment where children can participate in physical activity. Although changes in many of these determinants require major societal and policy shifts, children's eating behaviors, especially as influenced by parents' or caregivers' feeding practices, are modifiable risk factors for overweight and obesity, especially in the first years of life (2). One of these modifiable risk factors is children's intake of added sugars in sugar-sweetened beverages (SSBs) which has been

shown to increase the odds ratio of being overweight and obese by 1.55 and is a determinant of body weight (3). In addition to having implications for obesity, consumption of added sugars at levels above 10 percent of energy also increased risk for dental caries at age 12 (4). The World Health Organization and the U.S. Department of Agriculture's 2015–2020 *Dietary Guidelines for Americans* recommends an energy intake of $\leq$10 percent from added sugars; however, systematic reviews suggest the intake must be $<$5 percent to lower caries risk (5-8).

The emerging association between obesity and oral health presents an opportunity for oral health professionals to engage with interprofessional teams in prevention and management of this significant public health problem. The American Dental Association (ADA), the American Association of Pediatric Dentistry (AAPD), and the American Dental Hygienists' Association (ADHA) all have policies related to encouraging healthy food choices that follow national guidelines to reduce consumption of added sugars, especially those found in SSBs such as soft drinks, sports drinks, and energy drinks (9-11), however, the literature related to implementing these policies is lacking. Existing literature is largely survey research of oral health professionals regarding attitudes, knowledge, and beliefs about addressing obesity in the dental setting.

The purpose of this scoping review is to identify and review published studies that discuss skills and tools oral health professionals can use with children (under age 12) and their parents to encourage dietary changes to aid in the prevention of childhood obesity and reduced consumption of SSBs.

Methods

Scoping review methodology was used to examine the breadth and depth of the literature related to the topic of interest, as well as gaps. The PRISMA (Preferred Reporting Items of Systematic reviews and Meta-Analyses) statement was used to guide the search and review process (12) (Figure 1). Key search terms were developed with the assistance of an academic librarian and were used to examine selected electronic databases: PubMed, EMBASE, CINAHL, and the Cochrane Database of Systematic Reviews. MeSH headings included health professional terms: "dentist(s)," "dental hygienist(s)," "oral health professionals," "oral health care professionals," and "pediatric dentist." Action/skills and methodology search terms included "counseling skills," "counseling tools," "motivational interviewing," "behavior modification," "communication skills," "counseling," "health coaching," and "advise and counsel." Topic search terms included "dentist healthy lifestyle," "prevention OR reduction AND obesity," "nutrition," "sugar-sweetened beverages AND consumption," and "behavior change AND food habits." Population terms included "child" OR "children" OR "parent(s)" OR "family(ies)" OR "toddler(s)" OR "pre-teen(s)."

Publications included in this review were limited to those addressing both childhood obesity and SSB consumption in the dental setting. The initial search using MeSH headings yielded 582 records. A second search using terms more specific to the study question narrowed findings to 26 records, with 4 more identified by authors during their review, for a total of 30. A third search of peripheral studies identified an additional 25 records, increasing the combined record count to 637. After duplicate and extraneous records were removed, 57 remained. Two authors independently reviewed the abstracts of 57 research and non-research materials obtained from the electronic database searches, using the established inclusion criteria to determine their relevance. Eighteen records were excluded based on irrelevant titles. The full-text articles of 39 records were appraised for eligibility. Of those, 33 were excluded because both obesity *and* skills or tools used by oral health professionals to prevent childhood obesity and/or methods to address SSB consumption were not mentioned or specifically identified. Based on this established exclusion criteria, the review was limited to only six articles. (Table 1).

Results

Tavares and Chomitz assessed the feasibility of a dental-office-based weight intervention protocol for children and adolescents based on motivational interviewing (MI). This 18-month pilot study included children and adolescents aged 6–13 (13). Literature supports weight screening as an essential component of comprehensive care in dentistry (19). Through a Healthy Weight Intervention (HWI), consumption of sugar in beverages, and key recommendations related to caries risk and prevention of obesity were addressed over of series of two to three visits with a dental hygienist. The authors emphasized that good dietary habits are necessary to help maintain both oral health and general health and should be included as part of routine preventive care (13). One of the recommended behavioral strategies was consumption of less low-nutritive foods such as SSBs. At each visit, a dental hygienist collected information about obesity risk factors related to food, exercise, screen time, and meal habits to create a report customized with recommendations for healthy behavior change (13). If a child had a body mass index (BMI) greater than or equal to 85 percent, he or she was referred to a physician. Outcomes observed during the study included the extent to which children and caregivers adopted the dental hygienist's recommendations, followed through with any referrals, and met behavior-change goals. After counseling was provided by the dental hygienist, 95 percent of caregivers reported

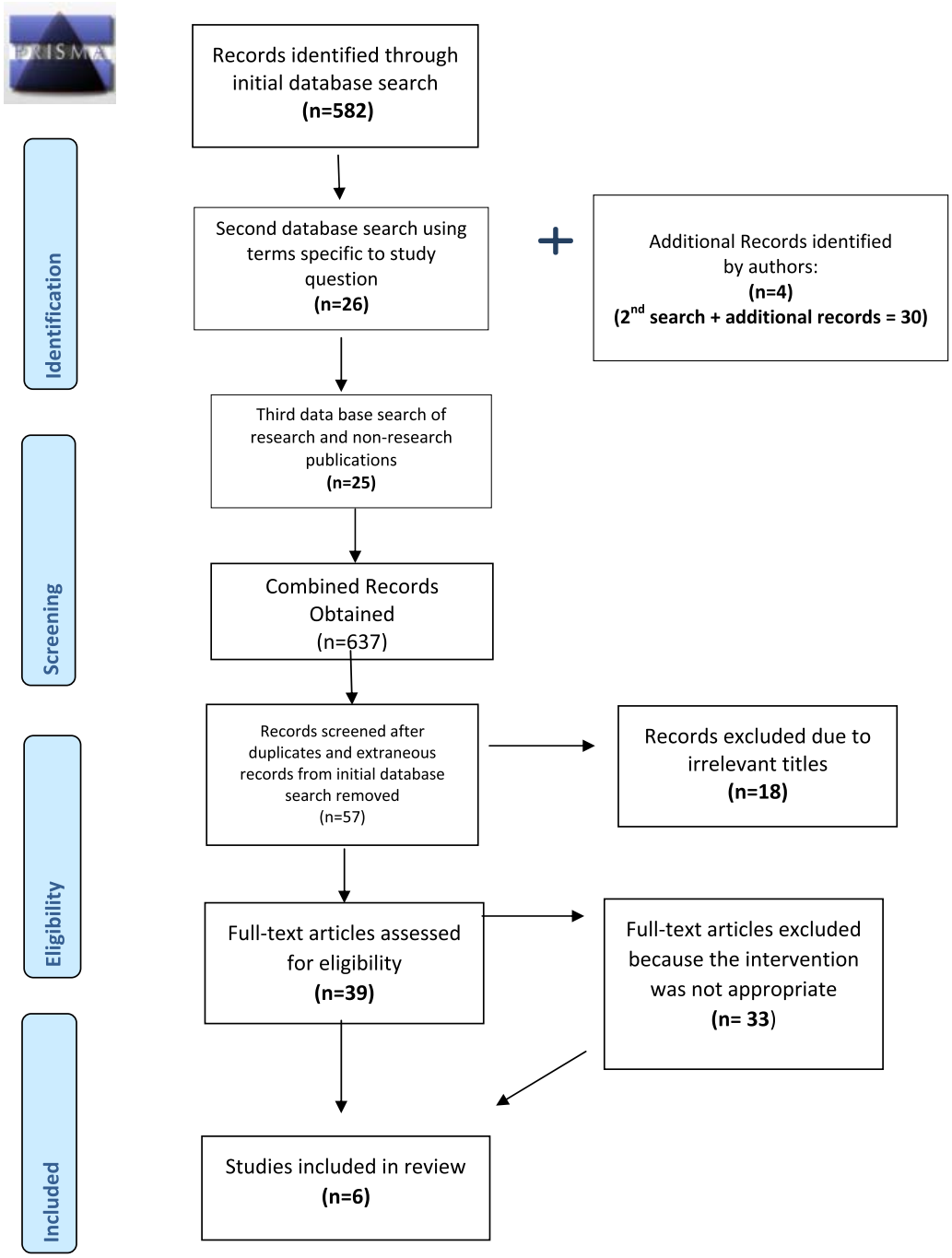

Figure 1 PRISMA Flow chart of included records. Flow chart indicates that 637 combined records were retrieved, 57 records were screened after duplicates, and extraneous citations were removed, 18 were excluded based on irrelevant titles, 39 full-text articles were reviewed for eligibility, 33 were excluded because the intervention was not applicable to study question. Six studies were included in the review.

better food choices for their child (13). The majority of caregivers also felt the dental office was a good place to get healthy eating/exercise information, and 94 percent felt the dental hygienist was a good person to discuss height and weight goals with the caregiver and child (13). The weight-based intervention in the dental office was well received, and 95.5 percent of participants would recommend the HWI to other families (13).

Watt *et al.* conducted an exploratory pilot randomized controlled trial (RCT) using a protocol previously reported

Table 1 Description of Included Studies

Citation/authors	Year published	Country of origin	Study aims/purpose/or overview	Study population/ age/sample size	Obesity addressed	Sugar sweetened beverage consumption addressed	Outcomes measured
Tavares and Chomitz (13)	2009	USA	Assess feasibility of dental-office-based weight intervention protocol for child/adolescent. Intervention: HWI protocol based on MI. One of recommended behavioral strategies: Consume less low-nutritive foods such as SSBs.	Children and adolescents ages 6–13 $n = 139$	YES	YES	18-month pilot study, with children and adolescents ages 6–13 who returned for two to three visits during this timeframe. At each visit, hygienists collected information about obesity risk factors in regards to food, exercise, "screen time." and meal habits to create an individualized report with recommendations for healthy behavior change. Height, weight, and BMI for age were calculated. Children and adolescents with BMI > or equal to 85% were referred to a physician. Extent that children and caregivers adopted the hygienist's recommendations, followed through with any referrals, and met behavior change goals. Descriptive outcomes provided ($n = 67$ caregivers): 95.5% reported better food choices for child, 95.5% felt the dental office was a good place to get healthy eating/exercise information and 94% felt the DH was a good person to discuss height and weight goals with caregiver and child; 95.5% would recommend the HWI to other families.
Masood et al. (14)	2014	UK	Proposes the need for a targeted population approach addressing sugar consumption, suggesting that dentists are well positioned to play a role in this type of approach.	NA	YES (mentioned)	YES	Letter to editor; narrative review surmised that reduction of sugar consumption could positively impact the obesity epidemic – and dentists are well positioned to integrate sugar-cessation programs into their standard of patient care.

Table 1. Continued

Citation/authors	Year published	Country of origin	Study aims/purpose/or overview	Study population/ age/sample size	Obesity addressed	Sugar sweetened beverage consumption addressed	Outcomes measured
Palacios et al. (15)	2009	US	Broad overview of nutrition and health guidelines for oral health professional.	NA	YES	YES	Narrative review; Briefly addressed consumption of sugar in beverages and key recommendations related to caries risk and prevention of obesity. States advice on good dietary habits to help maintain both oral and general health should be included as part of routine preventive care. Asserts overweight and obesity as a growing concern; emphasizes the elimination of SSBs. States that monitoring total caloric intake and regular exercise will positively influence weight. control.
Akabas et al. (16)	2012	NA	Role of oral health professional incorporating nutrition and physical activity for health promotion/disease prevention. Suggests there is an opportunity for dentists to expand their role in health-care delivery by offering nutrition and physical activity recommendations to prevent and/or reduce chronic disease.	NA	YES	YES (p. 795) – addresses as a relevant topic for dentists to address with patients as a part of preventive care	Narrative review; No reporting of methods for inclusion of literature in review. Provides rationale for patient-centered care in combination with evidenced-based care to improve oral health outcomes. Active listening and MI are identified as techniques that can be used by practitioners to promote lifestyle change.
Murphy et al. (17)	2013	NA	Proposed: 3–4 short MI sessions in dental setting.	Proposed: 11–16-year-olds	YES	YES	Study protocol only
Watt et al. (18)	2013	UK	RCT to assess the use of an obesity preventive intervention, using MI among overweight 11–16 year olds attending primary	11–16 year olds who were overweight or obese	YES Primary outcome: BMI and Waist Circumference (WC) were	YES Secondary outcome: Consumption of soft drinks (daily	Pilot study was not powered to detect significant changes in outcomes. At 6-month follow up, the intervention group had reduced BMI *z* scores (0.05), mean

Table 1. Continued

Citation/authors	Year published	Country of origin	Study aims/purpose/or overview	Study population/ age/sample size	Obesity addressed	Sugar sweetened beverage consumption addressed	Outcomes measured
			dental care services in North Central London PCTs	Dental practices ($n = 10$) were randomized to control and intervention group 2-day tailored MI workshop to train intervention dental teams 39 teen participants: intervention ($n = 22$) and control ($n = 17$)	primary outcomes Questionnaires to assess: Physical/sedentary activity Readiness to change and confidence in changing eating/drinking habits Social support	total volume and frequency) Four nonconsecutive 24 hour diet records were taken using the multiple-pass method, with at least one weekend day	consumption of sugary drinks daily and frequency of unhealthy snacks, However, mean differences in anthropometric and dietary outcomes between groups was not statistically significant from baseline to 6 months.

in the literature (17,18). The aim of the study was to assess the practicability and appropriateness of an obesity-prevention intervention using MI in overweight 11- to 16-year-olds attending primary dental care offices and clinics ($n = 10$) in London. The SWITCH (Smart Weight in Teenagers Choosing Health) pilot study included a number of phases, but only the component related to the topic under review will be discussed (18). Offices were randomized to a control or intervention group, and the dental teams in the intervention group were trained on MI. There were a total of 39 participants randomized to control ($n = 17$) and intervention ($n = 22$) groups. Participants' ages ranged from 11.2 to 15.3 years (18). Authors did not specify how many of the study participants were under age 12. Primary outcomes included changes in BMI and WC, and secondary outcomes included changes in total volume and frequency of consumption SSBs. At the 6-month follow-up, the intervention group had trends toward positive changes with reduced BMI, mean consumption of SSBs, and frequency of unhealthy snacks, but the changes were not statistically significant given that the sample size was underpowered to detect significant differences (18). Results from this study demonstrated an interest in obesity prevention techniques as a part of comprehensive patient care in the dental setting. The greatest challenge identified by the authors was recruitment of subjects who were overweight or obese and who visited the dentist regularly (18).

In addition to traditional literature such as systematic reviews and randomized controlled trials, gray literature was also reviewed. Gray literature includes but is not limited to unpublished studies, dissertations, non-English-language literature, reports, and conference proceedings (20). Recommendations from the gray literature also support a need for a targeted population approach addressing sugar consumption; proposing dentists are well positioned to play a role in this type of approach (14). In a letter to the editor of *The Lancet*, Masood *et al.* surmised that reduction of sugar consumption could positively impact the obesity epidemic. Additionally, it was noted that dentists are well positioned to integrate programs to decrease intake of sugar into their standard of patient care (14).

Palacios *et al.* provide a narrative review addressing consumption of sugar in beverages and offer key recommendations related to caries risk and prevention of obesity. Recommendations include providing advice on good dietary habits to help maintain both oral health and general health, which should be incorporated as part of routine preventive care (15). The authors suggest overweight and obesity are growing concerns while emphasizing that eliminating consumption of SSBs, monitoring total caloric intake, and engaging in regular exercise would be useful tools to influence weight control (15).

Akabas *et al*. explore the potential role of oral health professionals in incorporating nutrition and physical activity in health promotion and disease prevention efforts. They assert that there is an opportunity for dentists to expand their role in health care delivery by offering nutrition education *and* physical activity recommendations to prevent and/or reduce chronic disease (16). The authors provide a narrative review of the literature supporting patient-centered care in combination with evidence-based care to improve oral health outcomes. Active listening and MI are identified as techniques practitioners can use to promote positive lifestyle change (16).

Discussion

This scoping review evaluated the literature to determine skills and tools needed by oral health professionals to positively promote implementation of dietary changes in children under age 12 and their parents to decrease intake of SSBs and reduce the risk of childhood obesity. Six research and nonresearch publications were identified for inclusion. The findings were limited to two pilot studies, two narrative reviews, a study protocol, and a letter to the editor. Only two studies of high-level evidence were used in this review. The HWI in the pilot study by Tavares and Chomitz showed great merit. Patients responded positively and saw the value of dietary education in the dental setting. There was a positive trend in food choices reported, and the majority felt the dental hygienist was the best person to discuss height and weight goals with the caregiver and the child (13). The SWITCH pilot RCT study also showed promise but was underpowered to detect statistical significance. Overall, the attitudes of the dental teams and children and adolescents in the practices that participated were positive about the intervention. Focus groups revealed that the children and adolescents felt the MI sessions allowed them to reflect on the diet choices but felt a focus on discussing healthy food/drinks with practical suggestions was more acceptable than a focus on weight management by the dental team. Dental teams had a positive view of being involved in the study, but a reported barrier was lack of time to include the MI in their daily practice (17,18) There are limited studies available to validate the effectiveness of MI as an intervention for behavior change. Execution of a randomized control trial in dental practice settings specifically targeting SSB consumption using MI as an intervention in overweight and obese patients aged 11–16 has potential for replication by other oral health professionals (18). Higher-level evidence is needed to assess the value of discussing diet with children ages 12 and under in the dental setting. A targeted population approach to decrease sugar intake in the dental setting with a format similar to tobacco cessation programs has been suggested (14), but there are no studies to validate the effectiveness of such programs. Narrative research on dietary habits for optimum oral health and general health are too broad in scope (15). More focused quantitative studies identifying outcomes specific to reducing SSB consumption and modification of dietary habits that reduce risk of obesity are needed to identify outcomes of programs implemented in the dental setting aimed at reducing SSB consumption and modification of dietary habits that reduce risk for obesity. Evidence-based care in combination with patient-centered care is needed to improve oral health outcomes (16). The primary limitation of this review is the lack of evidence-based literature addressing both SSB consumption and obesity in the dental setting. The authors had hoped to find more intervention studies with outcome-based data demonstrating implementation of skills and tools in the dental setting to address these behaviors but evidence was limited. Additionally, literature reviewed did not specifically focus on children under age 12. The study population for the Tavares and Chomitz study included children and adolescents ages 6–13 whereas most studies included participants ages 11–16. Future research targeting behavioral changes in children under age 12 would be beneficial. Appropriate length of time for interventions and power analysis to determine adequate sample size were also identified as gaps that need to be addressed in future studies.

Policy statements by ADA recognize that the dental team can play a role in promoting healthy lifestyle and behavior change to reduce risk of overweight and obesity by working collaboratively with other health care professionals and organizations (21). Third party payers do not typically reimburse for nutrition education and counseling in the dental office. Lack of financial incentive and time may discourage dental offices from including nutrition education and counseling as a preventive protocol. Coverage of nutrition counseling as an essential plan benefit is a priority policy concern for ADA and was adopted by its House of Delegates in October 2016 (21). Continuing education courses or modules that heighten awareness of childhood obesity, discuss implications for oral health, and better define the role of the oral health professionals are needed. An ADA resolution supports "legislative and regulatory actions to increase consumer awareness about the potential benefits of limiting added sugar consumption in relation to general and oral health," indicating support for preventive initiatives for improved health (21). Public service announcements by governmental agencies and interprofessional collaboration among oral health organizations and other health organizations are also needed to create awareness among consumers about the complexity of obesity and its relationship to oral health and general health.

Conclusion

The association between obesity and oral health presents an opportunity for oral health professionals to engage with

interprofessional teams in prevention and management of this significant public health problem. Oral health professionals are uniquely positioned to address SSB consumption and promote positive dietary habits for improved weight management. Evidence-based documentation of the implementation of policies established by ADHA, AAPD, and ADA related to reduced SSB consumption and promotion of behavioral modifications to reduce risk of obesity in the dental setting is needed. Future large-scale randomized multisite studies are needed to determine effectiveness of tools and skills to address SSB consumption to assist with weight control that can be integrated into preventive patient care by oral health professionals.

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