

Childhood dental caries and obesity: Opportunities for interdisciplinary approaches to prevention

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Abstract

Dental caries and obesity are prevalent and preventable chronic childhood diseases. Evidence shows a strong connection between these two diseases, with overlapping common risk factors, including diet as a key driver of risk. Dental professionals are well-positioned to perform nutritional counseling and obesity prevention in dental clinic settings, but training and clinical integration remain key challenges. This paper highlights the potential for leveraging the common risk factor approach (CRFA) framework and its principles to reduce the impact of childhood dental caries and obesity. Strategies and methods are provided to integrate meaningful didactic and clinical training experiences in dental academia, and the need to include effective and evidence-based nutritional counseling techniques in dental settings is also described. Additionally, the potential for integrating CRFA and engaging health care providers across the spectrum of care, including primary care settings, to reduce the prevalence of these diseases in pediatric populations is highlighted. Finally, the authors propose future directions for multidisciplinary research to advance the scientific knowledge in this area and to inform effective and comprehensive interventions for dental settings.

KEYWORDS

common risk factor approach, dental caries, diet, nutrition, obesity, pediatric

1 | INTRODUCTION

Despite exciting recent advancements in obesity treatment, there is still a pressing need for effective obesity prevention efforts, especially among pediatric populations. Dental caries and obesity are among the most prevalent, preventable chronic diseases experienced by U.S. children and adolescents. The prevalence of dental caries among U.S. youth aged 2–19 years was 45.8%, while approximately 20% have obesity.^{1,2} Moreover, disparities exist for both conditions, with prevalence rates being higher for non-Hispanic Black and Hispanic youth compared to white counterparts, indicating a need for

comprehensive strategies that can make progress toward alleviating inequity.^{3,4} Untreated dental caries in children and adolescents result in pain, poor nutrition, difficulty eating, speaking, playing, and learning, and low oral health-related quality of life.^{5,6}

Childhood obesity is associated with an increased risk of medical co-morbidities as well as poorer mental health outcomes and quality of life. It contributes to over \$1 billion in medical costs, indicating the personal and social impacts.⁷ Additionally, both conditions can progress into adulthood, leading to additional complications later in life and highlighting the importance of prevention. It is evident that dental caries and obesity are major public health issues in the U.S.

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Preventing them is critical to promoting optimal health for children and adolescents and reducing the cost of care borne by families and government systems.

The causes of obesity and dental caries are complex and include many individual, interpersonal, and environmental factors.⁸ However, one of the most common behavioral risk factors for dental caries is the frequent intake of processed sugary foods and drinks, highlighting the roles of snacking and sugary drink intake as important behavioral targets for preventing dental caries and obesity risk. Additionally, more attention is being paid to the multi-level drivers of both chronic diseases, such as parent feeding practices, socioeconomic status, insurance status, and access to care that impact risk of both chronic conditions.

Given the common etiologies between obesity and oral health, dental providers are an essential but overlooked group of clinical providers who can actively engage in obesity prevention efforts. Dental providers are well-positioned to provide screening, surveillance, and dietary counseling in the context of their existing clinical care. Moreover, dental professionals provide care in various settings, including schools and community clinics, with the promise of reaching populations who disproportionately experience chronic disease disparities but remain underrepresented in prevention efforts. Thus, a clear rationale exists for engaging dental providers in comprehensive prevention efforts that can impact both conditions.

2 | DIETARY INTAKE IS A KEY DETERMINANT OF DENTAL CARIES AND OBESITY, HIGHLIGHTING DENTAL PROFESSIONALS' ROLE IN PREVENTING CHILDHOOD OBESITY

While some studies show a positive relationship between dental caries and obesity,^{9,10} a few do not.^{11–13} Moreover, recent systematic reviews and meta-analyses indicate a strong association between dental caries and obesity.^{14–17}

A primary dietary driver of caries risk is the intake of processed sugars and refined carbohydrates, which increase the risk of dental caries. Related eating behaviors such as bottle feeding, snacking, and extended consumption of ultra-processed foods, sugary drinks, and juice that result in exposure to sugars over more extended periods of time are also associated with increased risk.¹⁸ Given the strong links between dietary intake and caries risk, many of the determinants that impact dietary intake in early childhood, including food preferences, the home food environment, parent feeding practices, and food access, are directly relevant to caries prevention, but remain understudied.¹⁹

With growing evidence of an association, the Robert Wood Johnson Foundation (RWJF) organized a first-of-its-kind national conference titled “Healthy Futures: Engaging the Oral Health Community in Childhood Obesity Prevention” in 2016 to highlight the role of obesity and its association with dental caries.²⁰ This conference concluded that dental care professionals, as direct health care providers and thought leaders within their communities, are

well-positioned to play an essential role in preventing and treating dental diseases, preventing childhood obesity, and improving their patients' overall health and well-being.²¹ Additionally, given the evidence linking diet with oral health, the Academy of Nutrition and Dietetics supports the integration of nutrition with oral health services.²² Clear dietary targets, including reducing sugary foods and beverages, increasing fruits, vegetables, and high-quality protein, and reducing extended eating occasions of refined foods, are highlighted approaches for meeting dietary recommendations while also addressing key obesity prevention targets and reducing caries risk.

3 | THE COMMON RISK FACTOR APPROACH PROVIDES A FRAMEWORK FOR EFFORTS TO PREVENT MULTIPLE NON-COMMUNICABLE DISEASES, INCLUDING DENTAL CARIES AND OBESITY

The common risk factor approach (CRFA) is based on health policy recommendations from the World Health Organization (WHO).²³ The WHO's “Integrated Program for Community Health in Non-communicable Diseases” focuses on risk factors common to several non-communicable diseases (NCDs).^{24,25} The fundamental principle behind this program was to develop a unified strategy to target common risk factors (CRFs) for various significant NCDs to promote health and prevent and control diseases.²⁴ It is believed that instead of disease-specific interventions to promote health, the integrated CRFA targets a small number of CRFs with a more significant influence on multiple NCDs at much lower costs, greater effectiveness, and efficiency.²⁶ This addresses challenges associated with isolated and individual disease-focused health interventions, which can tax existing limited resources and may increase inequalities between different population groups.²⁶

In the 2000s, CRFA was further developed and adapted to oral health and directed action at CRFs for chronic NCDs and oral conditions.²⁶ The United Nations General Assembly (UNGA) recognized that oral diseases are significant health burdens and share CRFs with many chronic diseases.²⁷ In light of the association between obesity and dental caries among children, implementing CRFA for health promotion and disease prevention is of great value because obesity risk and poor oral health share CRFs, including factors that drive health inequities and impact at-risk populations.²⁸

4 | IMPLICATIONS FOR EDUCATION, PRACTICE, AND RESEARCH

4.1 | Dental education and training

Professional organizations such as the American Academy of Pediatric Dentistry, American Dental Association, and American Academy of Pediatrics have recognized dental professionals' responsibility to understand their patients' diet and nutrition behaviors.²⁹ However,

the Commission on Dental Accreditation (CODA) standards for training students in diet, nutrition, nutrition-related behaviors, and obesity prevention vary between predoctoral dental, dental hygiene, dental therapy, and advanced dental education programs. The CODA's most recent predoctoral standards for dental education programs do not mention any language on diet, nutrition, or obesity.³⁰

The CODA standards for dental hygiene and dental therapy programs acknowledge the importance of including biomedical science content related to nutrition in the dental hygiene and dental therapy curricula.^{31,32} A dental therapy graduate is also expected to be competent in nutritional counseling and dietary analysis.³² A CODA-accredited pediatric dental residency programs are expected to provide adequate clinical experiences to achieve competency in educating patients/parents/caregivers on diet and nutrition, in addition to an in-depth level of didactic instruction on diet, nutrition, and sugars and their role in oral health and disease.³³ Oral Medicine residents are expected to receive formal instruction in nutrition principles, especially concerning oral health and orofacial conditions.³⁴ However, CODA standards do not specify how these competencies are assessed, and other advanced dental education programs do not mention any language related to diet, nutrition, or obesity prevention. Despite the existing CODA standards, it is unclear how much didactic or clinical experience students and residents receive, and training may vary widely by school or program. Evidence shows that efforts of dental schools and dental hygiene programs to include obesity-related curricular content are very low.³⁵ Thus, there is an excellent opportunity for dental training programs to integrate diet, nutrition, nutritional counseling, and obesity prevention content in both didactic and clinical curricula.

For programs planning to integrate both didactic and clinical content related to diet, nutrition, and obesity to train their students, there are resources readily available for free. One example is the Nutritional Counseling and Obesity Prevention Handbook.³⁶ This handbook was developed for a grant funded by the Health Resources and Services Administration (HRSA) and was designed specifically for dental trainees. It provides an overview of childhood obesity and its consequences, recommendations for promoting optimal oral health and healthy weight in children, and tools that oral health professionals can use to support childhood obesity prevention efforts in clinical care settings.³⁶ This handbook also includes a healthy weight nutrition screener to assess the risk factors associated with poor nutrition, childhood obesity, and dental caries.

Additionally, through the same HRSA funding, an online self-guided training module was also developed for dental care professionals interested in integrating obesity screening and nutritional counseling strategies into clinical practice.³⁷ This self-guided training module provides detailed audio visuals showing how to use the nutrition screener, use a stadiometer, measure body mass index, and counsel children and families on key nutrition targets to optimize oral health. While this provides an example of available resources, additional efforts are needed to meaningfully integrate nutrition counseling and obesity prevention training into the dental curriculum and

assess the competency of dental health trainees in these practice domains.

4.2 | Clinical integration of nutritional counseling and obesity prevention in dental practice

As much as dental academia needs to integrate didactic and clinical content related to nutrition and obesity in curricula, it is equally essential that nutrition counseling and obesity screening and prevention strategies are, in turn, integrated into dental clinical care settings. Most children and adolescents in the U.S. visit a dental office at least once yearly. In 2019, approximately 87% of children aged 2 to 17 had a dental visit in the past year.³⁸ Given the many behavioral factors that affect both oral health and child weight status and that all children are recommended to visit a dental office every 6 months, dental professionals are well-positioned to comprehensively evaluate child dietary and nutrition behaviors and provide appropriate counseling to children's and families to prevent obesity and dental caries.

Dental providers can also engage in obesity screening and make referrals to pediatric primary care professionals or dietitians.²¹ Training in behavior change approaches, including cognitive behavioral therapy (CBT) and motivational interviewing (MI), would increase their skills in nutritional counseling.²⁸ Recent evidence supports dental professionals' use of customized dietary behavioral guidance and self-determination theory to reinforce caregivers' autonomous motivation to improve caregivers' feeding practices.³⁹ To facilitate the integration of these practices into clinical care, key barriers should be addressed. The barriers reported by dental professionals mimic those in primary care and other clinical settings, including lack of time and training.⁴⁰ Other barriers at the implementation level include a lack of reimbursement for screening and counseling for weight-related behaviors in the dental setting, and this would require policy changes.

Evidence shows that a small proportion of practicing dentists may be currently involved in obesity prevention and nutrition counseling.⁴¹ In a 2016 survey of pediatric dentist members of the American Academy of Pediatric Dentistry, only 17% of the respondents integrated childhood obesity information or other healthy weight interventions into their practices.⁴¹ However, more than 70% of the respondents believed that pediatric dentists played a role in helping children maintain their healthy weight.⁴¹ Therefore, not implementing such strategies in dental practice is a missed opportunity to improve patients' overall health and well-being. Studies assessing willingness to implement nutrition counseling and obesity screening and prevention strategies among other dental care providers are lacking, which is an opportunity for future research. In addition to providing clear patient benefits, these efforts would support dental providers in providing more holistic care. This can bolster the patient-client relationship, improve care satisfaction, and improve long-term outcomes for patients.

4.3 | Healthcare professionals' role and interprofessional collaboration

It is essential to recognize the crucial role of other healthcare professionals such as primary care physicians, pediatricians, social workers, community health workers, registered dietitians, and nurse practitioners in addressing dental caries and the obesity epidemics in children. Interprofessional collaboration can support multidisciplinary approaches to delivering comprehensive care. This is particularly relevant for pediatric primary care providers who see children regularly throughout early childhood, making them a logical partners in these efforts. Integrating CRFA into medical practice will help prevent dental caries and obesity among at-risk children. Initiating discussions on the diet's association between obesity and dental caries in medical practice and providing nutritional counseling will improve children's and parents' understanding of the link between the diseases and consequently may help them adopt healthy dietary practices. To integrate CRFA, MI, and nutritional counseling in their practice setting, healthcare professionals should be sufficiently trained in these topics.

Related to this effort, evidence shows that medical schools need to integrate sufficient nutrition-related education hours into their curricula. In a recent systematic review, the authors concluded that there are sparse and inconsistent data on nutrition learning experiences in U.S. medical schools.⁴² The authors indicated that medical schools must build formal nutrition education objectives and create learning experiences that can be applied to clinical practice.³⁷

Enhanced training and interprofessional collaboration can support efforts to effectively provide evidence-based care while addressing concerns and misconceptions, such as eating disorder risk, that are common across professional disciplines.⁴³ Moreover, training should address weight-related bias and stigma in delivering care.⁴⁴

4.4 | Interdisciplinary research opportunities

Few studies have aimed to identify CRFs between dental caries and obesity. A 2016 scoping review found that dental caries and obesity shared CRFs⁴⁵; 5 obesity risk factors (ORFs) were also significantly related to dental caries: 2 modifiable (stress and diet) and three non-modifiable (developmental conditions, socioeconomic status, acculturation).⁴⁵ However, the literature examining key social determinants of health (SDOH) and multilevel factors that impact obesity and dental caries is lacking. Additionally, there is a need to examine which factors are key determinants of dental caries and obesity. Most studies conducted in recent decades were conducted *independently* and not from a CRF perspective, resulting in known risk factors specific only to dental caries or obesity and not the combination.

A few intervention studies targeting both caries and obesity risk in dental settings have been conducted in the U.S. and internationally. Still, findings are preliminary, or studies still need to be completed. One pilot study conducted in an urban dental clinic in

the U.S. demonstrated the feasibility of reaching families with young children (6–36 months).⁴⁶ Participating families reported high acceptability and preliminary findings showed that the program assisted in selecting positive behavior change goals.⁴⁶ Another study, informed by a multi-level social-ecological framework for conceptualizing and addressing oral health and obesity risk, will provide insights into using a CRFA for managing obesity in caries risk among South Asian immigrant families in the U.S., but results are not yet available.⁴⁷

Most other studies are limited to observational study designs, and future research should use robust analytical methods and more rigorous study designs to assess causal inferences between risk factors and these chronic disease outcomes. Additionally, significant opportunities exist to continue to develop and test innovative interventions to address multi-level (individual, family, community, and society/policy) determinants of nutrition-related chronic diseases that impact obesity and caries risk. This includes integrating evidence-based obesity prevention approaches into dental clinical care and designing efficacious interventions to reduce obesity risk and improve oral health outcomes.

Finally, there are opportunities for researchers and practitioners across a wide range of disciplines (e.g., nutrition, public health, obesity, dentistry, pediatrics, and health policy) to engage in collaborative, comprehensive research efforts to understand the relationship between dental caries and obesity, identify effective, practical, comprehensive intervention approaches, and promote policy changes that can impact can improve clinical care.

5 | CONCLUSIONS

Dental providers are a promising and important but often overlooked group of clinicians who can contribute to pediatric obesity prevention efforts. Screening for risk factors that underlie obesity and dental caries risk and providing routine nutrition counseling for improving dietary intake are well within the scope of dental practice. Given the common etiologies between dental caries and obesity, more comprehensive research and clinical care efforts to reduce preventable chronic disease risk among pediatric populations in the U.S. are warranted. Additionally, dental training programs and other health professional programs must integrate CRFA and nutrition-related curricula into their programs. Interprofessional collaboration across health domains and settings will further bolster efforts to address these two chronic, common childhood diseases.

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CONFLICT OF INTEREST STATEMENT

No conflicts of interest to disclose.

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