



Family Meals and Cardiometabolic Risk Factors in Young Children

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Abstract

Purpose of the Review Family meals represent a novel strategy for improving cardiovascular health in youth. The purpose of this paper is to describe the association between family meals, dietary patterns, and weight status in youth.

Review Findings According to the American Heart Association's Life's Essential 8, poor diet quality and overweight/obesity status are key contributors to suboptimal cardiovascular health. Current literature highlights a positive correlation between the number of family meals and healthier eating patterns, including greater consumption of fruits and vegetables, and a reduced risk of obesity in youth. However, to date, the role of family meals in improving cardiovascular health in youth has been largely observational and prospective studies are needed to assess causality.

Summary Family meals may be an effective strategy for improved dietary patterns and weight status in youth.

Keywords Cardiovascular health · Family meals · Diet quality · Pediatric obesity

Introduction

Children are typically born with optimal cardiovascular health, as defined by the American Heart Association (AHA) Life's Essential 8™ [1•]. Primordial disease prevention and the maintenance of cardiovascular health through childhood are the goal and require preservation of four health behaviors and four health factors [1•]. However, atherosclerosis, the precursor of cardiovascular disease (CVD), often begins in childhood and risk factors represent early manifestations of CVD in youth. Risk factors for CVD are directly associated with obesity [2–7] and if retained into early adulthood are predictive of CVD in adults [8, 9]. Among the most salient of Life's Essential 8™ (Fig. 1) in youth is diet, physical activity, and weight status [10•].

The childhood years are a crucial time for the establishment of diet and physical activity behaviors [11]. In the USA, only 20% of children consume an ideal diet inclusive of 4–5 servings of vegetables and fruits [12–14]; diet quality based on adherence to the Dietary Guidelines for Americans is poor [15•, 16]. In youth, Health Eating Index (HEI) scores from 2017 to 2018 were lower than the population average of 58. HEI score fell from 58 to 54 for children 5–8 years old and to 53 for children 9–13 years old [17]. This trend in HEI indicates a lack of adherence to the Dietary Guidelines for Americans. Furthermore, approximately 75% of children do not meet the physical activity recommendation of ≥ 60 min per day [18, 19]. Suboptimal health behaviors contribute to energy imbalance and to the increasing prevalence of obesity. While not addressed within this review, these individual health behaviors related to energy imbalance do need to be more broadly considered within the context of social, cultural, environmental, and genetic influences.

To promote engagement in optimal diet and physical activity behaviors in children, strong evidence supports the use of family-based lifestyle modification particularly within the context of weight management interventions [20–28, 29•]; the majority of work established in 6–12 years old [20, 23, 24, 26–28, 30]. These interventions have shown significant impacts on weight; however, few have described subsequent cardiometabolic outcomes. A systematic review of youth at risk for type 2 diabetes, who

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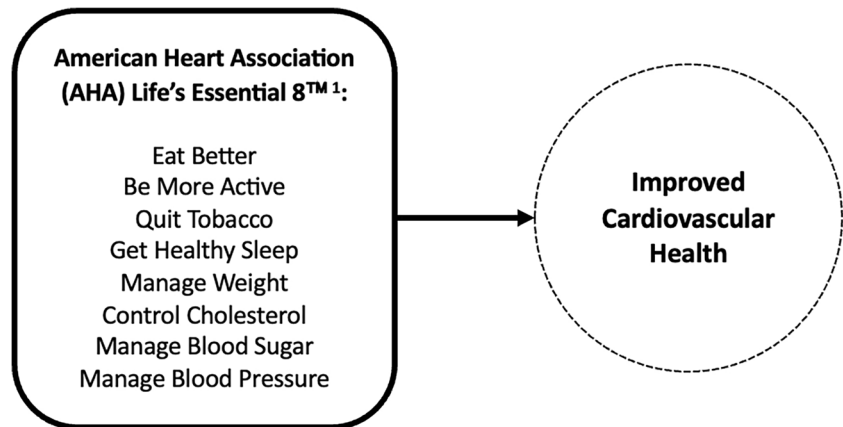
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Fig. 1 Key measures for improving and maintaining cardiovascular health



engaged in behavioral interventions, examined cardiometabolic outcomes (e.g., blood pressure and blood glucose) in addition to weight and found cardiometabolic outcomes were maintained within normal levels post-intervention [31]. There is an opportunity for greater inclusion of objective measures of cardiovascular health within family-based lifestyle interventions.

Unique to lifestyle interventions in youth is the family-based approach. The inclusion of a parent or family unit is underscored as an effective component of family-based lifestyle modification interventions [29•]. Embedded within the family-based approach is parental modeling, whereby both the parent and child work toward the same health behavior changes. For example, if a child reduces their sugar sweetened beverage intake, the parent should do so as well. Traditionally family-based lifestyle modification is more focused at the individual level with delivery of the intervention to the parent and/or child. Changes at the family level are encouraged through the physical food environment where parents are often considered to be the gatekeepers of food for youth [32]. Indeed, the feeding environment has been recognized as a key influence that can encourage and support healthy eating practices among children [33].

Within the home feeding environment there are social factors (e.g., family meals) and physical factors (e.g., availability of foods) that can influence diet, one of the health behaviors identified as suboptimal in children by Life's Essential 8™ [1•, 10•]. One of the most studied factors observationally within the home feeding environment has been family meals. Family members eating meals together more frequently has been promoted by national organizations such as the American Academy of Pediatrics [34] and the American Heart Association [35] in addition to being suggested for health promotion [36–38]. Family meals may serve as a protective factor for cardiovascular health in youth given the positive relationship with healthy eating behaviors and obesity prevention. The purpose of this paper is to review findings examining the relationship between family

meals, diet, and weight status in youth from a cardiovascular health perspective.

Characterization of Family Meals

The definition of family meals varies [39•, 40–42]. Family meals have been defined based on the presence of other individuals (most or all family members or having at least one parent) at a meal [43, 44•] or an occasion at specified times of the day where most, if not all members of the immediate family, eat meals together [39•]. The majority of literature has characterized family meals based on frequency with less specification about structural characteristics such as meal type, location, length, and/or identification of who is present at the family meal [40]. Understanding the types and quality of foods consumed at family meals is even more limited with further complexities related to family meals occurring at eating establishments away from home. Initial research examining family meals has been largely supported by the Project EAT (Eating and Activity over Time) body of work which was established in 1997 at the University of Minnesota [45].

Family Meals and Diet

As shown in Fig. 1, diet, a key health behavior identified by Life's Essential 8™ [1•], is often targeted for change to improve cardiovascular health outcomes. Standard dietary strategies used in interventions with youth typically include counting calorie intake and/or measuring consumption of specific food groups (e.g., fruits, vegetables) daily. Family meals may offer an alternative intervention target. While more frequent family meals have been associated with improvements in diet [39•, 43, 44•, 45–48], the evidence has been largely observational. The most consistent evidence of associations with frequent family meals and diet has been with fruit

and/or vegetable consumption or a broader healthier eating pattern [43, 44•, 46•, 49]. The relationship between family meals and additional dietary behaviors, such as consumption of sugar sweetened beverages and snack foods, has found mixed evidence and lack of statistical evidence, respectively [44•].

Findings from a meta-analysis of cross-sectional studies concluded that more frequent family meals and more frequent family dinner meals were weakly associated with fruit and vegetable intake [44•]. Longitudinal studies have further supported these findings [50–52]. In contrast, one of the few experimental studies used a quasi-experimental design over 10 weeks focused on increasing family meal frequency (≥ 5 times/week) and found fruit and vegetable intake did not change [53]. However, family meals as an intervention target were not integrated within a classic family-based behavioral intervention which may have limited findings. Additional experimental studies [54, 55] include family meals as one of many intervention goals and, thus, have not isolated family meals as an exposure. This lack of isolation has made it difficult to attribute outcomes specifically to family meal frequency.

With greater focus on consumption of a healthy dietary pattern (e.g., increase in nutrient dense foods, decrease in energy-dense foods) [1•, 15•], metrics such as the HEI that measure adherence to the Dietary Guidelines for Americans offer a comprehensive assessment of the diet. Albeit weak, a meta-analysis of cross-sectional studies found more frequent family meals were associated with higher HEI-2010 total scores [44•]. Additional work using nine different frequency measures has shown that more family dinner meals are associated with higher HEI scores, indicators of higher diet quality across all measures [56]. Several studies have characterized a healthier dietary pattern more broadly and have found support of a positive relationship with family meals [49, 57]. Specifically, a systematic review looking at frequency of family meals and healthy dietary patterns in older children (10–19 years old) [49] and the European Feel4Diabetes study conducted across six European countries (Greece, Spain, Bulgaria, Hungary, Belgium, Finland) in younger children found evidence of a positive relationship between more frequent family meals and a healthier dietary pattern [57].

Taken together, findings which are largely observational, indicate more frequent family meals may be a promising strategy for improving diet quality in youth. Qualitative data indicate parents view family meals favorably [39•]. This is important because favorability encourages uptake of family meals and high uptake is associated with improved diet. Improvements in diet are essential given diet is a key health behavior and independently

associated with cardiovascular health in adults [58]. In addition to consuming a diet of good quality in childhood, maintaining a healthy weight is also necessary for the primary prevention of CVD [59].

Family Meals and Weight Management

In youth, family meals have also been considered in relationship to weight management, a health factor identified for Life's Essential 8™ [1•] required for cardiovascular health. Indeed, the prevalence of obesity (BMI for age and sex $\geq 95^{\text{th}}$ percentile) continues to climb in pediatric populations with the most current prevalence estimate of 21.5% in US children (2–19 years old) according to National Health and Nutrition Examination Survey 2017-2020 data [60]. Once obesity in childhood is established it is difficult to reverse. There is therefore a critical need to maintain a healthy weight in childhood [61]. More frequent family meals have been related to a decreased risk of overweight and obesity [36, 45, 47, 62, 63]. A meta-analysis of 57 studies found that more frequent family meals was significantly associated with a lower BMI in children ($r = -0.05$, 95% CI $[-0.06, -0.03]$) [64]. These findings were similar from an earlier meta-analysis which showed children and adolescents who shared family meals ≥ 3 times per week were more likely to have normal weight compared to those who ate less frequent family meals (< 3 time per week) [43]. These meta-analysis findings support an earlier study using the Early Childhood Longitudinal Study, Birth Cohort a nationally representative datasets that showed more frequent evening family meals (> 5 nights per week) was associated with a reduced risk for overweight and obesity in preschool-aged children [adjusted OR (95%CI): 0.77 (0.65–0.92)] compared to those not eating frequent evening meals [65].

The European Feel4Diabetes study conducted across six European countries analyzed data from 989 parent-child dyads and found family dinner frequency inversely associated with BMI in boys ($\beta = -0.182$, $p = 0.021$) and girls ($\beta = -0.124$, $p < 0.001$) at baseline [66•]. According to this 2-year longitudinal study, family meal breakfast frequency and family meal dinner frequency were inversely associated with BMI in boys and girls and an increase in family meal frequency was associated with a decreased odds of being in a higher BMI category within the 2-year period [66•]. These findings are further supported by a 10-year longitudinal study that reported family meals may have a lasting protective effect as higher family meal frequency was significantly associated with reduced odds of overweight/obesity in young adulthood [36]. Family meals appear to be a protective factor for weight management, but causality cannot be inferred based on the lack of randomized intervention studies conducted to date.

Family Meals and Additional Health Outcomes

To our knowledge, the relationships between family meal frequency and health factors such as blood pressure, cholesterol, and blood glucose identified in Life's Essential 8™ [1•] are unknown. Understanding if more frequent family meals improve health factors beyond just health behaviors will be important to move this body of work forward. While not the purpose of this review, it is important to note that more frequent family meals have been associated with important psychosocial outcomes such as improved self-esteem and sense of well-being [46•, 56, 67–69]. Family meals have also been associated with reduced engagement in high-risk behaviors [46•, 70–72].

Family Meals as an Intervention Target

Observational data provide a positive signal that family meal frequency may be an important strategy to promote optimal cardiovascular health through the promotion of a healthful diet and healthy weight status in youth. Intervention studies investigating family meals have been conducted but have not isolated family meals as the intervention target limiting the ability to attribute findings to family meals [39•]. A well-designed randomized intervention is a logical next step to advance this body of work that may better illuminate findings [39•, 44•, 64]. Despite the inability to infer causality, qualitative research has demonstrated parents are motivated to have family meals given the perceived positive experience and practicality [39•]. The potential uptake of family meals as an intervention target in contrast to individually focused targets makes it a promising approach.

Conclusion

In youth, family meals are associated with healthy eating patterns and reduced risk of obesity. These associated outcomes are two key components of Life's Essential 8™ [1•] (Fig. 1) [10•]. Clinicians should consider family meals as an upstream factor that is related to cardiovascular health and may want to consider presenting family meals as a vehicle for promoting healthy dietary patterns, preventing childhood obesity, and reducing CVD risk factor burden.

Further research is needed to elucidate the exact mechanisms driving the relationship between family meal frequency and cardiovascular health. This will require a stronger structural definition of a family meal and

consideration of family meals as an isolated intervention target within the context of family-based behavioral intervention studies.

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Declarations

Conflict of Interest CBS served as a speaker for the Cardiometabolic Health Congress (topic: childhood obesity) and a speaker for the National Academy of Continuing Medical Education (topic: homozygous familial hypercholesterolemia). She also reports grant support as the Site Primary Investigator for the Regeneron Evkeeza trial. She is the immediate past chair of the American Heart Association Atherosclerosis, Hypertension and Obesity in the Young Committee.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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