Preventing Obesity Among Preschool Children: How Can Child-care Settings Promote Healthy Eating and Physical Activity?

Research Synthesis October 2011

Healthy Eating Research

Active Living Research

Poor diet and lack of physical activity are major contributors to obesity. The preschool years are a critically important period for developing healthy food preferences and motor skills.[1,2] As such, experts suggest that obesity-prevention efforts begin in early childhood and have identified preventing obesity among young children as an important strategy for reversing the epidemic.[3] All-time high rates of obesity are evident among the nation's youngest children—more than 21 percent of preschool children are overweight or obese.[4]

The consequences of obesity for young children and the economic toll of this epidemic are serious. Children who are obese have a greater likelihood of being obese in adulthood and developing heart disease, diabetes, and other chronic conditions.[5–7] Effective strategies to reduce and prevent obesity among preschool children are needed to protect children from these health consequences and avoid the future financial burden of health care expenditures.

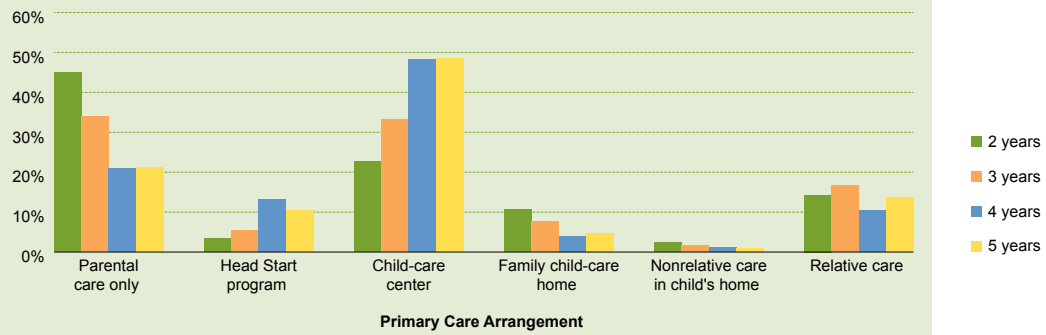
Child-care settings provide numerous opportunities to promote healthy eating and physical activity behaviors among preschool children. The majority of U.S. children are placed in some form of non-parental care during their preschool years (Figure 1).[8] While approximately 15 percent of preschool children are primarily cared for by their relatives, most preschoolers who spend time in non-parental care arrangements are placed in center-based care (e.g., child-care centers, preschools, Head Start programs) or a family child-care home.

Healthy Eating Research and **Active Living Research** are national programs of the Robert Wood Johnson Foundation

Robert Wood Johnson Foundation

Given the widespread use of child care, an understanding of current practices relevant to nutrition and physical activity in child-care settings is needed to inform obesity-prevention efforts. This research synthesis reviews studies that have identified opportunities to promote a healthy diet and regular physical activity among preschool children. It also examines outcomes of research interventions designed to prevent obesity in child-care settings.

Figure 1.
Percentage of U.S. preschool children in various types of primary care arrangements by age[8]



Key Research Results

- Research in child-care settings has identified opportunities to improve the nutritional quality of foods provided to children, mealtime behaviors of caregivers, and the provision of nutrition education.
- Regulations regarding nutrition and physical activity practices in child-care settings are limited and vary widely among and within U.S. states.[9–12]
- Many preschool children enrolled in child care are not meeting recommendations for physical activity.[13–16] Child-care practices and policies relating to 1) the amount of time allocated for physical activity; 2) required training and supportive staff behaviors; and 3) appropriate physical settings for play have the potential to influence physical activity levels.[17]
- There is some evidence of a relationship between use of informal child-care arrangements (e.g., relative care) and increased risk for obesity.[18,19] Research examining the relationship between children's weight status and use of formal child-care arrangements (e.g., licensed family child-care homes, child-care centers, Head Start programs) has produced mixed results.[18–20]
- Opportunities for parent education and involvement may be limited in many child-care settings,[17,21] and only a few studies have examined parent perceptions relevant to nutrition and physical activity environments.[22,23]
- Existing evidence indicates the following may be successful strategies for promoting healthy eating and physical activity in child-care settings: integrating opportunities for physical activity into the classroom curriculum; modifying foodservice practices; providing classroom-based nutrition education; and engaging parents through educational newsletters or activities.[24–34] At this time, it is not clear which combinations of specific strategies are effective for reducing obesity among preschool children.

Details on Key Research Results

Research in child-care settings has identified opportunities to improve the nutritional quality of foods provided to children, mealtime behaviors of caregivers, and the provision of nutrition education.

Despite the importance of learning to accept a variety of healthy foods during the preschool years, few recent studies have been conducted to evaluate the nutritional quality of foods served in child-care settings. Nutritional standards used to evaluate the meals and snacks offered in child-care settings have included the Child and Adult Care Food Program (CACFP) meal pattern requirements (see Table 1 for a program description), the *Dietary Guidelines for Americans*, and the nutrient-based recommendations for child-care providers developed by the American Dietetic Association (ADA).[35–37] The ADA recommends that foods and beverages offered to children in care for four to seven hours per day provide at least one-third of their daily needs (i.e., Recommended Dietary Allowances or RDAs) for energy and nutrients, and that foods and beverages offered to children in care for eight hours or more meet one-half to two-thirds of their daily needs.[37]

Table 1.
Summary of regulations for the Child and Adult Care Food Program

The Child and Adult Care Food Program (CACFP), jointly administered by the U.S. Department of Agriculture and designated state agencies, provides meals and snacks for 2.4 million children in center-based care and approximately 845,000 children in family child-care homes.[76] All nonprofit child-care centers, for-profit child-care centers that serve 25% or more low-income children, Head Start programs, and family child-care homes that have a sponsoring organization are eligible to participate.[36] Sponsors serve as intermediaries between family child-care businesses and the designated state administrative agency and ensure compliance with federal and state CACFP regulations.

For each child enrolled in an eligible child-care facility, the CACFP provides funding reimbursement to child-care centers and family child-care providers for up to either two meals and one snack or one meal and two snacks daily.[36] Meals and snacks served to children in child-care centers and Head Start programs are reimbursed at rates based on the type of meal served (i.e., breakfast, lunch, or supper) and a child's eligibility for free, reduced-price, or paid meals and snacks. Similarly, meals and snacks served to children in family child-care homes are reimbursed based on two tiers of provider eligibility. There are higher "tier I" reimbursement rates for child-care homes located in low-income areas and for low-income providers.

To be eligible for reimbursement, the current CACFP guidelines require that meals and snacks include a minimum number of age-appropriate servings from four food categories: fluid milk; vegetables, fruit or 100% juice; grains or bread; and meat or meat alternatives.[36] However, the current guidelines do not require meals and snacks to meet any nutrient-based standards and do not prohibit child-care providers from offering non-reimbursable foods or beverages that are low in nutrition and high in calories. These guidelines are based in part on nutrition and health information from 1989 and were recently reviewed by the Institute of Medicine (IOM).[69] To ensure the meals and snacks provided by CACFP providers are of the highest nutritional quality possible, the IOM has recommended key changes to the meal requirements, which include the following:

- One fruit and two different vegetables should be served at each lunch/supper meal. Different types of vegetables should be served at each lunch and supper over the course of a 5-day week so that children are provided a variety of dark green vegetables, orange vegetables, legumes, and other vegetables. Starchy vegetables should be served no more than twice per week.
- Fruit rather than fruit juice should be served at most meals. Juice should be served a maximum of once per day in a serving size appropriate to the age group's needs.
- At least half of the grains/breads served at meals and snacks should be whole grain-rich. Other grain/bread servings must be enriched.
- The amounts of solid fats, added sugars, trans fats, and sodium should be limited in all meals and snacks. Milk and yogurt must be low-fat or nonfat for all children age two years or older and meats must be lean.

The American Academy of Pediatrics, as well as the American Public Health Association and the National Resource Center for Health and Safety in Child Care and Early Education, have also recently updated nutrition standards for the promotion of healthy eating in child-care settings (see Table 2).[38]

Table 2.
Selected nutrition standards from Caring for Our Children: National Health and Safety Performance Standards[38]

- Facilities should provide nourishing and attractive food for children according to a written plan developed by a qualified nutritionist/registered dietitian.
- All meals and snacks and their preparation, service, and storage should meet the requirements for meals of the child care component of the U.S. Department of Agriculture, Child and Adult Care Food Program.
- Children in care should be offered items of food from the following categories: grains, vegetables, fruits, milk, meat and beans, and oils. Salty foods (e.g., chips, pretzels) should be limited and concentrated sweets (e.g., candy, sugar-sweetened drinks) avoided.
- Clean, sanitary drinking water should be readily available, in indoor and outdoor areas, throughout the day.
- Facilities should serve only full-strength (100%) pasteurized fruit juice or full-strength fruit juice diluted with water from a cup. Children should be served no more than a total of four to six ounces of juice per day.
- Facilities should develop, at least one month in advance, written menus showing all foods to be served to parents/guardians.
- Facilities should serve toddlers and preschoolers small-sized, age-appropriate portions and should permit children to have one or more additional servings of the nutritious foods that are low in fat, sugar, and sodium as needed to meet the caloric needs of the individual child.
- Children two years of age and older should be served skim or 1% pasteurized milk.
- Caregivers/teachers and children should sit at the table and eat the meal or snack together. Family style meal service should be encouraged.
- Caregivers/teachers should not force or bribe children to eat nor use food as a reward or punishment.
- Facilities should have a nutrition plan that integrates the introduction of food and feeding experiences with facility activities and home feeding. The plan should include opportunities for children to develop the knowledge and skills necessary to make appropriate food choices.
- Parents/guardians should be informed of the range of nutrition learning activities provided by the facility. Formal nutrition information and education programs should be conducted at least twice a year under the guidance of a nutritionist/registered dietitian based on a needs assessment for nutrition information and education as perceived by families and staff.

Only a few small studies and two nationally-representative studies evaluating the nutritional quality of foods offered in child-care settings have been published in the past 10 years. The most recent nationally-representative study of family child-care homes was limited in scope as its primary purpose was to evaluate the impact of legislation more narrowly targeting CACFP benefits to low-income children.[39] Results of this study showed CACFP meal pattern requirements were met by the majority of family child-care providers ineligible for the higher reimbursement rates provided to low-income providers and child-care homes located in low-income areas, and the most common combinations of meals and snacks (breakfast, lunch, and one snack or breakfast, lunch, and two snacks) offered met ADA recommendations. However, the study identified nutritional concerns relating to the percentage of energy from saturated fat, average sodium levels, and the number of fruit and vegetable items provided by meals and snacks.

A more recent national study of Head Start programs (see Table 3 for program description) in 2008 showed that most had instituted key practices to prevent obesity.[40] However, opportunities to better promote healthy eating were also identified:

- Most programs reported they never serve sugar-sweetened drinks or juice drinks that are less than 100% fruit juice to children. However, 46 percent of the programs reported that soda and vending machines are available for staff use.
- Nearly all programs reported that some vegetable other than fried potatoes is served each day, but only 86 percent of the programs prepared vegetables without adding fat.
- While 94 percent of programs did not allow staff to consume foods or beverages in front of children that were different than those the children were served, only 70 percent of programs had written guidelines about feeding children.

Table 3.
Summary of regulations for Head Start

Head Start is a federal child development program that serves low-income children ages three to five years.[74] In 2009, more than 904,000 children were served by 49,200 classrooms across the U.S.[75]

The overall goal of Head Start is to increase the school readiness of preschool children in low-income families. To achieve this goal, Head Start provides a comprehensive range of services, including nutrition services. A number of federal regulations for Head Start programs address the promotion of healthy eating and physical activity.[46] The regulations help to ensure that:

- Parents receive guidance on nutrition and physical activity
- Facilities participate in the Child and Adult Care Food Program
- Meals and snacks provide one-third to one-half of the daily nutritional needs of children in part-day and full-day programs, respectively
- Staff model healthy eating behaviors and attitudes for children
- Facilities provide opportunities for outdoor and indoor active play, adequate space and equipment to promote active play, and opportunities to develop gross and fine motor skills

It is also critical for preschool children to have a supportive mealtime environment for trying unfamiliar foods and learning about healthy eating.[37] A small number of studies have examined the mealtime behaviors of child-care providers and nutrition education practices in child-care settings.[21,40–45] Research conducted in Head Start programs,[40,41,43,44] child-care centers,[42,45] and family child-care homes[21,45] suggests that most caregivers support healthy eating by sitting with children at meals and eating the same foods. Nevertheless, caregivers may benefit from additional training on feeding children and helping them to pay attention to their internal signals of hunger and satiation. In addition, caregivers may need assistance with providing nutrition education.

One representative study surveyed a random sample of family child-care providers in Kansas regarding nutrition policies and practices.[21] The findings showed that 68 percent of caregivers sat down with children for meals and 90 percent talked with children about trying and enjoying healthy foods. However, of concern, among the 297 caregivers who responded to the survey:

- Approximately one in five caregivers reported that children are required to finish everything on their plate before leaving the meal table most or all of the time.
- Seventeen percent of caregivers reported eating or drinking less-healthy foods (e.g., sweets, salty snacks, sugar-sweetened drinks) in front of the children.
- More than half of caregivers reported they receive no annual training on nutrition.
- Only 47 percent of caregivers provided nutrition education for children by reading books or playing games with nutrition themes.

Regulations regarding nutrition and physical activity practices in child-care settings are limited and vary widely among and within U.S. states.[9–12]

The regulation of formal child-care settings primarily occurs at the state level. While Head Start programs are subject to federal performance standards, each U.S. state creates and enforces its own set of regulations for licensed child-care facilities.[46] Additional policies may be adopted by localities and individual child-care facilities; however, these policies must meet state requirements. As a result, state licensing regulations of relevance to obesity prevention vary widely among and within states.

Four recent studies have reviewed state licensing regulations regarding nutrition, physical activity, and media use.[9–12] These studies identified a number of opportunities for strengthening state licensing regulations to prevent childhood obesity. For example, one study[10] reviewed state regulations in 2007 for reference to eight key nutrition and physical activity practices that have a documented relationship to childhood obesity: 1) water is freely available; 2) sugar-sweetened beverages are limited; 3) foods of low nutritional value are limited; 4) children are not forced to eat; 5) food is not used as a reward; 6) support is provided for breastfeeding and provision of breast milk; 7) screen time is limited; and 8) physical activity is required daily.

- The review found that most states had few nutrition and physical activity regulations related to obesity for child-care centers and family child-care homes.
- For child-care centers, just five states had five or more of the eight regulations and four states had none of the regulations.
- For family child-care homes, there were 10 states that had four or more of the eight regulations. However, six states had none of the eight regulations.

In 2011, the National Resource Center for Health and Safety in Child Care and Early Education updated previous reviews of states' regulations for child-care settings and evaluated regulations based on a selected set of guidelines from the *Caring for Our Children: National Health and Safety Performance Standards*.[47] The selected guidelines relating to infant feeding, nutrition, physical activity, and screen time were identified as components likely to have a high impact on childhood obesity. Results of this review showed there is considerable room for improvement in even the strongest of states' regulations.

Many preschool children enrolled in child care are not meeting recommendations for physical activity.[13–16] Child-care practices and policies relating to 1) the amount of time allocated for physical activity; 2) required training and supportive staff behaviors; and 3) appropriate physical settings for play have the potential to influence physical activity levels.[17]

Regular physical activity plays a critical role in the prevention of obesity and engaging in active play is essential to healthy development.[48] Play contributes to the cognitive, physical, social, and emotional well-being of young children.[49] It is recommended that preschoolers accumulate at least two hours of physical activity every day, including time spent in unstructured, free play.[50] Although research indicates that most preschool children are not meeting these recommendations for physical activity[13–16] and the child-care environment may account for as much as 47 percent of the variation in children's activity levels,[13,16,51–53] relatively few studies have been conducted to examine the factors that influence activity levels in child-care settings.

Based on the available evidence and expert opinion, best practice recommendations and standards have been developed to promote physical activity in child-care settings.[17,38] Recommended best practices and standards for promoting physical activity include:

- In regards to opportunities for vigorous activity, it is recommended that children be provided with at least 90-120 minutes of active playtime per eight-hour day at child care and that caregivers lead children in physical activity at least two times per day.
- Caregivers should join children in active play and encourage children to be active.
- Children should be provided two to three occasions to play outdoors daily unless weather or environmental conditions pose a significant health or safety risk. Outdoor play spaces should include open, grassy areas and covered areas for shade and shelter when possible.
- Television or videos should rarely or never be shown and limited to not more than 30 minutes once a week for educational purposes.

Relative to the best practice recommendations, assessments of physical activity environments in Head Start programs,[40,41] child-care centers,[17,54] and family child-care homes[21,54] have indicated there is room for improvement to better promote physical activity among children. For example, one study in North Carolina assessed physical activity environments at 96 child-care centers by completing one full-day observation at each center.[17] The results showed:

- Although one-third of the centers provided more than 90 minutes of physical activity on the day of the observation, only 14 percent of them provided 120 minutes of active playtime and six centers provided just 15 minutes.
- Caregivers provided two or more occasions of structured physical activity at just 40 percent of the centers.
- While caregivers at 15 percent of the centers joined children in active play on five or more occasions, caregivers at 61 percent of the centers either failed to join in active play with children or did so only one or two times.
- Children were allowed to watch 30-60 minutes of television at nearly 20 percent of the centers and 9 percent of the centers allowed children to watch more than 60 minutes of television.

There is some evidence of a relationship between use of informal child-care arrangements (e.g., relative care) and increased risk for obesity.[18,19] Research examining the relationship between children's weight status and use of formal child-care arrangements (e.g., licensed family child-care homes, child-care centers, Head Start programs) has produced mixed results.[18–20]

Only a small number of research studies have examined whether there is a relationship between type of child-care participation during the preschool years and weight status.[18–20] Two studies found a relationship between use of informal child care (e.g., relative care) and increased risk for obesity.[18,19] However, there are mixed results in regards to participation in formal child care (e.g., licensed family child-care homes, child-care centers, Head Start programs) and risk for obesity.[18–20]

One study in a U.K. sample of 12,354 children focused on early child-care participation between the age of nine months and three years.[18] For this study, informal child-care arrangements were defined to include care received from a friend, neighbor, grandparent or other relative, babysitter, or other unregistered caregivers. Formal child-care arrangements were defined to include care received at a child-care center or care provided by a registered caregiver. The results of this study showed that children in informal arrangements were more likely to be obese than those who were in a non-parental child care arrangement fewer than 10 hours per week. In contrast, children in formal arrangements were no more likely to be obese.

One other study focused on formal child-care arrangements and found that spending a limited number of hours per week in non-parental child care may be protective.[20] Researchers assessed participation in formal child-care arrangements from ages three to five years and weight status at ages six to 12 years for a U.S. sample of 1,244 children. Children who received care from a family child-care provider, a Head Start program, a prekindergarten program, preschool, or other child-care center were considered to have formal arrangements. After accounting for other factors, including race, poverty status, birth weight, hours of daily television viewing, child behavioral problems, and cognitive stimulation provided by the family, the results showed children who participated in child care for fewer than 15 hours per week were less likely to be obese than children who did not attend formal child care. However, spending more than 15 hours per week in formal child care was not related to risk for obesity.

Opportunities for parent education and involvement may be limited in many child-care settings,[17,21] and only a few studies have examined parent perceptions relevant to nutrition and physical activity environments.[22,23]

Recommendations for promoting better nutrition and physical activity in child-care settings encourage the involvement of parents or guardians.[17,37] Parents exert a powerful influence on their children's eating and activity behaviors; however, parents may be only rarely offered educational opportunities or be engaged in child-care programs to promote healthy behaviors. For example, one large survey of family child-care providers in Kansas found that only 45 percent of providers offered nutrition education opportunities to parents and just 30 percent of providers offered education about physical activity to parents through flyers, handouts, brochures, or newsletters.[21] Written guidelines for food brought in for holidays or birthday celebrations were provided to parents by fewer than 20 percent of family child-care providers. A similar study of 96 child-care centers in North Carolina found that only 4 percent of the centers had documented the provision of physical activity education for parents.[17]

In contrast, a national study that surveyed Head Start program directors found 97 percent of programs distributed information about healthy eating and 78 percent of programs distributed information about physical activity to parents.[40] Most programs went beyond distributing information by additionally offering educational workshops for parents or discussing health behaviors at parent-teacher conferences. Parents were provided opportunities to participate in menu planning by 80 percent of programs and become involved in overall childhood obesity-prevention efforts by 40 percent of programs.

The activities modeled by Head Start programs to engage parents in obesity-prevention efforts may also be important and feasible to implement in family child-care homes and child-care centers; however, few studies have examined parent perceptions and behaviors relevant to the nutrition and physical activity environments in child-care settings.[22,23,55] One study surveyed 508 parents of children attending child-care centers in North Carolina regarding their perceptions of meal offerings and opportunities for physical activity.[22] The study identified key factors that might motivate parents to advocate for change in child-care centers. Most recommendations made by parents in relation to these factors were in line with recommendations from health professionals and included the following:

- To improve meals and snacks, parents most often recommended serving more fruits and vegetables, offering a greater variety of foods, and decreasing foods of low nutritional quality.
- To improve physical activity opportunities, parents most often recommended providing more structured and provider-led activities as well as additional outdoor time.

Existing evidence indicates the following may be successful strategies for promoting healthy eating and physical activity in child-care settings: integrating opportunities for physical activity into the classroom curriculum; modifying foodservice practices; providing classroom-based nutrition education; and engaging parents through educational newsletters or activities.[24–34] At this time, it is not clear which combinations of specific strategies are effective for reducing obesity among preschool children.

At least 19 interventions have been designed to improve nutrition,[24,26,27,56] physical activity,[28–32,57,58] or a combination of nutrition and physical activity[25,33,34,59–63] outcomes for children enrolled in child care. Evaluation results have provided some evidence that interventions in child-care settings have the potential to impact nutrition and physical activity outcomes and the development of obesity; however, it is not yet clear which strategies are most effective. Of the 17 interventions that have complete impact evaluations, 11 interventions demonstrated a positive impact on nutrition or physical activity outcomes.[24–34] These interventions included one or more of the following strategies: integrating additional opportunities for physical activity into classroom curriculum; modifying foodservice practices; providing classroom-based nutrition education; and engaging parents through educational newsletters or activities.

Few interventions have been evaluated to determine their impact on child weight status,[24,25,33,34,58] and just two of these interventions[25,34] were shown to reduce risk for obesity (see Table 4). Both successful interventions included multiple components to address nutrition, physical activity, and sedentary behaviors. For example, the "Hip-Hop to Health Jr." program provided three weekly classroom lessons, classroom-based physical activity, and weekly parent newsletters for 14 weeks.[25] The classroom lessons used puppets to teach healthy eating and exercise concepts such as the food guide pyramid and reducing television viewing. Classroom-based physical activities were teacher-led and were provided three times per week for 20 minutes. Parent newsletters included homework assignments to reinforce the eating and exercise concepts delivered to children. Results of a randomized-controlled evaluation in 12 Head Start centers serving primarily African-American preschoolers showed:

- Children enrolled at centers assigned to the intervention had smaller increases in body mass index (BMI) compared with control children at one-year and two-year follow-up assessments.
- Children enrolled in the intervention were found to consume fewer calories from saturated fat compared to control children at one-year follow-up.
- Intake of total fat and dietary fiber per 1,000 calories, physical activity frequency and intensity, and hours of daily television viewing were similar among children enrolled in the intervention and control children at both one-year and two-year follow-up assessments.

Although the "Hip-Hop to Health Jr." program was shown to reduce risk for obesity among African-American preschool children, a second evaluation of the program at Head Start centers serving primarily Latino preschoolers did not find the program to have any beneficial impact.[64] For this second evaluation, the "Hip-Hop to Health Jr." program was culturally tailored for the Latino children and delivered in both Spanish and English. The results underscore the need for additional research to determine whether strategies found to be effective in one child-care setting will produce similar results in different settings.

Table 4.
Interventions in child-care settings that were designed to prevent obesity

Reference	Child-care Setting and Sample	Description of Intervention	Summary of Outcomes
Williams et al, 2002, 2004	n=9 Head Start centers in upstate NY n=1,296 children ages 2–5 years	The two-year "Healthy Start" Project included the following strategies: ■ A training workshop and monthly site visits to help cooks implement program objectives designed to lower the total and saturated fat content of meals ■ Classroom nutrition education curriculum ■ Parent "take home" activity papers and three to four meetings per year	Reduced serum cholesterol and consumption of saturated fat from Head Start meals among children attending centers assigned to the food service modification as compared to children attending control centers. There was no effect of the food service intervention on gain in weight-to-height ratio over the intervention period. Nutrition education did not lead to additional reductions in cholesterol beyond the reduction achieved by the food service modification alone.
Reilly et al, 2006	n=36 nurseries in Glasgow, Scotland n=545 children with a mean age of 4.2 years	The 24-week "MAGIC" program included two components: ■ Nursery component: Three weekly 30-minute sessions were designed to increase levels of physical activity and develop movement skills. ■ Home-based component: A resource packet and health education materials were sent home with children.	There was no effect of the intervention on BMI[a] or moderate-to-vigorous physical activity at the six-month or 12-month follow-up assessments.
Eliakim et al, 2007	n=4 preschools in Oranit, Israel n=101 children ages 5-6 years	The four-month program included the following strategies: ■ Classroom-based nutrition education activities and exercise training (45 minutes/day, six days/week) ■ Support to limit sedentary activities and to engage in more physical activity after school	There was no effect of the intervention on physical activity as assessed by step counts. However, favorable changes were observed in BMI-for-age percentile, percent body fat, and fitness among children in the intervention group compared with the control group.
Fitzgibbon et al, 2005	n=12 Head Start centers in Chicago, IL n=362 children with a mean age of 4 years	The 14-week "Hip-Hop to Health Jr." program included the following strategies: ■ Three weekly 20-minute lessons introducing a healthy eating or exercise concept ■ Three weekly 20-minutes sessions that engaged children in aerobic physical activity ■ Weekly newsletters for parents	Children in the intervention group had smaller increases in BMI compared to those in the control group at one-year and two-year follow-up assessments. Children in the intervention group also consumed fewer calories from saturated fat compared with children in the control group at one-year follow-up. There was no observable effect of the intervention on total fat intake, fiber intake, physical activity, or TV viewing.
Fitzgibbon et al, 2006	n=12 Head Start preschool programs in Chicago, IL n=389 children with a mean age of 4 years	The 14-week "Hip-Hop to Health Jr." program for Latino preschool children included the following strategies: ■ Three weekly 20-minute lessons introducing a healthy eating or exercise concept ■ Three weekly 20-minutes sessions that engaged children in aerobic physical activity ■ Weekly newsletters for parents	There was no observable effect of the intervention on dietary, physical activity, TV viewing, or weight status outcomes.
Dennison et al, 2004	n=16 day care and preschool centers in upstate NY n=77 children ages 2–5 years	The 39-week "Brocodile the Crocodile" program included: ■ 32, one-hour classroom educational sessions that focused on healthy eating ■ seven, one-hour classroom educational sessions that focused on television viewing ■ Activities designed for completion by children and parents at home	The percentage of children watching television/videos more than two hours/day decreased from 33% to 18% in the intervention group, compared with an increase of 41% among the control group. There was no effect of the intervention on BMI.

[a]BMI = body mass index (kg/m^2)

A small number of studies have evaluated the impact of interventions on child-care practices or policies.[27,60,61,63,65] Among these interventions, just two were designed to impact aspects of both nutrition and physical activity environments.[61,63,66] For example, The Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) intervention is delivered by professional child-care consultants and involves five steps: 1) self-assessment; 2) collaborative action planning; 3) continuing education workshops; 4) technical assistance with the implementation of changes; and 5) re-assessment. The self-assessment instrument is based on a set of best practice recommendations and guides child-care providers in the process of setting improvement goals. NAP SACC utilizes an incremental approach and improvement goals are chosen to affect about 20 percent of the nutrition and physical activity recommendations. A randomized controlled evaluation[61] of the NAP SACC program showed:

- Among the 41 child-care centers that completed most or all of the intervention, a positive program impact was observed for measures of nutrition environments, policies, and practices. Child-care centers participating in the NAP SACC program implemented policies such as requiring that parents bring only healthful treats for celebrations, and practices such as serving more fruits and vegetables.
- A positive program impact was not observed for measures of physical activity environments, policies, and practices in this study; however, other evaluations of the NAP SACC program have found evidence of some beneficial effects.[67,68] One observed example of such benefits included an increase in the number of centers providing indoor play spaces and portable play equipment.[67]

Conclusions & Implications

The majority of U.S. children are placed in some form of non-parental care during their preschool years.[8] Despite the widespread use of child care and an all-time high prevalence of obesity among preschool children,[4] regulations relevant to the promotion of healthy eating and physical activity in licensed child-care facilities are limited and vary widely among and within U.S. states. Research in child-care facilities has identified numerous opportunities to improve the nutritional quality of foods served to children, increase the amount of time children are engaged in physical activity, and better support caregivers in promoting healthy behaviors. To date, only a small number of interventions have been designed to address these opportunities for obesity prevention in child-care settings. However, evaluation results have identified some promising approaches and suggest that interventions in child-care settings have the potential to impact nutrition and physical activity outcomes as well as the development of obesity. Additional research is needed to refine promising intervention strategies and inform regulatory efforts to protect future generations from the serious health consequences and economic toll of obesity.

Areas Where Additional Research Is Needed

- There is a need for both qualitative and quantitative studies to examine why the use of informal child care (e.g., relative care) may be related to increased risk for obesity among certain groups. In particular, there is a need to understand the potential influence of race, ethnicity, and socioeconomic background on this relationship.
- Additional longitudinal studies are needed to clarify the relationship between use of formal child care during the preschool years and risk for obesity. Researchers carrying out these studies should distinguish the impact of limited participation from full-day participation on most days of the week.

- There is a need for evaluation of the changes to the Child and Adult Care Food Program (CACFP) meal requirements recently recommended by the Institute of Medicine (IOM) to better align the meals served with the current *Dietary Guidelines for Americans*.[69] The IOM has called for research to evaluate the impact of the recommended meal requirements on the nutritional quality of meals and snacks served, as well as participants' total and program-related dietary intake. In addition, studies are needed to evaluate the cost of these changes and identify barriers and facilitators to the provision of meals and snacks that meet the recommended meal requirements.
- Policy evaluation studies are needed to assess the impact of state and local regulations for child-care facilities on the eating and physical activity behaviors of preschool children. Although policy reviews have found that most states lack strong regulations for child-care facilities,[9–11] research evidence to support the development of stronger licensing regulations is lacking. Strict regulations for child-care facilities also could have unintended consequences, and the existence of regulations does not guarantee that child-care providers will be able to comply, especially when state funding for oversight and monitoring is limited.
- Additional research is needed to identify opportunities for better promotion of healthy eating and physical activity in family child-care homes. The majority of recent research has focused on Head Start programs and child-care centers. As the last nationally representative study of family child-care homes is now more than a decade old and included only CACFP-participating homes,[39] there is a particular need for representative studies to describe the nutritional quality of foods served to children and the amount of time devoted to physical activity in family child-care homes.
- Future studies should investigate the behaviors and perceptions of diverse parents that use different child-care settings. Few studies have examined parental perceptions of the nutrition and physical activity environments in child-care settings and additional studies are needed to inform the design of interventions. As parents may serve as persuasive advocates for changes in practices and policies to better promote healthy eating and physical activity, a strong understanding of their perceptions will be critical to advancing obesity-prevention efforts.
- There is an urgent need for the development and evaluation of multi-component programs to address nutrition and physical activity behaviors in child-care settings. Although two interventions showed evidence of success in reducing risk for obesity among preschool children,[25,34] much remains to be learned and successful interventions need to be tailored for diverse groups. The development and evaluation of interventions for preschool children in low-income and racial and ethnic minority communities should be a priority given the disproportionate impact of obesity among these youth.[70–73] To advance obesity-prevention efforts, future interventions should complete assessments of child body composition (e.g., percent fat mass) or weight status (BMI) and develop improved measures of dietary intake and physical activity. There is also a need to develop and refine measures of child-care practices and policies to aid in the evaluation of interventions designed to improve food and physical activity environments.

Policy Recommendations

There are a variety of policy opportunities at the federal, state, and local level to improve nutrition and physical activity among children in child-care settings. The Healthy, Hunger-Free Kids Act, passed by Congress and signed into law in December 2010, includes a variety of provisions to improve the Child and Adult Care Food Program (CACFP). In addition, the Institute of Medicine (IOM) released two reports in 2011 that are relevant to the CACFP and include specific recommendations to address obesity in child-care settings: *Child and Adult Care Food Program: Aligning Dietary Guidance for All* and *Early Childhood Obesity Prevention Policies*.[3,69] A sample of policy recommendations based on the new law, the IOM reports, and this research synthesis are presented below.

Implement changes to the CACFP

- USDA should work with state agencies and other stakeholders to promote and expand participation in CACFP through program simplification, paperwork reduction, and other strategies.
- USDA should update nutrition standards and meal patterns and swiftly issue a proposed rule to improve nutrition in participating child-care centers and family child-care homes. This update should include a review of the associated costs with adjustments to reimbursement rates as necessary.
- USDA should encourage participating child-care centers and family child-care homes to provide opportunities for structured and unstructured daily physical activity, and to limit screen time.
- USDA and the U.S. Department of Health and Human Services (HHS) should encourage state licensing entities to include criteria for nutrition and wellness standards in licensing determinations.
- Nutrition and wellness quality in child-care settings should be studied.
- Strategies that encourage states to allow non-licensed child-care settings receiving child care block grant subsidies to participate in the CACFP should be identified.

Strengthen state and local regulations for child-care settings

- Update state and local regulations, standards, and guidelines related to child care to include rating and improvement strategies that promote quality care and strong standards for physical activity, nutrition, and screen time based on current recommended evidence-based guidance from respected sources such as the *Dietary Guidelines for Americans*, the American Academy of Pediatrics, and *Caring for Our Children: National Health and Safety Performance Standards*.
- Identify strategies for encouraging best practices to improve nutrition and increase physical activity in non-licensed child-care settings.

Increase opportunities for training and technical assistance in child-care settings

- Encourage current federally-funded programs and funding streams (such as USDA's Team Nutrition grants and the cooperative extension program, as well as Community Transformation Grants and other prevention and public health funding from the Centers for Disease Control and Prevention) to allocate resources to training and technical assistance in the child-care setting.
- Preserve funding and increase opportunities for linguistically and culturally appropriate training and technical assistance for child-care and preschool staff to support healthy eating, physical activity, and parent education and engagement.
- Assess the impact of training and technical assistance.

Preserve and promote funding for obesity prevention

- Support the Prevention and Public Health Fund, CACFP investments (study, technical assistance, and training), Community Transformation Grants, and other effective prevention programs at USDA and HHS.
- Encourage agencies that are administering prevention and nutrition assistance funds, as well as other funders such as the National Institutes of Health and the Agency for Healthcare Research and Quality, to support innovative pilots with rigorous evaluations to build more evidence on what works to promote healthy eating, physical activity, and screen time reduction in child-care settings.
- Work to implement and disseminate promising policies and practices for obesity prevention, for example by investing in translational research.

Stakeholder collaboration

- Support collaboration and partnerships between state, federal, public, and private entities, including early care and education, health care, public health, regulatory, and government agencies, and stakeholders that impact children in child-care settings to maximize effective use of public and private resources.
- Allocate federal resources to support local, state, and federal collaboration.

Prepared by Nicole Larson, PhD, MPH, RD, University of Minnesota; Dianne Ward, EdD, University of North Carolina; Sara Benjamin Neelon, PhD, MPH, RD, Duke University; and Mary Story, PhD, RD, University of Minnesota.

Peer review was provided by Sofiya Alhassan, PhD, University of Massachusetts; Kumar Chandran, MS, MPH, California Food Policy Advocates; and John Sirard, PhD, University of Virginia.

The policy recommendations were developed with input from some of the organizations included on the Healthy Kids, Healthy Future Policy Subcommittee.

ABOUT HEALTHY EATING RESEARCH

Healthy Eating Research is a national program of the Robert Wood Johnson Foundation. Technical assistance and direction are provided by the University of Minnesota School of Public Health under the direction of Mary Story, PhD, RD, program director, and Karen M. Kaphingst, MPH, deputy director. The Healthy Eating Research program supports research to identify, analyze and evaluate environmental and policy strategies that can promote healthy eating among children and prevent childhood obesity. Special emphasis is given to research projects that benefit children and adolescents ages 3 to 18 and their families, especially in lower-income and racial and ethnic populations at highest risk for obesity. For more information, visit *www.healthyeatingresearch.org*.

University of Minnesota, School of Public Health
1300 South 2nd St., Suite 300
Minneapolis, MN 55454
www.healthyeatingresearch.org

ABOUT ACTIVE LIVING RESEARCH

Active Living Research, a national program of the Robert Wood Johnson Foundation, stimulates and supports research to identify environmental factors and policies that influence physical activity for children and families to inform effective childhood obesity prevention strategies, particularly in lower-income and racial and ethnic communities at highest risk. Active Living Research wants solid research to be part of the public debate about active living. For more information, visit *www.activelivingresearch.org.*

San Diego State University
3900 Fifth Avenue, Suite 310
San Diego, CA 92103-3138
www.activelivingresearch.org

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Route 1 and College Road East
P.O. Box 2316
Princeton, NJ 08543-2316
www.rwjf.org

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