Treatment of Pediatric Overweight and Obesity: Position of the Academy of Nutrition and Dietetics Based on an Umbrella Review of Systematic Reviews

Shelley Kirk, PhD, RD, LD; Beth Ogata, MS, RD, CD, CSP; Elizabeth Wichert, MPH, RD, LDN; Deepa Handu, PhD, RD, LDN; Mary Rozga, PhD, RDN

ABSTRACT

This Academy of Nutrition and Dietetics Position Paper describes current evidence on multi-component interventions with nutrition to treat pediatric overweight and obesity and discusses implications for RDNs. An umbrella review of eight systematic reviews provides evidence that multi-component interventions that include nutrition improve body mass index z-scores in all ages and in a variety of settings. More evidence is needed regarding appropriate body mass index measures to track weight and health status changes in children and adolescents with overweight and obesity. Current evidence indicates that multi-component interventions that include nutrition do not negatively impact psychosocial outcomes, but research on long-term outcomes is needed. Evolving technology and societal circumstances have created opportunities to provide innovative, collaborative, and engaging interventions through telehealth. RDNs specializing in pediatric overweight and obesity treatment play a crucial role in providing a wide range of evidence-based interventions in a variety of settings. These skills are important for tailoring treatment to each child or adolescent while accounting for community and societal factors, which can lead to improved health across the lifespan.

J Acad Nutr Diet. 2022;122(4):848-861.

IT IS THE POSITION OF THE ACADemy of Nutrition and Dietetics that children and adolescents with overweight or obesity should receive multi-component, culturally appropriate interventions with family involvement and nutrition counseling from an RDN. RDNs should use appropriate screening and assessment methods that address weight and mental health status; use inclusive language; and work within their scope of practice to provide nutrition assessment and tailored interventions that leverage new technology to improve health outcomes.

https://doi.org/10.1016/j.jand.2022.01.008

Position Statement

It is the position of the Academy of Nutrition and Dietetics that children and adolescents with overweight or obesity should receive multi-component, culturally appropriate interventions with family involvement and nutrition counseling from an RDN. RDNs should use appropriate screening and assessment methods that address weight and mental health status; use inclusive language; and work within their scope of practice to provide nutrition assessment and tailored interventions that leverage new technology to improve health outcomes.

Pediatric overweight and obesity continues to be a significant problem in the United States. Prevalence of pediatric obesity in 2017–2018 was 19.3%, affecting 14.4 million children and adolescents. Prevalence is higher among children who are Hispanic and non-Hispanic Black, and in families with lower- and middle-incomes.[1] Obesity is associated with significant short- and long-term health problems, including cardiovascular disease, type 2 diabetes, depression, and other mental health issues.[2] Pediatric obesity is associated with higher hospitalization costs when it is a primary or secondary diagnosis[3] and directly increases lifetime medical costs compared with youth without overweight or obesity.[4]

The contributors to pediatric overweight and obesity are multifactorial, creating complex challenges for treatment. No single effective treatment strategy exists, and the interventions that have proven effective are often expensive, have varied reimbursement rates, and may not be effective for or available to all pediatric individuals. Weight bias and stigma are significant barriers to pediatric weight management. Nutrition, physical activity, and mental health interventions are integral components of pediatric obesity treatment. Registered dietitian nutritionists (RDNs) are uniquely positioned to work directly with pediatric individuals and their families, develop innovative approaches and collaborations with other health care providers and community members, and direct research and advocacy efforts.

In 2013, the Academy of Nutrition and Dietetics (Academy) published a Position Paper on prevention and treatment of pediatric overweight and obesity.[5] That Position Paper has since expired, necessitating re-examination of the literature and current topics of interest or uncertainty in the field of pediatric overweight and obesity treatment. Prevention of pediatric

overweight and obesity is addressed in a separate position paper.

POSITION FOCUS

The objective of this Position Paper is to examine current evidence on multicomponent interventions that include nutrition to treat pediatric overweight or obesity and to discuss practice implications for RDNs. Specific topics addressed include:

- BMI Measures for Nutrition Assessment
- Effect of Multi-Component Weight Management Interventions with Nutrition on Cardiometabolic Outcomes
- Effect of Multi-Component Weight Management Interventions with Nutrition on Psychosocial Outcomes
- Family-Based Weight Management Interventions
- Weight Management Interventions with Nutrition Delivered Through Electronic Devices or via Interactive Remote Encounters
- Considerations for Multi-Component Weight Management Interventions with Nutrition Delivered to Specific Groups
- Reimbursement
- Implications of the COVID-19 Pandemic on Pediatric Weight Management Interventions

POSITION PAPER DEVELOPMENT PROCESS

Academy Position Papers are based on systematic reviews (SRs).[6] A recent scoping review identified a wide range of current and relevant SRs examining the effect of multi-component interventions with nutrition to treat pediatric overweight and obesity.[7] Therefore, to address the broad and complex nature of pediatric weight management, an umbrella review, also called an overview of SRs, was conducted. Methods adhered to those outlined by the Cochrane Collaboration for overviews of SRs.[8] Research questions were created by expert panel members to address topics requiring clarification in pediatric overweight and obesity treatment. A detailed description of methods can be found on the Evidence Analysis Library website.[9]

Systematic reviews were eligible for inclusion if they were published from January 2017 to February 2021, searched at least two databases, and assessed risk of bias of included studies. Pediatric patients and clients (collectively referred to as *patients* in this Position Paper) were required to be 2 to 17 years of age with overweight (≥85th and <95th percentile for BMI for age and sex) or obesity (≥95th percentile for BMI for age and sex).[10] Certainty of evidence (level of confidence in the evidence) was obtained directly from the SRs or was determined using the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) method.[8,11] Evidence was graded as "HIGH," "MODERATE," "LOW," or "VERY LOW." Risk of bias of each SR was assessed using the AMSTAR2 tool.[12] Systematic reviews that assessed certainty of evidence were prioritized over those that did not ascertain certainty of evidence. For each section, a conclusion statement summarizing the evidence is described in bold text.

Table 1. Comparison of weight status categories according to BMI[a] *z*-score and %BMIp95[b]

Metric	Overweight	Obesity (Class 1)	Severe obesity (Class 2)	Severe obesity (Class 3)
BMI *z*-score[23]	≥1.04 SD[c]	≥1.64 SD	≥2.33 SD	—
%BMIp95[21,24]	BMI 85th-95th percentile	BMI 100%-119% of the 95th percentile	BMI 120%-139% of the 95th percentile	BMI ≥140% of the 95th percentile

[a]BMI = body mass index.
[b]% BMIp95 = percentage of 95th percentile for body mass index.
[c]SD = standard deviation.

BMI Measures for Nutrition Assessment

In pediatric individuals 2 to 17 years of age with overweight or obesity, three SRs reported multi-component weight management interventions with nutrition reduced BMI *z*-scores compared with controls, but effects were small.[13-15] No SRs reported 95th percentile for BMI (%BMIp95) as an outcome of interest. Therefore, evidence certainty was UNGRADED.

Implication for Practitioners. Historically, BMI *z*-score has been widely used as the accepted metric to evaluate change in weight status over time, including among children and adolescents with overweight and obesity. BMI *z*-score is defined as BMI transformed into the number of standard deviations (SD) above or below the mean population BMI for age and sex.[16] A decrease in BMI *z*-score of at least 0.5 SD over 0 to 6 months of treatment or 0.6 SD over 6 to 12 months of treatment may be associated with a clinically relevant reduction in percent body fat.[17]

However, growing evidence and consensus among experts in the field of pediatric weight management suggest that evaluating change in BMI *z*-score may lead to erroneous conclusions, particularly when applied to those in early childhood and older adolescents with severe obesity.[18-22] For example, in a sample of >30,000 participants 2 to 19 years of age, participants with very high BMIs had variable BMI *z*-scores according to age, even though there was no change in weight status relative to the Centers for Disease Control and Prevention (CDC) 95th percentile for BMI (%BMIp95).[18,21] Based on these findings, it was recommended that very high BMI values should be expressed relative to the CDC 95th percentile, particularly in studies that evaluate obesity interventions. Comparison of BMI *z*-score[23] and % BMIp95[21,24] according to weight status categories are described in Table 1. Recent studies on pediatric obesity interventions have reported weight status changes using %BMIp95,[25-28] along with other BMI outcome metrics (eg, percentage distance of a child's BMI from the median BMI for age and sex).[28] As a result, BMI *z*-score is no longer viewed as an outcome measure that is generalizable for use across the age span because of the issues raised for those with severe obesity.

Further investigation of alternative BMI outcome metrics are currently

- Macronutrient-balanced, portion controlled,[33-36] with an emphasis on promoting intake of high-fiber foods, such as fruits, nonstarchy vegetables, and whole-grain products to help manage hunger[37,38]
- Reduced glycemic load[35,39]
- Calorie-defined plan[40,41]
- Unbalanced macronutrient (eg, high protein, low carbohydrate, or low-fat)[42-44]
- Mediterranean diet[45] (ages 12 and older)
- DASH[b]—Child 1 version[46,47]
- Meal replacement[48]
- Mindful eating (self-regulation of stomach hunger/satisfaction/fullness; identifying nonstomach hunger triggers for eating (eg, emotional eating); slowing down the rate of eating and savoring what is eaten)[49,50]
- Healthy Nutrition Guidelines targeting specific changes in eating habits (eg, reducing intake of sugary drinks; establishing a regular meal and snack pattern; eating age-appropriate portions of protein sources and starchy foods; selecting healthier snacks; eating more fruit and nonstarchy vegetables; selecting healthier options when eating out, etc.)[51-53]
- Parenting/caregiver support with eating that is developmentally appropriate (eg, providing structure around eating, division of responsibility, etc.)[54-57]
- Use of nutrition-related apps or digital aids
- Time-limited eating[27] (ages 5 and older)
- Intermittent energy restriction[25] (ages 12 and older)

[a]Dietary approaches described in this table are not intended to be formal recommendations, but rather options for RDNs and patients or families to consider based on supporting evidence, the RDN's clinical experience, and the individual patients' needs and preferences.

[b]DASH = Dietary Approaches to Stop Hypertension.

Figure 1. Dietary interventions to consider for pediatric patients 2—17 years of age (unless otherwise noted below) with overweight or obesity.[a]

underway at the CDC to ensure applicability for all children, regardless of age or weight status.[29] Currently, there is no agreed-upon definition for determining a "successful outcome" according to changes in more recent BMI outcome metrics of interest.[30]

Effect of Multi-Component Weight Management Interventions with Nutrition on Cardiometabolic Outcomes

In pediatric individuals 2 to 17 years of age with overweight or obesity, three systematic reviews reported multi-component weight management interventions including nutrition reduced BMI *z*-scores compared with controls.[13-15] In the clinical setting, multi-component pediatric weight management interventions were modestly effective in reducing BMI *z*-scores in 6- to 17-year-old participants.[13,14] Clinical decision support tools and inclusion of nutrition professionals were identified as effective intervention methods to reduce BMI *z*-score.[31,32] No current SRs reported the outcomes of %BMIp95, hemoglobin A1c, triglyceride, or alanine transaminase levels. Evidence certainty was MODERATE for BMI *z*-scores.

Implication for Practitioners. In the pediatric population, teaching behaviors to promote a healthy lifestyle can help improve the individual's current health status and facilitates development of skills to improve and maintain health into the future. Effective treatment of pediatric overweight and obesity requires consideration of complex contributing factors, including individual genetics and health status, food environment, and values and beliefs of the pediatric individual and family. RDNs with training and experience in managing pediatric overweight and obesity are uniquely qualified to provide nutrition services across a broad range of settings and for a diverse patient population. A recent SR demonstrated that pediatric weight management interventions involving a dietitian or international equivalent were more efficacious than those without.[31]

Pediatric patients with overweight or obesity should be referred to RDNs for nutrition assessment, diagnosis, intervention, and monitoring. Nutrition services from a qualified RDN use a variety of counseling and education techniques in a variety of settings, including inpatient and outpatient settings, to support patients in the manner that works best for them and their families. RDNs are aware of and open to the variety of dietary strategies to treat pediatric overweight and obesity and understand there is no single dietary approach for treating youth with overweight or obesity. Dietary approaches for RDNs *to consider* for pediatric overweight and obesity treatment are described in Figure 1 and are based on clinical expertise and supporting evidence from primary research articles.[25,27,33-57] Having a thorough knowledge of the acceptable and evidence-based dietary approaches will help to ensure the nutrition intervention offered is tailored to best meet the needs of the patient and family and promotes good overall nutrition status. Selection of the appropriate dietary strategy is tailored according to the extent of overweight or obesity, presence of comorbidities, mental health status, level of family involvement, socioeconomic status (SES), use of other intensive therapies such as pharmacotherapy or bariatric surgery, and readiness and ability to follow the recommended dietary changes advised.

Most evidence suggested that nutrition interventions alone were not adequate to impact BMI *z*-scores. Thus, RDNs have a responsibility to encourage

Youth with overweight or obesity and family
Pediatric registered dietitian nutritionists, including
- Board-certified specialists in pediatric nutrition
- Board-certified specialists in obesity and weight management
- Those with certificate of training in obesity for pediatrics and adults pediatricians

Psychologists and other mental health providers
Social workers
Exercise physiologists, physical therapists, or other qualified physical activity practitioners
Board-certified behavior analysts (BCBA)
Feeding therapists (often occupational, physical, or speech therapists with additional training in feeding)
Public health nurses
Teachers and para-educators

Figure 2. Interdisciplinary team supporting children and adolescents with overweight or obesity.

and help coordinate interdisciplinary referrals and interventions to support other components of weight management interventions such as physical activity and mental health (Fig 2). This Position Paper does not address intensive pediatric weight management therapies such as pharmacotherapy and bariatric surgery for the treatment of severe obesity. However, all intensive therapies require the involvement of an RDN experienced in pediatric weight management to ensure that nutritional assessment, counseling, education, and monitoring of nutrition status are provided to the child or adolescent, along with appropriate family involvement.[58-62] This is of particular importance when seeking to optimize the positive impact these intensive therapies have on improving weight status, while working to establish long-term adherence to a health-promoting dietary pattern and eating behaviors, consistent use of nutritional supplements as indicated, along with a physically active lifestyle to support optimal growth and development. RDNs can find more information on bariatric surgery for the pediatric population from the American Academy of Pediatrics[63] and the Academy,[64] and from recent primary studies examining the effectiveness of bariatric procedures in the PCORnet[65] and Teen-LABS studies.[66]

Effect of Multi-Component Weight Management Interventions with Nutrition on Psychosocial Outcomes

In pediatric individuals with overweight or obesity, three SRs were analyzed to examine the effect of multicomponent interventions with nutrition on quality of life,[13,14,67] two SRs reported the outcome of anxiety and depression,[67,68] one SR reported the outcome of eating disorder risk,[69] and four SRs reported the outcome of self-esteem.[13,14] In pediatric individuals with overweight or obesity, no evidence suggests that weight management interventions with nutrition result in worsening of quality of life,[13,14] anxiety or depression,[67,68] eating disorder risk or bulimia symptoms short-term,[69] disordered eating attitudes or behaviors (evidence from primary research),[70] self-esteem,[13,14] or adverse events.[13,14] However, long-term risk (>27 months) of developing eating disorder symptoms post-treatment remains a concern.[30] Low-certainty evidence suggests that these psychosocial outcomes may be improved after pediatric weight management interventions and moderate evidence suggests that quality of life may be improved for adolescents.[14] Evidence certainty was graded as MODERATE/LOW.

Implication for Practitioners. ***Weight bias.*** A major concern in the treatment of children and adolescents with overweight or obesity is the impact of weight stigma and weight bias and how it affects health outcomes. Weight stigma is the "attribution of negative beliefs (bias) based on weight, which can contribute to discrimination, and can arise when children do not fit social norms for body weight or shape."[71] A recently published comprehensive review summarized the pervasiveness of weight stigma in youth with overweight or obesity, particularly in those seeking treatment. Sixty-four percent of adolescents enrolled in a weight loss camp had experienced weight stigma, and of these individuals, 71% had experienced weight stigma at school in the past year.[71] In addition, weight stigma is associated with other adverse health outcomes, including depression, eating disorders, and poor self-esteem, in addition to overeating behaviors and avoidance of physical activity.[30,71]

Health care providers contribute to this problem but also can be part of the solution. Clinicians working in the field of pediatric obesity must recognize obesity as a disease that results from an interplay of behavioral, environmental, genetic, and metabolic factors, rather than being self-inflicted and primarily attributable to unhealthy personal choices. This perspective helps the practitioner avoid "blaming" or "fat-shaming" the patient or family, and thus to not attribute their lack of success with weight management to a failure in willpower or inability to take responsibility. Adopting this conceptual framework in practice will help provide a more supportive, compassionate, respectful, and health-promoting clinical environment for youth with overweight or obesity and their families seeking treatment. RDNs role model and provide education to other health care professionals regarding strategies to appropriately communicate about body weight with patients and families.[72]

In addition, it has been recommended that clinicians use "people-first" language,[73] referring to individuals as "persons with obesity" rather than

"obese persons." Consideration also needs to be given to the language used when communicating with patients and families about body weight, because terms such as *large*, *fat*, or *obese* are often perceived negatively. Verbiage for clinicians to use when discussing weight with patients and families that is viewed as less stigmatizing include *weight problem* or *BMI*.[74]

Other recommendations to reduce weight bias and stigma in a clinical setting include the following[72]:

- Ensure furniture, equipment, and facilities can accommodate diverse body sizes
- Ask about patient preferences when initiating conversations about weight
- Use motivational interviewing to set patient-generated goals in nutrition counseling
- Respect patient concerns and preferences, including language preferences for talking about body weight
- Acknowledge social and environmental factors that impact weight status

Eating disorder risk. Evidence suggests that structured pediatric obesity treatment interventions that include a dietary component are associated with reduced eating disorder prevalence, eating disorder risk, and improved symptoms,[69] including decreased external and emotional eating, improved self-perception, less weight and shape concern, and decreased binge eating symptoms.[75] However, a significant increase in restrained eating after treatment was reported,[29] which can be an early indicator of eating disorder pathology.[76] In addition, Jebeile et al[68,69] in 2019 described limitations in how data were reported and in reporting of follow-up data, which is needed to adequately detect the emergence of eating disorder risk factors over time.[68,69] Eating disorder symptoms often do not present until more than 27 months after dieting onset.[76] As noted in Jebeile et al,[69] only three of the 30 studies reported met criteria for this extended follow-up period, with participants in these limited studies reporting more eating disorder symptoms. In addition, dietary restraint, the construct most likely to detect early eating disorder pathology, was available for review but omitted from these analyses.[30] Given these variable findings, clinicians need to be aware of the risk for increased restrained eating after treatment, with appropriate interventions provided to address this potential risk for developing an eating disorder.

RDNs working in multi-component pediatric obesity programs should be trained to treat eating disorders or should refer to RDNs that specialize in this field. Research examining the relationship between weight management interventions and eating disorders is evolving, and RDNs in both of these specialized areas of practice must stay abreast of new evidence and guidelines.

Mental health screening and tracking. Mental health concerns among children and adolescents with overweight and obesity, such as depression, anxiety, disordered eating behaviors, body shape concerns, and low self-esteem,[77-81] underscore the need to screen for and address psychological comorbidities when providing overweight and obesity treatment. An SR and meta-analysis representing more than 143,000 children and adolescents found 10.4% of youth with obesity had depression.[77] Youth with obesity were 1.32 times more likely to have depression than normal-weight peers, and the odds were 1.44 for females. Also, those with depression were 3.5 times more likely to develop severe obesity (vs obesity) than those without depression.[78] Screening at the start of and throughout treatment to identify risk for psychological pathologies or impairments will help to connect youth with appropriate mental health services. A comprehensive approach to the assessment of youth with obesity that goes beyond physiologic and anthropometric measures and includes mental health concerns can optimize the impact of lifestyle interventions. A list of validated mental health screening tools that can be used in the clinical setting can be found in Figure 3.

Family-Based Interventions

In pediatric individuals 2 to 17 years of age with overweight or obesity, weight management interventions with parental involvement reduced their BMI *z*-score to a greater extent than interventions without parental involvement.[13,14] In children 6 to 11 years of age, weight management interventions in the home setting were among the most efficacious in reducing BMI *z*-score.[13] No evidence available reported the outcomes of %BMIp95, hemoglobin A1c, triglyceride and alanine transaminase levels, quality of life, anxiety or depression, or eating disorder symptoms or diagnosis in family-based interventions specifically. The grade for certainty of evidence for the outcome of BMI *z*-score was MODERATE.

Implication for Practitioners. Family-based interventions may offer several benefits and address some of the barriers to clinic-based treatment. Interventions in the home setting, including through telehealth, have the potential to reach individuals who may have difficulty accessing the health care system (eg, because of lack of transportation or financial issues).[82,83] Working with patients and families in their homes can improve understanding of family's strengths and supports as well as barriers to treatment and provides an opportunity to further individualize the treatment approach plan.[84] Telehealth visits can offer improved access to weight management programs, may improve engagement with the patient and family, and offer opportunities for multiple caregivers in different households or locations to attend a visit. Refer to the following section for more information on telehealth.

However, even interventions that are not delivered directly in the home should include a parental or caregiver component, because these interventions were shown to be more efficacious than interventions without a parental or caregiver component. Family-based behavioral group interventions can be conducted in the community setting and may allow for a break-even initial rate of return and positive return on investment.[85] Nutrition interventions for families include involving children in food shopping and meal preparation beginning at an early age, and increasing responsibility with the child's skills and abilities. Families can participate in cooking classes and can work with RDNs to shape mealtime environments that support healthy eating, while accounting for cultural and economic diversity. Guidelines for evidence-based recommendations and best practices to promote healthy eating

Screening tool	Health conditions being screened	Target population	Number of items	Individuals completing	Type of reporting	Link
SCARED (Screen for Child Anxiety Related Disorders)	General anxiety disorder, separation anxiety disorder, panic disorder, and social phobia	Youth ages ≥12 years; children ages 8–11 years can complete with the assistance of adult who reads the questions	41	Youth and parent	Self-report	SCARED-form-Parent-and-Child-version.pdf (ohsu.edu)
PSC, PSC-17 and Y-PSC (pediatric symptoms checklist)	Cognitive, emotional, and behavioral problems	Parents or youth ages ≥11 years	17 or 35	Youth and parent	Self-report	Tools/Professionals (brightfutures.org); psc_english_Y.PDF (massgeneral.org)
CES-DC (Center for Epidemiological Studies Depression Scale)	Depression	Children ages 6-17 years	20	Youth	Self-report	Microsoft Word - Center for Epidemiological Studies Depression Scale for Children (mhrbwcc.org); Tools/Professionals (brightfutures.org)
PHQ-9 "A" (Patient Health Questionnaire modified for teens)	Depression	Youth ages 11–17 years	9	Youth	Self-report	IHC MHI Depression Fact Sheet: Children and Adolescents (aacap.org)
PHQ-4 (Patient Health Questionnaire for Teens): Screens for depression and anxiety	Depression and anxiety	Youth ≥11 years	4	Youth	Self-report	PHQ-4.pdf (oregonpainguidance.org)
QEWPS-5 (Questionnaire on Eating and Weight Patterns)	Binge eating disorder (BED) and bulimia nervosa (BN)	Teens ages ≥12 years	26	Youth	Self-report	ptpmcrender.fcgi (europepmc.org); QWEP-5 (anzaed.org.au)

Figure 3. Pediatric mental health screening tools

behaviors, including in the family setting, can be used as a resource for RDNs working with families.[54] RDNs work with families in clinical, community, school, and home settings to comprehensively address opportunities and barriers in pediatric overweight and obesity treatment.

Weight Management Interventions with Nutrition Delivered Through Electronic Devices or via Interactive Remote Encounters

In individuals 2 to 17 years of age with overweight or obesity, no SRs were identified that met inclusion criteria and examined the effects of electronic/mobile health care (eHealth/mHealth) or telehealth-delivered weight management interventions. Therefore, evidence certainty was UNGRADED.

Implication for Practitioners. Use of telehealth to deliver nutrition care has increased over the past decade, and particularly since the onset of the COVID-19 pandemic.[86] Although research on use of eHealth, mHealth, and telehealth interventions are still emerging in pediatrics, substantial research supports the efficacy of telehealth interventions for BMI reduction and improved dietary quality in adults with chronic disease that can inform use in the pediatric population.[87,88] Children and adolescents have widespread access to electronic devices, providing opportunities for engaging nutrition interventions.

Multicomponent pediatric weight management programs are well suited to provide interventions delivered via electronic devices or interactive remote encounters. Offering telehealth visits may decrease the burden of transportation and logistics for patients' families while potentially improving engagement and satisfaction.[89] Telehealth visits also offer opportunities to provide group visits, enhance nutrition assessment by providing a window into a patient's and family's home environment, and allow for care coordination for patients with multiple caregivers or residing in multiple households.[90]

Limitations of using telehealth, mHealth, or eHealth include access to smart phone devices and high-speed internet access. Individuals who are racial or ethnic minorities, rural residents, and those with lower levels of education and income are less likely to have internet access at home.[91] In low-resource and rural areas, schools may be positioned as one solution to increase access to internet connectivity for family telehealth visits if schools can provide a private space for visits.[92] Language barriers may be amplified when using mobile apps for which instructions may not be available in multiple languages. Although several commercially available diet and physical activity apps are aimed at children and teens, these apps may not use evidence-based or expert recommendations. For example, the Kurbo app is designed to facilitate coaching between health educators and children, but there has been concern about potentially stigmatizing language or approaches.[93] Finally, when patients are seen remotely, self-reported weight and height are most often used, and this is a significant limitation for using telehealth for the treatment of pediatric obesity.[94,95] RDNs can provide caregivers with instructions on measuring children's height and weight accurately at home.[96]

With the emergence of telehealth, there are important additional professional, ethical, and legal considerations. Video conferencing platforms and applications must be Health Insurance Portability and Accountability Act compliant. Documentation should include the disclosure of protected health information for electronic and telephone communication, the patient's family's agreement to engage in electronic communication, payment information, and disclosure of how protected health information will be stored. RDNs must ensure a private, quiet, and professional space to conduct virtual visits. Patients also need access to a private, comfortable space. RDNs should be aware of legal implications when seeking to provide care via telehealth. These can include dietetics licensure, certain exemptions, and other restrictions related to telehealth. Review of current regulations is outside the scope of this paper; however, RDNs can review relevant state laws on the Center for Connected Health Policy,[97] as recommended by the Commission on Dietetic Registration.

Nutrition coverage for telehealth via Medicaid/Children's Health Insurance Program varies greatly because programs are managed at the state level. Under the Affordable Care Act, RDN-provided medical nutrition therapy related to preventive care services, including obesity screening and counseling for all age groups, are listed under the essential health benefit category. During the COVID-19 pandemic, virtual services for Medicare beneficiaries were expanded on a temporary and emergency basis, providing payment for covered telehealth services (subject to state law) in all areas, not just rurally, for new and existing patients seen by RDNs.[98] Whether the same coverage will exist post-pandemic is yet to be determined. The Center for Connected Health Policy has resources regarding insurance coverage and new policies during the COVID-19 pandemic.[97] Coverage from private health care plans can vary widely regarding length, number of appointments, and diagnoses, and is beyond the scope of this paper. RDNs should contact private payers to confirm policies regarding telehealth coverage.[99]

Considerations for Multi-Component Weight Management Interventions with Nutrition Delivered to Specific Groups

Evidence is lacking regarding pediatric weight management interventions that are specific and relevant to subpopulations, including, but not limited to, individuals who identify as racial or ethnic minorities, have low SES or high-risk social determinants of health, who are gender diverse, or who have experienced adverse childhood experiences (ACEs).[100-102] Therefore, evidence certainty was UNGRADED.

Implication for Practitioners. Some groups of children and adolescents require special consideration because they are disproportionately affected by overweight or obesity, have additional contributors to overweight or obesity (eg, medical conditions or environmental contributors), or have conditions or living situations in which responses to treatment approaches may differ from those of the general population.

Prevalence of overweight and obesity is higher among children who identify as racial and ethnic minorities or who are from families with low SES.[103] There are also disparities in access to intervention services, and when interventions *are* accessed, they may be less effective.[104-107]

The association between ACEs and obesity in adulthood has been

recognized for some time, and an association between ACEs and pediatric overweight and obesity has been identified as well.[108-110] Sexual abuse may have a greater effect on obesity than other ACEs, and there seems to be a cumulative effect, such that experiencing multiple ACEs may be associated with increased risk of obesity.[108]

The prevalence of overweight and obesity is higher among children with chronic health conditions.[111] Some conditions have features that predispose an individual to excessive weight gain, including but not limited to short stature, respiratory difficulties, hypotonia, or motor deficits that interfere with physical activity or need for medications that increase appetite. In other instances, behavior, lifestyle, and the disorder intersect (eg, rigidity associated with autism spectrum disorder contributes to excessive intake of a favorite food).[112,113]

Youth who identify as sexual or gender minorities, including youth who identify as transgender or whose gender identity or expression does not align with that assigned at birth, are at increased risk for overweight, obesity, and eating disorders, and gender diverse youth may experience weight-based victimization.[114-118] There can be cardiometabolic-related side effects to gender-affirming therapy,[119] and clear, evidence-based guidelines for interpretation of weight and other growth parameters for youth who are transgender are needed.

There is often overlap and intersection between factors that contribute to health disparities. For example, risk of overweight or obesity among children with neurodevelopmental disorders was higher if their family's income was below the poverty threshold and they experienced ACEs.[120]

For all populations described above, RDNs should use culturally appropriate assessment tools and educational materials in addition to inclusive language. Some resources are available for providing culturally sensitive care for patients with special needs, such as youth who are gender or sexual minorities.[121,122] RDNs should be aware of potential barriers to overweight or obesity treatment for specific groups.

Food insecurity is a barrier to healthy eating in a wide variety of patients' families, and it may be beneficial for RDNs to routinely screen for food insecurity. The "Hunger Vital Sign" is a validated two-item tool to screen households for food insecurity.[123] RDNs should be aware of local and community resources to facilitate healthy eating in patients with limited resources.

RDNs refer to and collaborate with other specialists when needed to address the complex needs of individuals with a range of social and health challenges (Fig 2). RDNs serve as educators to other health care professionals by understanding and discussing the complex relationships between exposures such as low SES or ACEs and development of overweight and obesity. Complex interventions, such as those that address multiple targets (system, community, and individuals) and multiple settings (school, health care), seem to be less likely to increase disparities.[106] Further research and policy development are needed to address disparities, including identifying gaps in care, expanding access to interventions, and ensuring that interventions do not further increase inequalities.

Reimbursement

Evidence describing cost-effectiveness of pediatric overweight and obesity treatment interventions was limited. Cost-effectiveness of pediatric overweight and obesity treatment interventions compared with usual care was demonstrated in two primary studies. Evidence certainty is VERY LOW.

Three SRs included cost-effectiveness of pediatric weight management programs, but two did not identify individual studies reporting this outcome.[32,67] A third SR described cost-effectiveness of specific interventions, including one to support clinical decisions and self-guided behavior and one multidisciplinary home-based program.[15]

Implication for Practitioners. Pediatric obesity is associated with higher hospitalization costs and charges[3] and directly increases lifetime medical costs compared with youth who do not have overweight.[4] Multicomponent interventions that include nutrition demonstrate improved outcomes.[9,13-15] A significant barrier to treatment of overweight and obesity is lack of insurance coverage and reimbursement.[124] Nutrition and other services needed for overweight and obesity management are not always reimbursed, and even when they are reimbursed, rates may not cover the actual cost of the service. Inadequate reimbursement also contributes to lack of services in rural and underserved areas, which is an additional barrier to obesity management.[125]

Adequate reimbursement is crucial for increasing access to effective nutrition services for children and adolescents with overweight or obesity. Obtaining adequate reimbursement will require demonstration of intervention efficacy on short-and long-term health outcomes, as well as cost-effectiveness. Studies with consistent methodology and outcome measures that examine direct and indirect costs and benefits of interventions provided by RDNs are needed.[126] Outcomes data can support increased reimbursement for nutrition and related services and also can be used to justify institutional support.[124] RDNs can participate in dietetics research through research projects within their university or organization or through the Academy's Nutrition Research Network and Evidence Analysis Center.[127,128]

Individual RDNs can advocate for reimbursement through the Academy's Action Center,[129] which allows Academy members and non-members to easily take action on nutrition issues, as well as through involvement in local, state, and governmental policy. RDNs also can be advocates for reimbursement by providing evidence-based practice and collecting outcomes data, including with the Academy of Nutrition and Dietetics Health Informatics Infrastructure tool.[130] Institutions can use innovative approaches to pediatric overweight and obesity treatment to increase reach and engagement, including through telehealth, group visits, and collaboration with community partners to increase cost efficiency.

New and novel models of care being explored to improve efficacy and cost-effectiveness include:

- Integrating RDNs into primary care practices[131]
- Improving access to RDNs[132]
- Family-based behavioral group interventions[85]
- Telehealth and other remote delivery methods

Implications of the COVID-19 Pandemic on Pediatric Weight Management Interventions

Children and adolescents with obesity face increased biological, psychological,

and socio-environmental risks as well as increased risk for severity of COVID-19 because of impaired immune response from chronic inflammation exacerbated by stress.[133] Although no SRs were identified in the umbrella review conducted for this Position Paper, a recent review conducted by Stavridou et al 2021[134] reported 15 articles from across the world describing changes in weight, eating behaviors, and physical activity during the COVID-19 pandemic in children, adolescents, and young adults. Weight gain reported in all groups was attributed to increased food intake, including potato chips, meat, and sugary drinks, as well as reduced physical activity because of restrictions imposed on structured sports, playgrounds, gyms, and other activities.

Health Disparities and Food Insecurity. The additional stress brought on by the COVID-19 pandemic compounds the stress already experienced by vulnerable populations from poverty, racism, and structural inequality. Pediatric individuals who are Hispanic, non-Hispanic Black, or publicly insured, or who are from families with lower incomes had increased rates of obesity as a result of the pandemic when compared with non-Hispanic White pediatric individuals who were not publicly insured.[135]

Several accommodations by the United States Department of Agriculture addressed food insecurity during the pandemic.[136] Despite these efforts, food insecurity dramatically increased during the pandemic[137,138] related to finances, difficulty accessing stores, and fear of transmitting or contracting the virus. Parents with food insecurity reported increased restriction of the amount of food offered to make the food at home last longer, pressure to eat, and using food as a reward and monitoring compared with food-secure parents.[138] Although literature is unclear whether food insecurity beyond the impact of poverty is an independent cause of pediatric obesity,[139] these conditions often coexist. Poor health outcomes are associated with food insecurity and malnutrition related to under- and over-nutrition in children.[139] Quality of evidence is impacted by the lack of consistency in the literature to measure food insecurity.[139]

Implication for Practitioners. The COVID-19 pandemic restrictions have disrupted everyday routines that often anchor health-promoting habits such as structured meals and physical activity. RDNs are well positioned to address challenges in pediatric weight management created or exacerbated by the COVID-19 pandemic. Suggested approaches include:

- Promote structured meals and snacks to make eating times predictable and alleviate stress around eating. Encourage family meals without electronic devices and promote conversations for social interaction.[140,141]
- Provide education on meal planning techniques to make the most of grocery shopping trips, including how to prepare healthy meals and snacks that use shelf-stable, frozen ingredients, and longer-lasting produce. RDNs provide education on budget-friendly meals and foster meal planning skills using low-cost, whole ingredients, which can be an important buffer against food insecurity.[142]
- Encourage physical activity. Interventions should include education and resources on how to promote physical activity in indoor spaces, taking into consideration that some families may have limited space.
- Acknowledge the stress brought on by the COVID-19 pandemic and discuss coping mechanisms. Make referrals to mental health professionals when appropriate.
- Screen for eating disorder behaviors that may have increased since the COVID-19 pandemic.
- Screen for food insecurity using a validated tool such as the United States Department of Agriculture two-item food insecurity tool,[123] and connect families with community and emergency food resources.
- Acknowledge that accessing healthy food on a budget can be hard rather than assuming there is a lack of interest or concern to improve dietary quality. Patient-centered communication improves the likelihood of therapeutic success.[143] Having open, honest conversations helps practitioners connect families with community and emergency food resources.
- Advocate and lobby for equitable health care and mental health care, food access, and safe public spaces for vulnerable populations.

Multicomponent pediatric weight management programs with nutrition should support families to address barriers to adopting and maintaining healthy lifestyle behaviors during the pandemic. Research will continue to evolve in the post–COVID-19 pandemic world to a "new normal" for dietetics practice.

LIMITATIONS AND FUTURE DIRECTIONS

Overall, nutrition intervention studies lack consistent methodology and outcome measures. Gaps in current evidence include lack of consensus for determining successful outcomes of multi-component pediatric obesity weight management interventions. Research is underway for investigating alternative BMI metrics. Additional gaps include the effect of medical nutrition therapy provided by an RDN for pediatric individuals with overweight or obesity, using appropriate BMI metrics and the long-term impact of interventions on eating disorder risk and behaviors. More research is needed to inform policies to decrease risk of ACEs, which impact development of overweight and obesity, and to ensure interventions do not further increase disparities for groups with higher risk for overweight and obesity. Evidenced-based guidelines for interpretation of anthropometrics and appropriate nutrition interventions for gender-diverse youth are needed. With emerging technology, future research should focus on how to integrate telehealth, mHealth, and in-person care to improve the patient–family experience and to determine effectiveness of caregiver involvement with these interventions. Finally, to ensure adequate reimbursement and access to care, future research must examine the efficacy of interventions provided by an RDN on short-and long-term health outcomes, including cost-effectiveness and benefits for children and adolescents with overweight or obesity.

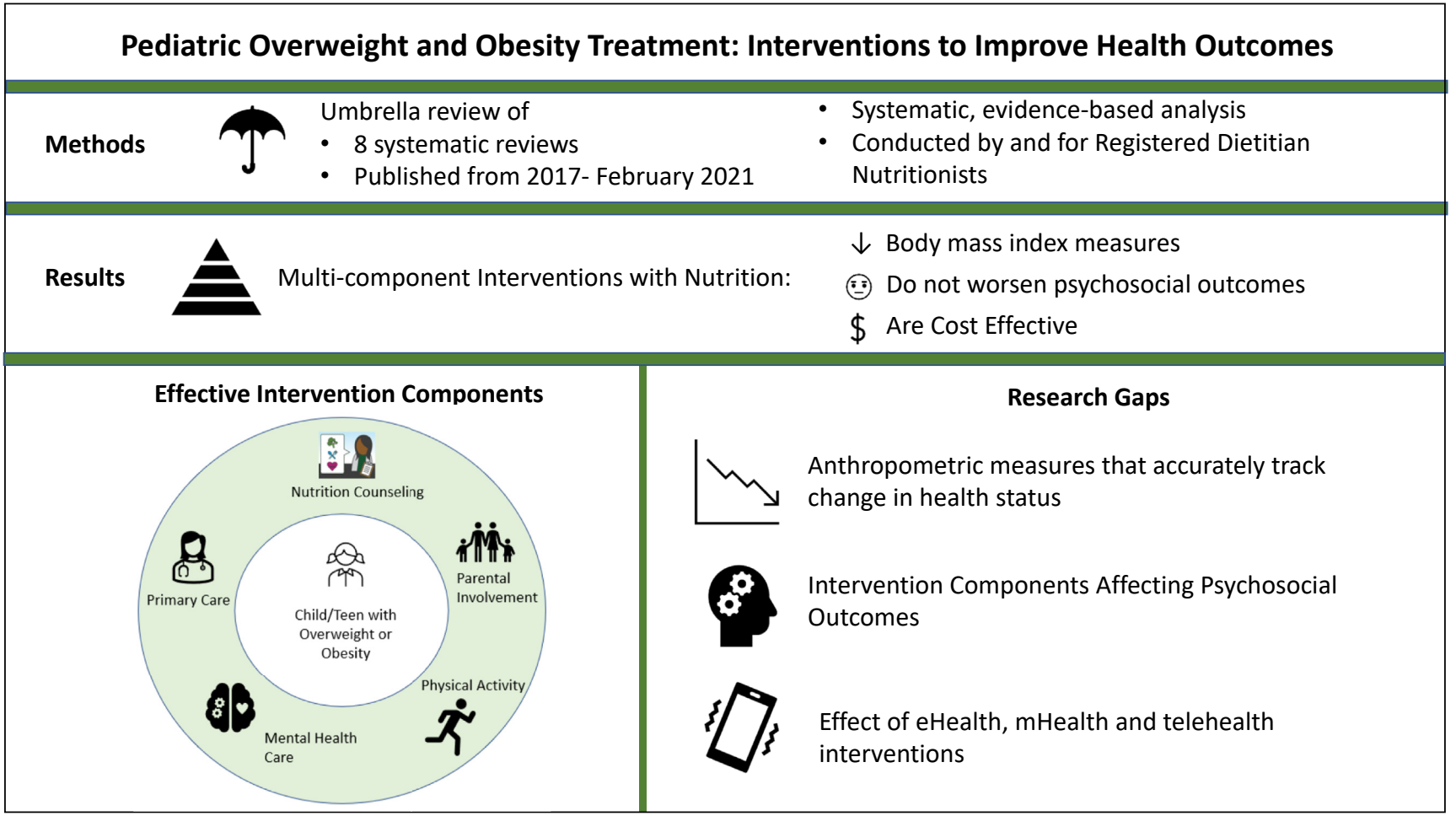

Figure 4. Visual summary of findings from an umbrella review of systematic reviews examining nutrition interventions for pediatric overweight and obesity treatment.

CONCLUSION

This Position Paper provides evidence that multi-component nutrition interventions are effective for treating pediatric overweight and obesity, and interventions including dietitians or international equivalents are more effective than those without. However, defining "successful" outcomes for pediatric weight management needs to go beyond improvement in weight status and other cardiometabolic outcomes. Screening for mental health status in youth with overweight and obesity at the onset of care and during treatment is important, particularly given the prevalence of depression, anxiety, weight stigma or bias, and potential risk for developing restricted eating post-treatment. To approach patients and families without judgment or blame, RDNs ensure that interactions do not add to the problem of weight stigma by using appropriate "people-first" language and understanding the complexities of overweight or obesity as a disease. RDNs collaborate with patients' families and multidisciplinary teams to address the complex, multi-level factors that contribute to pediatric overweight and obesity. More research is needed regarding BMI measures to effectively track change in health status, the effect of pediatric weight management treatment on psychosocial outcomes, and the effect of eHealth, mHealth, and telehealth interventions in overweight and obesity treatment. Major themes from this Position Paper and its supporting umbrella review are described in Figure 4.

References

1. Centers for Disease Control and Prevention. *Prevalence of Childhood Obesity in the United States*. U.S. Department of Health and Human Services; 2021. Accessed July 14, 2021. https://www.cdc.gov/obesity/data/childhood.html. Updated April 5, 2021.
2. Centers for Disease Control and Prevention. Childhood Obesity Causes & Consequences. U.S. Department of Health and Human Services; 2021. Accessed August 30, 2021. https://www.cdc.gov/obesity/childhood/causes.html#Consequences.
3. Kompaniyets L, Lundeen EA, Belay B, Goodman AB, Tangka F, Blanck HM. Hospital length of stay, charges, and costs associated with a diagnosis of obesity in US children and youth, 2006-2016. *Med Care*. 2020;58(8):722-726.
4. Finkelstein EA, Graham WC, Malhotra R. Lifetime direct medical costs of childhood obesity. *Pediatrics*. 2014;133(5):854-862.
5. Hoelscher DM, Kirk S, Ritchie L, Cunningham-Sabo L. Position of the Academy of Nutrition and Dietetics: Interventions for the prevention and treatment of pediatric overweight and obesity. *J Acad Nutr Diet*. 2013;113(10):1375-1394.
6. Handu D, Moloney L, Rozga MR, Cheng F, Wickstrom D, Acosta A. Evolving the Academy position paper process: Commitment to evidence-based practice. *J Acad Nutr Diet*. 2018;118(9):1743-1746.
7. Rozga M, Handu D. Current systems-level evidence on nutrition interventions to prevent and treat cardiometabolic risk in the pediatric population: An evidence analysis center scoping review. *J Acad Nutr Diet*. 2021;121(12):2501-2523.
8. Pollock MFR, Becker LA, Pieper D, Hartling L. Chapter V: Overviews of reviews. In: Higgins JPTTJ, Chandler J, Cumpston M, Li T, Page MJ, Welch VA, eds. *Cochrane Handbook for Systematic Reviews of Interventions version 6.2*. Cochrane; 2021.
9. Academy of Nutrition and Dietetics' Evidence Analysis Center. Pediatric weight management. Academy of Nutrition and Dietetics. Evidence Analysis Library Web site. 2021. Accessed August 30, 2021. https://andeal.org/pwm. Updated August 2021.
10. Centers for Disease Control and Prevention. *Defining childhood weight status*. Centers for Disease Control and Prevention; 2021. Accessed July 22, 2021. https://www.cdc.gov/obesity/childhood/defining.html.
11. Guyatt GH, Oxman AD, Vist GE, et al. GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008;336(7650):924-926.
12. Shea BJ, Reeves BC, Wells G, et al. AMSTAR 2: A critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ*. 2017;358:j4008.
13. Mead E, Brown T, Rees K, et al. Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years. *Cochrane Database Syst Rev*. 2017;6(6). 2017;Cd012651.
14. Al-Khudairy L, Loveman E, Colquitt JL, et al. Diet, physical activity and behavioural interventions for the treatment of overweight or obese adolescents aged 12 to 17 years. *Cochrane Database Syst Rev*. 2017;6(6). 2017;Cd012691.
15. Salam RA, Padhani ZA, Das JK, et al. Effects of lifestyle modification interventions to prevent and manage child and adolescent obesity: A systematic review and meta-analysis. *Nutrients*. 2020;12(8):2208.
16. Centers for Disease Control and Prevention. Z-score data files. Centers for Disease Control and Prevention. 2009. Accessed June 25, 2021. https://www.cdc.gov/growthcharts/data_tables.htm.
17. Hunt LP, Ford A, Sabin MA, Crowne EC, Shield JP. Clinical measures of adiposity and percentage fat loss: Which measure most accurately reflects fat loss and what should we aim for? *Arch Dis Child*. 2007;92(5):399-403.
18. Woo JG. Using body mass index Z-score among severely obese adolescents: A cautionary note. *Int J Pediatr Obes*. 2009;4(4):405-410.
19. Kelly AS, Daniels SR. Rethinking the use of body mass index z-score in children and adolescents with severe obesity: Time to kick it to the curb? *J Pediatr*. 2017;188:7-8.
20. Kelly AS, Barlow SE, Rao G, et al. Severe obesity in children and adolescents: Identification, associated health risks, and treatment approaches: A scientific statement from the American Heart Association. *Circulation*. 2013;128(15):1689-1712.
21. Freedman DS, Butte NF, Taveras EM, et al. BMI z-scores are a poor indicator of adiposity among 2- to 19-year-olds with very high BMIs, NHANES 1999-2000 to 2013-2014. *Obesity (Silver Spring)*. 2017;25(4):739-746.
22. Freedman DS, Butte NF, Taveras EM, Goodman AB, Ogden CL, Blanck HM. The limitations of transforming very high body mass indexes into z-scores among 8.7 million 2- to 4-year-old children. *J Pediatr*. 2017;188:50-56.e51.
23. Wang Y, Chen HJ. *Use of Percentiles and Z-Scores in Anthropometry*. New York: Springer; 2012.
24. Freedman DS, Berenson GS. Tracking of BMI z scores for severe obesity. *Pediatrics*. 2017;140(3).
25. Jebeile H, Gow ML, Lister NB, et al. Intermittent energy restriction is a feasible, effective, and acceptable intervention to treat adolescents with obesity. *J Nutr*. 2019;149(7):1189-1197.
26. Kumar S, King EC, Christison AL, et al. Health outcomes of youth in clinical pediatric weight management programs in POWER. *J Pediatr*. 2019;208:57-65.e54.
27. Vidmar AP, Goran MI, Raymond JK. Time-limited eating in pediatric patients with obesity: A case series. *J Food Sci Nutr Res*. 2019;2(3):236-244.
28. Eichen DM, Mestre ZL, Strong DR, Rhee KE, Boutelle KN. Defining and identifying predictors of rapid response to pediatric obesity treatment. *Pediatr Obes*. 2020;15(6). 2020;e12621.
29. Freedman DS, Woo JG, Ogden CL, Xu JH, Cole TJ. Distance and percentage distance from median BMI as alternatives to BMI z score. *Br J Nutr*. 2020;124(5):493-500.
30. Cardel MI, Atkinson MA, Taveras EM, Holm JC, Kelly AS. Obesity treatment among adolescents: A review of current evidence and future directions. *JAMA Pediatr*. 2020;174(6):609-617.
31. Thompson KL, Chung M, Handu D, et al. The effectiveness of nutrition specialists on pediatric weight management outcomes in multicomponent pediatric weight management interventions: A systematic review and exploratory meta-analysis. *J Acad Nutr Diet*. 2019;119(5):799-817.e743.
32. Flodgren G, Gonçalves-Bradley DC, Summerbell CD. Interventions to change the behaviour of health professionals and the organisation of care to promote weight

reduction in children and adults with overweight or obesity. *Cochrane Database Syst Rev*. 2017;11(11). 2017;Cd000984.

33. U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2020–2025*, 9th ed. December 2020.
34. U.S. Department of Agriculture. MyPlate Kids. 2021. Accessed September 9, 2021. https://www.myplate.gov/life-stages/kids.
35. Kirk S, Brehm B, Saelens BE, et al. Role of carbohydrate modification in weight management among obese children: A randomized clinical trial. *J Pediatr*. 2012;161(2):320-327.e321.
36. Kim J, Lim H. Nutritional management in childhood obesity. *J Obes Metab Syndr*. 2019;28(4):225-235.
37. Brauchla M, Juan W, Story J, Kranz S. Sources of dietary fiber and the association of fiber intake with childhood obesity risk (in 2-18 year olds) and diabetes risk of adolescents 12-18 year olds: NHANES 2003-2006. *J Nutr Metab*. 2012;2012:736258.
38. Pereira MA, Ludwig DS. Dietary fiber and body-weight regulation: Observations and mechanisms. *Pediatr Clin North Am*. 2001;48(4):969-980.
39. Ebbeling CB, Ludwig DS. Treating obesity in youth: Should dietary glycemic load be a consideration? *Adv Pediatr*. 2001;48:179-212.
40. Barlow SE. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics*. 2007;120(Suppl 4):S164-S192.
41. Gow ML, Ho M, Burrows TL, et al. Impact of dietary macronutrient distribution on BMI and cardiometabolic outcomes in overweight and obese children and adolescents: A systematic review. *Nutr Rev*. 2014;72(7):453-470.
42. Bravata DM, Sanders L, Huang J, et al. Efficacy and safety of low-carbohydrate diets: A systematic review. *JAMA*. 2003;289(14):1837-1850.
43. Sondike SB, Copperman N, Jacobson MS. Effects of a low-carbohydrate diet on weight loss and cardiovascular risk factor in overweight adolescents. *J Pediatr*. 2003;142(3):253-258.
44. Demol S, Yackobovitch-Gavan M, Shalitin S, Nagelberg N, Gillon-Keren M, Phillip M. Low-carbohydrate (low & high-fat) versus high-carbohydrate low-fat diets in the treatment of obesity in adolescents. *Acta Paediatr*. 2009;98(2):346-351.
45. D'Innocenzo S, Biagi C, Lanari M. Obesity and the Mediterranean diet: A review of evidence of the role and sustainability of the Mediterranean diet. *Nutrients*. 2019;11(6):1306.
46. Lari A, Sohouli MH, Fatahi S, et al. The effects of the Dietary Approaches to Stop Hypertension (DASH) diet on metabolic risk factors in patients with chronic disease: A systematic review and meta-analysis of randomized controlled trials. *Nutr Metab Cardiovasc Dis*. 2021;31(10):2766-2778.
47. Paula Bricarello L, Poltronieri F, Fernandes R, Retondario A, de Moraes Trindade EBS, de Vasconcelos FAG. Effects of the Dietary Approach to Stop Hypertension (DASH) diet on blood pressure, overweight and obesity in adolescents: A systematic review. *Clin Nutr ESPEN*. 2018;28:1-11.
48. Andela S, Burrows TL, Baur LA, Coyle DH, Collins CE, Gow ML. Efficacy of very low-energy diet programs for weight loss: A systematic review with meta-analysis of intervention studies in children and adolescents with obesity. *Obes Rev*. 2019;20(6):871-882.
49. Dalen J, Brody JL, Staples JK, Sedillo D. A conceptual framework for the expansion of behavioral interventions for youth obesity: A family-based mindful eating approach. *Child Obes*. 2015;11(5):577-584.
50. O'Reilly GA, Cook L, Spruijt-Metz D, Black DS. Mindfulness-based interventions for obesity-related eating behaviours: A literature review. *Obes Rev*. 2014;15(6):453-461.
51. Savoye M, Shaw M, Dziura J, et al. Effects of a weight management program on body composition and metabolic parameters in overweight children: A randomized controlled trial. *JAMA*. 2007;297(24):2697-2704.
52. DeBar LL, Stevens VJ, Perrin N, et al. A primary care-based, multicomponent lifestyle intervention for overweight adolescent females. *Pediatrics*. 2012;129(3):e611-e620.
53. Rolls BJ. Plenary Lecture 1: Dietary strategies for the prevention and treatment of obesity. *Proc Nutr Soc*. 2010;69(1):70-79.
54. Fisher JLJ, Miller L, Smethers A, Lott M. *EvidenceBased Recommendations and Best Practices for Promoting Healthy Eating Behaviors in Children 2 to 8 Years Executive Summary*. Durham, NC: Healthy Eating Research; 2021.
55. Loth KA, MacLehose RF, Fulkerson JA, Crow S, Neumark-Sztainer D. Food-related parenting practices and adolescent weight status: A population-based study. *Pediatrics*. 2013;131(5):e1443-e1450.
56. Satter EM. The feeding relationship. *J Am Diet Assoc*. 1986;86(3):352-356.
57. Satter E. Feeding dynamics: Helping children to eat well. *J Pediatr Health Care*. 1995;9(4):178-184.
58. Singhal V, Sella AC, Malhotra S. Pharmacotherapy in pediatric obesity: Current evidence and landscape. *Curr Opin Endocrinol Diabetes Obes*. 2021;28(1):55-63.
59. Srivastava G, Fox CK, Kelly AS, et al. Clinical considerations regarding the use of obesity pharmacotherapy in adolescents with obesity. *Obesity (Silver Spring)*. 2019;27(2):190-204.
60. Kelly AS, Fox CK, Rudser KD, Gross AC, Ryder JR. Pediatric obesity pharmacotherapy: Current state of the field, review of the literature and clinical trial considerations. *Int J Obes (Lond)*. 2016;40(7):1043-1050.
61. Nogueira I, Hrovat K. Adolescent bariatric surgery: Review on nutrition considerations. *Nutr Clin Pract*. 2014;29(6):740-746.
62. Fullmer MA, Abrams SH, Hrovat K, et al. Nutritional strategy for adolescents undergoing bariatric surgery: Report of a working group of the Nutrition Committee of NASPGHAN/NACHRI. *J Pediatr Gastroenterol Nutr*. 2012;54(1):125-135.
63. Armstrong SC, Bolling CF, Michalsky MP, Reichard KW. Pediatric metabolic and bariatric surgery: Evidence, barriers, and best practices. *Pediatrics*. 2019;144(6).
64. Academy of Nutrition and Dietetics' Weight Management Practice Group. *Academy of Nutrition and Dietetics Pocket Guide to Bariatric Surgery*. 3rd ed. Academy of Nutrition and Dietetics; 2021.
65. Inge TH, Coley RY, Bazzano LA, et al. Comparative effectiveness of bariatric procedures among adolescents: The PCORnet bariatric study. *Surg Obes Relat Dis*. 2018;14(9):1374-1386.
66. University of Colorado Anschutz Medical Campus. Teen-LABS Publications. Accessed December 1, 2021. https://medschool.cuanschutz.edu/surgery/research/teen-labs/publications/teen-labs-publications#ac-2020-1. Published 2021.
67. Brown T, O'Malley C, Blackshaw J, et al. Exploring the evidence base for Tier 3 specialist weight management interventions for children aged 2-18 years in the UK: A rapid systematic review. *J Public Health (Oxf)*. 2018;40(4):835-847.
68. Jebeile H, Gow ML, Baur LA, Garnett SP, Paxton SJ, Lister NB. Association of pediatric obesity treatment, including a dietary component, with change in depression and anxiety: A systematic review and meta-analysis. *JAMA Pediatr*. 2019;173(11). 2019;e192841.
69. Jebeile H, Gow ML, Baur LA, Garnett SP, Paxton SJ, Lister NB. Treatment of obesity, with a dietary component, and eating disorder risk in children and adolescents: A systematic review with meta-analysis. *Obes Rev*. 2019;20(9):1287-1298.
70. Follansbee-Junger K, Janicke DM, Sallinen BJ. The influence of a behavioral weight management program on disordered eating attitudes and behaviors in children with overweight. *J Am Diet Assoc*. 2010;110(11):1653-1659.
71. Haqq AM, Kebbe M, Tan Q, Manco M, Salas XR. Complexity and stigma of pediatric obesity. *Child Obes*. 2021;17(4):229-240.
72. Howes EM, Harden SM, Cox HK, Hedrick VE. Communicating about weight in dietetics practice: Recommendations for reduction of weight bias and stigma. *J Acad Nutr Diet*; 2021.
73. Dietz WH. The need for people-first language in our Obesity journal. *Obesity (Silver Spring)*. 2015;23(5):917.
74. Puhl RM, Himmelstein MS. Adolescent preferences for weight terminology used by health care providers. *Pediatr Obes*. 2018;13(9):533-540.
75. De Giuseppe R, Di Napoli I, Porri D, Cena H. Pediatric obesity and eating disorders symptoms: the role of the multidisciplinary treatment: A systematic review. *Front Pediatr*. 2019;7:123.
76. Stice E, Van Ryzin MJ. A prospective test of the temporal sequencing of risk factor emergence in the dual pathway model of eating disorders. *J Abnorm Psychol*. 2019;128(2):119-128.

77. Sutaria S, Devakumar D, Yasuda SS, Das S, Saxena S. Is obesity associated with depression in children? Systematic review and meta-analysis. *Arch Dis Child*. 2019;104(1):64-74.
78. Fox CK, Gross AC, Rudser KD, Foy AM, Kelly AS. Depression, anxiety, and severity of obesity in adolescents: Is emotional eating the link? *Clin Pediatr (Phila)*. 2016;55(12):1120-1125.
79. Rao WW, Zong QQ, Zhang JW, et al. Obesity increases the risk of depression in children and adolescents: Results from a systematic review and meta-analysis. *J Affect Disord*. 2020;267:78-85.
80. Mannan M, Mamun A, Doi S, Clavarino A. Prospective associations between depression and obesity for adolescent males and females: A systematic review and meta-analysis of longitudinal studies. *PLoS One*. 2016;11(6): e0157240.
81. Kang NR, Kwack YS. An update on mental health problems and cognitive behavioral therapy in pediatric obesity. *Pediatr Gastroenterol Hepatol Nutr*. 2020;23(1):15-25.
82. Appelhans BM, French SA, Bradley LE, Lui K, Janssen I, Richardson D. CHECK: A randomized trial evaluating the efficacy and cost-effectiveness of home visitation in pediatric weight loss treatment. *Contemp Clin Trials*. 2020;88:105891.
83. Roberts KJ, Binns HJ, Vincent C, Koenig MD. A scoping review: Family and child perspectives of clinic-based obesity treatment. *J Pediatr Nurs*. 2021;57:56-72.
84. Stark LJ, Filigno SS, Kichler JC, et al. Maintenance following a randomized trial of a clinic and home-based behavioral intervention of obesity in preschoolers. *J Pediatr*. 2019;213:128-136.e123.
85. Borner KB, Canter KS, Lee RH, Davis AM, Hampl S, Chuang I. Making the business case for coverage of family-based behavioral group interventions for pediatric obesity. *J Pediatr Psychol*. 2016;41(8):867-878.
86. Rozga M, Handu D, Kelley K, et al. Telehealth during the COVID-19 pandemic: A cross-sectional survey of registered dietitian nutritionists. *J Acad Nutr Diet*. 2021;121(12):2524-2535.
87. Kelly JT, Reidlinger DP, Hoffmann TC, Campbell KL. Telehealth methods to deliver dietary interventions in adults with chronic disease: A systematic review and meta-analysis. *Am J Clin Nutr*. 2016;104(6):1693-1702.
88. Huang JW, Lin YY, Wu NY. The effectiveness of telemedicine on body mass index: A systematic review and meta-analysis. *J Telemed Telecare*. 2019;25(7): 389-401.
89. DeSilva S, Vaidya SS. The application of telemedicine to pediatric obesity: Lessons from the past decade. *Telemed J E Health*. 2021;27(2):159-166.
90. Mehta P, Stahl MG, Germone MM, et al. Telehealth and nutrition support during the COVID-19 pandemic. *J Acad Nutr Diet*. 2020;120(12):1953-1957.
91. Pew Research Center. Internet/Broadband Fact Sheet. 2021. Accessed June 10, 2021. https://www.pewresearch.org/internet/fact-sheet/internet-broadband/. Updated 2021.
92. Hosseini H, Yilmaz A. Using telehealth to address pediatric obesity in rural Pennsylvania. *Hospital Topics*. 2019;97(3):107-118.
93. National Eating Disorders Association. NEDA statement on kurbo by WW APP. Accessed September 13, 2021. https://www.nationaleatingdisorders.org/neda-statement-kurbo-ww-app.
94. Stommel M, Osier N. Temporal changes in bias of body mass index scores based on self-reported height and weight. *Int J Obesity*. 2013;37(3):461-467.
95. Pursey K, Burrows TL, Stanwell P, Collins CE. How accurate is web-based self-reported height, weight, and body mass index in young adults? *J Med Internet Res*. 2014;16(1):e4.
96. Centers for Disease Control and Prevention. Measuring children's height and weight accurately at home. Accessed August 11, 2021. https://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/measuring_children.html. Updated May 15, 2015.
97. Center for Connected Health Policy. Understanding telehealth policy. 2021. Accessed August 11, 2021. https://www.cchpca.org/.
98. Centers for Medicare & Medicaid Services. Medicare Telemedicine Health Care Provider Fact Sheet. CMS.gov. Accessed August 11, 2021. https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet.
99. Peregrin T. Telehealth is transforming health care: What you need to know to practice telenutrition. *J Acad Nutr Diet*. 2019;119(11):1916-1920.
100. Kim K, Lee Y. Family-based child weight management intervention in early childhood in low-income families: A systematic review. *J Child Health Care*. 2020;24(2):207-220.
101. Tamayo MC, Dobbs PD, Pincu Y. Family-centered interventions for treatment and prevention of childhood obesity in Hispanic families: A systematic review. *J Commun Health*. 2021;46(3):635-643.
102. Kornet-van der Aa DA, Altenburg TM, van Randeraad-van der Zee CH, Chinapaw MJ. The effectiveness and promising strategies of obesity prevention and treatment programmes among adolescents from disadvantaged backgrounds: A systematic review. *Obes Rev*. 2017;18(5):581-593.
103. Centers for Disease Control and Prevention. Childhood Obesity Facts. 2021. Accessed July 27, 2017. https://www.cdc.gov/obesity/data/childhood.html.
104. Byrd AS, Toth AT, Stanford FC. Racial disparities in obesity treatment. *Curr Obes Rep*. 2018;7(2):130-138.
105. Mandelbaum J, Harrison SE, Brittingham J. Disparities in nutrition counseling at pediatric wellness visits in South Carolina. *Child Obes*. 2020;16(7):520-526.
106. Venturelli F, Ferrari F, Broccoli S, et al. The effect of public health/pediatric obesity interventions on socioeconomic inequalities in childhood obesity: A scoping review. *Obes Rev*. 2019;20(12):1720-1739.
107. Myers CA, Martin CK, Apolzan JW, et al. Food insecurity and weight loss in an underserved primary care population: A post hoc analysis of a cluster randomized trial. *Ann Intern Med*. 2021;174(7):1032-1034.
108. Schroeder K, Schuler BR, Kobulsky JM, Sarwer DB. The association between adverse childhood experiences and childhood obesity: A systematic review. *Obes Rev*. 2021;22(7). 2021;e13204.
109. Schuler BR, Vazquez C, Kobulsky JM, Schroeder K, Tripicchio GL, Wildfeuer R. The early effects of cumulative and individual adverse childhood experiences on child diet: Examining the role of socioeconomic status. *Prev Med*. 2021;145:106447.
110. McKelvey LM, Saccente JE, Swindle TM. Adverse childhood experiences in infancy and toddlerhood predict obesity and health outcomes in middle childhood. *Child Obes*. 2019;15(3):206-215.
111. Chen AY, Kim SE, Houtrow AJ, Newacheck PW. Prevalence of obesity among children with chronic conditions. *Obesity (Silver Spring)*. 2010;18(1):210-213.
112. Dhaliwal KK, Orsso CE, Richard C, Haqq AM, Zwaigenbaum L. Risk factors for unhealthy weight gain and obesity among children with autism spectrum disorder. *Int J Mol Sci*. 2019;20(13):3285.
113. Pham D, Silver S, Haq S, Hashmi SS, Eissa M. Obesity and severe obesity in children with autism spectrum disorder: Prevalence and risk factors. *South Med J*. 2020;113(4):168-175.
114. Schvey NA, Pearlman AT, Klein DA, Murphy MA, Gray JC. Obesity and eating disorder disparities among sexual and gender minority youth. *JAMA Pediatr*. 2021;175(4):412-415.
115. Grammer AC, Byrne ME, Pearlman AT, Klein DA, Schvey NA. Overweight and obesity in sexual and gender minority adolescents: A systematic review. *Obes Rev*. 2019;20(10):1350-1366.
116. Eisenberg ME, Puhl R, Watson RJ. Family weight teasing, LGBTQ attitudes, and well-being among LGBTQ adolescents. *Fam Community Health*. 2020;43(1):17-25.
117. Himmelstein MS, Puhl RM, Watson RJ. Weight-based victimization, eating behaviors, and weight-related health in sexual and gender minority adolescents. *Appetite*. 2019;141:104321.
118. Coelho JS, Suen J, Clark BA, Marshall SK, Geller J, Lam PY. Eating disorder diagnoses and symptom presentation in transgender youth: A scoping review. *Curr Psychiatry Rep*. 2019;21(11):107.
119. Hembree WC, Cohen-Kettenis PT, Gooren L, et al. Endocrine treatment of gender-dysphoric/gender-incongruent persons: An Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2017;102(11):3869-3903.
120. Mehari K, Iyengar SS, Berg KL, Gonzales JM, Bennett AE. Adverse childhood experiences and obesity among young children with neurodevelopmental delays. *Matern Child Health J*. 2020;24(8):1057-1064.
121. Rahman R, Linsenmeyer WR. Caring for transgender patients and clients: Nutrition-related clinical and psychosocial considerations. *J Acad Nutr Diet*. 2019;119(5):727-732.
122. Linsenmeyer W. Nutrition guidance for transgender and gender diverse individuals. 2021. Accessed August 11,

2021. https://sites.google.com/slu.edu/transgendernutrition/home.

123. Hager ER, Quigg AM, Black MM, et al. Development and validity of a 2-item screene to identify families at risk for food insecurity. *Pediatrics*. 2010;126(1):e26-e32.

124. Newsome FA, Dilip A, Armstrong SC, Salloum RG, Cardel MI. Scaling-up stage 4 pediatric obesity clinics: Identifying barriers and future directions using implementation science. *Obesity (Silver Spring)*. 2021;29(6):941-943.

125. Findholt NE, Davis MM, Michael YL. Perceived barriers, resources, and training needs of rural primary care providers relevant to the management of childhood obesity. *J Rural Health*. 2013;29(Suppl 1):s17-s24.

126. Zanganeh M, Adab P, Li B, Frew E. A systematic review of methods, study quality, and results of economic evaluation for childhood and adolescent obesity intervention. *Int J Environ Res Public Health*. 2019;16(3):485.

127. Academy of Nutrition and Dietetics. Nutrition Research Network. eatrightPRO. eatrightPRO Web site. 2021. Accessed September 13, 2021. https://www.eatrightpro.org/research/projects-tools-and-initiatives/nutrition-research-network.

128. Academy of Nutrition and Dietetics' Evidence Analysis Center. Evidence Analysis Library. Academy of Nutrition and Dietetics. 2021. Accessed September 13, 2021. https://www.andeal.org/.

129. Academy of Nutrition and Dietetics. Action Center. Academy of Nutrition and Dietetics. 2021. Accessed August 12, 2021. https://www.eatrightpro.org/advocacy/take-action/action-center.

130. Academy of Nutrition and Dietetics. ANDHII®. Academy of Nutrition and Dietetics. 2021. Accessed August 12, 2021. https://www.eatrightpro.org/research/projects-tools-and-initiatives/andhii.

131. Silberberg M, Carter-Edwards L, Mayhew M, et al. Integrating registered dietitian nutritionists into primary care practices to work with children with overweight. *Am J Lifestyle Med*. 2020;14(2):194-203.

132. Warner MF, Miklos KE, Strowman SR, Ireland K, Pojednic RM. Improved access to and impact of registered dietitian nutritionist services associated with an integrated care model in a high-risk, minority population. *J Acad Nutr Diet*. 2018;118(10):1951-1957.

133. Browne NT, Snethen JA, Greenberg CS, et al. When pandemics collide: The impact of COVID-19 on childhood obesity. *J Pediatr Nurs*. 2021;56:90-98.

134. Stavridou A, Kapsali E, Panagouli E, et al. Obesity in children and adolescents during COVID-19 pandemic. *Children*. 2021;8(2):135.

135. Jenssen BP, Kelly MK, Powell M, Bouchelle Z, Mayne SL, Fiks AG. COVID-19 and changes in child obesity. *Pediatrics*. 2021;147(5).

136. CONGRESS.GOV. H.R.748—CARES Act 116TH cONGRESS (2019-2020). U.S. Government Publishing Office. 2019-2020. Accessed June 10, 2021. https://www.congress.gov/bill/116th-congress/house-bill/748/text.

137. Schanzenbach DW, Pitts A. *Estimates of Food Insecurity During the COVID-19 Crisis: Results From the COVID Impact Survey, Week 1 (April 20—26, 2020)*. Institute for Policy Research Rapid Research Report; 2020.

138. Adams EL, Caccavale LJ, Smith D, Bean MK. Food insecurity, the home food environment, and parent feeding practices in the era of COVID-19. *Obesity (Silver Spring)*. 2020;28(11):2056-2063.

139. Spoede E, Corkins MR, Spear BA, et al. Food insecurity and pediatric malnutrition related to under- and overweight in the United States: An evidence analysis center systematic review. *J Acad Nutr Diet*. 2021;121(5):952-978.e954.

140. Jones BL. Making time for family meals: Parental influences, home eating environments, barriers and protective factors. *Physiol Behav*. 2018;193(Pt B):248-251.

141. Dallacker M, Hertwig R, Mata J. The frequency of family meals and nutritional health in children: A meta-analysis. *Obes Rev*. 2018;19(5):638-653.

142. Gundersen CG, Garasky SB. Financial management skills are associated with food insecurity in a sample of households with children in the United States. *J Nutr*. 2012;142(10):1865-1870.

143. Levinson W, Lesser CS, Epstein RM. Developing physician communication skills for patient-centered care. *Health Aff (Millwood)*. 2010;29(7):1310-1318.

This Academy of Nutrition and Dietetics position was approved by the Council on Research on January 18, 2022. The position paper was previously published September 2013. This position is in effect until December 31, 2029. Position papers should not be used to indicate endorsement of products or services. All requests to use portions of the position or republish in its entirety must be directed to the Academy at journal@eatright.org.

Reviewers: Jill Balla Kohn, MS, RDN, LDN (Director, Nutrition Information Services, Academy of Nutrition and Dietetics, Chicago, IL); Sarah Klemm, RDN, CD, LDN (Manager, Nutrition Information Services, Academy of Nutrition and Dietetics). *Nutrition Services Payment Committee*: Marcy Kyle, RDN, LD, CDCES, FAND (Diabetes Care and Education Specialist, Eastport Health Care); *House Leadership Teams*: Lona Sandon, PhD, RDN, LD (Program Director, Associate Professor, University of Texas Southwestern Medical Center).

AUTHOR INFORMATION

S. Kirk is a professor, University of Cincinnati Department of Pediatrics; director, HealthWorks!—pediatric weight management program at Cincinnati Children's Hospital Medical Center, Cincinnati, OH. B. Ogata is a lecturer, University of Washington, Department of Pediatrics, Seattle, WA. E. Wichert is a clinical dietitian III, Children's Hospital of Philadelphia, Philadelphia, PA. D. Handu is a senior scientific director, Academy of Nutrition and Dietetics Evidence Analysis Center, Chicago, IL. M. Rozga is a nutrition researcher II, Academy of Nutrition and Dietetics, Chicago, IL.

Address correspondence to: Mary Rozga, PhD, RDN, Nutrition Researcher II, Research, International and Scientific Affairs, Academy of Nutrition and Dietetics, 120 S., Riverside Plaza, Suite 2190, Chicago, IL 60606-6995. E-mail: mrozga@eatright.org

ACKNOWLEDGEMENTS

Umbrella Review Prevention Workgroup Members: The authors would like to thank Deanna Hoelscher, PhD, RDN, LD, CNS FISBNPA; Lynn Brann, PhD, RDN, FAND; and Sara O'Brien, MS, RDN. The authors thank the reviewers listed above and Academy member reviewers for their many constructive comments and suggestions. The reviewers were not asked to endorse this position or the supporting review.

STATEMENT OF POTENTIAL CONFLICT OF INTEREST

SK is the principal investigator for R34-DK118510-NIH/NIDDK grant and co-investigator for R01-IH/NIDDK grant. MR and DH are dietitians employed by the Academy of Nutrition and Dietetics. Authors had no other conflicts of interest to disclose.

FUNDING/SUPPORT

This systematic review was funded by the Academy of Nutrition and Dietetics.

AUTHOR CONTRIBUTIONS

All authors worked collaboratively to conceive of the research questions, eligibility criteria and outcomes. All authors screened studies for inclusion. MR extracted data and summarized evidence. MR and DH assessed risk of bias of included systematic reviews. All authors contributed to the first draft. All authors reviewed and edited the manuscript in detail and approved of the final draft.