Title

Supporting early childhood routines to promote cardiovascular health across the life course.

Journal

Current Problems in Pediatric and Adolescent Health Care, 53(5)

Authors

Kim, Leah
Duh-Leong, Carol
Nagpal, Nikita
et al.

Publication Date

2023-05-01

DOI

10.1016/j.cppeds.2023.101434

Peer reviewed

HHS Public Access

Author manuscript

Curr Probl Pediatr Adolesc Health Care. Author manuscript; available in PMC 2024 October 09.

Published in final edited form as:

Curr Probl Pediatr Adolesc Health Care. 2023 May ; 53(5): 101434. doi:10.1016/j.cppeds.2023.101434.

Supporting Early Childhood Routines to Promote Cardiovascular Health across the Life Course

Leah Kim, BA[*,1], **Carol Duh-Leong, MD, MPP**[*,2], **Nikita Nagpal, MD, MS**[2], **Robin Ortiz, MD, MS**[*,2,3,4], **Michelle W. Katzow, MD, MS**[5], **Shirley Russ, MD, MPH**[6,7], **Neal Halfon, MD, MPH**[6,7,8,9]

[1]NYU Grossman School of Medicine, 550 First Avenue, New York, NY, 10016, USA

[2]Department of Pediatrics, NYU Grossman School of Medicine, New York, NY

[3]Department of Population Health, NYU Grossman School of Medicine, New York, NY

[4]Institute for Excellence in Health Equity, NYU Langone Health, New York, NY

[5]Department of Pediatrics, Zucker School of Medicine at Hofstra/Northwell, New Hyde Park, NY

[6]Center for Healthier Children, Families, and Communities, University of California, Los Angeles, Los Angeles, CA

[7]Department of Pediatrics, Geffen School of Medicine, University of California, Los Angeles, Los Angeles, CA

[8]Department of Health Policy and Management, UCLA Fielding School of Public Health, Los Angeles, CA

[9]Department of Public Policy, UCLA Luskin School of Public Affairs, Los Angeles, CA

Abstract

Optimal cardiovascular health is an essential component of human health and well-being across the life course. Heart healthy practices around diet, physical activity, and sleep early in childhood have the potential to greatly improve lifespan and quality.[1] Early childhood routines, defined as functional practices that are predictable and repeatable, predict positive growth and development across the lifecourse.[2–4] The American Heart Association has identified key heart healthy routines, such as daily regular activities including diet, physical activity, and sleep that promote cardiovascular health.[5] Integrating the strength-based relational aspects of routines with the acquisition of cardiovascular health development capabilities allows children to establish their own optimal cardiovascular health trajectory early on. A systematic life course approach to supporting heart healthy routines in early childhood would inform clinical, research, and policy strategies to

Corresponding Author: Leah Kim, BA, NYU Grossman School of Medicine, 550 First Avenue, New York, NY, 10016, USA, leah.kim@nyulangone.org.

*Co-first authorship

Conflicts of Interest: The authors have no conflicts of interest relevant to this article to disclose.

promote long-term cardiovascular health, and contribute to reducing inequalities in cardiovascular outcomes.

INTRODUCTION

In the US, exponential advances in public health and medicine have extended life expectancy over the last two centuries.[1] Yet, cardiovascular disease remains a barrier to further extension of life expectancy and human flourishing.[1,6,7] During the Coronavirus-19 pandemic, US deaths from cardiovascular disease rose and have not yet fallen, remaining the number one cause of death nationally.[8] To promote cardiovascular helath, the American Heart Association (AHA) has released a preventive medicine paradigm called Life's Essential 8, composed of guidance around diet, physical activity, nicotine avoidance, sleep, weight management, lipids, glucose, and blood pressure management.[5] The etiology of cardiovascular disease is multifactorial, including genetic predisposition, lifetime exposures to chronic stress, and modifiable practices, or behaviors, around diet, activity, and sleep.[8] An expansive body of literature has shown that adult cardiovascular outcomes can be traced back to measurable indicators in childhood (e.g., body mass index [BMI]).[9,10] Subsequently, the American Academy of Pediatrics (AAP) has endorsed pediatric-specific guidelines around practices related to diet, physical activity, and sleep beginning in early childhood, with recommendations evolving per developmental stage as the child progresses through childhood (Table 1).

These diet, physical activity, and sleep practices occur along the life course, but when practices are established very early in childhood as routines, they are more likely to persist into adulthood.[11] A child's developmental ecosystem is a complex, interdependent processes; small changes in the system can have reverberating, outsized effects throughout the system over time. The development of routines, for example, are of particular importance early in childhood because they help children develop self-regulation and independence, which have long-term effects.[12] Furthermore, adverse events and experiences in early childhood are associated with chronic toxic stress,[13] which set in train physiologic and biologic patterns of over-reactivity. Early routines, characterized by predictability and stability, could mitigate some of these adverse impacts with potential attenuation of stress responses and further benefits for lifelong health. Early childhood routines occur when functional practices become predictable and repeatable, laying the groundwork for them to become habits later on (Figure 1), which are repeated practices that occur without conscious intention or thought.

In this review paper, we apply a life course health development approach to review evidence about heart healthy practices and discuss the evidence base for how clinical interventions can foster these practices into routines early in life (Table 2; Figure 1). The life course health development approach suggests that health is best regarded as an emergent, dynamic and developmental process that is influenced not just by a person's genetic predisposition but also by their multi-level physical and social environment.[14] Health development continues throughout the stages of the life course (Table 2), but it is particularly sensitive to events and experiences at certain developmental stages (e.g. early childhood).[15] The main benefits

of using a life course approach to support heart healthy routines to promote cardiovascular health is that it is interdisciplinary, integrates social, biological and relational explanations of health, and synthesizes multiple models of health and chronic disease.[10,16] Finally, the life course approach focuses on the positive development of health, and examines what can be done to improve all aspects of children's developmental ecosystems early in life to improve health trajectories and experiences across the whole of the lifespan.

The goal of this review is to identify evidence-based early childhood heart healthy routines and to support child health practitioners to promote those routines with the children they serve so as to positively impact cardiovascular health across the life course.[14,17] We primarily discuss dietary routines, as these practices have ample evidence in regard to cardiovascular health and are one of the first routines caregivers practice with their infants. We then apply similar principles to discuss physical activity and sleep, recognizing that the life course approach takes an integrated view that acknowledges the inter-connected, relational nature of dietary, physical activity and sleep routines.

HEALTH IS A DEVELOPMENTAL PROCESS

Longitudinal Effects

Scientific studies have identified childhood as a period of rapid growth and development where experiences and exposures are particularly influential for long-term cardiovascular health outcomes, reinforcing the importance of the establishment of heart healthy routines during this time period.[9,18–21] Indicators of long-term risk for adult cardiovascular disease are already measurable in childhood (e.g., BMI, biomarkers).[9,18–27] For example, analysis of data from the International Childhood Cardiovascular Cohort Consortium, a prospective cohort study of 38,589 participants tracking childhood risk factors from ages 3 to 19, showed that children with elevated composite score of BMI, systolic blood pressure, total cholesterol level, triglyceride level, and smoking demonstrated a hazard ratio of 2.71 for a fatal cardiovascular event in adulthood per unit increase.[19] Reinforcing these findings, another longitudinal cohort study followed 9,388 children from age 8 to adulthood and stratified participants based on body mass index, total cholesterol, blood pressure, and glucose to one of three cardiovascular levels (ideal, intermediate, and poor).[9] By age 8, some children already did not qualify for the "ideal" cardiovascular level based on suboptimal measurements of the four markers listed, highlighting the importance of early interventions to optimize routines far earlier than age 8.[9] Moreover, these stratifications (ideal, intermediate, poor) predicted higher carotid intima-media thickness in adulthood, emphasizing that the origins of adult cardiovascular outcomes begin in childhood.[9]

Researchers have also detected evidence that cardiovascular risk may begin *in utero*, far earlier than age 8. For example, the original and life course field-defining Barker hypothesis as well as the developmental origins of health and disease approach are theories in response to the observed association between intra-uterine growth restriction and the development of hypertension and cardiovascular disease in mid-life.[28] This has led to the suggestion that fetal under-nutrition results in a "thrifty phenotype" adaptation that helps to ensure fetal survival when nutrition is scarce, yet becomes maladaptive later in the life course when nutrition is in abundant supply.[28] Increased prenatal levels of oxidative stress, which

reflect exposures to environmental and psychosocial stressors in the course of daily life, are associated with rapid infant weight gain (> 0.67 increase in weight-for-age z-score in the 1st year of life) early in life.[29,30] Rapid infant weight gain subsequently predicts increased adiposity decades later in adulthood[31,32] suggesting one potential mechanism linking prenatal stress with adult cardiovascular risk. Pregnant women with poor diet quality were more likely to give birth to large for gestational age babies, even after controlling for maternal obesity.[33] Infants born large for gestational age have increased risk for obesity and metabolic syndrome as adults.[34] This evidence suggests the need for an intergenerational approach to heart healthy routines, whereby greater attention to the mother's own heart healthy routines and nutrition during pregnancy may be an essential component of cardiovascular health promotion for her developing baby with potential to help avert poor cardiovascular outcomes in adulthood for both mother and child.

Strategically Timed Intervention

Given the heavy influence of the early childhood period on later cardiovascular health, pediatric counseling is particularly important for prevention and optimization of health across the life course. Empowering caregivers with the understanding that what they do with their child early in life has lifelong impacts may increase activation and prioritization of healthy early childhood routines. To support these efforts, clinical interventions focused on early childhood may also strategically leverage pediatric primary care and their widely attended health visits in infancy to target early childhood routines.

Strategic timing of interventions early in life not only gives children a biological advantage by improving early indicators of cardiovascular pathology, but also a behavioral advantage because healthy routines early in life are more likely to develop into habits that become more effortless in adulthood.[35] Establishing childhood heart healthy routines has been shown to have longitudinal beneficial influences on heart healthy habits in adulthood. Specific to diet, a cohort of 1,768 Finnish children in the Cardiovascular Risk in Young Finns Study showed that 3-year-olds who consumed more meat and carbohydrates continued consumption routinely at age 24, and children who ate more healthy foods like fruits continued to do so well into adulthood.[36] In terms of physical activity, participants in the Young Finns Study demonstrated that physical activity routines at age 3 predicted adult physical activity, measured every three years from ages 24 to 39.[37] For sleep, studies showed that sleep problems beginning in infancy persist into childhood. Although sleep patterns shift in adolescence as part of development, overall sleep length and trends in sleep problems persist from early childhood.[38–40] Given evidence that heart healthy routines in early childhood are likely to endure through adulthood, impacting routines early in life is a strategic approach.

Developmentally Focused

Interventions to optimize early childhood routines to meet health goals should reflect the developmental stage of the target child to match increasing levels of independence. Much of the literature supporting the benefits of behavioral routines is premised on models aiming to prevent childhood obesity, which is just one risk factor for cardiovascular morbidity and mortality later in life.[41–43] However, factors linked to childhood obesity are frequently also

linked to diet, physical activity, and sleep behaviors that are likely independent risk factors for cardiovascular disease.[44–46] Based on this literature, child health practitioners should support developmentally appropriate family routines related to diet, physical activity, and sleep to promote healthy habits that will optimize long-term cardiovascular health.

The time spanning early pregnancy and age 2, labeled the first 1000 days of life, has proven to be an important period in the development of increased obesity risk.[47,48] Feeding and diet-related routines are among the first to be established. Most healthy newborns can be fed on demand, and by 1 to 2 months, feeding routines should be flexibly timed to respond to the infant's hunger and fullness cues.[49] Responsive feeding has been linked to lower rates of child obesity and is a common target of early obesity prevention interventions.[50] Responding to the child's cues related to food, known as responsive feeding, promotes the child's ability to self-regulate and recognize his/her own internal hunger and fullness cues later on in infancy and childhood.[51] In order to achieve this, the caregiver needs to learn how to recognize these cues, and know how to respond appropriately. Self-regulation, or a child's ability to control one's own behavior, is a key component of a child's ability to set routines.[12] By 9 months, set meal and snack times become an important diet-related routine in which families should practice appropriate division of responsibility around food as a child grows in independence.[52] This means that the caregiver determines when and where the meal occurs, as well as the foods that are offered, but the infant chooses what and how much to eat.[52] Establishing meal and snack-time routines that consistently reflect these divisions of responsibility can prevent struggles related to picky eating and promote consumption of healthy foods like fruits and vegetables in the subsequent years, a key protective factor against cardiovascular disease.[53] Routines that include family meals without distractions (i.e., screens) provide an opportunity for caregiver modeling of healthy behaviors and healthy relationship building (See Relational Determinants of Health).

Similar principles guide the development of physical activity and sleep routines. For example, establishing routines for physical activity can also begin at birth with supervised daily tummy time and increasing awake time unrestrained to support motor development, exploration, and physical engagement with the infant's surroundings in conjunction with increasing independence.[54] Although more research needs to be done on the effect of tummy time on cardiovascular health outcomes, multiple studies have shown positive effects on motor skills, and one study has shown tummy time correlating with lower infant BMIs.[54] Thus, encouraging physical activity routines may begin from birth. The literature supporting the importance of routines for the purposes of obtaining adequate quality and quantity of sleep in childhood is robust, although more work needs to be done to link sleep in childhood to cardiovascular disease in adulthood. Table 1 highlights age-appropriate bedtime routines that are tailored to the child's developmental stage.

HEALTH IS A MULTI-LEVEL PROCESS

Heart healthy routines exist within a multi-level context. Particularly for young children who are growing, learning, and absorbing many experiences for the first time, their daily routines are influenced by disparities in structural determinants including their household and neighborhood context.[55,56] Depending on a child's developmental stage, caregivers and

other family members facilitate the majority or almost all daily routines. These families also exist within communities that possess cultural strengths that can bolster healthy routines and rituals and build family cohesion, particularly in the face of challenges and adversity.

Structural Determinants of Health

Leading medical and public health organizations including the World Health Organization, the National Academies of Sciences, Engineering and Medicine, and the American Academy of Pediatrics have all highlighted that health disparities have their origins in structural inequalities in access to resources that shape the conditions in which children are born, grow, play, and work.[57–65] Given that 16.9% of children in the US live in poverty, promoting healthy routines requires an understanding of structural determinants of health development that shape health behaviors and may hinder the formation of routines.[66] These developmental ecosystem conditions include household factors (e.g., material hardships like food insecurity) and neighborhood characteristics (e.g., park and healthy food access), that may create developmental disparities in the ability to provide heart healthy routines beginning in infancy.

A growing body of evidence has established the deleterious effects of disparities in household resources on diet, physical activity, and sleep.[55,56] Examples of household disparities include material hardships, or the inability for families to meet basic needs like food insecurity or housing disrepair. Caregivers who have experienced food insecurity have higher odds of non-responsive feeding styles with their infants that increase obesity (See Developmentally Focused), showing how structural determinants of health interact with relational health as well (See Relational Determinants of Health).[67] Caregivers have described how limited budgets or limited healthy food access in the neighborhood (as discussed below) prevent them buying healthy foods such as fruits, vegetables, and whole grains that they would ideally provide for their children, requiring instead substitutions with lower quality, more calorie-dense, processed, but also more affordable foods.[68,69] Other household material hardships like housing disrepair have also been documented to affect heart healthy routines. For example, housing disrepair and financial difficulties have been associated with suboptimal sleep practices in toddlers (e.g., not having a regular bedtime, no bedtime routine).[70] This may reflect how the physical environment of housing disrepair, lack of space as well as family stress may present a barrier to the opportunity to establish optimal sleep practices into regular bedtime routines early in life (Table 1).[70]

Disparities in neighborhood environments also may influence cardiovascular outcomes early in life. While more research is needed on the effect of neighborhood environment on diet in the first few years of life, research on older, school-aged children, adolescents, and their families hint at disparities that may trickle down to younger family members. Older children with poorer dietary quality are more likely to live farther away from larger supermarkets that supply healthy foods and are more likely to live closer to fast food restaurants that supply unhealthy food.[71–73] Studies also show that neighborhood prevalence of corner stores, convenient for low cost snacks, encouraged consumption of processed foods such as chips and sugary beverages that also increase exposure to environmental chemicals now increasingly understood to increase obesity risk.[74–77] Although the evidence

for the relationship between supermarket and fast food access and outcomes beyond dietary practices like child obesity status has been mixed, qualitative studies describe how low neighborhood healthy food access poses significant barriers to achieving heart healthy dietary routines.[71,73,78,79] Similar principles apply to the neighborhood influence on physical activity; easy access to safe playgrounds and parks facilitate frequent and daily physical activity.[80,81] In early childhood, the AAP recommends that children participate in daily moderate to vigorous physical activity (Table 1). Children living in cities where parents have increased concerns about neighborhood safety engaged in less physical activity compared to children living in suburban settings where the perception of safety was high.[82,83] Studies show that preschool aged children who had access to greenspaces had longer daily outdoor play time compared to children without access to greenspaces.[84–86]

Understanding a child's structural household and neighborhood environment can help child health practitioners anticipate barriers to setting heart healthy routines and subsequently integrate that into their counseling for families. To facilitate these conversations, clinical health systems are increasingly incorporating screening programs for social determinants of health to help inform practitioners understanding of families' risk factors to help tailor their counseling and also to facilitate community linkages to organizations that can mitigate household and neighborhood level disparities.[87]

To use food insecurity as an example, practitioner-based interventions with evidence-based success in addressing food insecurity included community linkages to organizations offering food and social support, food vouchers, and providing food onsite.[88] Child health practitioners have historically played an important role in mitigating these disparities, through referrals to the USDA Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), which provides nutritional assistance for low-income infants and children under five years old.[89] Studies show that children enrolled in WIC have healthier dietary practices than those eligible but not enrolled.[90] In 2009, WIC updated its policies including increasing the fruit and vegetable allowance and reducing the juice allowance.[91] Since then, studies have shown that families altered purchasing practices, purchasing more fruits and vegetables and less juice.[91,92] Consequently, efforts like these likely contributed to the reversal of increasing obesity prevalence in a subset of WIC recipients over multiple years, with a decrease in the prevalence of obesity in WIC participants ages 2 to 4 years between years 2010 to 2014.[91] These trends demonstrate the importance of benefits like WIC, and the role of clinical-community linkages in promoting the dietary routines of vulnerable young children.

Relational Determinants of Health

Early relational health refers to the role of safe, stable, and nurturing interpersonal relationships in determining child health outcomes.[93,94] Researchers have shown how the quality of the relationships in a child's life contribute to long term cardiovascular outcomes through their influence on early childhood diet, physical activity, and sleep routines.

Particularly in early childhood, a child's relationship with their primary caregiver is critical for healthy growth and development, with long-term consequences (See Longitudinal Effects). During infancy and toddlerhood, children are dependent on their caregiver as

their gatekeeper of resources and their first introduction to diet, physical activity, and sleep (See Developmentally Focused). Young children only experience fruits and vegetables if somebody introduces them, a principle that applies to aspects of physical activity as well. In young children, the most active form of physical activity is often through outdoor play, and frequency of playground attendance is facilitated by a caregiver's capacity to accompany and supervise the child. In a cross-sectional study of 8,950 preschool-aged children, interviews with caregivers showed that about half of children did not have the opportunity to have caregiver-supervised outdoor play at least once a day.[95]

A multi-level life course approach integrates an understanding of the early dyadic relationship between the primary caregiver and the child into assessments of health routines as displayed in Figure 2. Establishing routines in early childhood is a multi-level process because of this intimate dynamic relationship between children and their families, interlocking the child's health with the health of the primary caregiver and other key family members.[96,97] As displayed, assessing a child's health routines as healthy or unhealthy in isolation omits the context of a primary caregiver's health routines. Maintaining heart healthy routines for a young child is resource and energy intensive (e.g., breastfeeding, responsive feeding techniques, adhering to a daily sleep schedule). If a child has a healthy routine but the primary caregiver does not, the primary caregiver may not have the capacity for self-care alongside prioritizing their child's health to maintain healthy routines themselves; this may represent a vulnerable, unsustainable family status where the primary caregiver is shunting limited material or energy resources to support a child and potentially neglecting their own health as a consequence.[98,99] When a child and primary caregiver both have unhealthy routines, this may represent a situation where a primary caregiver may have limited lived experiences or resources (knowledge, experience, energy or material) to implement heart healthy routines for themselves or for the child. Consequently, approaches to promote the child's health routines may have to start by supporting the caregiver's practices and routines.[100–102] When a child's routine is unhealthy and the caregiver's routines are healthy, this may indicate a situation where a child's temperament may pose barriers to a primary caregiver's heart healthy parenting goals (e.g., through picky eating) and/or multiple caregivers in a situation where a primary caregiver's and a child's routines are not synchronized.[103–105] Finally, the situation in which both caregiver and child exhibit healthy routines reflects an ideal situation where not only do caregivers and children possess heart healthy routines, but also have a likely bond that may help sustain these healthy routines longer term.[106,107] Interventions designed to improve heart healthy routines may be best conceptualized, then, as occurring at the family level, with all family members engaged and in agreement on the approach, and with potential life course benefits across generations.

Caregiver feeding styles, which reflect the quality of a responsive back and forth dynamic in the caregiver-child relationship, are an example of the start of a heart healthy routine. In the dietary literature, there are four main types of caregiver feeding styles: (1) authoritarian, where caregivers set strict food rules without adjusting for child preference, (2) authoritative, where caregivers set rules but are highly responsive to the child's needs, (3) indulgent, where caregivers support children in making their own food choices without imposing rules, and (4) uninvolved, where caregivers do not create food-related rules or routines or respond to the child's needs.[108] In multiple studies, the authoritative but responsive

feeding style has shown to be associated with healthy and diverse food intake for young children. This style also reflects the attributes of a healthy responsive relationship between child and caregiver, where the child is given the opportunity to trial their independence, a key foundation to the development of self-regulation of behavior and subsequently, routines.[109–113] Similarly, in a randomized control trial in which parents were taught responsive parenting techniques related to infant sleep such as implementing a consistent bedtime routine but also encouraging self-soothing during night awakenings, infants in the intervention group had increased sleep duration, earlier bedtimes, and increased self-soothing practices to self-regulate their sleep routines.[114]

Shared family mealtimes are an example of family rituals that present opportunities for families to strengthen relationships, and to increase family cohesion and functioning.[115] Through experiences of shared mealtimes, children have been shown to receive emotional benefits including increasing self-esteem and later on, decreasing adolescent development of anxiety, depression, and high-risk behaviors.[116–118] These shared family mealtimes are also the ideal setting for children to grow nutritionally and developmentally. Children also consolidate their perception of healthy diet routines through observing healthy eating practices modeled by caregivers, helping with cooking, turning off screens while eating, and eating higher quality food.[119] Studies show that younger children who experience shared family mealtimes have increased consumption of fruits and vegetables and limited evidence suggesting that this may decrease obesity rates in childhood and adolescence.[120–124] For example, the Family Matters intervention utilizes community health workers and home visits (See Structural Determinants of Health) to promote increasing the quantity and quality of family meals to improve cardiovascular health in children ages 5-10 years.[125] Future work should also consider adapting interventions (See Strength-Based interventions) like these that are currently aimed towards older children for younger children (See Strategically Timed) to promote shared family mealtimes.

The American Academy of Pediatrics recommends that child health practitioners support relational health through promoting safe, stable, nurturing relationships in all families through encouraging safe and effective parenting practices and modeling effective communication.[93] They also recommend that practitioners develop and engage in targeted interventions that increase caregiver access to social supports in the community so that caregivers may also have safe, stable, nurturing relationships in their own lives.[93] When counseling families about heart healthy routines, it is important to utilize the AAP recommendations for relational health to support caregivers, coach families about responsive parenting styles, and engage family members to develop family cohesion around shared heart healthy routines (See Strength-Based Interventions).

Cultural Strengths

Children grow and play within families and communities with distinct cultures, or social norms that define customs, beliefs, and habits.[126] These cultural characteristics shape daily practices and healthy routines for young children. For example, sleep in young children is highly influenced by their caregivers' cultural beliefs around bedtime routines and sleeping arrangements (e.g., co-sleeping between young children and caregivers is common in certain

communities).[127,128] Caregivers and families often self-identify into communities with specific cultural routines that build family and community cohesion around these practices, which should be viewed as a strength to be incorporated into the process of heart healthy routines counseling. It is important for child health practitioners to understand a family's cultural beliefs and practices as a social determinant of heart health; true engagement with the child and family entails leveraging their existing cultural assets.

Breastfeeding is an early evolutionarily grounded, developmentally positive caregiver-child routine that while well-established over human history, is highly affected by cultural beliefs and practices. In some communities, breastfeeding is the socially accepted default for feeding infants[129–131]. For example, a qualitative study of immigrant mothers self-identifying as Hispanic reported that in their "home countries," with 95% reporting being from Mexico, breastfeeding was the cultural norm and that their mothers had breastfed, shaping their own default beliefs around the benefits of breastfeeding.[129] When these mothers moved to the US, they described feeling pressure to formula feed in public as part of the acculturation process because they felt it was less culturally appropriate to breastfeed in public.[129] These cultural differences may contribute to what has been described as part of the "immigrant paradox," demonstrated in a cohort study where first-generation immigrants from Mexico had greater rates of initiation and continuation of healthy dietary routines (e.g., breastfeeding) over other groups, including immigrant mothers who acculturated to the US.[132]

When mothers who intend to breastfeed self-identify with communities that have cultural norms that discourage breastfeeding, they face additional barriers related to these cultural beliefs and in response, may intentionally seek community members who not only support their individual beliefs around breastfeeding but also understand the cultural norms that they are trying to reconcile. In a meta-ethnography of African American mothers who breastfed, women reported that breastfeeding was not preferred in their communities, contributing to feelings of isolation when they chose to breastfeed.[133] In such situations, mothers engaged in protective coping mechanisms by seeking community support groups, such as in-person meetings through communities like La Leche League and social media groups of breastfeeding Black mothers to meet peers who could identify with their decision to breastfeed despite perceived cultural barriers to breastfeeding.[133]

Cultural strengths also play a role during the developmental transition to solid foods (See Developmentally Focused). Again, studies have shown how acculturation to the US negatively skewed healthy eating habits even in the process of caregivers introducing new solid foods to young children. Immigrant caregivers valued consuming food from their childhood experiences, which included frequent consumption of fruits from their cultures; children who were exposed to more produce from their family's cultures had increased consumption rates of fruits and vegetables.[134,135] In addition to the cultural familiarity with certain foods, it is possible that the caregiver's own emotional response to foods remembered from their own childhoods impacts in turn their child's emotional response, and that it is the association between positive affect and the food in question that helps develop the child's preference for certain food types. Inability to access certain foods could have a negative impact on the potential for these early affect-laden associations to

develop. Although caregivers often instill their own culture-based heart healthy eating habits intergenerationally to children, this effect may dissipate over time as children experience acculturation to the US. For example, in a cross-sectional study of 2780 Mexican American adults, those who had immigrated as adults to the US had healthier diets than those who had immigrated ages 2-5.[136] This process may also be affected by disparities in the social and physical environment, which are more common in immigrants with lower income (See Structural Determinants of Health).

Child health practitioners applying a multi-level approach to promoting heart healthy routines should engage families in describing their cultural values and beliefs on specific heart healthy routines that they are discussing together. Utilizing a participatory approach, which engages caregivers and families as partners,[138] practitioners should utilize open-ended questions to query a family's description about the influence of their cultural beliefs and practices on heart healthy routines (e.g., around early childhood feeding practices, their perception of appropriate physical activities). Allowing the caregiver to lead this conversation acknowledges that even within communities defined by characteristics such as race and ethnicity, there is significant heterogeneity in cultural differences between and within geographic and international borders, dependent on different levels of acculturation to locally perceived cultural values in the US, making each patient's situation unique. Understanding cultural belief orientations in a caregiver and child's social environment allows practitioners to meet families where they are to promote routines most closely aligned with best practices while still incorporating cultural elements. Furthermore, understanding these beliefs can help practitioners engage key stakeholders such as grandparents, partners or other community members in maintaining healthy routines. Medical support such as nutrition and lactation support staff as well as health interventions should also be culturally, community engaged for maximal effectiveness. As research increasingly adopts a community engaged participatory approach,[138] findings in the literature will augment current knowledge to describe how best to harness multi-level influences on health routines beyond structural barriers to leverage cultural strengths to promote healthier routines.

HEALTH IS A POSITIVE PROCESS

According to the World Health Organization, "health" is "a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity".[139] The National Academies of Medicine defines children's health using three positive criteria: Children should be able to a) achieve their full potential, b) have their needs met, and c) develop the ability to interact meaningfully with the surrounding biological, physical, and social environment.[140] In pediatrics, there is a key early opportunity to optimize childhood health within the framework of pediatric preventive visits – embracing the goal of "health" rather than the avoidance of disease. The life course health development approach emphasizes the importance of the active development of health in the early years,[14,15] and of acquiring capacities or capabilities for health that can help keep trajectories of health on track across the whole of the life course.[141]

Optimization

Optimization emphasizes positive aspects and goals of health rather than using a disease-based model. Supporting early childhood routines for cardiovascular health is a natural fit for this approach, as it facilitates focusing on positive healthy diet, physical activity, and sleep practices rather than the presence or absence of cardiovascular disease. Furthermore, building these skills or capabilities for heart healthy routines and focusing on positive outcomes not only improves cardiovascular health but also has benefits for many other long-term domains of health, including mental and behavioral health,[142–146] cancer,[147–149] and academic performance.[3,150–152] The transactional nature of the health development process also means that steps taken towards positive health tend to reinforce each other and lead on to other benefits.[153] For example, establishing optimal nutrition and physical activity routines early on brings benefits for overall levels of energy and a sense of well-being, increasing the potential for further physical activity and the establishment of healthy eating through the later stages of the life course.[154] These ‘virtuous cycles’ therefore tend to reinforce each other via positive feedback loops, compounding over time, and resulting states of greater health. Conversely, calorie-dense, sugar heavy foods and a lack of physical activity result in lower energy levels and a need for greater effort during physical exertion as BMI increases, posing the risk of a compromised health trajectory and worsening health over time.[154]

In the clinic, optimization approaches health with a holistic, well-rounded assessment rather than by problem or disease. In practice, practitioners balance screening and managing illnesses and comorbidities with augmentation of positive health behaviors. Currently in practice, screening and preventive processes are built into the workflow with the intention of preventing negative health outcomes (disease mitigation approach[15]). For example, screening for detection of lead toxicity and autism are standard practice for all child health practitioners, to prevent and mitigate negative neurological consequences.[155] This approach can be expanded to incorporate optimization principles by also screening for healthy practices and to positively reinforce routines and patterns that promote heart healthy diet, physical activity, and sleep, while maintaining that overall health is the goal.

Strengths-Based Interventions

Table 3 highlights a few examples of strengths-based family or childcare interventions that demonstrate evidence of impacting early childhood routines. They each highlight and demonstrate specific clinical strategies that can be utilized to help establish positive childhood routines.

Even without the structure of formal programs like the ones listed in Table 3, child health practitioners can implement similar core strategies to identify family strengths and support healthy habits. One important tool in clinic is motivational interviewing (MI), a strengths-based patient-centered communication style that can be used for modification of health behaviors. This approach has been shown to effectively promote and achieve positive behavior changes around cardiovascular outcomes in adults and children.[156] Benefits of MI are that its goals are to foster a positive and beneficial patient/family and practitioner relationship, while allowing the families to actively participate in care and promote

autonomy. The approach guides families to identify what aspects of their health are a priority at this time and to focus on those areas first. There is supporting evidence for use of MI in the primary care setting that shows subsequent reductions in BMI percentile through effective dietary counseling that improve dietary practices.[157]

Goal-setting is another strategy utilized by interventions (Table 3) that has been shown by researchers to promote healthy behavioral change in children.[158] Setting goals around childhood routines with family can be a useful evidence-based tool in effecting change. Specifically "SMART" goals (**S**pecific, **M**easurable, **A**chievable, **R**ealistic, and **T**ime-Based) foster autonomy and engagement for the patients and families.[159,160] Stepwise goals also allow patients/families to work at a pace that is feasible and comfortable for them. Again, the use of a participatory approach[138] facilitates effective clinical interventions that engage families to recognize their own strengths to meet heart healthy goals at the pace that is right for them.

Conclusion

Optimal cardiovascular health is an essential component of human health and well-being. We apply a life course health development approach to highlight the essential role of the child health practitioner in promoting heart healthy routines around diet, physical activity, and sleep in the context of safe, secure nurturing family relationships in early childhood. Researchers have established the longitudinal potency of early childhood practices and outcomes on cardiovascular health in adulthood. Thus, early childhood is a strategic time to take advantage of the potential compounding impact of well targeted interventions and to begin developmentally tailored heart healthy routines.

Studies show that in 2021, 16.9% of children in the US live in poverty. Thus, for many children, routines occur within the context of and are impacted by negative structural factors that often accompany poverty such as disparities in household resources and neighborhood environments.[66] Child health practitioners can play key roles in screening for these factors and facilitating community linkages to help mitigate them.[87] Within the family; young children see their primary caregivers as both gatekeepers and models of daily practices, thus a child's access to safe, stable, nurturing relationships can promote heart healthy routines. Families also live within and are influenced by communities with their own cultural norms, beliefs, and practices that practitioners can work to understand and leverage into strategies to promote health. Practitioners who apply community participatory strategies to partner with patients and their families to promote heart healthy routines appreciate each child's daily routines as informed by all of these factors and will be better positioned to engage families in further improvement of health.

Finally, a life course approach views cardiovascular health as a positive health developing process. Practitioners should engage strength-based interventions to leverage relationships and assets families inherently possess to encourage heart healthy routines to benefit children in not only length of but also in quality of life. As the Roman philosopher Lucius Seneca explained, "so is life: not how long it is, but how good it is, is what matters." Thus, our outcomes extend beyond avoiding biomarkers of disease but rather embracing positive goals - healthy diet, activity, and sleep – to sustain health and well-being across the life course.

Funding Sources:

This work was supported by the U.S. Department of Health and Human Services/Health Resources and Service Administration under award numbers UA6MC32492 (Life Course Intervention Research Network) as well as the National Institute for the Environmental Health Sciences (K23ES035461: PI Duh-Leong) and the National Heart, Lung and Blood Institute (K23HL159326: PI Katzow). The funders/sponsors did not participate in the work.

References

1. Mehta NK, Abrams LR, Myrskylä M. US life expectancy stalls due to cardiovascular disease, not drug deaths. Proc Natl Acad Sci U S A. 2020;117(13):6998–7000. doi:10.1073/pnas.1920391117 [PubMed: 32179670]
2. Fiese BH, Tomcho TJ, Douglas M, Josephs K, Poltrock S, Baker T. A review of 50 years of research on naturally occurring family routines and rituals: cause for celebration? J Fam Psychol. 2002;16(4):381–390. doi:10.1037//0893-3200.16.4.381 [PubMed: 12561283]
3. Ferretti LK, Bub KL. Family Routines and School Readiness During the Transition to Kindergarten. Early Education and Development. 2017;28(1):59–77. doi:10.1080/10409289.2016.1195671
4. Spagnola M, Fiese BH. Family routines and rituals: A context for development in the lives of young children. Infants and Young Children. 2007;20(4):284–299. doi:10.1097/01.IYC.0000290352.32170.5a
5. Lloyd-Jones DM, Allen NB, Anderson CAM, et al. Life's Essential 8: Updating and Enhancing the American Heart Association's Construct of Cardiovascular Health: A Presidential Advisory From the American Heart Association. Circulation. 2022;146(5):e18–e43. doi:10.1161/CIR.0000000000001078 [PubMed: 35766027]
6. McGee H. Health-Related Quality of Life in Cardiac Patients. In: Perk J, Gohlke H, Hellemans I, et al., eds. Cardiovascular Prevention and Rehabilitation. Springer; 2007:256–268. doi:10.1007/978-1-84628-502-8_31
7. Products - Data Briefs - Number 364 - April 2020. Published June 25, 2020. Accessed June 12, 2023. https://www.cdc.gov/nchs/products/databriefs/db364.htm
8. Heart Disease and Stroke Statistics—2023 Update: A Report From the American Heart Association | Circulation. Accessed June 12, 2023. 10.l161/CIR.0000000000001123
9. Allen NB, Krefman AE, Labarthe D, et al. Cardiovascular Health Trajectories From Childhood Through Middle Age and Their Association With Subclinical Atherosclerosis. JAMA Cardiol. 2020;5(5):557–566. doi:10.1001/jamacardio.2020.0140 [PubMed: 32159727]
10. Halfon N, Verhoef PA, Kuo AA. Childhood antecedents to adult cardiovascular disease. Pediatr Rev. 2012;33(2):51–60; quiz 61. doi:10.1542/pir.33-2-51 [PubMed: 22301031]
11. Lioret S, Campbell KJ, McNaughton SA, et al. Lifestyle Patterns Begin in Early Childhood, Persist and Are Socioeconomically Patterned, Confirming the Importance of Early Life Interventions. Nutrients. 2020;12(3):724. doi:10.3390/nul2030724 [PubMed: 32182889]
12. Hemmeter M, Ostrosky M, Fox L. Social and Emotional Foundations for Early Learning: A Conceptual Model for Intervention. School Psychology Review. 2006;35:583–601. doi:10.1080/02796015.2006.12087963
13. Shonkoff JP, Garner AS, Committee on Psychosocial Aspects of Child and Family Health, Committee on Early Childhood, Adoption, and Dependent Care, Section on Developmental and Behavioral Pediatrics. The lifelong effects of early childhood adversity and toxic stress. Pediatrics. 2012;129(1):e232–246. doi:10.1542/peds.2011-2663 [PubMed: 22201156]
14. Halfon N, Larson K, Lu M, Tullis E, Russ S. Lifecourse health development: past, present and future. Matern Child Health J. 2014;18(2):344–365. doi:10.1007/s10995-013-1346-2 [PubMed: 23975451]
15. Halfon N, Forrest CB, Lerner RM, Faustman EM, eds. Handbook of Life Course Health Development. Springer; 2018. Accessed June 12, 2023. http://www.ncbi.nlm.nih.gov/books/NBK543707/

16. Life course working group, International Longevity Centre, World Health Organization. The Implications for Training of Embracing A Life Course Approach to Health. https://apps.who.int/iris/bitstream/handle/10665/69400/WHO_NMH_HPS_00.2_eng.pdf
17. Russ SA, Hotez E, Berghaus M, et al. What Makes an Intervention a Life Course Intervention? Pediatrics. 2022;149(Suppl 5):e2021053509D. doi:10.1542/peds.2021-053509D
18. Lawlor DA, Benfield L, Logue J, et al. Association between general and central adiposity in childhood, and change in these, with cardiovascular risk factors in adolescence: prospective cohort study. BMJ. 2010;341:c6224. doi:10.1136/bmj.c6224 [PubMed: 21109577]
19. Jacobs DR, Woo JG, Sinaiko AR, et al. Childhood Cardiovascular Risk Factors and Adult Cardiovascular Events. N Engl J Med. 2022;386(20):1877–1888. doi:10.1056/NEJMoa2109191 [PubMed: 35373933]
20. Juonala M, Magnussen CG, Venn A, et al. Influence of Age on Associations Between Childhood Risk Factors and Carotid Intima-Media Thickness in Adulthood. Circulation. 2010;122(24) :2514–2520. doi:10.1161/CIRCULATIONAHA.110.966465 [PubMed: 21126976]
21. Raitakari OT, Juonala M, Kähönen M, et al. Cardiovascular Risk Factors in Childhood and Carotid Artery Intima-Media Thickness in Adulthood: The Cardiovascular Risk in Young Finns Study. JAMA. 2003;290(17):2277–2283. doi:10.1001/jama.290.17.2277 [PubMed: 14600186]
22. Li S, Chen W, Srinivasan SR, et al. Childhood Cardiovascular Risk Factors and Carotid Vascular Changes in Adulthood: The Bogalusa Heart Study. JAMA. 2003;290(17):2271–2276. doi:10.1001/jama.290.17.2271 [PubMed: 14600185]
23. Burke V Obesity in Childhood and Cardiovascular Risk. Clinical and Experimental Pharmacology and Physiology. 2006;33(9):831–837. doi:10.1111/j.1440-1681.2006.04449.x [PubMed: 16922816]
24. Heiskanen JS, Ruohonen S, Rovio SP, et al. Cardiovascular Risk Factors in Childhood and Left Ventricular Diastolic Function in Adulthood. Pediatrics. 2021;147(3):e2020016691. doi:10.1542/peds.2020-016691 [PubMed: 33558307]
25. Juonala M, Järvisalo MJ, Mäki-Torkko N, Kähönen M, Viikari JSA, Raitakari OT. Risk Factors Identified in Childhood and Decreased Carotid Artery Elasticity in Adulthood. Circulation. 2005;112(10):1486–1493. doi:10.1161/CIRCULATIONAHA.104.502161 [PubMed: 16129802]
26. Juonala M, Magnussen CG, Berenson GS, et al. Childhood Adiposity, Adult Adiposity, and Cardiovascular Risk Factors. New England Journal of Medicine. 2011;365(20):1876–1885. doi:10.1056/NEJMoa1010112 [PubMed: 22087679]
27. Davis PH, Dawson JD, Riley WA, Lauer RM. Carotid Intimal-Medial Thickness Is Related to Cardiovascular Risk Factors Measured From Childhood Through Middle Age. Circulation. 2001;104(23):2815–2819. doi:10.1161/hc4601.099486 [PubMed: 11733400]
28. Barker DJ. Fetal origins of coronary heart disease. BMJ. 1995;311(6998):171–174. doi:10.1136/bmj.3n.6998.171 [PubMed: 7613432]
29. Arogbokun O, Rosen E, Keil AP, et al. Maternal Oxidative Stress Biomarkers in Pregnancy and Child Growth from Birth to Age 6. The Journal of Clinical Endocrinology & Metabolism. 2021;106(5):1427–1436. doi:10.1210/clinem/dgab018 [PubMed: 33524128]
30. Duh-Leong C, Ghassabian A, Kannan K, et al. Prenatal oxidative stress and rapid infant weight gain. Int J Obes. 2023;47(7):583–589. doi:10.1038/s41366-023-01302-8
31. Ong KK, Loos RJF. Rapid infancy weight gain and subsequent obesity: systematic reviews and hopeful suggestions. Acta Paediatr. 2006;95(8):904–908. doi:10.1080/08035250600719754 [PubMed: 16882560]
32. Zheng M, Lamb KE, Grimes C, et al. Rapid weight gain during infancy and subsequent adiposity: a systematic review and meta-analysis of evidence. Obesity Reviews. 2018;19(3):321–332. doi:10.1111/obr.12632 [PubMed: 29052309]
33. Zhu Y, Hedderson MM, Sridhar S, Xu F, Feng J, Ferrara A. Poor diet quality in pregnancy is associated with increased risk of excess fetal growth: a prospective multi-racial/ethnic cohort study. Int J Epidemiol. 2019;48(2):423–432. doi:10.1093/ije/dyy285 [PubMed: 30590563]
34. Hong YH, Lee JE. Large for Gestational Age and Obesity-Related Comorbidities. J Obes Metab Syndr. 2021;30(2):124–131. doi:10.7570/jomes20130 [PubMed: 34053939]

35. Arlinghaus KR, Johnston CA. The Importance of Creating Habits and Routine. Am J Lifestyle Med. 2018;13(2):142–144. doi:10.1177/1559827618818044 [PubMed: 30800018]
36. Mikkilä V, Räsänen L, Raitakari OT, Pietinen P, Viikari J. Consistent dietary patterns identified from childhood to adulthood: the cardiovascular risk in Young Finns Study. Br J Nutr. 2005;93(6):923–931. doi:10.1079/bjn20051418 [PubMed: 16022763]
37. Telama R, Yang X, Viikari J, Välimäki I, Wanne O, Raitakari O. Physical activity from childhood to adulthood: a 21-year tracking study. Am J Prev Med. 2005;28(3):267–273. doi:10.1016/j.amepre.2004.12.003 [PubMed: 15766614]
38. Thorleifsdottir B, Björnsson JK, Benediktsdottir B, Gislason T, Kristbjarnarson H. Sleep and sleep habits from childhood to young adulthood over a 10-year period. Journal of Psychosomatic Research. 2002;53(1):529–537. doi:10.1016/S0022-3999(02)00444-0 [PubMed: 12127168]
39. Lam P, Hiscock H, Wake M. Outcomes of Infant Sleep Problems: A Longitudinal Study of Sleep, Behavior, and Maternal Well-Being. Pediatrics. 2003;111(3):e203–e207. doi:10.1542/peds.111.3.e203 [PubMed: 12612272]
40. Gregory AM, O'connor TG. Sleep Problems in Childhood: A Longitudinal Study of Developmental Change and Association With Behavioral Problems. Journal of the American Academy of Child & Adolescent Psychiatry. 2002;41(8):964–971. doi:10.1097/00004583-200208000-00015 [PubMed: 12162632]
41. Haines J, McDonald J, O'Brien A, et al. Healthy Habits, Happy Homes: randomized trial to improve household routines for obesity prevention among preschool-aged children. JAMA Pediatr. 2013;167(11):1072–1079. doi:10.1001/jamapediatncs.2013.2356 [PubMed: 24019074]
42. Se A, Re W. Household routines and obesity in US preschool-aged children. Pediatrics. 2010;125(3). doi:10.1542/peds.2009-0417
43. Anderson SE, Sacker A, Whitaker RC, Kelly Y. Self-regulation and household routines at age three and obesity at age eleven: longitudinal analysis of the UK Millennium Cohort Study. Int J Obes (Lond). 2017;41(10):1459–1466. doi:10.1038/ijo.2017.94 [PubMed: 28435162]
44. Lao XQ, Liu X, Deng HB, et al. Sleep Quality, Sleep Duration, and the Risk of Coronary Heart Disease: A Prospective Cohort Study With 60,586 Adults. J Clin Sleep Med. 2018;14(1):109–117. doi:10.5664/jcsm.6894 [PubMed: 29198294]
45. Chareonrungrueangchai K, Wongkawinwoot K, Anothaisintawee T, Reutrakul S. Dietary Factors and Risks of Cardiovascular Diseases: An Umbrella Review. Nutrients. 2020;12(4):1088. doi:10.3390/nul2041088 [PubMed: 32326404]
46. Nystoriak MA, Bhatnagar A. Cardiovascular Effects and Benefits of Exercise. Front Cardiovasc Med. 2018;5:135. doi:10.3389/fcvm.2018.00135 [PubMed: 30324108]
47. Woo Baidal JA, Locks LM, Cheng ER, Blake-Lamb TL, Perkins ME, Taveras EM. Risk Factors for Childhood Obesity in the First 1,000 Days: A Systematic Review. American Journal of Preventive Medicine. 2016;50(6):761–779. doi:10.1016/j.amepre.2015.11.012 [PubMed: 26916261]
48. Taveras EM, Perkins ME, Boudreau AA, et al. Twelve-Month Outcomes of the First 1000 Days Program on Infant Weight Status. Pediatrics. 2021;148(2):e2020046706. doi:10.1542/peds.2020-046706 [PubMed: 34326179]
49. Healthy Active Living—Responsive Feeding. Pediatric Patient Education. Published online January 1, 2021. doi:10.1542/ppe_documentl34
50. Hurley KM, Cross MB, Hughes SO. A Systematic Review of Responsive Feeding and Child Obesity in High-Income Countries123. J Nutr. 2011;141(3):495–501. doi:10.3945/jn.110.130047 [PubMed: 21270360]
51. Black MM, Aboud FE. Responsive Feeding Is Embedded in a Theoretical Framework of Responsive Parenting123. J Nutr. 2011;141(3):490–494. doi:10.3945/jn.110.129973 [PubMed: 21270366]
52. Infant Food and Feeding. Accessed July 7, 2023. https://www.aap.org/en/patient-care/healthy-active-living-for-families/infant-food-and-feeding/
53. Veer P van't, Jansen MC, Klerk M Kok FJ. Fruits and vegetables in the prevention of cancer and cardiovascular disease. Public Health Nutrihon. 2000;3(1):103–107. doi:10.1017/S1368980000000136

54. Hewitt L, Kerr E, Stanley RM, Okely AD. Tummy Time and Infant Health Outcomes: A Systematic Review. Pediatrics. 2020;145(6):e20192168. doi:10.1542/peds.2019-2168 [PubMed: 32371428]
55. Flores G, Tomany-Korman SC, Olson L. Does Disadvantage Start at Home?: Racial and Ethnic Disparities in Health-Related Early Childhood Home Routines and Safety Practices. Archives of Pediatrics & Adolescent Medicine. 2005;159(2):158–165. doi:10.1001/archpedi.159.2.158 [PubMed: 15699310]
56. Johnson K, Theberge S. Reducing Disparities Beginning in Early Childhood. Published online 2007. doi:10.7916/D8N01G77
57. Accessed July 20, 2023. https://frac.org/wp-content/uploads/FRAC_AAP_Toolkit_2021.pdf
58. Health inequities and their causes. Accessed July 20, 2023. https://www.who.int/news-room/facts-in-pictures/detail/health-inequities-and-their-causes
59. Health equity. Accessed July 20, 2023. https://www.who.int/health-topics/health-equity
60. Social determinants of health. Accessed July 20, 2023. https://www.who.int/health-topics/social-determinants-of-health
61. Integrating Social Needs Care into the Delivery of Health Care to Improve the Nations Health | National Academies. Accessed July 20, 2023. https://www.nationalacademies.org/our-work/integrating-social-needs-care-into-the-delivery-of-health-care-to-improve-the-nations-health
62. Committee on Educating Health Professionals to Address the Social Determinants of Health, Board on Global Health, Institute of Medicine, National Academies of Sciences, Engineering, and Medicine. A Framework for Educating Health Professionals to Address the Social Determinants of Health. National Academies Press (US); 2016. Accessed July 20, 2023. http://www.ncbi.nlm.nih.gov/books/NBK395983/
63. AAP Equity Agenda. Accessed July 20, 2023. https://www.aap.org/en/about-the-aap/american-academy-of-pediatrics-equity-and-inclusion-efforts/aap-equity-agenda/
64. Trent M, Dooley DG, Dougé J, et al. The Impact of Racism on Child and Adolescent Health. Pediatrics. 2019;144(2):e20191765. doi:10.1542/peds.2019-1765 [PubMed: 31358665]
65. American Academy of Pediatrics Board of Directors. Truth, Reconciliation, and Transformation: Continuing on the Path to Equity. Pediatrics. 2020;146(3):e2020019794. doi:10.1542/peds.2020-019794 [PubMed: 32727826]
66. Bureau UC. Poverty Rate of Children Higher Than National Rate, Lower for Older Populations. Census.gov. Accessed July 26, 2023. https://www.census.gov/library/stories/2022/10/poverty-rate-varies-by-age-groups.html
67. Gross RS, Brown NM, Mendelsohn AL, Katzow MW, Arana MM, Messito MJ. Maternal Stress and Infant Feeding in Hispanic Families Experiencing Poverty. Acad Pediatr. 2022;22(1):71–79. doi:10.1016/j.acap.2021.04.022 [PubMed: 33940204]
68. DiSantis KI, Grier SA, Odoms-Young A, et al. What "Price" Means When Buying Food: Insights From a Multisite Qualitative Study With Black Americans. Am J Public Health. 2013;103(3):516–522. doi:10.2105/AJPH.2012.301149 [PubMed: 23327261]
69. Ravikumar D, Spyreli E, Woodside J, McKinley M, Kelly C. Parental perceptions of the food environment and their influence on food decisions among low-income families: a rapid review of qualitative evidence. BMC Public Health. 2022;22(1):9. doi:10.1186/sl2889-021-12414-z [PubMed: 34983469]
70. Duh-Leong C, Messito MJ, Katzow MW, et al. Material Hardships and Infant and Toddler Sleep Duration in Low-Income Hispanic Families. Acad Pediatr. 2020;20(8):1184–1191. doi:10.1016/j.acap.2020.07.003 [PubMed: 32650047]
71. Longacre MR, Drake KM, MacKenzie TA, et al. Fast-Food Environments and Family Fast-Food Intake in Nonmetropolitan Areas. Am J Prev Med. 2012;42(6):579–587. doi:10.1016/j.amepre.2012.02.017 [PubMed: 22608373]
72. Devine CM, Jastran M, Jabs JA, Wethington E, Farrell TJ, Bisogni CA. "A lot of sacrifices:" Work-family spillover and the food choice coping strategies of low wage employed parents. Soc Sci Med. 2006;63(10):2591–2603. doi:10.1016/j.socscimed.2006.06.029 [PubMed: 16889881]
73. Showed NN, Cole KW, Johnson K, DeCamp LR, Bair-Merritt M, Thornton RLJ. Neighborhood and Parental Influences on Diet and Physical Activity Behaviors in Young Low-Income Pediatric

Patients. Clin Pediatr (Phila). 2017;56(13):1235–1243. doi:10.1177/0009922816684599 [PubMed: 28024417]

74. Kiszko K, Cantor J, Abrams C, et al. Corner store purchases in a low-income urban community in NYC. J Community Health. 2015;40(6):1084–1090. doi:10.1007/sl0900-015-0033-1 [PubMed: 25910485]
75. Borradaile KE, Sherman S, Vander Veur SS, et al. Snacking in children: the role of urban corner stores. Pediatrics. 2009;124(5):1293–1298. doi:10.1542/peds.2009-0964 [PubMed: 19822591]
76. Lent MR, Vander Veur S, Mallya G, et al. Corner store purchases made by adults, adolescents and children: items, nutritional characteristics and amount spent. Public Health Nutr. 2015;18(9):1706–1712. doi:10.1017/S1368980014001670 [PubMed: 25115817]
77. Yang C, Lee HK, Kong APS, Lim LL, Cai Z, Chung ACK. Early-life exposure to endocrine disrupting chemicals associates with childhood obesity. Ann Pediatr Endocrinol Metab. 2018;23(4):182–195. doi:10.6065/apem.2018.23.4.182 [PubMed: 30599479]
78. Zhou Q, Zhao L, Zhang L, et al. Neighborhood supermarket access and childhood obesity: A systematic review. Obesity Reviews. 2021;22(S1):e12937. doi:10.1111/obr.12937 [PubMed: 31482658]
79. Burdette HL, Whitaker RC. Neighborhood playgrounds, fast food restaurants, and crime: relationships to overweight in low-income preschool children. Preventive Medicine. 2004;38(1):57–63. doi:10.1016/j.ypmed.2003.09.029 [PubMed: 14672642]
80. Bai P, Schipperijn J, Rosenberg M, Christian H. Neighborhood Places for Preschool Children's Physical Activity: A Mixed-Methods Study Using Global Positioning System, Geographic Information Systems, and Accelerometry Data. J Phys Act Health. Published online June 9, 2023:1–11. doi:10.1123/jpah.2022-0462
81. Accessed July 7, 2023. https://downloads.aap.org/AAP/PDF/Bright%20Futures/BF4_PhysicalActivity.pdf
82. Datar A, Nicosia N, Shier V. Parent perceptions of neighborhood safety and children's physical activity, sedentary behavior, and obesity: evidence from a national longitudinal study. Am J Epidemiol. 2013;177(10):1065–1073. doi:10.1093/aje/kws353 [PubMed: 23579555]
83. Weir FA, Etelson D, Brand DA. Parents' perceptions of neighborhood safety and children's physical activity. Prev Med. 2006;43(3):212–217. doi:10.1016/j.ypmed.2006.03.024 [PubMed: 16712912]
84. Reuben A, Rutherford GW, James J, Razani N. Association of neighborhood parks with child health in the United States. Prev Med. 2020;141:106265. doi:10.1016/j.ypmed.2020.106265 [PubMed: 33035547]
85. Grigsby-Toussaint DS, Chi SH, Fiese BH, STRONG Kids Project Writing Group. Where they live, how they play: neighborhood greenness and outdoor physical activity among preschoolers. Int J Health Geogr. 2011;10:66. doi:10.1186/1476-072X-10-66 [PubMed: 22165919]
86. Lovasi GS, Jacobson JS, Quinn JW, Neckerman KM, Ashby-Thompson MN, Rundle A. Is the environment near home and school associated with physical activity and adiposity of urban preschool children? J Urban Health. 2011;88(6):1143–1157. doi:10.1007/sll524-011-9604-3 [PubMed: 21826583]
87. Chung EK, Siegel BS, Garg A, et al. Screening for Social Determinants of Health Among Children and Families Living in Poverty: A Guide for Clinicians. Curr Probi Pediatr Adolesc Health Care. 2016;46(5):135–153. doi:10.1016/j.cppeds.2016.02.004
88. De Marchis EH, Torres JM, Benesch T, et al. Interventions Addressing Food Insecurity in Health Care Settings: A Systematic Review. Ann Fam Med. 2019;17(5):436–447. doi:10.1370/afm.2412 [PubMed: 31501207]
89. WIC Eligibility Requirements | Food and Nutrition Service. Accessed July 13, 2023. https://www.fns.usda.gov/wic/wic-eligibility-requirements
90. Caulfield LE, Bennett WL, Gross SM, et al. Maternal and Child Outcomes Associated With the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Agency for Healthcare Research and Quality (US); 2022. Accessed July 13, 2023. http://www.ncbi.nlm.nih.gov/books/NBK579797/

91. Daepp MIG, Gortmaker SL, Wang YC, Long MW, Kenney EL. WIC Food Package Changes: Trends in Childhood Obesity Prevalence. Pediatrics. 2019;143(5):e20182841. doi:10.1542/peds.2018-2841 [PubMed: 30936251]
92. Andreyeva T, Luedicke J, Tripp AS, Henderson KE. Effects of reduced juice allowances in food packages for the women, infants, and children program. Pediatrics. 2013;131(5):919–927. doi:10.1542/peds.2012-3471 [PubMed: 23629613]
93. Garner A, Yogman M, COMMITTEE ON PSYCHOSOCIAL ASPECTS OF CHILD AND FAMILY HEALTH SODABP COUNCIL ON EARLY CHILDHOOD. Preventing Childhood Toxic Stress: Partnering With Families and Communities to Promote Relational Health. Pediatrics. 2021;148(2):e2021052582. doi:10.1542/peds.2021-052582 [PubMed: 34312296]
94. Duh-Leong C, Dreyer BP, Huang TTK, et al. Social Capital as a Positive Social Determinant of Health: A Narrative Review. Acad Pediatr. Published online October 2, 2020. doi:10.1016/j.acap.2020.09.013
95. Tandon PS, Zhou C, Christakis DA. Frequency of Parent-Supervised Outdoor Play of US Preschool-Aged Children. Archives of Pediatrics & Adolescent Medicine. 2012;166(8):707–712. doi:10.1001/archpediatrics.2011.1835 [PubMed: 22473885]
96. Willis DW, Eddy JM. Early relational health: Innovations in child health for promotion, screening, and research. Infant Ment Health J. 2022;43(3):361–372. doi:10.1002/imhj.21980 [PubMed: 35537061]
97. Frosch CA, Schoppe-Sullivan SJ, O'Banion DD. Parenting and Child Development: A Relational Health Perspective. American Journal of Lifestyle Medicine. 2021;15(1):45–59. doi:10.1177/1559827619849028 [PubMed: 33447170]
98. Gross RS, Mendelsohn AL, Arana MM, Messito MJ. Food Insecurity During Pregnancy and Breastfeeding by Low-Income Hispanic Mothers. Pediatrics. 2019;143(6):e20184113. doi:10.1542/peds.2018-4113 [PubMed: 31088893]
99. Duh-Leong C, Yin HS, Yi SS, et al. Material Hardship and Stress from COVID-19 in Immigrant Chinese American Families with Infants. J Immigr Minor Health. 2022;24(1):48–57. doi:10.1007/sl0903-021-01267-8 [PubMed: 34491512]
100. Larsen JK, Hermans RCJ, Sleddens EFC, Engels RCME, Fisher JO, Kremers SPJ. How parental dietary behavior and food parenting practices affect children's dietary behavior. Interacting sources of influence? Appetite. 2015;89:246–257. doi:10.1016/j.appet.2015.02.012 [PubMed: 25681294]
101. Gibson EL, Androutsos O, Moreno L, et al. Influences of Parental Snacking-Related Attitudes, Behaviours and Nutritional Knowledge on Young Children's Healthy and Unhealthy Snacking: The ToyBox Study. Nutrients. 2020;12(2):432. doi:10.3390/nul2020432 [PubMed: 32046193]
102. Balantekin KN. The Influence of Parental Dieting Behavior on Child Dieting Behavior and Weight Status. Curr Obes Rep. 2019;8(2):137–144. doi:10.1007/sl3679-019-00338-0 [PubMed: 30847737]
103. Wolstenholme H, Kelly C, Hennessy M, Heary C. Childhood fussy/picky eating behaviours: a systematic review and synthesis of qualitative studies. Int J Behav Nntr Phys Act. 2020;17(1):2. doi:10.1186/sl2966-019-0899-x
104. Chilman L, Kennedy-Behr A, Frakking T, Swanepoel L, Verdonck M. Picky Eating in Children: A Scoping Review to Examine Its Intrinsic and Extrinsic Features and How They Relate to Identification. Int J Environ Res Public Health. 2021;18(17):9067. doi:10.3390/ijerphl8179067 [PubMed: 34501656]
105. Taylor CM, Emmett PM. Picky eating in children: causes and consequences. Proc Nutr Soc. Published online November 5, 2018:1–9. doi:10.1017/S0029665118002586
106. Petersen TL, Møller LB, Brønd JC, Jepsen R, Grøntved A. Association between parent and child physical activity: a systematic review. Int J Behav Nutr Phys Act. 2020;17(1):67. doi:10.1186/s12966-020-00966-z [PubMed: 32423407]
107. Knobl V, Dallacker M, Hertwig R, Mata J. Happy and healthy: How family mealtime routines relate to child nutritional health. Appetite. 2022;171:105939. doi:10.1016/j.appet.2022.105939 [PubMed: 35065143]

108. Shloim N, Edelson LR, Martin N, Hetherington MM. Parenting Styles, Feeding Styles, Feeding Practices, and Weight Status in 4–12 Year-Old Children: A Systematic Review of the Literature. Front Psychol. 2015;6:1849. doi:10.3389/fpsyg.2015.01849 [PubMed: 26696920]
109. Peters J, Dollman J, Petkov J, Parletta N. Associations between parenting styles and nutrition knowledge and 2-5-year-old children's fruit, vegetable and non-core food consumption. Public Health Nutr. 2013;16(11):1979–1987. doi:10.1017/S1368980012004648 [PubMed: 23089340]
110. Patrick H, Nicklas TA, Hughes SO, Morales M. The benefits of authoritative feeding style: caregiver feeding styles and children's food consumption patterns. Appetite. 2005;44(2):243–249. doi:10.1016/j.appet.2002.07.001 [PubMed: 15808898]
111. Arlinghaus KR, Vollrath K, Hernandez DC, et al. Authoritative parent feeding style is associated with better child dietary quality at dinner among low-income minority families. Am J Clin Nutr. 2018;108(4):730–736. doi:10.1093/ajcn/nqy142 [PubMed: 30169719]
112. Chen B, Kattelmann K, Comstock C, McCormack L, Wey H, Meendering J. Parenting Styles, Food Parenting Practices and Dietary Intakes of Preschoolers. Nutrients. 2021;13(10):3630. doi:10.3390/nu13103630 [PubMed: 34684630]
113. Burnett AJ, Lamb KE, McCann J, Worsley A, Lacy KE. Parenting styles and the dietary intake of pre-school children: a systematic review. Psychol Health. 2020;35(11):1326–1345. doi:10.1080/08870446.2020.1743842 [PubMed: 32255381]
114. Paul IM, Savage JS, Anzman-Frasca S, Marini ME, Mindell JA, Birch LL. INSIGHT Responsive Parenting Intervention and Infant Sleep. Pediatrics. 2016;138(1):e20160762. doi:10.1542/peds.2016-0762 [PubMed: 27354460]
115. Walton K, Breen A, Gruson-Wood J, Jewell K, Haycraft E, Haines J. Dishing on dinner: a life course approach to understanding the family meal context among families with preschoolers. Public Health Nutr. 24(6):1338–1348. doi:10.1017/S1368980020001779
116. Agathao BT, Cunha DB, Sichieri R, Lopes CS. The role of family meal frequency in common mental disorders in children and adolescents over eight months of follow-up. PLoS One. 2021;16(2):e0243793. doi:10.1371/journal.pone.0243793 [PubMed: 33539371]
117. Eisenberg ME, Olson RE, Neumark-Sztainer D, Story M, Bearinger LH. Correlations between family meals and psychosocial well-being among adolescents. Arch Pediatr Adolesc Med. 2004;158(8):792–796. doi:10.1001/archpedi.158.8.792 [PubMed: 15289253]
118. Fulkerson JA, Story M, Mellin A, Leffert N, Neumark-Sztainer D, French SA. Family dinner meal frequency and adolescent development: relationships with developmental assets and high-risk behaviors. J Adolesc Health. 2006;39(3):337–345. doi:10.1016/j.jadohealth.2005.12.026 [PubMed: 16919794]
119. Dallacker M, Hertwig R, Mata J. Quality matters: A meta-analysis on components of healthy family meals. Health Psychol. 2019;38(12):1137–1149. doi:10.1037/hea0000801 [PubMed: 31556657]
120. Verhage CL, Gillebaart M, van der Veek SMC, Vereijken CMJL. The relation between family meals and health of infants and toddlers: A review. Appetite. 2018;127:97–109. doi:10.1016/j.appet.2018.04.010 [PubMed: 29654851]
121. Hammons AJ, Fiese BH. Is Frequency of Shared Family Meals Related to the Nutritional Health of Children and Adolescents? Pediatrics. 2011;127(6):e1565–e1574. doi:10.1542/peds.2010-1440 [PubMed: 21536618]
122. Berge JM, Rowley S, Trofholz A, et al. Childhood obesity and interpersonal dynamics during family meals. Pediatrics. 2014;134(5):923–932. doi:10.1542/peds.2014-1936 [PubMed: 25311603]
123. Lee HJ, Lee SY, Park EC. Do family meals affect childhood overweight or obesity?: nationwide survey 2008-2012. Pediatr Obes. 2016;11(3):161–165. doi:10.1111/ijpo.12035 [PubMed: 26061428]
124. Berge JM, Wall M, Hsueh TF, Fulkerson JA, Farson N, Neumark-Sztainer D. The Protective Role of Family Meals for Youth Obesity: 10-year Longitudinal Associations. J Pediatr. 2015;166(2):296–301. doi:10.1016/j.jpeds.2014.08.030 [PubMed: 25266343]
125. Berge JM, Trofholz AC, Aqeel M, et al. A three-arm randomized controlled trial using ecological momentary intervention, community health workers, and video feedback at family meals to

improve child cardiovascular health: the Family Matters study design. BMC Public Health. 2023;23(1):708. doi:10.1186/sl2889-023-l5504-2 [PubMed: 37072737]

126. Fiese BH, Everhart RS. Routines. In: Haith MM, Benson JB, eds. Encyclopedia of Infant and Early Childhood Development. Academic Press; 2008:34–41. doi:10.1016/B978-012370877-9.00135-3
127. Owens JA. Sleep in children: Cross-cultural perspectives. Sleep Biol Rhythms. 2004;2(3):165–173. doi:10.1lll/j,1479-8425.2004.00147.x
128. Jenni OG, O'Connor BB. Children's Sleep: An Interplay Between Culture and Biology. Pediatrics. 2005;115(Supplement_1):204–216. doi:10.1542/peds.2004-0815B [PubMed: 15866854]
129. Hohl S, Thompson B, Escareño M, Duggan C. Cultural Norms in Conflict: Breastfeeding Among Hispanic Immigrants in Rural Washington State. Matern Child Health J. 2016;20(7):1549–1557. doi:10.1007/s10995-016-1954-8 [PubMed: 27021068]
130. Ibanez G, Martin N, Denantes M, Saurel-Cubizolles MJ, Ringa V, Magnier AM. Prevalence of breastfeeding in industrialized countries. Rev Epidemiol Sante Publique. 2012;60(4):305–320. doi:10.1016/j.respe.2012.02.008 [PubMed: 22835774]
131. Unar-Munguía M, Lozada-Tequeanes AL, González-Castell D, Cervantes-Armenia MA, Bonvecchio A. Breastfeeding practices in Mexico: Results from the National Demographic Dynamic Survey 2006-2018. Matern Child Nutr. 2021;17(2):e13119. doi:10.1111/mcn.13119 [PubMed: 33325133]
132. Kimbro RT, Lynch SM, McLanahan S. The Influence of Acculturation on Breastfeeding Initiation and Duration for Mexican-Americans. Popul Res Policy Rev. 2008;27(2):183–199. doi:10.1007/sl1113-007-9059-0 [PubMed: 21399755]
133. Gyamfi A, Spatz DF, Jefferson UT, Fucas R, O'Neill B, Henderson WA. Breastfeeding Social Support Among African American Women in the United States: A Meta-Ethnography. Adv Neonatal Care. 2023;23(1):72–80. doi:10.1097/ANC.0000000000001021 [PubMed: 35939758]
134. Chen Q, Goto K, Wolff C, Zhao Y. Relationships between children's exposure to ethnic produce and their dietary behaviors. J Immigr Minor Health. 2015;17(2):383–388. doi:10.1007/s10903-014-0036-5 [PubMed: 24817576]
135. Cook EJ, Powell FC, Ali N, et al. 'They Are Kids, Let Them Eat': A Qualitative Investigation into the Parental Beliefs and Practices of Providing a Healthy Diet for Young Children among a Culturally Diverse and Deprived Population in the UK. Int J Environ Res Public Health. 2021;18(24):13087. doi:10.3390/ijerphl82413087 [PubMed: 34948698]
136. Hook JV, Quiros S, Dondero M, Altman CE. Healthy Eating Among Mexican Immigrants: Migration in Childhood and Time in the U.S. Journal of health and social behavior. 2018;59(3):391. doi:10.1177/0022146518788869 [PubMed: 30039983]
137. Zhang Q, Liu R, Diggs LA, Wang Y, Ling L. Does acculturation affect the dietary intakes and body weight status of children of immigrants in the U.S. and other developed countries? A systematic review. Ethn Health. 2019;24(1):73–93. doi:10.1080/13557858.2017.1315365 [PubMed: 28406037]
138. Vaughn LM, Crosh C, Boyer K, Jenkins A. The Possibility and Promise of Action Research in Pediatrics: A Scoping Review. Clin Pediatr (Phila). Published online January 10, 2023:00099228221144838. doi:10.1177/00099228221144838
139. Constitution of the World Health Organization. Accessed July 23, 2023. https://www.who.int/about/governance/constitution
140. National Research Council (US), Institute of Medicine (US). Children's Health, The Nation's Wealth: Assessing and Improving Child Health. National Academies Press (US); 2004. Accessed September 20, 2023. http://www.ncbi.nlm.nih.gov/books/NBK92206/
141. Halfon N, Chandra A, Cannon JS, Gardner W, Forrest CB. The Gross Developmental Potential (GDP2): a new approach for measuring human potential and wellbeing. BMC Public Health. 2022;22(1):1626. doi:10.1186/sl2889-022-14030-x [PubMed: 36030209]
142. Ferretti LK, Bub KL. The influence of family routines on the resilience of low-income preschoolers. Journal of Applied Developmental Psychology. 2014;35(3):168–180. doi:10.1016/j.appdev.2014.03.003

143. Glynn LM, Davis EP, Luby JL, Baram TZ, Sandman CA. A predictable home environment may protect child mental health during the COVID-19 pandemic. Neurobiol Stress. 2021;14:100291. doi:10.1016/j.ynstr.2020.100291 [PubMed: 33532520]
144. EI Muñiz, Silver EJ, Stein REK. Family routines and social-emotional school readiness among preschool-age children. J Dev Behav Pediatr. 2014;35(2):93–99. doi:10.1097/DBP.0000000000000021 [PubMed: 24509054]
145. Zajicek-Farber ML, Mayer LM, Daughtery LG. Connections Among Parental Mental Health, Stress, Child Routines, and Early Emotional Behavioral Regulation of Preschool Children in Low-Income Families. Journal of the Society for Social Work and Research. 2012;3(1):31–50. doi:10.5243/jsswr.2012.3
146. Hale L, Berger LM, LeBourgeois MK, Brooks-Gunn J. A longitudinal study of preschoolers' language-based bedtime routines, sleep duration, and well-being. Journal of Family Psychology. 2011;25(3):423–433. doi:10.1037/a0023564 [PubMed: 21517173]
147. Wiseman MJ. Nutrition and cancer: prevention and survival. Br J Nutr. 2019;122(5):481–487. doi:10.1017/S0007114518002222 [PubMed: 30213279]
148. Key TJ, Bradbury KE, Perez-Cornago A, Sinha R, Tsilidis KK, Tsugane S. Diet, nutrition, and cancer risk: what do we know and what is the way forward? BMJ. 2020;368:m511. doi:10.1136/bmj.m511 [PubMed: 32139373]
149. Ubago-Guisado E, Rodríguez-Barranco M, Ching-López A, et al. Evidence Update on the Relationship between Diet and the Most Common Cancers from the European Prospective Investigation into Cancer and Nutrition (EPIC) Study: A Systematic Review. Nutrients. 2021;13(10):3582. doi:10.3390/nul3103582 [PubMed: 34684583]
150. Boise C, Ren L, Cheung R. Consistent Routines Matter: Child Routines Mediated the Association Between Interparental Functioning and School Readiness. Early Childhood Research Quarterly. 2022;61:145–157. doi:10.1016/j.ecresq.2022.07.002
151. Ren L, Boise C, Cheung RYM. Consistent routines matter: Child routines mediated the association between interparental functioning and school readiness. Early Childhood Research Quarterly. 2022;61:145–157. doi:10.1016/j.ecresq.2022.07.002
152. Turnbull KLP, Mateus DMC, LoCasale-Crouch J, Coolman FL, Hirt SE, Okezie E. Family routines and practices that support the school readiness of young children living in poverty. Early Childhood Research Quarterly. 2022;58:1–13. doi:10.1016/j.ecresq.2021.07.004
153. Ekman R, Fletcher A, Giota J, Eriksson A, Thomas B, Bååthe F. A Flourishing Brain in the 21st Century: A Scoping Review of the Impact of Developing Good Habits for Mind, Brain, Well-Being, and Learning. Mind, Brain, and Education. 2022;16(1):13–23. doi:10.1111/mbe.12305
154. Boehm JK, Kubzansky LD. The heart's content: the association between positive psychological well-being and cardiovascular health. Psychol Bull. 2012;138(4):655–691. doi:10.1037/a0027448 [PubMed: 22506752]
155. Preventive Care/Periodicity Schedule. Accessed July 25, 2023. https://www.aap.org/en/practice-management/care-delivery-approaches/periodicity-schedule/
156. Nagpal N, Messito MJ, Katzow M, Gross RS. Obesity in Children. Pediatr Rev. 2022;43(11):601–617. doi:10.1542/pir.2021-005095 [PubMed: 36316265]
157. Resnicow K, McMaster F, Bocian A, et al. Motivational interviewing and dietary counseling for obesity in primary care: an RCT. Pediatrics. 2015;135(4):649–657. doi:10.1542/peds.2014-1880 [PubMed: 25825539]
158. Fisher A, Hammersley ML, Jones RA, Morgan PJ, Collins CE, Okely A. Goal setting for weight-related behavior change in children: An exploratory study. Nutr Health. 2018;24(2):67–74. doi:10.1177/0260106018758519 [PubMed: 29466911]
159. Deslippe AL, Bains A, Loiselle SE, et al. SMART goals of children of 6-12 years enrolled in a family-centred lifestyle intervention for childhood obesity: Secondary analysis of a randomized controlled trial. Pediatr Obes. 2023;18(1):e12973. doi:10.1111/ijpo.12973 [PubMed: 36066248]
160. Herbst RB, Khalsa AS, Schlottmann H, Kerrey MK, Glass K, Burkhardt MC. Effective Implementation of Culturally Appropriate Tools in Addressing Overweight and Obesity in an Urban Underserved Early Childhood Population in Pediatric Primary Care. Clin Pediatr (Phila). 2019;58(5):511–520. doi:10.1177/0009922819832088 [PubMed: 30841719]

161. Toddler Food and Feeding. Accessed July 7, 2023. https://www.aap.org/en/patient-care/healthy-active-living-for-families/toddler-food-and-feeding/
162. Preschooler Food and Feeding. Accessed July 7, 2023. https://www.aap.org/en/patient-care/healthy-active-living-for-families/preschooler-food-and-feeding/
163. Jenco M, Editor NC. AAP endorses new recommendations on sleep times. Published online June 13, 2016. Accessed July 7, 2023. https://publications.aap.org/aapnews/news/6630/AAP-endorses-new-recommendations-on-sleep-times
164. Accessed July 28, 2023. https://downloads.aap.org/AAP/PDF/BBB_handout_Jan2023.pdf
165. Moon RY, Carlin RF, Hand I, THE TASK FORCE ON SUDDEN INFANT DEATH SYNDROME AND THE COMMITTEE ON FETUS AND NEWBORN. Sleep-Related Infant Deaths: Updated 2022 Recommendations for Reducing Infant Deaths in the Sleep Environment. Pediatrics. 2022;150(1):e2022057990. doi:10.1542/peds.2022-057990 [PubMed: 35726558]
166. Messito MJ, Mendelsohn AL, Katzow MW, Scott MA, Vandyousefi S, Gross RS. Prenatal and Pediatric Primary Care-Based Child Obesity Prevention Program: A Randomized Trial. Pediatrics. 2020;146(4):e20200709. doi:10.1542/peds.2020-0709 [PubMed: 32883807]
167. Savage JS, Hohman EE, Marini ME, Shelly A, Paul IM, Birch LL. INSIGHT responsive parenting intervention and infant feeding practices: randomized clinical trial. Int J Behav Nutr Phys Act. 2018;15(1):64. doi:10.1186/sl2966-018-0700-6 [PubMed: 29986721]
168. Ruggiero CF, Hohman EE, Birch LL, Paul IM, Savage JS. INSIGHT responsive parenting intervention effects on child appetite and maternal feeding practices through age 3 years. Appetite. 2021;159:105060. doi:10.1016/j.appet.2020.105060 [PubMed: 33276013]
169. Sanders LM, Perrin EM, Yin HS, Bronaugh A, Rothman RL. "Greenlight Study": A Controlled Trial of Low-Literacy, Early Childhood Obesity Prevention. Pediatrics. 2014;133(6):e1724–e1737. doi:10.1542/peds.2013-3867 [PubMed: 24819570]
170. Alkon A, Crowley AA, Neelon SEB, et al. Nutrition and physical activity randomized control trial in child care centers improves knowledge, policies, and children's body mass index. BMC Public Health. 2014;14:215. doi:10.1186/1471-2458-14-215 [PubMed: 24580983]
171. Battista RA, Oakley H, Weddell MS, Mudd LM, Greene JB, West ST. Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina. Prev Med. 2014;67 Suppl 1:S10–16. doi:10.1016/j.ypmed.2014.01.022 [PubMed: 24495522]
172. An Intervention to Promote Healthy Weight: Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) Theory and Design. Accessed July 25, 2023. https://stacks.cdc.gov/view/cdc/20150
173. Healthy Minds and Bodies. Sesame Workshop. Published January 27, 2023. Accessed July 28, 2023. https://sesameworkshop.org/healthy-minds-and-bodies/

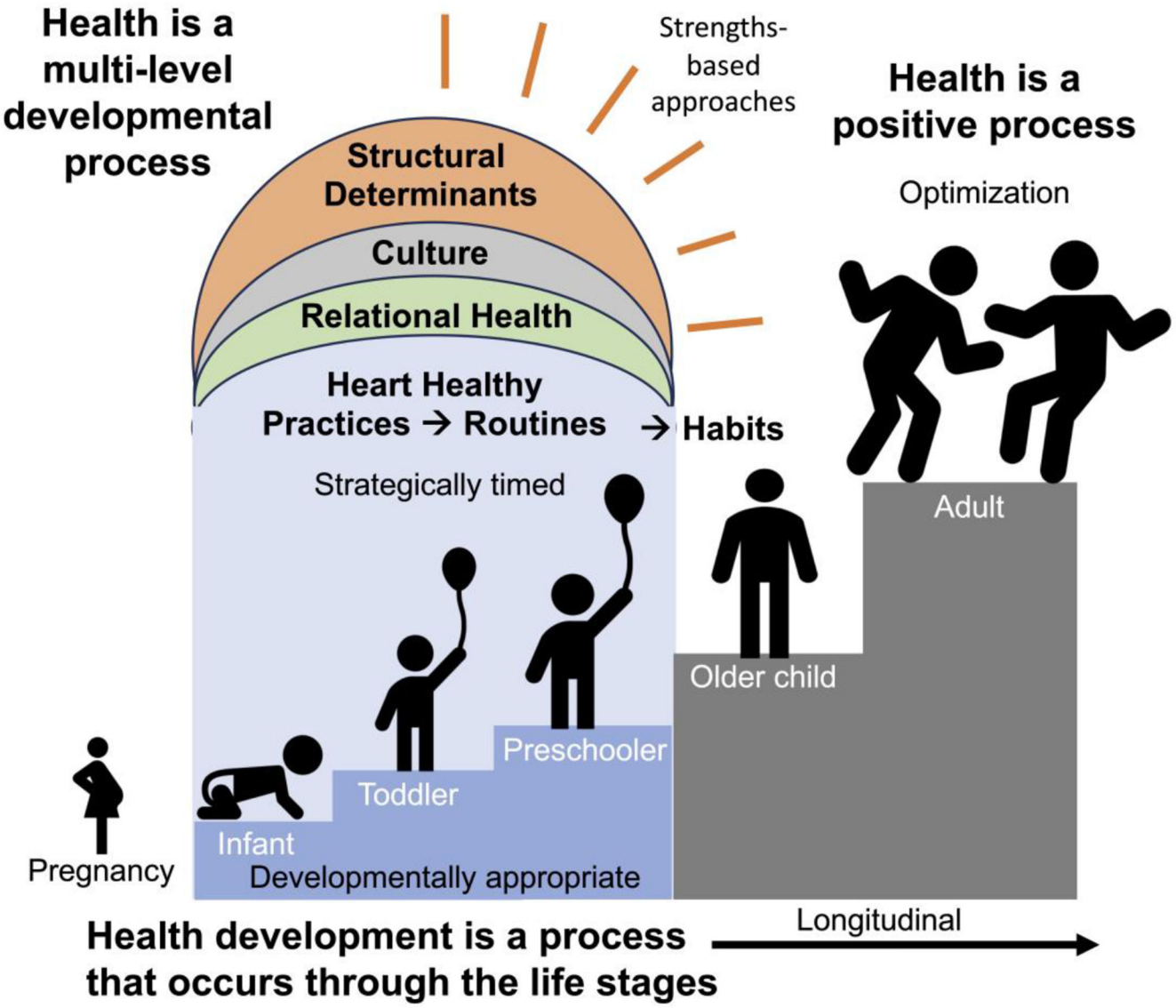

Figure 1:
Proposed model for the effect of multi-level processes on early childhood routines.

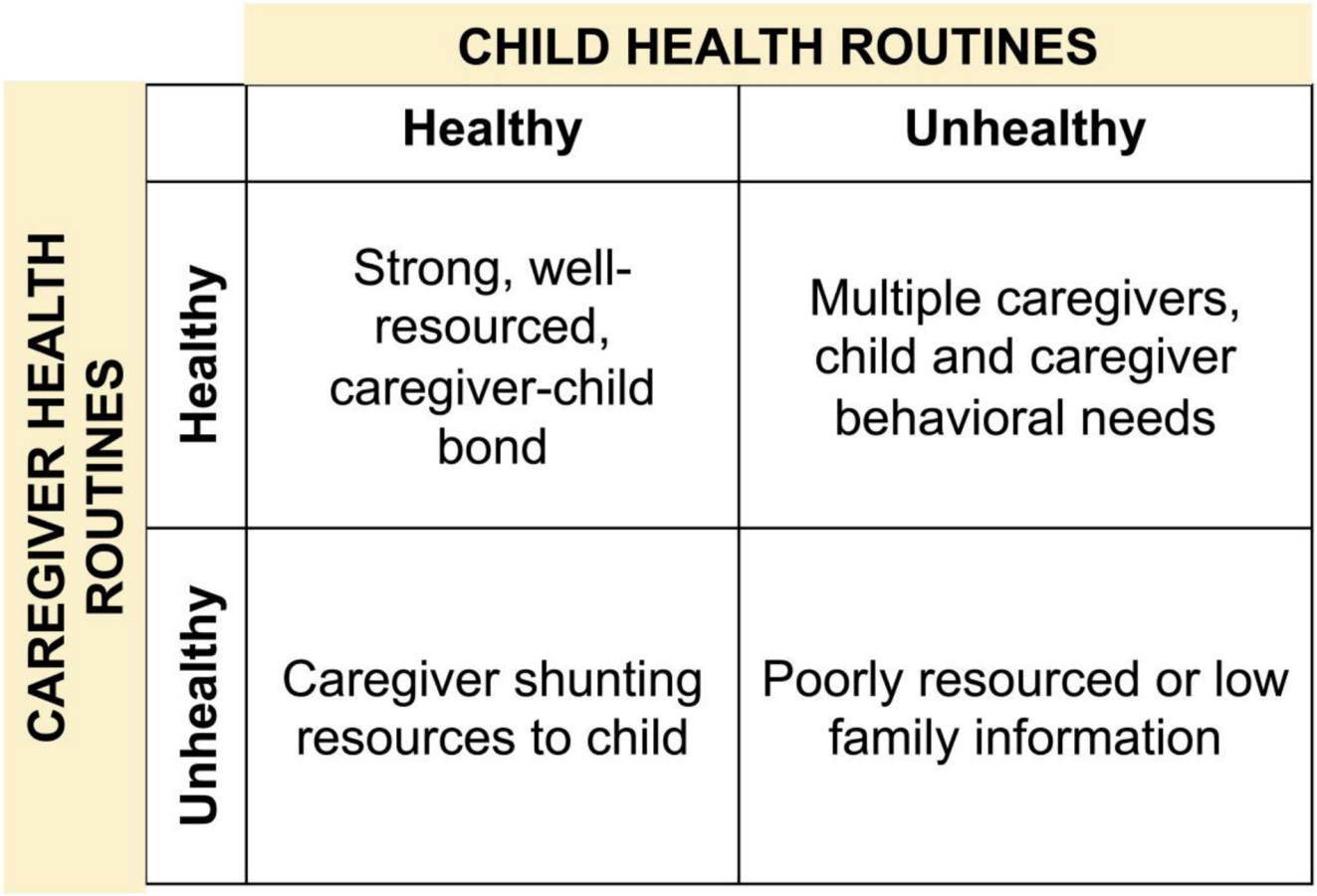

Figure 2:
Dyadic caregiver-child relational routines.

Table 1:

AAP Evidence-Based Heart Healthy Routine Guidelines in Early Childhood.

Heart Healthy Routines	Age Group	AAP Guidelines
Healthy diet	Infancy (0-1 year)	Breastfeed exclusively for at least 6 months and continue for 1 year or longer.[52] Introduce diverse foods when starting solid foods.[52] Introduce 2-3 healthy snacks per day at 9 months.[52] Encourage self-feeding via spoons, fingers, and cups.[52] Do not introduce juice or other sugary beverages.[52]
	Toddlerhood (1-3 years)	Provide healthy foods and let child control portion completed based on satiety cues.[161] Introduce diverse foods to prevent picky eating.[161] Provide 2-3 healthy snacks per day.[161] Continue avoiding juice or other sugary beverages and encourage water or milk consumption.[161]
	Preschool (3-5 years)	Provide healthy foods and let child control portion completed based on satiety cues.[162] Introduce diverse foods to prevent picky eating.[162] Provide 2-3 healthy snacks per day.[162] Continue avoiding juice or other sugary beverages and encourage water or milk consumption.[162]
Physical activity	Infancy (0-1 year)	Promote daily physical activity that encourages interaction with caregivers and the environment.[81] Facilitate supervised daily tummy time.[81]
	Toddlerhood (1-3 years)	Participate in at least 30 minutes of structured and at least 60 minutes up to several hours of unstructured physical activity per day.[81]
	Preschool (3-5 years)	Participate in at least 60 minutes of structured and at least 60 minutes up to several hours of unstructured physical activity per day.[81]
Sleep	Infancy (0-1 year)	Sleep 12-16 hours per day, including naps.[163] Brush teeth twice daily.[164] Read a book interactively with child before bed.[164] Infants should sleep on their backs, on a firm and flat surface without nearby soft objects, close to the parents but on a separate bed.[165]
	Toddlerhood (1-3 years)	Sleep 11-14 hours per day, including naps.[104] Brush teeth twice daily.[164] Read a book interactively with child before bed.[164]
	Preschool (3-5 years)	Sleep 10-13 hours per day, including naps.[163] Brush teeth twice daily.[164] Read a book interactively with child before bed.[164]

Table 2:

Narrative Review Outline.

Themes	Subthemes	Summary
Health is a developmental process	Longitudinal Effects	Cardiovascular health trajectory is largely determined by 8 years of age.
	Strategically Timed Intervention	Focusing on routines early in life has long term positive effects.
	Developmentally Focused	Childhood routines must be adapted to the developmental stages of early childhood.
Health is a multi-level process	Structural Determinants of Health	Childhood routines occur within a neighborhood and societal context, and structural inequalities can impede ideal routines.
	Relational Determinants of Health	Childhood routines are interwoven into routines of caregivers and other family members and accompanied by affect-laden social-emotional interactions.
	Cultural Strengths	Communities may have cultural and community rituals that serve as strengths to draw from when building family routines.
Health is a positive process	Optimization	Early childhood routines focus on positive outcomes rather than avoidance of disease.
	Strengths-Based Interventions	It is valuable to highlight family strengths rather than using a family deficit-based model. Specific interventions have been shown to bolster family strengths.

Table 3:

Examples of Strengths-Based Interventions to Support Early Childhood Routines to Promote Cardiovascular Health

Intervention	Description of Intervention
Starting Early[166]	**General Description:** A strength-based intervention with families with exposure to adverse social determinants of health aligned with pediatric visits providing comprehensive nutrition/lactation counseling and parenting support groups facilitated by registered dieticians. **Ages:** Pregnancy through age 3. **Optimization Targets:** Improved diet, physical activity, sleep, caregiver-child relationship. **Strengths Leveraged:** One-on-one motivational interviews to set goals aligned with families, group-based sessions for social support and peer-generated strengths-based approaches.
Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT)[167,168]	**General Description:** A home-based intervention by nurses teaching developmentally appropriate, healthy, responsive feeding techniques. **Ages:** Birth through age 3. **Optimization Targets:** Improved diet, physical activity, sleep, child emotional wellbeing, confidence in parenting. **Strengths Leveraged:** Fostering responsive parenting strategies in the context of child's temperament and behaviors.
Greenlight[169]	**General Description:** A primary care intervention, where practitioners use a health literacy approach and utilize motivational interviewing to help parents implement goals that increase healthy behaviors. **Ages:** 2 months through age 2. **Optimization Targets:** Improved infant feeding, sleep, physical activity. **Strengths Leveraged:** Implementing social cognitive theory into an intervention providing motivational interviewing and goal setting, a written toolkit with ideal behaviors, helping families reach the ideal, fostering caregiver confidence in reaching goals.
Nutrition and Physical Activity Self-Assessment for Primary Care (NAP SACC)[170–172]	**General Description:** An intervention for early childcare settings that promotes healthy eating and physical activity. **Ages:** Preschool. **Optimization Targets:** Improved diet, physical activity, caregiver knowledge about these topics. **Strengths Leveraged:** Improving pre-existing positive aspects of care provided at childcare facilities.
Family Resources in Sesame Street in Communities [173]	**General Description:** Sesame Street Workshop's *Sesame Street in Communities* offers high-quality resources on multiple topics relevant to early childhood heart healthy routines. **Ages:** 0 to 7+ **Optimization Targets:** Eating well, emotional well-being, health and hygiene, physical activity, learning through routines. **Strengths Leveraged:** Leveraging family members and community ("these are the people in your neighborhood") to help children grow "smarter, stronger, and kinder."