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Intervening in Early Childhood to Prevent Obesity:

Best Practices for Home and Child Care Settings

An increasing proportion of U.S. children aged 2-5 are overweight. Early intervention among preschoolers at risk for poor nutrition and obesity, prior to the onset and consolidation of unhealthy eating habits and sedentary patterns, is critical to obesity prevention. Preschool aged children are more likely to modify their lifestyle behaviors than older children, as behaviors are less ingrained. Further, parents and other caregivers play a more central role in guiding younger children's behaviors. Many children in this age group are in licensed child care during all or part of each week. Early childhood education settings can thus play an important part in providing opportunities for early development of healthy food and activity habits that are conducive to the maintenance of a healthy weight. Obesity prevention in young children is best done using a multi-component intervention program combining nutrition education, physical activity, and family support, with improved access to healthy food and exercise. Involving program participants in the development of programs is important to building acceptance by children, families, and communities. Demonstration of an effective public health approach to obesity prevention for very young children has the potential for wide dissemination for policy and practice and positive influence on the prevention of childhood obesity.

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Introduction. An increasing proportion of U.S. children aged 2-5 are overweight or at risk of becoming so. Early intervention among preschoolers at risk for poor nutrition and obesity, prior to the onset and consolidation of unhealthy eating habits and sedentary patterns, is critical to obesity prevention. Preschool aged children are more likely to modify their lifestyle behaviors than older children, as behaviors are less ingrained (Ritchie, 2001; Patrick, 2005). Further, parents and other caregivers play a more central role in guiding younger children's behaviors (Patrick, 2005; Ontai, 2009). Many children in this age group are in licensed child care during all or part of each week. Early childhood education (ECE) settings can thus play an important part in providing opportunities for early development of healthy food and activity habits that are conducive to the maintenance of a healthy weight. Demonstration of an effective public health approach to obesity prevention for very young children has the potential for wide dissemination for policy and practice and positive influence on the prevention of childhood obesity.

The Need for Early Childhood Obesity Prevention. The prevalence of obesity in children aged 2-5 years old has more than doubled from 5.0% in the 1970s to 12.4% in 2006 (Ogden, 2002, 2008). The largest nationally representative longitudinal study of young children found that nearly one-quarter of children are already overweight or obese by the time they start kindergarten (Anderson, 2009). Most excess weight prior to puberty is gained before age 5 (Gardner, 2009). Children who are overweight between ages 2 to 5 are five times more likely to be overweight at age 12, when compared with children who are not overweight in their preschool years (Nader, 2006). Adolescent overweight, in turn, increases the likelihood of adult obesity and its co-morbidities (Oren, 2003). The link between early behaviors and obesity later in life leads to the conclusion that successful obesity prevention strategies must begin at a very young age.

Obesity related health problems impose a considerable economic burden on society. The estimated annual cost from health care and lost productivity due to overweight, obesity, and physical inactivity has been estimated at \$41.2 billion in California alone (CCPHA, 2009). Even more alarming, this trend is expected to lead to a reduction in life expectancy (Blacklow, 2007). Further, treatment of obesity in children is likely to be more costly and less efficacious than prevention (Wake, 2009).

Early Childhood Education Settings Prime for Reaching Young Children. Nationally, the number of licensed child care facilities is estimated to have increased more than 4-fold in the past three decades (Story, 2006). The majority (~73%) of the 19.6 million children under five years of age in the U.S. spend time in ECE programs before they attend kindergarten (US Census Bureau, 2005). Most children spend between 10 and 40 hours per week in child care (CHIS, 2005), where they receive a considerable portion of their daily food and activity during every weekday of the year, from shortly after birth through age 5 or 6 when beginning school.

ECE programs provide an unparalleled opportunity to reach the vast majority of young children in the U.S. No other institution has as much continuous and intensive contact with young children. Child care providers are in a unique position to influence the health knowledge, attitudes and practices of the children in their care as well as the parents of those children (Gupta, 2005; Hughes, 2007; Taveras, 2006). Although ECE environments have unquestionable potential to greatly influence norms and habits for child nutrition and physical activity, this potential has not been realized.

California Ideal for Early Childhood Obesity Prevention. California is home to 1 in 8 of the nation's children under 5 years of age (US Census Bureau, 2008) and home to nearly 1 in 10 of the nation's children in child care (NACCRR, 2009). In California nearly 40% of low-income young children are overweight (CDHCS, 2007), highest in the nation with the exception of only one other state (Polhamus, 2009). About half (550,000) of California's preschool aged children are enrolled in licensed child care (CHIS, 2005). Due to changes in welfare policy, many low-income households must comply with work requirements, making child care a vital resource for low-income families. In California, approximately a third of children in child care are from families earning less than 200 percent of the federal poverty level (CHIS, 2005).

ECE Settings Largely Untapped for Obesity Prevention. Outside of basic health and safety rules, few states have regulations for licensed child care related to healthy foods and physical activity. Kaphingst et al (2009) found that only 2 states specify that menus in child care centers (no states mandated this for family day care homes) were required to be consistent with the *Dietary Guidelines for Americans*; only 12 states have any regulations limiting foods of low nutritional value; and only 9 states specify guidelines for time spent out of doors or watching TV. Further, there is no federal requirement for a wellness policy in ECE settings. In California, licensing requirements include only basic health and safety (e.g., safety of meals and water, specifications on amount of physical space); no codes specific to obesity prevention exist (Benjamin, 2009a; CCR, 2009).

While much work has focused upon schools in the prevention of childhood obesity, preschool aged children and child care settings have received comparatively little attention (Story, 2006). The few studies available suggest that spending time in child care is related to poorer eating and physical activity habits and increased adiposity compared to care at home (Benjamin, 2009b; Hawkins, 2009). A 1993 study of child care centers in seven states found that menus followed by facilities did not model healthy dietary patterns nor provide diets low in fat (Briley, 1993). A 1997 study of a nationally representative sample of child care centers and family day care homes participating in the Child and Adult Care Food Program (CACFP) found that children consumed 61-71% of their daily energy needs and more than 66% of the recommended dietary allowance for key nutrients while in child care (Fox, 1997). However, meals and snacks exceeded the *Dietary Guidelines for Americans* for calories from saturated fat and 50 percent of facilities served lunches with more than 35 percent of calories from fat. Food groups most often missing from meals were fruits and vegetables. A statewide California survey of foods served to 2-5 year olds at over 400 child care centers and homes found that nearly one quarter of sites typically served whole milk (only lower fat milks are recommended for children over 2), only 28% typically served water with meals and snacks, nearly one-third did not have water easily accessible to children by self-serve during the day, whole grains were lacking at most sites, and on any given day one quarter of sites served french fries, half provided fruit canned in syrup and 2% provided no fruit or vegetables whatsoever (Ritchie, 2010; CFPA, 2009). Lunches brought from home are typically even less nutritious than those provided by child care sites (Whaley, 2009; Sweitzer, 2009).

Contrary to popular perception, young children are not typically very active in child care settings (Oliver, 2007). One study found that in an 8-hour day at child care centers in 2 states, children received less than the minimum recommended 1 hour of moderate to vigorous physical activity (Benjamin, 2009c). In Massachusetts, children were sedentary (not including eating or sleeping) for 150 minutes per day, and spent 41 minutes engaged in physical activity (all activity more vigorous than walking). In Rhode Island, children fared worse. They spent 165 minutes – more than 2.5 hours – in sedentary activities with only 29 minutes out of the day devoted to physical activity. Aspects of the physical and social environment found to be related to enhanced physical activity in ECE include outdoor space, opportunities for active play, portable play equipment, active provider involvement, and physical activity training and education (Bower, 2008; Brown, 2009; Dowda, 2009).

What Works in Early Childhood Education Settings. Surprisingly few intervention studies have been designed to change eating or physical activity practices in ECE settings. Of those, most focus has been on educational strategies of short duration (<1 year) involving relatively small sample sizes of children (<100). Studies of short duration with small sample sizes are not likely to impact obesity outcomes. Therefore, in addition to studies with weight related outcomes, included in this review are studies aiming to improve diet and physical activity behaviors (Alhassan, 2007; Benjamin, 2007; Corvalan, 2008; Dennison, 2004; Eliakim, 2007; Fitzgibbon, 2002, 2005, 2006; Gosliner, 2010; Harvey-Berino, 2003; Johnson, 2007; Leonard, 1984; McGarvey, 2004; Pollard, 2001; Reilly, 2006; Scheffler, 2007; Trost, 2008; Ward, 2008; Williams, 1998, 2002, 2004; Wolman, 2008). These behavior changes could impact children's weight status over time. Also consulted were relevant review articles to take advantage of judgments of recognized experts in the field of obesity prevention, ECE settings, and parent engagement (Benton, 2004; Bluford, 2007; Campbell, 2007; Flynn, 2006; Golan, 2006; Olstad, 2009; Larson, 2007; Small, 2007; Story, 2006; Vaughn, 2007). What follows is a description of the best practices identified from the best evidence currently available (**Table 1** and **Table 2**).

Table 1. Promoting Healthy Eating in ECE Settings		
Strategy	Educational	Environmental
Best Practice	<ul style="list-style-type: none"> • Comprehensive health education in conjunction with supporting environmental changes – for both eating and physical activity. • Social marketing to increase children's acceptance of healthy foods • Child participation in hands-on nutrition activities • Integrate nutrition messages through simultaneous home and on-site activities 	<ul style="list-style-type: none"> • Repeated exposure to healthy foods • Increase the nutritional quality of foods provided (e.g., increase vegetables, decrease calories, fat) • Engage parents as active participants in providing healthy foods in the home environment
Promising Strategy	<ul style="list-style-type: none"> • Didactic nutrition education for children • Use rewards and incentives to motivate children • Distribute newsletters to parents reflecting child nutrition lessons 	<ul style="list-style-type: none"> • Encourage families to follow healthy eating practices at home (e.g., policy of no snacking while watching TV)
Research Opportunity	<ul style="list-style-type: none"> • Reward sites to improve foodservice • Involve health professional consultants to provide technical assistance specific to site needs • Provide nutrition training to food service staff • Provide staff and parent training on child development in relation to nutrition and child-feeding practices • Provide staff worksite wellness training on personal nutrition • Provide child training on self-regulation of food intake 	<ul style="list-style-type: none"> • Decrease site provision of sweetened beverages and limit juice to no more than 4-6 fl oz/day • Increase site provision of drinking water • Implement policy to mandate time for nutrition education

Table 2. Promoting Physical Activity in ECE Settings		
Strategy	Educational	Environmental
Best Practice	<ul style="list-style-type: none"> • Incorporate physical activity into existing curriculum • Provide at least 2 hours/day of physical activity; half in structured activities and half in unstructured free play 	
Promising Strategy	<ul style="list-style-type: none"> • Distribute newsletters to parents reflecting child physical activity lessons • Educate children to reduce TV time and other sedentary behaviors 	
Research Opportunity	<ul style="list-style-type: none"> • Reward sites to improve physical activity • Provide physical activity training to staff • Provide staff and parent training on child development in relation to physical activity • Provide staff worksite wellness training on personal physical activity 	<ul style="list-style-type: none"> • Increase recess/outdoor play time • Improve portable and fixed play equipment • Implement policy to mandate time for physical activity

1. Integrate education with supportive environmental change.

The deceptively simple primary cause of obesity is energy imbalance—too many calories consumed and too few calories burned. However, this is actually a complex, multifaceted problem that requires an innovative solution. The forces that lead to energy imbalance on a population level are numerous and pervasive. Of the myriad programs that have attempted to reduce childhood obesity in school-aged children, only a few have achieved even modest success (Ritchie, 2006; Peterson, 2007). The likely reason is that most programs have focused primarily on giving children (or their caregivers) information and encouraging them to change their behaviors. It has become increasingly clear that children's behaviors are influenced strongly by their environment—that is, the types of food and opportunities for physical activity available at home, at child care and school, and in the larger community—and that meaningful and sustainable behavior change is unlikely to occur unless these environments support it. Expert consensus is mounting that environmental and policy change is critical to preventing obesity in children (Story, 2009). A growing body of research suggests that improvements in school food and physical activity environments do lead to healthier food choices and improved fitness levels among school-age children (Kubik, 2003). For example, several recent studies in elementary schools have successfully influenced BMI through a combination of education and environmental support (Economos, 2007; Foster, 2008). Likewise in child care settings, the most successful interventions coupled educational messages with institutional change – so that children are taught about healthy eating and physical activity while provided healthy foods and more opportunities for physical activity at child care.

2. Include both nutrition education and physical education.

The most successful interventions were those that included nutrition as an integral part of the child care curriculum. Targeting obesity prevention through physical activity alone does not seem to be as effective without incorporating nutrition education. Young children appear to learn best when exposed to hands-on (rather than didactic) activities including ample opportunities for tasting, touching and working with food. Providers and parents should be reminded that repeated exposure is typically required to promote acceptance of new foods by young children.

3. Build in parent engagement.

Interventions that aimed to involve parents were generally more successful than those that did not. Efforts to include parents in child care settings are most effective when the parent not only receives newsletters that reflect the child's in-class lessons, but is also given guidance and at-home activities to aid in the progression of healthier lifestyle changes for the child. Research on engaging parents in school and after-school programs points to several successful strategies that can be adopted in ECE settings (Table 3).

Table 3. Best Practices for Parent/Family Involvement

I:	Communicating—Communication about nutrition and physical activity between home and site is regular, two-way, and meaningful.
II:	Parenting—Parenting skills relating to nutrition and physical activity are promoted and supported.
III:	Child Learning—Parents play an integral role in assisting child learning about nutrition and physical activity.
IV:	Volunteering—Parents are welcome on-site, and their support and assistance are sought.
V:	Site Decision Making and Advocacy—Parents are full partners in the decisions that affect the health of children and families.
VI:	Collaborating with Community—Community resources are used to strengthen sites, families, and child learning about nutrition and physical activity.

(Adapted from: Epstein, 1992 and National PTA, 2009.)

Several promising strategies and opportunities for further research were also revealed. Research suggests that many child care providers are not adequately trained on child nutrition and feeding (Sigman-Grant, 2009; Ritchie, 2010). Promoting staff wellness may also be beneficial in empowering providers to model healthy eating and improve nutrition-related practices for children (Gosliner, 2010).

In contrast with schools, where wellness policy is federal mandated, relatively few states have enacted policy requirements for child care (Kaphingst, 2009). Observational data suggest that having child care policy in place regarding snack consumption, for example, is associated with an increase in fruit intake by children (Vereecken, 2008). However, the impact of systematic changes to child care policy has not been well studied. Experts have recommended at the federal level that all meals and snacks offered by the Child and Adult Care Food Program or CACFP (USDA's food subsidy program for child care settings (USDA, 2009)) should meet the *Dietary Guidelines for Americans* (Story, 2006; CDE, 2009). Further, states should develop nutrition and physical activity policies that address children's eating, physical activity, and media use for all licensed child care facilities (regardless of whether or not they participate in CACFP). At the local level, licensed child care sites should have written wellness policies to ensure healthy meals, snacks, and beverages, adequate and appropriate physical activity, limits on screen time, and staff training on child nutrition and physical activity.

Case Study: Decreasing childhood obesity by improving child care meals in conjunction with education

What was done: Child care sites received comprehensive health education and total fat content of meals was reduced to less than 30% and saturated fat content to less than 10% of total calories.

What it means: Providing children in child care with healthier meal options, as well as health education, can promote healthy eating.

Source: Williams, 2004.



Case Study: Promoting healthy eating with social marketing plus exposure to healthy options

What was done: 4 Head Start centers provided a marketing campaign via education and storybooks and repeated exposure to various healthier options in an effort to increase children's acceptance of fruits and vegetables.

What it means: Repeated exposure and children's active participation in nutrition lessons encourages children to make healthy choices.

Source: Johnson, 2007.



Case Study: Decreasing childhood obesity by teacher-led curriculum

What was done: 12 Head Start center teachers provided nutrition lessons and physical activity sessions to children (40 minutes, three times weekly for 3 months) along with supplemental take-home activities, resulting in decreased obesity and reduced saturated fat consumption that persisted at 2 years follow-up.

What it means: Teachers can implement effective obesity prevention strategies that can have long-term impacts.

Source: Fitzgibbon, 2005.



What Works in Home Settings. In-home interventions allow for maximal parental or guardian participation and involvement in the efforts to improve childhood activity behavior, eating habits and obesity. While more interventions have targeted obesity of young children within child care settings than at home, the ECE environment does not always ensure that the changes implemented in the classroom will carry over into the home. The most successful obesity reduction interventions that occur in ECE settings are those that also intervene in the participants' homes in efforts to promote retention of positive changes. Allocating the intervention between home and child care facility promotes both parent and child involvement. However, intervening in the home alone also promotes both parent and child involvement and has the potential to result in better improvements in both reducing obesity and sedentary behavior compared to child care setting under certain circumstances (**Table 4**) (Campbell, 2008; Haire-Joshu, 2008; Hakanan, 2005; Harvey-Berino, 2003; Horodyski, 2005; Leonard, 1984; Rask-Nissila, 2002; Talvia 2004, 2006; Wardle, 2003).



Case Study: Decreasing childhood obesity with at-home individual nutrition counseling

What was done: Individualized counseling at home with parent and child provided over a 10 year period resulted in a decrease in dietary fat, saturated fat and cholesterol in child, and an increase in fruits and vegetable consumption in both parents and children. Among girls, the prevalence of obesity also decreased.

What it means: Guiding parents to reduce provision of high-energy, nutrient-poor foods and increase intake of nutrient-rich foods during child development may help with obesity prevention.

Source: Talvia, 2004.

Table 4: Promoting Healthy Eating and Physical Activity in Home Settings

Strategy	Educational	Environmental
Best Practice	<ul style="list-style-type: none"> • Distribute newsletters tailored to fit individual needs of participants • Provide individual parent counseling • Provide hands-on activities involving child 	<ul style="list-style-type: none"> • Increase availability of fruits and vegetables in home • Repeat exposure by offering healthy food options
Promising Strategy	<ul style="list-style-type: none"> • Provide non-food reward for child's behavior change • Provide group parent counseling 	<ul style="list-style-type: none"> • Decrease snacking and meal eating while watching TV • Promote heart-healthy diet (e.g., low in saturated fat)
Research Opportunity	<ul style="list-style-type: none"> • Provide parent counseling on children's weight and child-feeding practices • Provide In-home child counseling • Add cognitive behavioral aspect to intervention • Increase frequency of counseling • Intervene long-term – continuing beyond preschool age 	<ul style="list-style-type: none"> • Alter access to grocery stores and farmers' markets • Alter access to fast food restaurants • Decrease restrictive child feeding practices • Make additional alterations to home environment

What was done: Healthy eating and increased physical activity was promoted to parents via group counseling and weekly homework assignments over a 5 week period resulting in increased healthy food habits and decreased sedentary behavior in children.

What it means: Parent's providing verbal encouragement can help young children make better food and physical activity choices.

Source: Leonard, 1984.



Case Study: Increasing children's acceptance of fruits and vegetables

What was done: In-home counseling to parents and children and repeated exposure of child to disliked foods resulted in an increased acceptance of targeted fruits and vegetables.

What it means: Greater exposure of children to hands-on activities that engage children with food and nutrition can help to improve their eating patterns.

Source: Wardle, 2003.

In summary, obesity prevention in young children is best done using multi-component intervention programs combining nutrition education, physical activity, and family support, with improved access to healthy food and exercise. Involving program participants in the development of programs is important to building acceptance by children, families, and communities. Demonstration of an effective public health approach to obesity prevention for very young children has the potential for wide dissemination for policy and practice and positive influence on the prevention of childhood obesity.

References

- Alhassan S, Sirard JR, Robinson TN. The effects of increasing outdoor play time on physical activity in Latino preschool children. *Int J Pediatr Obes* 2007;2:153-8.
- Anderson SE, Whitaker RC. Prevalence of obesity among US preschool children in different racial and ethnic groups. *Arch Pediatr Adolesc Med* 2009;163:344-8.
- Benjamin SE, Rifas-Shiman SL, Taveras EM, Haines J, Finkelstein J, Kleinman K, Gillman MW. Early child care and adiposity at ages 1 and 3 years. *Pediatrics* 2009b;124:555-62.
- Benjamin SE, Taveras EM, Craddock AL, Walker EM, Slining MM, Gillman MW. State and regional variation in regulations related to feeding infants in child care. *Pediatrics* 2009a;124:e104-11.
- Benjamin SE. *How Active is Your Child at Day Care?* Nemours' Healthy Kids, Healthy Future. A Conference on Health Promotion and Obesity Prevention in Early Care and Education. Washington, DC. September 23-24, 2009c. Available at: <http://healthykidshealthyfuture.com/> (Accessed September 2009).
- Benjamin SE, Ammerman A, Sommers J, Dodds J, Neelon B, Ward DS. Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC): Results from a pilot intervention. *J Nutr Educ Behav* 2007;39:142-9.
- Benton D. Role of parents in the determination of the food preferences of children and the development of obesity. *Int J Obes Relat Metab Disord* 2004;28:858-69.
- Bluford DA, Sherry B, Scanlon KS. Interventions to prevent or treat obesity in preschool children: a review of evaluated programs. *Obesity (Silver Spring)* 2007;15:1356-72.
- Bower JK, Hales DP, Tate DF, Rubin DA, Benjamin SE, Ward DS. The childcare environment and children's physical activity. *Am J Prev Med* 2008;34:23-9.
- Briley ME, Roberts-Gray C, Rowe S. What can children learn from the menu at the child care center? *J Comm Health* 1993;19:363-77.
- Brown WH, Pfeiffer KA, McIver KL, Dowda M, Addy CL, Pate RR. Social and environmental factors associated with preschoolers' nonsedentary physical activity. *Child Dev* 2009;80:45-58.
- California Center for Public Health Advocacy (CCPHA). The Economic Costs of Overweight, Obesity, and Physical Inactivity Among California Adults—2006. July 2009.
- California Department of Education (CDE), California Health and Human Services Agency. *Keeping Children Healthy in California's Child Care Environments: Recommendations to Improve Nutrition and Increase Physical Activity. Executive Summary*. Sacramento, CA: CDE Press. 2009.
- California Department of Health Care Services (CDHCS). 2007 Pediatric Nutrition Surveillance California. Available at: www.dhcs.ca.gov/services/chdp/Pages/PedNSS2007.aspx#overview (Accessed June 2009).
- California Food Policy Advocates (CFPA). Survey of the Nutrition and Physical Activity Environments in California Licensed Child Care. 2009. Available at: <http://www.cfpa.net/> (Accessed September 2009).
- California Health Interview Survey (CHIS), 2005. Los Angeles, CA: UCLA Center for Health Policy Research. Available at: www.askchis.com (Accessed May 2009).
- Campbell KJ, Hesketh KD. Strategies which aim to positively impact on weight, physical activity, diet and sedentary behaviours in children from zero to five years. A systematic review of the literature. *Obes Rev* 2007;8:327-38.
- Corvalan C, Uauy R, Flores R, Kleinbaum D, Martorell R. Reduction in the energy content of meals served in the Chilean National Nursery School Council Program did not consistently decrease obesity among beneficiaries. *J Nutr* 2008;138:2237-43.
- Dennison BA, Russo TJ, Burdick PA, Jenkins PL. An intervention to reduce television viewing by preschool children. *Arch Pediatr Adolesc Med* 2004;158:170-6.

- Dowda M, Brown WH, McIver KL, Pfeiffer KA, O'Neill JR, Addy CL, Pate RR. Policies and characteristics of the preschool environment and physical activity of young children. *Pediatrics* 2009;123:e261-6.
- Economos CD, Raymond R, Hyatt RR, Goldberg JP, Must A, Naumova EN, Collins JJ, Nelson ME. A community intervention reduces BMI z-score in children: Shape Up Somerville first year results *Obesity* 2007;15:1325-36.
- Eliakim A, Nemet D, Balakirski Y, Epstein Y. The effects of nutritional-physical activity school-based intervention on fatness and fitness in preschool children. *J Pediatr Endocrinol Metab* 2007;20:711-8.
- Epstein JL. *School and Family Partnerships*, in M. C. Alkin (ed.) Encyclopedia of Educational Research, 6th edn. New York: Macmillan . 1992, pp. 1139–1151
- Fitzgibbon ML, Stolley MR, Dyer AL, VanHorn L, KauferChristoffel K. A community-based obesity prevention program for minority children: Rationale and study design for Hip-Hop to Health Jr. *Prev Med* 2002;34:289-97.
- Fitzgibbon ML, Stolley MR, Schiffer L, Van Horn L, KauferChristoffel K, Dyer A. Two-year follow-up results for Hip-Hop to Health Jr.: a randomized controlled trial for overweight prevention in preschool minority children. *J Pediatr* 2005;146:618-25.
- Fitzgibbon ML, Stolley MR, Schiffer L, Van Horn L, KauferChristoffel K, Dyer A. Hip-Hop to Health Jr. for Latino preschool children. *Obesity (Silver Spring)* 2006;14:1616-25.
- Flynn MA, McNeil DA, Maloff B, Mutasingwa D, Wu M, Ford C, Tough SC. Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. *Obes Rev* 2006;7 Suppl 1:7-66.
- Foster GD, Sherman S, Borradaile KE, Grundy KM, Vander Veur SS, Nachmani J, Karpyn A, Kumanyika S, Shults J. A policy-based school intervention to prevent overweight and obesity. *Pediatrics* 2008;121:e794-802.
- Fox MK, Glantz FB, Endahl J, Wilde J. Early Childhood and Child Care Study: Nutritional Assessment of the CACFP, vol. 2: Final Report (Washington, DC: U.S. Department of Agriculture, Food and Consumer Service, 1997).
- Gardner DS, Hosking J, Metcalf BS, Jeffery AN, Voss LD, Wilkin TJ. Contribution of early weight gain to childhood overweight and metabolic health: a longitudinal study (EarlyBird 36). *Pediatrics* 2009;123:e67-73.
- Golan M. Parents as agents of change in childhood obesity--from research to practice. *Int J Pediatr Obes* 2006;1:66-76.
- Gosliner WA, James P, Yancey A, Ritchie LD, Studer N, Crawford P. Impact of a staff wellness program on the nutrition and physical activity environment of child care centers. *Am J Health Prom* 2010;Jan/Feb:in press.
- Gupta RS, Shuman S, Taveras EM, Kulldorff M, Finkelstein J A. Opportunities for health promotion education in child care. *Pediatrics* 2005;116:e499-505.
- Hawkins SS, Cole TJ, Law C. Examining the relationship between maternal employment and health behaviours in 5-year-old British children. *J Epidemiol Community Health* 2009. Available at: <http://jech.bmj.com/> (Accessed September 2009).
- Haire-Joshu D, Elliott MB, Catio NM, Hessler K, Nanney MS, Hale N, Boehmer TK, Kreuter M, Brownson RC. High 5 for Kids: The impact of a home visiting program on fruit and vegetable intake of parents and their preschool children. *Prev Med* 2008;7:77-82.
- Harvey-Berino J, Rourke J. Obesity prevention in preschool Native-American children: A pilot study using home-visiting. *Obes Res* 2003;11:606-11.
- Horodyski M, Stommel M. Nutrition education aimed at toddlers: An intervention study. *Pediatr Nurs* 2005;31:366-72.

- Hughes SO, Patrick H, Power TG, Fisher JO, Anderson CB, Nicklas TA. The impact of child care providers' feeding on children's food consumption. *J Dev Behav Pediatr* 2007;28:100-7.
- Johnson SL, Bellows L, Beckstrom L, Anderson J. Evaluation of a social marketing campaign targeting preschool children. *Am J Health Behav* 2007;31:44-55.
- Kaphingst KM, Story M. Child care as an untapped setting for obesity prevention: state child care licensing regulations related to nutrition, physical activity, and media use for preschool aged children in the United States. *Prev Chronic Dis* 2009;6. http://www.cdc.gov/pcd/issues/2009/jan/07_0240.htm. Accessed September 2009.
- Kubik MY, Lytle LA, Hannan PJ, Perry CL, Story M. The association of the school food environment with dietary Behaviors of young adolescents. *Am J Public Health* 2003;93:1168-73.
- Larson N, Story M. Promoting good nutrition and physical activity in child-care settings. Research Brief. Princeton, NJ: Healthy Eating Research, a National Program of the Robert Wood Johnson Foundation. May 2007. Available at www.healthyeatingresearch.org.
- Leonard CP, D'Augelli AR, Smiciklas-Wright H. Effects of a weight-control promotion program on parents' responses to family eating situations. *J Am Diet Assoc* 1984;84:424-7.
- McGarvey E, Keller A, Forrester M, Williams E, Seward D, Suttle DE. Feasibility and benefits of a parent-focused preschool child obesity intervention. *Am J Public Health* 2004;94:1490-5.
- Nader PR, O'Brien M, Houts R, Bradley R, Belsky J, Crosnoe R, Friedman S, Mei Z, Susman EJ; National Institute of Child Health and Human Development Early Child Care Research Network. Identifying risk for obesity in early childhood. *Pediatrics* 2006;118:e594-601.
- National Association for Sport and Physical Education (NASPE). Active Start: A Statement of Physical Activity Guidelines for Children From Birth to Age 5, 2nd Edition, 2009.
- National Association of Child Care Resource and Referral Agencies (NACCRRA) and California Child Care Resource & Referral Network. 2009 Child Care in the State of: California. March 2009. Available at: <http://www.naccrra.org/randd/data/docs/CA.pdf> (Accessed September 2009).
- National Parent Teacher Association (PTA). Family-School Partnerships: National Standards for Family-School Partnerships. Available at: http://www.pta.org/national_standards.asp (Accessed November 2009).
- Ogden CL, Carroll MD, Flegal KM. High body mass index for age among US children and adolescents, 2003-2006. *JAMA* 2008;299:2401-5.
- Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among US children and adolescents, 1999-2000. *JAMA* 2002;288:1728-32.
- Oliver M, Schofield GM, Kolt GS. Physical activity in preschoolers: Understanding prevalence and measurement issues. *Sports Med* 2007;37:1045-70.
- Olstad DL, McCargar L. Prevention of overweight and obesity in children under the age of 6 years. *Appl Physiol Nutr Metab* 2009;34:551-70.
- Ontai L, Ritchie L, Williams ST, Young T, Townsend MS. Guiding family-based obesity prevention efforts in children, Part 1: What determinants do we target? *Int J Child Adolesc Health* 2009;2:19-30.
- Oren A, Vos LE, Uiterwaal CS, Gorissen WH, Grobbee DE, Bots ML. Change in body mass index from adolescence to young adulthood and increased carotid intima-media thickness at 28 years of age: the Atherosclerosis Risk in Young Adults study. *Int J Obes Relat Metab Disord* 2003;27:1383-90.
- Patrick H, Nicklas TA. A review of family and social determinants of children's eating patterns and diet quality. *J Am Coll Nutr* 2005;24:83-92.
- Peterson KE, Fox MK. Addressing the epidemic of childhood obesity through school-based interventions: What has been done and where do we go from here? *J Law Med Ethics* 2007;35:113-30.

- Polhamus B, Dalenius K, Borland E, Mackintosh H, Smith B, Grummer-Strawn L. Pediatric Nutrition Surveillance 2007 Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2009.
- Pollard C, Lewis J, Miller M. Start Right-Eat Right Award Scheme: Implementing food and nutrition policy in child care centers. *Health Ed Behav* 2001;28:320-30.
- Rask-Nissila L, Jokine E, Terho P. Neurological development of 5-year-old children receiving a low-saturated fat, low-cholesterol diet since infancy: a randomized controlled trial. *J Am Med Assoc* 2000;284:993-1000.
- Reilly JJ, Kelly L, Montgomery C, Williamson A, Fisher A, McColl JH, Lo Conte R, Paton JY, Grant S. Physical activity to prevent obesity in young children: a cluster randomised controlled trial. *Br Med J* 2006;333 (7577):1041-6.
- Ritchie L, Ivey S, Masch M, Woodward-Lopez G, Ikeda J, Crawford P. Pediatric overweight: a review of the literature. Center for Weight and Health, University of California, Berkeley. 2001:1-127. Available at: http://cnr.berkeley.edu/cwh/PDFs/Full_COPI_secure.pdf (Accessed October 2009).
- Ritchie L, Whaley S, Hecht K, Chandran K, James P, Samuels S, Crawford P. A multi-level study of childcare centers and homes in California: Recommendations to improve nutrition. *J Am Diet Assoc* 2010 (In preparation).
- Ritchie LD, Hoelscher D, Sothorn M, Crawford PB. Position of the American Dietetic Association: Individual-, family-, school-, and community-based interventions for pediatric overweight. *J Am Diet Assoc* 2006;106:925-45.
- Sigman-Grant M, Christiansen E, Branen L, Fletcher J, Johnson SL. About feeding children: mealtimes in child-care centers in four Western States. *J Am Diet Assoc* 2008;108:340-6.
- Small L, Anderson D, Melnyk BM. Prevention and early treatment of overweight and obesity in young children: a critical review and appraisal of the evidence. *Pediatr Nurs* 2007;33:149-52,155-61,127.
- Story M, Kaphingst K, French S. The role of child care settings in obesity prevention. *Future Child* 2006;16:143-78.
- Story M, Sallis JF, Orleans CT. Adolescent obesity: Towards evidence-based policy and environment solutions *J Adolesc Health* 2009;45:S1–S5.
- Sweitzer SJ, Briley ME, Robert-Gray C. Do sack lunches provided by parents meet the nutritional needs of young children who attend child care? *J Am Diet Assoc* 2009;109:141-4.
- Taveras EM, LaPelle N, Gupta RS, & Finkelstein JA. Planning for health promotion in low-income preschool child care settings: focus groups of parents and child care providers. *Ambul Pediatr* 2006;6:342-6.
- Trost SG, Fees B, Dziewaltowski D. Feasibility and efficacy of a "move and learn" physical activity curriculum in preschool children. *J Phys Act Health* 2008;5:88-103.
- US Census Bureau. 2008 Quick Facts. Available at: www.census.gov (Accessed September 2009).
- US Census Bureau. Who's minding the kids? Child care arrangements. Spring 2005.
- USDA Food and Nutrition Service. Child & Adult Care Food Program. Available at: www.fns.usda.gov/cnd/Care/default.htm (Accessed March 2009).
- Vaughn K, Waldrop J. Childhood obesity. Part II. Parent education key to beating early childhood obesity. *Nurse Pract* 2007;32:36-41.
- Vereecken C, Huybrechts I, Maes L, De Henauw S. Food consumption among preschoolers. Does the school make a difference? *Appetite* 2008;51:723-6.
- Wake M, Baur LA, Gerner B, Gibbons K, Gold L, Gunn J, Levickis P, McCallum Z, Naughton G, Sanci L, Ukoumunne OC. Outcomes and costs of primary care surveillance and intervention for overweight or obese children: the LEAP 2 randomised controlled trial. *BMJ* 2009;339:b3308.

- Ward D, Hales D, Haverly K, Marks J, Benjamin S, Ball S, Trost S. An instrument to assess the obesogenic environment of child care centers. *Am J Health Behav* 2008;32:380-386.
- Wardle J, Cooke LJ, Gibson EL, Sapochnik M, Sheiham A, Lawson M. Increasing children's acceptance of vegetables: a randomized trial of parent-led exposure. *Appetite* 2003;40:155-62.
- Whaley S, Gomez J, Mallo N, James P, Fredericks D, Abascal P, Sharp M, Chandran K, Hecht K. It's 12 O'clock... What Are Our Preschoolers Eating for Lunch? An Assessment of Nutrition and the Nutrition Environment in Licensed Child Care in Los Angeles County. CFPA, July 2008. Available at: www.cfpa.net/cacfp/gilbert_final.pdf (Accessed February 2009).
- Williams CL, Bollella MC, Stronbino BA, Spark A, Nicklas TA, Tolosi LB, Pittman BP. "Healthy-Start": Outcome of an intervention to promote heart healthy diet in preschool children. *J Am Coll Nutr* 2002;21:62-71.
- Williams CL, Bollella MC, Stronbino B A, Spark A, Nicklas TA, Tolosi L B, Pittman BP. Cardiovascular risk reduction in preschool children: The "Healthy Start" Project. *J Am Coll Nutr* 2004;23:117-23.
- Wolman, J, Skelly E, Kolotourou M, Lawson M, Sacher P. Tackling toddler obesity through a pilot community-based family intervention. *Community Pract* 2008;81:28-31.
- Woroby J, Pisuk J, Decker K. Diet and behavior in at-risk children: evaluation of an early intervention program. *Public Health Nurs* 2004;21:122-7.

Appendix I. Review Methodology

Search Process and Criteria

A systematic search of published literature was conducted using the PubMed database. Search terms are listed in Table 1 below. Additional limits included: English, humans, and an age range of children between newborn to 5 years. Trial type (e.g., randomized, controlled trial, the most rigorous study design) was not specified primarily due to the paucity of studies in this field. Two foci for interventions were searched: home-based involving parents, and child care-based. Essentially the same search was conducted twice for each factor of interest: first using terms “parent OR parenting OR family” and second using terms “preschool OR day care OR child care.” Review articles were also identified and scanned for articles that were not identified by the primary search. Abstracts were compiled for both original studies as well as review articles and were reviewed by three reviewers for inclusion in the review.

Inclusion criteria included the following:

- Intervention trials that targeted at least one of the dietary factors of interest with the aim of preventing obesity (e.g., slowing weight gain or improving body composition), improving health status (e.g., blood pressure, or blood cholesterol), or preventing chronic disease in children under 5 years old either through parental or child care intervention.
- Intervention trials that targeted physical activity factors of interest with the aim of preventing weight gain, improving health, or preventing chronic disease in children under 5 years old either through parental or child care intervention.
- Reviews of intervention trials for children under the age of 5.

Exclusion criteria included the following:

- Any intervention trial that included primarily children over the age of five.
- Any intervention trial that treated exclusively or primarily children who were already overweight or obese.
- Studies that did not implement an intervention.
- Animal studies.

Table 1: Search and Exclusion Terms by Factor of Interest

Factor	Terms	Exclusion Terms
Low Fat	Low fat, prevention, intervention	Diabetes, Prader-Willi
Fruits and Vegetables	Fruits OR Vegetables, prevention, intervention	
Physical Activity	Physical activity, prevention, intervention	
Obesity	Overweight OR Obesity, prevention, intervention	

Article Abstraction

The identified articles that met the above criteria were individually reviewed and abstracted using a standardized abstraction form. The abstraction focused on the following information:

- 1) Article (author, year, name, citation)
- 2) Study aim
- 3) Study population (initial/final sample size, age, race, gender, weight status, SES, inclusion/exclusion criteria)
- 4) Study type (design, setting)
- 5) Intervention (strategy/protocol, duration, follow-up timing)
- 6) Impact on diet or physical activity behaviors (what measured, how measured, measured change, p value)
- 7) Impact on health, such as adiposity or biochemical measure (what measured, how measured, measured change, p value)
- 8) Statistical analysis (statistical test, control and dependent variables)
- 9) Study strengths and limitations

Synthesis of Literature

Studies were reviewed to identify best practices as well as promising approaches and evaluation opportunities (Table 2). Review articles were also synthesized for additional recommendations.

Table 2. Classifying Strategies

- **Best practice strategies** were either evaluated and shown to be effective in a relatively large number of studies of high quality or were recommended by expert opinion in situations in which randomized, controlled trials are not feasible or have not yet been done.
- **Promising strategies** were less studied, included studies of weaker design, and/or were reported with more mixed findings. Often these include strategies that have been studied most often in combination with other strategies
- **Evaluation opportunities** represent gaps in the research and include strategies that have been considered and sometimes adopted, but have not been systematically evaluated yet.

Appendix II. Literature Reviewed

Author/Year (Study Name, Location)	Design	Target Population	Aims	Strategy	Impact on PA/fitness	Impact on diet/ nutrition	Impact on health/ adiposity
CHILD CARE-BASED INTERVENTIONS							
<i>Physical Activity</i>							
Alhassan, 2007 (CA, US)	RCT; 1 Head Start center; 2-3 mo duration	N=32; Ages 3-5; Latino; Low SES	↑ PA	ED: additional 60 minutes of recess	NS - PA	---	---
Reilly, 2006 (Glasgow, Scotland)	CRCT; 26 centers; 1 yr duration + 6 mo and 1 yr f/u	N=545; Mean age 4.2 yr	↓ BMI ↑ PA	ED: PE through play 3/wk	↑ movement skill	---	NS - change in BMI
Scheffler, 2007 (Berlin, Germany)	RCT; 17 centers; 2 yr duration	N=160; Ages 1.5-5 yr	↑ PA	ED: 1 hr structured PE 3/wk	↑ motor skills	---	↓ blood pressure
Trost, 2008 (Move and Learn; KS, US)	RCT; 1 center; 10 wk duration	N=42; Ages 3-5 yr	↑ PA	ED: ↑ PA by incorporating into curriculum	↑ MVPA	---	---
Wolman, 2008 (Fighting Fit Tots; South London, UK)	T; 1 child care center; 11 wk duration	N=11 families with children; Ages 18-30 mo	↑ PA	ED: parent and toddler PA 1/wk; PO: Parents' healthy lifestyle workshop 1/wk	NS - PA	---	---
Dennison, 2004 (NY, US)	RCT; 16 centers; 9 mo duration	N=163; Ages 3-5 yr	↓ TV viewing	ED: classroom curriculum & activities	↓ TV viewing/video-game playing	NS - TV snacking	NS - BMI; NS - BMI z score

Author/Year (Study Name, Location)	Design	Target Population	Aims	Strategy	Impact on PA/fitness	Impact on diet/ nutrition	Impact on health/ adiposity
Physical Activity & Nutrition							
Eliakim, 2007 (Health Intervention In Preschool Children; Oranit, Israel)	RCT; 4 preschool classes; 14 wk duration	N=101; Ages 5-6 yr	↓ obesity; ↑ PA; ↑ nutrition education	PO: 2 orientation lectures; ED: nutritional curriculum with games and lectures, PE 45 minutes/day 6 days/wk	↑ daily PA; ↑ fitness	---	↓ BMI z score; ↓ body fat
Fitzgibbon, 2002, 2005 (Hip Hop to Health Jr; Chicago, IL)	RCT; 12 Head Start centers; 14 wk duration + 2 year f/u	N~400 children; Mean age 4 yr; African American; Low SES	↑ FV, ↑ PA, ↓ BMI	PO, ED: In-class nutrition, homework, activities, and parents recorded FV intake	NS - PA/intensity; NS - TV viewing	↓ sat fat at 1 yr f/u; NS - total fat and fiber	↓ increases in BMI at 1 yr & 2 yr f/u
Fitzgibbon, 2006 (Hip Hop to Health Jr; Chicago, IL)	RCT; 12 Head Start centers; 2 yr duration	N=330; Preschool age; Latino	↑ FV, ↑ PA, ↓ BMI	PO: newsletters; ED: classroom nutrition curriculum; physical activity incorporated into curriculum	NS – PA/intensity	↓ sat fat; NS - total fat and dietary fiber	NS - BMI; NS - BMI z score
Benjamin, 2007 (NAP SACC; NC, US)	RCT; 8 centers; 6 mo duration + 1 mo f/u	Ages 2-5 yr	Improving center policies on nutrition and PA	ED: Self assessment of center's nutrition and PA practices and policies	↑ PA policies	↑ nutrition policies	---
Ward, 2008 (NAP SACC; NC, US)	RCT; 84 centers; 6 mo duration	Ages 3-6 yr	Improving center policies on nutrition and PA	ED: Self assessment of center's nutrition and PA practices and policies	NS - PA score (↑ in some individual items)	NS - nutrition score (↑ in some individual items)	---

Author/Year (Study Name, Location)	Design	Target Population	Aims	Strategy	Impact on PA/fitness	Impact on diet/ nutrition	Impact on health/ adiposity
Nutrition							
Corvalan, 2008 (Chilean National Nursery School Council Program; Chile)	T; Staggered intervention groups; 538 preschools; 1-3 yr duration	N=67,841; Ages 2- 5 yr; Low SES	↓ kcals in school meals by 10%	ET: Lower kcal meals provided	---	---	↓ BMI, obesity (only early intervention); ↓stunting (all interventions)
Pollard, 2001; (Start Right-Eat Right award study; Western Australia)	RCT; 134 centers; 2 yr duration + 9 mo f/u		↑ nutritional quality of food service	PR: Awards given to schools that were most improved; Food Service Child Care Advisory Group formed to consult with schools regarding nutrition and PA policies	---	↑ nutritional quality of food service	---
Williams, 1998, 2002, 2004 (Healthy Start; NY, US)	CT; 9 Head Start centers; 3 yr duration	N=700-800; Ages 2-5 yr at baseline; Non-white; Low SES	↓ CVD risk; ↓ dietary fat	ET, ED: Health education curriculum + changed menus so total fat <30% kcals, sat fat <10% kcals	---	↓ dietary fat & sat fat w/o compromising energy or essential nutrients	↓ blood cholesterol
Johnson, 2007 (CO, US)	CT; 4 Head Start centers; 12 wk duration	N=46; Ages 2-5 yr; Predominantly non-white; Low SES	↑ willingness to try new foods	ED: Social marketing campaign to ↑ children's acceptance of F/V including: child- driven nutrition activities; food- related storybooks featuring "the Food Friends," repeated opportunities to try new foods; PO: parent newsletters	---	↑ willingness to try new foods	---

Author/Year (Study Name, Location)	Design	Target Population	Aims	Strategy	Impact on PA/fitness	Impact on diet/ nutrition	Impact on health/ adiposity
HOME-BASED INTERVENTIONS							
Haire-Joshu, 2008 (rural MO)	RCT; 5 yr duration	N=1658; Ages 2-5 yr; African American; Low SES	↑ FV	PO, ED: Tailored newsletters, home visits ET: ↑ FV in the home	---	↑ FV intake	---
Harvey-Berino, 2003 (NY, Ontario and Quebec, Canada)	CT; 16 wk duration	N=47 mother/child pairs; Mean ages 22±8 mo; Mothers' BMI >25 kg/m ²	↓ OB	PO: Home visits; individualized counseling on eating	NS - PA	↓ energy intake; ↓ restrictive child feeding practices	↑ weight for height z scores; NS - BMI
Horodyski, 2005 (rural MI)	CT; 4 wk duration	N=135; Ages 11- 36 mo; Low SES	↑ FV; toddler and parent self- efficacy to ↑ FV intake	PO, ED: Home visits (nutrition, parenting); Child care (90 minute nutrition lessons- child and parent; videos & activities- parent only) ET: ↑ FV in the home	↓ TV viewing; NS - toddler self-efficacy for PA; ↑ parent self- efficacy	NS - toddler self-efficacy feeding; ↑ parent knowledge of feeding toddlers	---
Leonard, 1984 (PA, US)	CT; 5 wk duration	N=47 families with at least one preschool child; Mean age 4 yr	↑ healthier food selections, healthier eating habits, ↑ PA	ED, PO: Parents attended small group sessions led by health educator and given manual of tasks assigned for weekly meetings	↑ PA patterns	↑ family healthy eating habits; ↑ parent verbal promotion of healthy eating habits	---

Author/Year (Study Name, Location)	Design	Target Population	Aims	Strategy	Impact on PA/fitness	Impact on diet/ nutrition	Impact on health/ adiposity
Rask-Nissila, 2002; Talvia 2004, 2006; Hakanan, 2005 (STRIP Project; Turku, Finland)	RCT; 10-12 yr duration	N=1062 infants beginning at 7 mo if age	Parents and children: ↓ cholesterol, fat, sat fat, ↑ FV; Children: ↓ overweight	ED, PO: Individualized counseling on eating; Nutritionists met with families at 1-4 mo intervals until child 2 yr old and then biannually thereafter	---	↓ dietary fat, sat fat, cholesterol; ↑ FV	↓ serum cholesterol; NS - neurological development; ↓ overweight in girls; NS in boys
Wardle, 2003 (London, UK)	RCT; 2 wk duration	N=156 parents and children; Ages 2-6 yr	↑ children's acceptance of FV	ED, PO: children asked to taste "target" vegetable daily	---	↑ acceptability of "target" vegetable	---
OTHER INTERVENTIONS							
McGarvey, 2004 (Fit WIC; VA, US)	CT; 2 WIC sites; 1 yr duration	N=336; Ages 2-4 yr	↓ OB; ↑ PA; monitor mealtime behavior; ↓ TV; ↑ water; ↑ FV	ED, PO: parent groups received lessons on ↑ PA, ↑ FV delivered once every 2 mo; individual session with a nutritionist every 6 mo	↓ TV time	↑ choosing water over sweetened beverages	---
Gosliner, 2010 (CA, US)	CT; 13 centers; 9 mo duration	N=82 child care providers; Low SES sites	Improve nutrition and PA environment in child care	ED: worksite wellness consultation, training, newsletters, and other activities	NS - child PA practices	↑ FV at child meals, snacks, celebrations; ↓ sweet foods and sweetened beverages at celebrations	---

Abbreviations:

BMI, body mass index; CT, controlled trial; ED, education component; ET, environmental component; FV, fruits and vegetables; kcals, kilocalories; mo, month(s); NS, not statistically significant; OB, obesity; PA, physical activity; PO, parent outreach component; RCT, randomized and controlled trial; sat fat, dietary saturated fat; SES, socioeconomic status; T, non-randomized, non-controlled trial; f/u, follow-up; wk, week(s); yr, year(s).