HEAD START AND CHILD CARE PROVIDERS’ FEEDING PRACTICES: A POTENTIAL AVENUE FOR OBESITY PREVENTION IN YOUNG CHILDREN

BY
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DISSERTATION
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Abstract

The Academy of Nutrition and Dietetics released a position statement in 2012 regarding benchmarks for nutrition in child care to establish healthful eating behaviors in early childhood and prevent obesity in young children. Further, recent publications by the Institute of Medicine and national organizations have recommended specific feeding practices for child care providers to be implemented at the state-level to prevent early childhood obesity in preschool children. Although over 12 million US children in child care consuming up to 5 meals and snacks per day in such settings, little is known about child care providers’ feeding practices.

The purpose of this dissertation was to examine provider’s feeding practices in Head Start and child care programs with the following aims 1) To assess whether providers met the Academy’s benchmarks and if attainment of benchmarks varied across child care contexts (Head Start [HS], Child and Adult Care Food Program [CACFP] and non-CACFP). 2) To identify determinants of child care providers’ healthful and controlling feeding practices for 2-5y-old children. 3) To identify Head Start and child care provider’s motivators, barriers and facilitators for using family style meal service (FSMS) during child care mealtimes.

Cross-sectional data was collected in 2011 and 2012 where 118 child care providers from 24 center-based programs (6 Head Start [HS], 11 Child and Adult Care Food Program [CACFP] funded, 7 non-CACFP) completed self-administered surveys regarding their feeding practices for 2-5-year-old children. Chi-square tests and Analysis of variance were used to determine variation in meeting benchmarks across contexts. Multi-level multivariate linear regression models were used to predict seven feeding practices- healthful (allowing children to control their food intake, role modeling healthy eating and teaching children about nutrition) and controlling (pressuring children to eat and restricting access to food for health or weight control). For aim 3, qualitative semi-structured interviews were conducted with a subset of providers based on maximum variation purposive sampling. The interviews were lead until saturation was reached and the data was coded using thematic analysis by NVivo qualitative software.

It was found that HS providers had greater compliance with the Academy’s benchmarks compared to CACFP and non-CACFP providers. HS providers sat more frequently with children during meals ($P=0.01$), ate the same foods as children ($P=0.001$) and served meals family-style ($P<0.0001$) more often, compared to CACFP and non-CACFP providers. HS providers ($P=0.002$), parents ($P=0.001$) and children ($P=0.01$) received more nutrition education.
opportunities compared to CACFP and non-CACFP. HS providers encouraged more balance and
variety of foods ($P<0.05$), offered healthier foods ($P<0.05$), modeled healthy eating ($P<0.001$),
and taught children about nutrition ($P<0.001$) compared to CACFP and non-CACFP providers.
Providers across all three contexts used significantly more non-internal than internal mealtime
verbal comments ($P<0.0001$).

Regarding predictors of provider’s feeding practices; working in a HS center predicted
teaching children about nutrition and modeling healthy eating; that may be attributed to the HS
performance standards which require HS providers to practice healthful feeding. Providers who
reported being concerned about children’s weight, responsible for feeding children and had an
authoritarian feeding style were more likely to pressure children to eat, restrict intake, and
control food intake to decrease or maintain children’s weight. Providers with non-White race,
who were trying to lose weight, perceived nutrition as important in their own diet, and had
greater number of nutrition training opportunities were more likely to use restrictive feeding
practices. Findings suggest that individual and child care level factors, particularly provider race,
education, training, feeding attitudes and styles and the child care context may influence
providers’ feeding practices with young children.

A qualitative investigation of the motivators, barriers and facilitators for using family
style meal service (FSMS) from the perspective of 18 child care providers revealed that HS and
CACFP providers were motivated to use FSMS because it created pleasant mealtimes,
opportunities to role model healthy eating, and healthful child development. CACFP and non-
CACFP providers reported not using FSMS because it was resource intensive, messy,
unhygienic, and seemed to violate CACFP policy. HS and CACFP providers recommended
strategies to overcome these barriers. They suggested that FSMS becomes easier with practice
and teaching children self-help skills during play time can avoid messes during mealtimes.

Possible reasons for an increased compliance of HS providers to the Academy’s
benchmarks may be attributed to HS federal performance standards for child nutrition and
increased nutrition training opportunities for HS staff. HS programs can serve as a model in
implementing the Academy’s benchmarks. Considering the predictors of providers feeding
practices identified by this study when developing interventions, may add to the efficacy of
childhood obesity prevention programs. The present research offers new insights not only
regarding providers’ barriers to FSMS, but also strategies from providers to help overcome these
barriers and allow for effective implementation of FSMS in child care settings. Providers should be encouraged to adopt FSMS, because the long-term health consequences and learning opportunities of FSMS outweigh any barriers related to its practical implementation. By strengthening policies and training that are more aligned with the Academy’s benchmarks, child care providers can be in a unique position to prevent childhood obesity by instilling positive eating behaviors related to self-regulation of the preschool-aged children in their care.
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Chapter 1.
Introduction

Childhood obesity has become a national health concern both in prevalence and severity. Results from the 2009-2010 National Health and Nutrition Examination Survey (NHANES) estimated that nearly 27% of the US 2-5-year-olds are overweight or obese. Obese preschoolers are predominantly at risk because excess weight during early childhood increases the risk for obesity and its associated health complications such as type 2 diabetes, hypertension and hyperlipidemia, cardiovascular disease in adolescence and adulthood. Overweight/obesity tracks from childhood into adulthood and is difficult to treat successfully in the long-term. Therefore the Institute of Medicine recommends that prevention is crucial to combat the childhood obesity epidemic. Although effective action to prevent the childhood obesity epidemic requires an evidence base of early life risk factors, unfortunately this evidence base is still very incomplete. Most studies that have focused on identification of risk factors for childhood obesity prevention are either focused on school aged children or have considered fewer potential predictors of overweight. However, it is well accepted that obesity is a multifactorial disease and the risk factors do not occur in isolation.

The current study fills the gap in current literature by identifying early determinants of childhood overweight/obesity in preschool aged children based on the Six-Cs ecological model as a theoretical framework for this study. The Six-Cs model identifies five spheres of environmental influence (child, clan, community, country, culture) and one of genetic influence (cell) as being important determinants of childhood weight status. Using the ecological Six-Cs model, the first aim of this study was to assess the influences of each of the previously reported potential risk factors on child overweight/obesity, and to determine if any of these risk factors would stand out as clear starting points for targeting key risk factors in future childhood obesity prevention programs.

A major social institution that is currently influencing preschool children and has the potential to shape preschool children’s eating behaviors and prevent the childhood obesity epidemic is the child care setting. More than 12 million preschool children attend child care, and typically consume half to three quarters of their daily energy while in full-time child care programs, making this an ideal setting for the promotion of healthful eating. Child care programs serve as homes away from home, where children develop early nutrition-related
behaviors that continue to form their food habits and nutrient intake patterns- potential risk factors in obesity- through adolescence and adulthood\textsuperscript{15-19}. Young children are more likely than older children to be influenced by adults in an eating environment\textsuperscript{20}. Among the social factors within the child care environment, providers’ feeding practices were highly associated with children’s dietary intake\textsuperscript{21}. Therefore child care providers offer potential opportunities for shaping children’s dietary intake and eating behaviors\textsuperscript{22}, and should be a primary focus for childhood obesity prevention. However, existing obesity prevention strategies are mainly focused on late childhood and adolescence in the home and school environment\textsuperscript{19}, indicating a missed opportunity for early childhood obesity prevention. Furthermore, research in child care has mainly focused on the food served in child care however the feeding practices of child care providers (or how the children are being fed) have largely been ignored.

The position statement released in 2011 by the Academy of Nutrition and Dietetics (Academy): Benchmarks for Nutrition in Child care\textsuperscript{23} provides guidance for child care providers in meeting benchmarks for healthful mealtime feeding practices for pre-school children (aged 2-5 years) to help children develop long-term positive eating behaviors and prevent obesity. Specifically, the Academy recommends that providers model and encourage healthful eating, support children’s hunger and satiety cues, serve meals family-style and not pressure children to eat\textsuperscript{23}. However research evaluating the adherence to benchmarks or other standards related to providers’ feeding practices (e.g. Head Start standards) is lacking. This study takes a leading step to evaluate child care providers feeding practices based on benchmarks put forth by the Academy.

Further, variation in child care policies create different policy-based contexts (i.e., (Head Start [HS], Child and Adult Care Food Program [CACFP] and non-CACFP) that can play an important role in how the Academy’s benchmarks are addressed. Head Start providers are required to meet the federal performance standards for child nutrition, that are similar to the Academy’s benchmarks however CACFP and non-CACFP are not required to meet such feeding practice standards. Despite the variation in nutrition policies across child care contexts, to our knowledge no published studies have evaluated how provider feeding practices vary across these policy-based contexts. Without such information it is difficult to plan training or implement obesity prevention efforts. This study takes the first step to bridge this knowledge gap by
evaluating child care providers feeding practices across the three policy-driven child care contexts (Head Start, CACFP and non-CACFP).

In order to utilize the potential of child care provider’s mealtime feeding practices for healthful development of children’s eating behaviors and obesity prevention, a better understanding is needed of factors that lead providers to use healthful and controlling feeding practices. Based on the feeding practice recommendations by the Academy, providers are encouraged to use healthful feeding practices (e.g. allowing children to control the amount of food they eat, modeling healthy eating and teaching children about food and nutrition) to encourage self-regulation of intake, acceptance of new foods and development of healthful eating behaviors. Providers are also advised to avoid controlling feeding practices (e.g. pressuring children to eat or restricting access to food), because they can contribute to the development of unhealthy eating behaviors and childhood obesity.

Researchers have focused on parents regarding their predictors of child feeding practices; however it is not known whether the same factors that influence parent’s feeding practices (e.g. ethnicity, education, weight, feeding style) also predict child care providers’ feeding practices. Addressing feeding practices of HS and CACFP providers who work with children from low-income and minority backgrounds takes on added importance given the increased obesity risk for children growing up in these contexts. This study makes a valuable contribution by identifying predictors of providers’ healthful and controlling feeding practices. Understanding the characteristics that influence providers’ feeding practices is crucial in developing targeted interventions that can better enable child care providers to use healthful feeding practices while reducing controlling practices.

One of the feeding practice standards recommended by the Academy is that child care providers should serve meals family style to preschool children. When children are served meals family style, providers sit and eat meals together with children, model healthy eating and children are allowed to serve themselves and select their own portions from communal dishes and pitchers placed on the table. Family Style Meal Service (FSMS) allows children to actively participate in selecting their food and determining their portion sizes in response to their internal cues of hunger and fullness. This approach of using FSMS is inclusive of healthful feeding strategies such as division of responsibility, responsive feeding and supporting children’s self-regulation of energy intake and limits use of controlling feeding practices (such as pressuring
children to eat and restricting access to food) that negatively impact upon child eating\textsuperscript{28} and are an established risk factor for childhood obesity\textsuperscript{32}. Given that extensive provider training is cost and resource intensive, implementing FSMS is a low-cost option to implement healthful feeding in child care programs.

FSMS is a widely endorsed feeding practice because it recommended by the Academy, Head Start, CACFP and the Institute of Medicine. However, it is critical to understand that how this widely endorsed feeding practice policy translates in practice within the child care setting. This study takes a “bottom-up” and “collaborative” approach with child care providers to inform researchers and policy makers regarding providers’ perspectives of FSMS. In order to encourage child care providers to use FSMS, it is important to explore why some providers use this style of meal service and how they understand its benefits (motivators). Equally important is to understand why other providers are reluctant to use FSMS (barriers) and how to help them overcome these barriers (facilitators). By taking these providers’ perceptions into consideration, researchers and policy makers can not only make policy recommendations, but also offer practical strategies and targeted solutions to help child care providers overcome barriers and effectively implement FSMS.

**Objective and Study Aims**

The present study makes a valuable contribution by identifying risk factors of overweight and obesity in preschool age children. Further, this research study focuses on understanding child care providers’ feeding practices across child care policy-based contexts and identifies predictors of providers’ feeding practices. In addition, the present study engages providers as collaborative problem solvers to provide practical strategies to help overcome barriers regarding family style meal service. The overall objective of this study was to investigate the unique yet untapped potential regarding child care providers mealtime feeding practices to shape young children’s eating behaviors and prevent obesity.
Specific Aims

Aim 1. To identify the risk factors of overweight/obesity in preschool children (aged 2-years) using the Six-C’s ecological framework as a guiding principle.

Hypothesis. Child overweight/obesity will be predicted by 22 previously reported potential risk factors - child ethnicity, gender, nighttime sleep duration, time spent at home watching television (TV) per day, TV in view where family eats most meals, TV in bedroom, breastfeeding duration, family status (single parent vs. two parent), maternal education, parent Body Mass Index (BMI), family history of overweight/obesity, parent nutrition label knowledge, participation in Women Infants and Children (WIC) supplemental assistance program, age of attendance in childcare, childcare nutrition policies, child’s diet intake, fat content of milk, sugar, corn syrup, honey added to baby’s formula prior to 1 year of age, perceived dietary quality, neighborhood social cohesion, physical activity opportunities and parental feeding practices.

Aim 2. To evaluate child care providers’ mealtime feeding practices to assess whether providers met the Academy’s benchmarks, and if attainment of benchmarks varied across policy-based contexts (HS, CACFP and non-CACFP).

Hypothesis. Owing to HS program performance standards; federally-regulated HS programs would be more proficient in achieving the Academy’s benchmarks than programs enrolled in CACFP; and non-HS or CACFP (non-CACFP) programs.

Aim 3. To identify predictors of Head Start and child care providers healthful and controlling feeding practices for preschool children aged 2-5 years.

Hypothesis. Drawing from research regarding parents’ feeding practices, the following provider characteristics: non-white race, less than college level of education, overweight/obese status, feeding attitudes and authoritarian feeding style would predict controlling feeding practices, while authoritative feeding style and working in HS program, would predict healthful feeding practices.

Aim 4. To explore Head Start and child care providers’ motivators, barriers and facilitators regarding family style meal service, using a qualitative approach.

Due to the exploratory and qualitative approach, forming a hypothesis is not appropriate.
References


Chapter 2.
Review of Literature

Childhood Obesity

Prevalence in preschool children. Obesity rates in the United States have increased dramatically since 1980 doubling among adults and tripling among children\(^1\), and have reached epidemic proportions worldwide\(^2\). Results from the 2009-2010 National Health and Nutrition Examination Survey (NHANES) estimated that nearly 27% of the US 2-5-year-olds are overweight or obese\(^3\). These statistics are of particular concern because excess weight during early childhood increases the risk for obesity and its associated health complications in adolescence and adulthood\(^4\). The timeliness and national importance of this problem is exemplified by the recent “Let’s Move” initiative launched by First Lady Michelle Obama to combat childhood obesity.

Health risks associated with childhood obesity. Obesity is associated with significant health problems in children and is an early risk factor for much of adult morbidity and mortality\(^5\) and premature death\(^4\). Chronic diseases such as diabetes and cardiovascular disease that were associated with adulthood now appear in early childhood\(^6\). Overweight in childhood is associated with type 2 diabetes\(^6\), hypertension and hyperlipidemia, cardiovascular disease\(^7\), asthma\(^8\), lower self-esteem\(^9\), psychological and social stress\(^10\) and poorer academic performance\(^11\). These psychological and metabolic consequences of childhood obesity begin early, persist into adulthood\(^5\).

Prevention is crucial to combat childhood obesity epidemic. Obesity tracks from childhood into adulthood\(^5\). Childhood obesity, as in adults, is difficult to treat successfully in the long-term. A critical review of childhood obesity described treatment results as ‘equivocal’ and ‘modest’\(^12\). The U.S. health-care systems is burdened by the costs associated with obesity, with an estimated at 112,000+ deaths each year at an annual cost of $147 billion\(^13\). Therefore, obesity prevention during early childhood years is a national healthcare priority\(^14\). Developing a comprehensive understanding of the determinants of obesity during the early childhood years is a critical first step in developing such prevention initiatives.

Childhood obesity risk factors: An incomplete evidence base. Although effective action to prevent the childhood obesity epidemic requires an evidence base of risk factors,
unfortunately this evidence base is still very incomplete\textsuperscript{15}. Despite the increasing prevalence of overweight in preschool children, most studies have focused on school-age children and adolescents\textsuperscript{16}. In addition, recent systematic reviews found that most previous studies on risk factors for obesity were beset by methodological limitations, were unable to adequately account for confounding variables (particularly socioeconomic status), were mainly cross sectional, and failed to investigate the effect of several potential risk factors simultaneously\textsuperscript{17}. It is well accepted that there is no single cause of childhood obesity, but factors at multiple levels (e.g. genetic, cellular, physiological, psychological, social, and cultural) determine outcomes\textsuperscript{18}.

**An Ecological Framework: Theoretical Foundation for the Study**

**Six-Cs model.** The proposed project will fill the gap in current literature by developing a comprehensive understanding of early determinants of childhood obesity in preschool aged children by using the ecological framework presented in Figure 2.1 Six-Cs model\textsuperscript{19}. The Six-Cs model shows that a child’s weight is influenced by the intake and expenditure patterns of the child, but these patterns are entrenched within the larger ecology of the child’s family, community and demographic characteristics. The Six-Cs ecological model has been developed by the Synergistic Theory and Research Obesity and Nutrition Group (STRONG) Kids (SK) transdisciplinary research initiative at the University of Illinois at Urbana-Champaign. A transdisciplinary approach stimulates connections and synergies across many levels of influence: intrapersonal, interpersonal, organizational, community and societal\textsuperscript{20}. The ecological framework developed by the STRONG Kids research team using this transdisciplinary approach is referred to as the Six-Cs model\textsuperscript{19} and provides a theoretical framework that will guide the current study. This Six-Cs model identifies five spheres of environmental influence (child, clan, community, country, culture) and one of genetic influence (cell)\textsuperscript{19} as being important determinants of childhood weight status. The cell sphere represents genetic predispositions to body weight and other biological factors. The child sphere represents personal and behavioral features, some (but not all) of which are within the child’s control. The clan sphere represents family characteristics, such as parental factors and home rituals. Peers, schools and other institutional and community factors—have been combined into a single sphere called community, which represents factors regarding the child’s social world that is outside of the home. The country sphere represents state- and national-level institutions that impact inhabitants’ priorities and opportunities. Last,
the culture sphere includes societal factors: culture-specific norms, myths, and biases that guide citizens’ and policy makers’ central assumptions about eating, exercise, health, and the body\textsuperscript{19}.

Drawing from the Six-Cs ecological framework guiding the SK initiative\textsuperscript{19}, the proposed project will focus on a key component of the community sphere of influence outlined in the model – i.e., the role of child care environments in shaping young children’s health and nutrition status during the early childhood period.

**The Role of Child Care Providers in Early Childhood Obesity Prevention**

Lowering the prevalence of childhood obesity requires a coordinated, multilevel approach that goes beyond the home to target schools and communities\textsuperscript{21}. Child care settings with over 12 million preschool children in attendance provide an ideal opportunity for implementing such an approach\textsuperscript{22}. Considering that young children can benefit in many ways from links between the child care, home, and community, child care settings offer potential but untapped opportunities to implement obesity prevention efforts across multiple contexts i.e. not only children in care, but also child care staff and families of those children\textsuperscript{22-25}.

**Child care prevalence.** Child care providers play an important role in shaping the health of our nation’s children. According to estimates, over 12 million children attend child care, with 57\% of children ages 3-5 years in center-based care\textsuperscript{26,27}. These children spend a majority of their waking hours in child care settings\textsuperscript{28}. Children enter child care as early as 6 weeks of age, with 41\% spending 35 or more hours a week in such settings, while 25\% spend 15-34 hours/week in child care until they reach school age\textsuperscript{29}. With so many preschool children in attendance, child care can be a major force in shaping children’s dietary intake, physical activity, and energy balance.

**Child care programs: A unique but missed opportunity for obesity prevention.** Early Childhood Education (ECE) environments have unquestionable potential to prevent childhood obesity, yet this potential has not been realized. Most childhood obesity prevention efforts are focused on schools, however given that 25\% of preschool (2-5 years) children are already overweight; intervening before school entry should be a priority\textsuperscript{30}. Obesity prevention and treatment programs have been executed primarily in schools, however these efforts have had little success. Unfortunately, few of the school interventions have successfully produced long-term, clinically significant changes in school-aged children’s outcomes such as dietary intake,
physical activity or weight change. A possible reason for this lack of success in schools may be that eating behaviors, nutrition habits and weight gain patterns are already firmly established by school age. Therefore, an expansion of prevention approaches to other contexts and younger age groups is warranted. Given that a significant proportion of children are already overweight prior to school entry, a focus on young children in child care settings provide alternative contexts for obesity prevention. The child care setting is the primary social institution influencing young children, owing to 12 million children attending child care, consuming up to 5 meals and snacks per day and spending majority of their waking hours in such settings.

Therefore ECE programs provide an unparalleled opportunity to reach the vast majority of young children in the U.S. Child care providers are in a unique position to influence the nutrition knowledge, attitudes and practices of the children in their care as well as the parents of those children.

**Preschool age: an important development period.** Child care settings often serve as homes away from home, where children adopt early nutrition related behaviors. During the first 5 years of life, children make a relatively rapid from suckling to consuming the adapted adult food of their culture. During this period, children are learning more about food and eating than any other developmental period. By the time they enter school; children have consumed numerous meals and snacks, and have been exposed to several food commercials and related marketing approaches. They have learned about the different types of foods, things that are edible or not; the schedule for mealtimes and portion sizes of different foods; their likes and dislikes; and many guidelines of cuisine from their culture. In addition young children appear more likely than older children to be influenced by adults in an eating environment, and food habits and patterns of nutrient intake acquired in childhood track into adolescence and adulthood. Thus, combined with evidence regarding early learning about food and eating occurring during the first years of life, these trends suggest child care providers offer potential but untapped opportunities for instilling long-term healthful eating behaviors in young children and should become a primary focus for obesity prevention.

**Attendance in child care and childhood obesity.** The need to develop a better understanding of child care contexts gains importance in light of recent findings regarding the association between child care and child weight status. Recent studies have found that child care attendance can contribute to the development of obesity. Benjamin et al., (2009) found that the
more hours a child spent in child care, the higher his/her body mass index (BMI) was at ages one and three. Importantly, this finding was only noted if the child was in home-based child care. Gubbels et al., (2010)\textsuperscript{37} likewise concluded that children who attended child care at age seven months had significantly increased chances of being overweight at one year of age. Maher and colleagues\textsuperscript{38} found that children who attended family, friend, or neighbor care the year before kindergarten were more likely to be obese than children who were cared for in other child care settings. Further, infants cared for by a relative for first 9 months of life experienced greater weight gain in first 9 months because they were less likely to have been breastfed and more likely to eat solid foods too early\textsuperscript{39}.

In contrast, few studies have reported that child care attendance can decrease childhood obesity risk. Children between the ages of three and five who attended part-time (1 to 15 h per week) center-based child care had a decreased risk of being obese between ages six to twelve as compared to no child care\textsuperscript{40}. Further extensive (> 15 h/ per week) center-based child care attendance was not associated with future overweight\textsuperscript{40}. In one Head Start program, the group of children with full-day attendance had a more favorable change in BMI distribution during the school year than did the group with half-day attendance\textsuperscript{41-43}. Therefore, the results for association between child care attendance and obesity risk have been mixed, and vary with the type of child care setting with children in informal settings at a higher risk for overweight.

Further, most studies that have examined the association between child care attendance and childhood obesity have compared (1) child care center; (2) someone else's home; and (3) child's own home by nonparent. Since 57% of US children attend center-based child care that in turn have different nutrition standards (\textbf{Table 2.1}) more in-depth explorations including comparison of the nutritional environments and providers’ feeding practices in child care settings are needed to better understand the reasons for such findings\textsuperscript{36}.

\textbf{Nutrition and feeding standards in child care.} The nutrition regulations for child care are weak and vary across states\textsuperscript{24}. Many professional groups and government agencies provide structure to feeding within center-based child care settings:

\textit{USDA’s Child and Adult Care Food Program (CACFP)}. The U.S. Department of Agriculture’s (USDA) supplemental nutrition assistance program, the Child and Adult Care Food Program (CACFP) provides meals and snacks to 3.2 million low income U.S. children daily, but lacks feeding practice standards for child care staff\textsuperscript{44} Participating
sites have to comply with meal pattern requirements to get reimbursed for the meals\textsuperscript{44}. By specifying types of foods and serving sizes CACFP has a positive effect on children’s nutrient intake\textsuperscript{45}. Regarding training, CACFP requires yearly training for participating staff and agencies, although these trainings focus more on program integrity and safety issues than on feeding guidance. Although CACFP does not address specific feeding practice requirements, the program’s written feeding suggestions deal with a clean and safe setting, family-style service (defined as allowing children to serve themselves from common bowls and dishes), preparing enough food to meet the needs of all enrolled children, and allowing seconds. However, except for Head Start, CACFP-funded centers are not required to follow these suggestions\textsuperscript{44}.

\textbf{Head Start (HS) Program.} Head Start, the largest federally-funded ECE program in the U.S., provides services to nearly 1 million low-income preschool children\textsuperscript{22}. The Office of Head Start in the US Department of Health and Human Services (DHHS) administers funding to almost 1 million low-income preschool children in 50 states, the District of Columbia, and US territories\textsuperscript{22}. The average Head Start program has approximately 6 centers, each with 50 to 60 children aged 3 or 4 years. The program is child focused with the overall goal of increasing the school readiness of young children from low-income families. Children attend Head Start during the weekdays from 7 a.m. until 2 p.m. with the option of an after school program. Similar to other school programs, the HS school year begins in September and continues through May\textsuperscript{22}.

About one in every three children entering HS is overweight or obese, with a BMI at or above the eighty-fifth percentile\textsuperscript{22}. Therefore the federal regulations that govern HS, the Program Performance Standards provide a regulatory structure for addressing obesity\textsuperscript{46}. To receive federal funding, program directors must develop local policies and practices that meet the standards several of which involve obesity prevention\textsuperscript{46} (Table\textsuperscript{2.1}). These performance standards require programs to provide health care services as well as meals, snacks, and nutrition education\textsuperscript{46}. For example, to cover the costs of meals and snacks, programs must use funds from the USDA by participating in either the CACFP or the school meals programs and adhering to their nutritional requirements. In addition to parent education and outreach activities to improve parent nutrition knowledge and food preparation skills, programs must provide ongoing staff training and
development. Staff and children are required to eat meals together family style and share the same food that provides an opportunity for adults to reinforce and model healthy eating behaviors. Therefore HS programs have clearly a comprehensive set of standards for childhood obesity prevention as compared to CACFP. Table 2.1 provides a detailed comparison of CACFP and HS nutrition standards. Researchers have proposed that owing to these provisions Head Start can serve as a model for other child care and early childhood education programs that are developing health related policies.

One study acclaimed that in one HS program, the group of children with full-day attendance had a more favorable change in BMI distribution during the school year than did the group with half-day attendance. This can be attributed to HS federal nutrition performance standards. However, even among the full-day children, 30 percent were overweight or obese at the end of the school year. This underscores the need for strengthening obesity prevention efforts in HS programs to reach the nation's low income and minority children at greatest obesity risk. A feasible approach to guide prevention efforts is to assure that HS nutrition performance standards are being implemented. However, few studies have evaluated the adequacy of HS programs in meeting the HS nutrition performance standards related to child feeding. Unfortunately, studies have focused mainly on food rather than feeding. Although, federal funding supports and encourages the provision of nutritious meals and snacks in child care, research efforts are lacking regarding how to feed these meals to children.

Therefore, CACFP funded providers are required to meet the meal pattern requirements to receive reimbursement for meals. In addition to the CACFP meal patterns, HS providers are required to meet HS regulations as outlined in the performance standards. Since the CACFP meal pattern requirements, and HS performance standards are required; they are regulations. These “regulations” will be referred to as “policies” interchangeably, throughout the document.

There is a knowledge gap regarding efficacy of HS programs in meeting the performance standards related to child feeding practices, nutrition training and education opportunities for staff, parents and children. We also need a collaborative approach with the people in practice - center directors, administrators and providers to identify barriers
in implementing the nutrition standards. Further, in order for HS programs to serve as a model for other child care contexts (CACFP and non-CACFP) we first need to identify specific motivators and facilitators for implementing nutrition standards.

**The National Association for Education of Young Children (NAEYC).** The NAEYC publishes requirements for developmentally appropriate practices and standards for accreditation of child care centers. Based on the comparison of NAEYC with other standards in it is evident that although NAEYC is an accreditating institution for child care centers it requires only few nutrition standards to be met for accreditation.

**Caring for our children—national health and safety performance standards.** These guidelines for Out-of-Home Child Care Programs (CFOC) provides recommendations that apply to out-of home early care and education settings. The American Academy of Pediatrics, the American Public Health Association, and the National Resource Center for Health and Safety in Child Care and Early Education recently released the 3rd edition of Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs. CFOC has been a standard for measuring what has been done and what still needs to be done, as well as a technical manual on how to do it. This manual includes topics ranging from child development, injury prevention, and environmental safety. One of the areas is nutrition. In the third edition, several obesity prevention practices have been included in the nutrition section e.g. encouraging breastfeeding, using USDA MyPlate, healthful feeding practices such as sitting and eating meals together with children, and following family style meal service, limiting screen time and promoting physical activity. The CFOC standards are consistent with and complement Head Start’s Performance standards and NAEYC.

**Academy of Nutrition and Dietetics (Academy) benchmarks for nutrition in child care (2011).** The recently released Academy’s benchmarks take a more comprehensive approach and provide recommendations for the nutritional quality of food and beverages served, menus, meal patterns, and portion sizes; food preparation and service, nutrition training, nutrition consultation, physical and social environment, teacher feeding practices, active play and working with families. The recently released Academy’s benchmarks take a more comprehensive approach and provide recommendations for the nutritional quality of food and beverages served, menus, meal patterns, and portion sizes; food preparation and service, nutrition training, nutrition consultation, physical and social environment, teacher feeding practices, active play and working with families. **Table 2.1** clearly
illustrates that the Academy’s benchmarks are more comprehensive because they include guidelines for nutrition and feeding practices compared to any other proposed standards from governing agencies and professional groups (CACFP, HS, NAEYC and CFOC). These benchmarks are an effective science-based tool that can further inform the ways in which HS and child care programs address health and nutrition issues within their programming\(^4^9\). Achieving these recommended benchmarks for nutrition in Head Start and child care programs is an important public health priority to promote healthful eating and combat the childhood obesity epidemic\(^4^9\).

**Child care policy: An avenue for implementing nutrition standards.** It is evident from table 2.1 that Academy’s benchmarks provide comprehensive nutrition guidance, with emphasis on child care providers’ feeding practices. A possible way for implementing the Academy’s nutrition benchmarks in Head Start and early care and education centers is through policy. As interventions are resource and training intensive, policy changes might offer a suitable alternative to achieve benchmarks for nutrition. Two reviews of state regulations found that most states lacked adequate regulations related to healthful eating (Kaphingst & Story, 2009; Benjamin et al., 2008). Further, policy changes do not guarantee compliance. Many professional disciplines (including early childhood nutrition education) are facing a crisis because their language and logic are too distant from the people they try to serve\(^5^0\). Likewise, there is frequently a disconnect between recommended guidelines and staff mealtime behaviors. Therefore to help achieve the Academy’s benchmarks nutrition practitioners need to work in collaboration with HS and child care providers, and providers in order to: 1) advocate the Academy’s benchmarks; and 2) offer new insights from the “people in practice”- providers and administrators regarding feasible ways to implement benchmarks that can guide policy and thereby make compliance simple. Center directors and providers are aware about the “real-life scenarios” that might make it difficult to implement HS performance standards and recommended Academy’s benchmarks. They can also provide an insight how the current recommendations can be made more adaptable to implement them. Little documentation exists if centers and child care providers are meeting nutrition guidelines, and if not what are the barriers centers face in implementing these standards at program, policy and parent level. Without such information it is difficult to plan training, develop interventions, and determine how guidelines impact young children’s eating skills and habits.
We propose to examine if child care settings meet the Academy’s benchmarks for nutrition in child care and whether the nutrition and feeding practices vary across Head Start programs, CACFP-funded, and non-CACFP centers, along with possible motivators, facilitators and perceived barriers for inclusion of nutrition activities based on current standards within their programs.

**Child Care Providers’ Mealtime Feeding practices**

Feeding practices are specific behavioral strategies caregivers employ to influence a child’s dietary intake by controlling what and how much a child eats. As seen in Table 2.1, the Academy’s benchmarks and the Head Start standards encourage providers to use *healthful feeding practices* (e.g. allowing children to control the amount of food they eat, modeling healthy eating and teaching children about food and nutrition) to encourage self-regulation of intake, acceptance of new foods and development of healthful eating behaviors. Further, providers are also advised to avoid *controlling feeding practices* (e.g. pressuring children to eat or restricting access to food) because they can contribute to the development of unhealthy eating behaviors and childhood obesity. Most studies have focused on parental controlling feeding practices in the home environment, but there is limited evidence regarding child care providers' feeding practices. The evidence regarding how specific feeding practices impact child outcomes (weight and eating behaviors) is discussed below.

**Healthful feeding practices.** Practicing healthful feeding such as allowing children to eat based on their internal signals of hunger and fullness, role modeling healthy eating, and teaching children about nutrition by exposing them to a variety of foods can help children set on a path of long term healthful eating behaviors and prevent obesity. Most healthful feeding practices are recommended based on responsive feeding. Responsive feeding promotes children’s attention and interest in feeding, support of their internal cues of hunger and satiety, capability to communicate needs to their caregiver with discrete and meaningful signs, and successful advancement to independent feeding. Responsive feeding has its roots in Satter’s division of responsibility, a “shared responsibility” between the adult caregiver and child for the feeding relationship. Adult caregivers are responsible for choosing, preparing, and offering foods, and for determining when and where food is served. In contrast, children are responsible for how much of these foods they eat, and whether they eat at all. Division of responsibility in feeding
reflects the authoritative or cooperative feeding style, and has been found to be effective in developing healthy eating habits\textsuperscript{62,63}. Galloway and colleagues (2006) showed that in no pressure condition children consumed more of a healthy food (soup) and made fewer negative comments about the healthy food (soup)\textsuperscript{57}. The Academy recommends that child care providers should help children pay attention and eat according to their internal signals of hunger and fullness and respect their cues once expressed. Feeding practices recommended by the Academy and the Institute of Medicine to implement responsive feeding within the child care context are discussed.

**Family style meal service (FSMS).** FSMS, allows children to select their own portions and serve themselves from food placed in communal dishes and pitchers on the table\textsuperscript{49}. This type of service allows active participation of children in the food selection as well as the determination of portion sizes eaten. Family style meal service has been associated with many positive child outcomes including social, emotional and fine motor skill development. When children self-serve during FSMS, they have the opportunity to develop their social and motor skills such as sharing and passing the bowls around the table, taking turns and saying “please” and “thank you”\textsuperscript{64}. Self-serving, an important dimension of FSMS, has an intriguing relationship with childhood overweight because when children serve themselves it facilitates their understanding of their internal cues of hunger and fullness, and promotes self-regulation in eating\textsuperscript{49,63,65}. Self-regulation in eating refers to the capability (innate and socialized) to eat and not eat in response to internal cues of hunger and fullness\textsuperscript{66}, and has been identified as a mechanism to prevent childhood obesity\textsuperscript{66-70}. FSMS also has a positive impact on early childhood educators’ ability to role model healthy eating. During FSMS providers are more likely to try new foods with the children and talk with the children about food than educators who served pre-plated meals or cared for children who brought their own lunches\textsuperscript{71}.

Drawing from this evidence, FSMS is a widely endorsed feeding practice. The Head Start federal performance standards require HS providers to serve meals family style during mealtimes. The CACFP program recommends FSMS, but providers have the option of choosing between FSMS and pre-portioned meal service where providers portion each item on the menu, place it on the plate and provide it to each child. Therefore unlike FSMS, when meals are served pre-portioned children do not have the opportunity to self-serve and decide the types and the amount of food on their plate. The Academy advocates FSMS to encourage improved self-
regulation of intake in children. In collaboration with the American Academy of Pediatrics, the American Public Health Association also encourages socialization during meals as well as children’s fine motor development skills. Further, the IOM recommends FSMS because it presents an exclusive opportunity to implement responsive feeding in the ECE setting.

**Role Modeling Healthy eating.** Child care providers have a unique potential in shaping children’s dietary intake and eating behaviors through role modeling. Specifically, providers’ role modeling of healthy eating can encourage children’s acceptance of new foods. In a study that assessed the effectiveness of providers’ modeling on encouraging children’s acceptance of five new foods, Hendy and Raudenbush found that children were more likely to accept new foods if providers enthusiastically modeled consuming those foods. Higher levels of adult modeling have been associated with lower BMI and energy intake in children. Thus, national guidelines including HS performance standards, the Academy’s benchmarks, CFOC standards and the IOM (2012) recommend that providers sit at the table with children during meals and snacks, and eat meals together with children. Providers’ are also encouraged to consume healthy meals in front of the children. Despite the positive benefits of role modeling, limited research suggests that child care providers might not be consistently modeling healthy eating behaviors to children during mealtimes. Furthermore, center-based child care providers, including providers from CACFP-funded centers, were observed consuming unhealthy foods and sugar-sweetened beverages more often at centers with policies that promoted healthier foods for meals/snacks. However, studies that examine how child care policies affect the providers’ feeding during mealtimes are limited. This project attempts to fill the knowledge-gap by evaluating child care providers’ feeding practices across policy driven child care contexts (HS, CACFP and non-CACFP).

**Nutrition education and training.** The Academy recommends that nutrition education and training should be provided to child care providers, parents and children as a component of the child care program. The Academy recommends that providers should receive training to be knowledgeable about the basic principles of child nutrition, and the Academy’s benchmarks put forth in the position statement. Being knowledgeable about benchmarks may help providers to create a positive mealtime environment and develop healthful eating behaviors in children. Since providers have their own health challenges (low income, lack of insurance), the Academy and the Institute of Medicine recommend that the providers should be offered training to improve
their own health and wellbeing before they undertake any health promotion efforts that target children under their care. When providers’ improve their own health they may be positive role models. Lanigan (2012)\textsuperscript{76} found that improvements in nutrition education were significantly associated with changes in providers’ efficacy and feeding knowledge, suggesting a need for training providers. However the content and level of training required for providers to become effective role models and practice healthful feeding remains undetermined\textsuperscript{77}.

While in child care, children should develop an understanding about food through both informal experiences such as mealtime conversations as well as formal experiences e.g. books, posters and hands-on experiences\textsuperscript{49}. By incorporating nutrition education into their daily schedule with children, providers have the opportunity to offer repeated exposure to different foods and teach children about nutrition by engaging their sensory characteristics. Research suggests that children who use their senses by tasting, smelling and manipulating new foods are more likely to eat them, especially after repeated exposure\textsuperscript{78}.

Providers are also encouraged to communicate with parents of enrolled children about nutrition education in order to engage them in the nutrition education process, and to also ensure that children are receiving consistent messages and following the same practices at home and child care\textsuperscript{49}. CFOC recommends that child care programs collaborate with food and nutrition professionals to provide training to families at least twice a year\textsuperscript{48}.

The Academy encourages nutrition education and training opportunities for child care staff, parents and children to help disseminate healthful eating at multiple levels including the child care as well as the home environment. To our knowledge, no studies have evaluated providers’ compliance to the Academy’s benchmarks regarding healthful feeding across child care contexts.

\textit{Mealtime verbal communication.} Few studies have explored the importance of mealtime verbal comments in the child care context. One study found that teacher modeling alone was not effective at encouraging children’s consumption of unfamiliar foods\textsuperscript{53}. However, when modeling was combined with encouraging comments (e.g., saying “I love mangoes!” while eating mangoes), children were more likely to accept the new foods\textsuperscript{79}. Another study\textsuperscript{80} reported that child care providers’ authoritative feeding (e.g., saying “Drinking your milk will make you big and strong” while sitting with the Head Start children) was associated with higher dairy intake.
These findings suggest that verbal communication during mealtime is an important avenue in developing healthy eating habits in children.

Recently research by Ramsay and colleagues (2010) have extended findings of importance of child care provider mealtime verbal comments by identifying a link between providers’ verbal communication and children’s self-regulation of energy intake. Verbally cueing children to attend to hunger and satiation can be supportive of their self-regulation of energy intake\textsuperscript{81}. However, there is evidence that adults (parents and child care providers) often override children’s internal signal of hunger and satiety by using non-internal verbal cues e.g. “Clean your plate”, “Finish your soup!”, “Are you done?”, “You want some more?” Therefore caregiver non-internal cues comprise child’s eating decisions based on external cues or pressure from others (i.e., eating one bite, cleaning your plate). Using non–internal verbal comments at home and child care is predominantly detrimental to children’s attention to their internal signals of hunger and fullness that can hinder self-regulation of food intake causing an increased obesity risk\textsuperscript{65,82,83}. In contrast, caregiver internal cues support children’s eating decisions and are based on child’s internal cues of hunger and fullness. Therefore internal cues such as “You can have more if you are hungry”, “Are you full?” cue children to their internal signals of hunger and fullness and are supportive of children’s self-regulation of food intake.

Birch and her colleagues\textsuperscript{84} examined the impact of internal and non-internal cues on children’s food intake. Children who were cued to the amount of food on their plate and given rewards for eating were less sensitive to their hunger and fullness as compared to children who were cued to their hunger and satiation while eating. In the child care context, Gubbels\textsuperscript{85} found that during mealtime half of the children were stimulated to eat more than they wanted to (e.g. ‘Finish your sandwich!’), ranging up to 10 times per child during one meal. This same study\textsuperscript{85} also reported that among the social factors within child care environments, staffs’ mealtime feeding practices were highly associated with children’s dietary intake. A recent study\textsuperscript{86} explored the verbal communication of providers in Head Start programs regarding preschool children’s internal and non-internal hunger and satiation cues. These authors reported that child care providers’ verbal communication with children at mealtimes emphasized non-internal cues which were not supportive of children’s self-regulation of food intake. For example, “Are you done?” a non-internal cue, was a commonly used phrase at mealtimes and accounted for 126 comments out of the total 418 comments (30%) made by providers.
When caregivers incorporate strategies such as comments cueing children to their hunger and fullness, they support children’s responsiveness to energy density in their diet and reinforce their self-regulation skills. Supporting children’s self-regulation of intake by adopting appropriate feeding practices is part of the Academy’s nutrition benchmarks for child care settings. The afore-mentioned evidence underscores the importance of caregiver verbal communication during mealtimes because cueing children to attend to their hunger and satiety (internal cues) can help them self-regulate their energy intake and thereby prevent obesity. Although this is a feasible and cost effective approach to prevent childhood obesity in child care settings, most of the studies regarding verbal communication have focused on home mealtime environment.

**Controlling feeding practices.** Controlling feeding practices involve influencing children’s dietary intake and eating behaviors by pressuring children to eat, and restricting access to foods. Such practices lead to negative child outcomes both in the context of child eating and weight. In the context of child eating, pressuring children to eat may lead to higher levels of picky eating, greater resistance to eating and a dislike of certain foods that can persist well into adulthood. Further, in children ages 3-5, Fisher and Birch demonstrated that children made more comments, more requests for and more attempts to obtain the restricted food than unrestricted food, restricted access increased subsequent intake and higher levels of restriction were associated with greater increases in behavioural response to restricted food. The focus of these studies is parents and home environment.

In the context of child weight, Faith et al. 2004 showed higher restriction at age 5 predicted higher BMI z-scores at age 7 among low risk children (defined as having a normal weight mother). Likewise, Francis et al. 2005 reported higher child weight and adiposity associated with higher use of restrictive feeding practices. When parents were educated about feeding practices, parent’s use of restrictive feeding practices decreased in treatment group from baseline to follow-up. For obese mothers, maternal use of restriction and control was associated with higher child BMI z-score. High levels of control over children’s food intake have been linked with subsequent disinhibited child eating (unrestricted eating with loss of control) and child weight or BMI. Longitudinal research suggests that highly restrictive feeding practices have been most consistently associated with child weight gain.
Few studies have been conducted in child care settings regarding providers’ feeding practices. A recent study by Brann (2010) reported that family day care providers reported a high level of responsibility in feeding and monitoring of children’s food intake (98). Studies have reported that child care providers particularly detailed their control on how desserts will be allowed only on certain occasions (99,100). Unfortunately, environments with food restriction have been related to children’s overeating in the absence of hunger as well as delivering the contradictory message of unhealthy foods being tied to positive occasions (65,68). Child care and Head Start providers have also been reported to use directive feeding practices, such as controlling children’s food and portions, asserting the sequence in which food may be eaten, and having attitudes and beliefs that can encourage children to overeat (80,101). Some controlling feeding practices by child care providers in Head Start settings, such as efforts to get children to eat more, stemmed from their concerns about making sure children get enough food, since they may be experiencing food insecurity at home (40). Similarly, Lynch and Batal (2011) reported that owing to parents’ expressed fears that children are not eating enough, providers encourage children to eat, regardless of children’s hunger or fullness. Therefore it is crucial to understand providers’ perceptions of mealtime decisions regarding feeding practices so that training materials are relevant. Owing to the unique context of the child care environment, studying teacher feeding practices across different settings (nonCACFP, CACFP and HS programs) is warranted.

Factors Affecting Providers’ Feeding Practices

Feeding style. Feeding styles provide the basis for examining the interactions between adults and children during mealtimes in group settings. Hughes and colleagues (102) classify caregivers having four specific child feeding styles based on their use of responsive or demanding child feeding behaviors and attitudes. Caregivers using authoritative or cooperative feeding style are high demanding, high responsive and exhibit adequate control though reasoning and involvement, while caregivers and children share the responsibility for the feeding relationship. Caregivers decide what is served and children determine what and how much is eaten. In contrast, authoritarian caregivers are high demanding, low responsive and exhibit extensive control- restrictive feeding. Caregivers using an authoritarian or adult-controlled feeding style control all aspects of the child's eating including what, when, and how much children eat. Caregivers using a permissive or child-controlled feeding style allow the child to
control the feeding relationship, including what to eat, when to eat, and how much to eat. Permissive caregivers therefore impose little control and can be further classified as indulgent - low demanding, high responsive or give seconds and uninvolved low demanding, low responsive or indifferent.

**Feeding styles and child outcomes.** In the context of child weight; Rhee et al. (2006) demonstrated that children aged 4-5 of authoritarian, permissive and neglectful mothers were significantly more likely to be overweight in 1st grade than the children of mothers with an authoritative style. Authoritarian parenting carried the highest risk; with children of authoritarian parents being five times more likely to be overweight than children of authoritative parents, suggesting that a strict, unresponsive family environment may be particularly associated with excessive weight gain in childhood. This study controlled for the influence of a variety of other factors that may influence these outcomes such as gender, ethnicity, education, income, marital status and other behavior problems. It was unclear from this study whether the apparent effects of less adaptive parenting style on early weight gain are a product of, for example, overeating as a way of coping with stress or other negative emotions, or may actually be explained by specific feeding practices associated with authoritarian parenting. The focus of these studies has been parents and home environment.

In the context of child care providers, one study examined the influence of feeding among low-income children in HS programs where feeding styles of child care providers were observed and food consumption was assessed. It was reported that child care providers’ authoritative feeding in Head Start children was associated with higher dairy intake while indulgent feeding behaviors were positively related to children’s consumption of vegetables, dairy, entrée, and starch. This research highlighted the important influence that child care providers have in the development of healthy and unhealthy eating behaviors in minority children.

**Relationship between feeding style and feeding practices.** Hughes and colleagues demonstrated that authoritative parents were more likely to monitor their children’s food intake than less authoritative parents, and that children with indulgent parents had a higher BMI than did children with authoritarian parents. Further, studies have demonstrated that children and adolescents consume greater levels of fruit and vegetables if they have authoritative parents, or
parents who use an authoritative feeding style\textsuperscript{106}. Duke and colleagues\textsuperscript{107} found that parental pressure to eat was related to authoritarian parenting in parents with 7-year old sons. Furthermore, Blisset (2008)\textsuperscript{108} found that permissive parenting style was related to lower monitoring of children’s unhealthy food intake, increased use of restriction by mothers, and pressure to eat by fathers. Authoritative parenting style was also related to lower use of pressure to eat that was associated with higher BMI in children.

Findings from the above literature suggest that parents’ feeding practices are broadly linked with their feeding styles\textsuperscript{109} and that feeding styles are good predictors of children’s BMI, fruit and vegetable intake, healthier eating, physical activity and sedentary behaviors\textsuperscript{106}. However the research with providers is limited. Taken together, there is a need for research that examines the relationship between specific feeding styles and feeding practices in child care providers when feeding children in group settings.

**Race.** When feeding practices of multi-ethnic providers was examined, it was found that Hispanic center-based providers were more likely to use controlling feeding practices than non-Hispanic White and Asian providers\textsuperscript{101}. Such controlling practices included insisting children to finish their meals before leaving the table, did not allow children to eat less than they thought they should be eating and making children eat foods they thought were good for them. Further, Hispanic providers rarely sat with children during meals, and family-based Hispanic providers were three times more likely to cook foods they knew that children liked\textsuperscript{101}. Similarly, Hughes and colleagues found that Hispanic providers in HS programs practiced an authoritarian feeding style\textsuperscript{80}. Research with parents has also showed that Hispanic\textsuperscript{110} and African-American caregivers\textsuperscript{111} have an authoritarian feeding style and use bribes, direct commands and actions. Further, Caucasian women are less likely to use restriction than Asian American women and less likely to pressure children to eat than African American women\textsuperscript{112}.

Overall studies with parents and limited evidence from child care providers reflect cultural differences regarding the value of food and mealtimes, or cultural differences in beliefs regarding effective ways of getting children to eat.

**Education.** Researchers have found that mothers with college education are more likely to use positive feeding practices (breastfeeding, role model healthy eating by eating more fruits and less desserts and sweetened beverages) for infants and toddlers\textsuperscript{113}. Breastfeeding appears to
promote subsequent monitoring, and is associated with reduced use of pressuring and restrictive feeding practices. Further, the number of years of education was positively associated with monitoring children’s eating and division of responsibility in feeding. Last, pressuring children to eat has been negatively associated with maternal education. A study that assessed feeding practices of family day care providers found a reciprocal relationship between providers’ level of education and pressuring children to eat more food.

**Weight Status.** Overweight mothers differ in their feeding practices as compared to normal weight mothers. Non-Hispanic White studies show that heavier mothers have higher levels of disinhibited eating (or eating in the absence of hunger), that in turn is associated with their children’s inability to self-regulate energy intake, and is a predictor of their daughters’ overweight. Further, overweight mothers show less control over children’s eating from 2 to 11 years age. In twins, obese mothers reported significantly less control over their children’s intake than normal weight mothers. These differences were observed for both first-born and second-born twins while controlling for genetic predispositions, because monozygotic correlations were not greater than dizygotic correlations for maternal feeding style.

**Feeding Attitudes.** The two constructs of child feeding attitudes elucidated in the Child Feeding Questionnaire include 1) concern about child weight and 2) perceived responsibility in feeding the child. These feeding attitudes are in turn influenced by the parents’ perception about child’s weight status, child BMI percentile and intake. Overall, studies have shown that parents who perceive that their children are overweight or at risk of becoming overweight are more likely to use restrictive feeding practices. In contrast, parents who perceive their children to be too thin are more likely to pressure their child to eat in an attempt to increase intake. Child overweight/obese status has been associated with parental concern about child weight, while child BMI percentile consistent with normal weight is associated with perceived responsibility for feeding. Mothers have reported using more restrictive feeding practices when they perceived daughters as overweight, when they were concerned about daughters' weight, and when daughters were heavier. On the other hand, mothers have reported to pressure their child to eat related to concerns about the child being too thin, having a lower energy intake and lower BMI.
In the context of child care providers, a significant positive association was found between family day care providers’ concern about child weight and controlling feeding practices (restriction of energy dense foods and pressuring children to eat more food)\(^98\). Further, researchers have found that child care providers have certain misconceptions regarding nutrition, such as grains are unhealthy for children\(^{121}\). Another study that examined the feeding attitudes, and practices among a multi-ethnic sample of child care providers found that over half of the providers reported misconceptions around child feeding such as encouraging or making children eat specific desirable food items, determining how much children should eat, privileging dessert, and preparing only food they knew children would like\(^{101}\). In addition a study that examined providers’ attitudes in the context of food scarcity, reported that a majority of providers’ disagreed with the emphasis on childhood overweight, and perceived that children generally grow out of preschool overweight and the issue of obesity need not be addressed\(^{121}\). Similarly, a focus group study with CACFP providers found that although providers were committed to nutrition and perceived themselves as responsible for keeping children healthy and shaping their food preferences, none of them believed that overweight or obesity was an issue for a preschool aged child\(^{122}\). A preschool pilot intervention *Encouraging Healthy Activity and Eating in Child care Environments* (ENHANCE) found that a reduction of providers’ misconceptions about feeding (e.g. rewarding children with a food treat is effective way to manage classroom, children who self-serve, are likely to eat more, society has gone overboard limiting sweets) significantly improved their observed feeding practices (family style meal service, avoiding controlling feeding practices)\(^{76}\). These results underscore the importance of assessing feeding attitudes as a predictor of feeding practices.

**Child care policies.** Variation in nutrition policies creates three policy based contexts HS, CACFP and non-CACFP (Table 2.1), that may impact the providers’ feeding practices. We hypothesized that HS providers will be more likely to use healthful feeding practices as compared to CACFP and non-CACFP providers. This is because HS providers are required to meet HS program’s performance standards regarding feeding practices; however CACFP and non-CACFP programs lack such standards. Grant and colleagues found that CACFP providers are more likely to practice healthful feeding as compared to non-CACFP providers. However, this study did not differentiate HS providers from CACFP providers even though HS standards regarding providers’ feeding practices are mandatory and comprehensive as compared to CACFP
standards. Further, center-based child care policies about providers’ eating practices were associated with providers’ eating behaviors during mealtime interactions with children. Providers’ role modeled healthy eating more often at centers that had written policies about staff discouraging unhealthy foods for meals/snacks and having informal nutrition talks with children at meals. However, providers were observed consuming unhealthy foods and sugar-sweetened beverages more often at centers with policies that promoted healthier foods for meals/snacks.

About half of the centers in this study participated in the CACFP program, however this study did not differentiate CACFP funded centers from non-CACFP settings. Studies have found that participation in Head Start and CACFP funded programs may reduce the prevalence of overweight and obesity in young children. However, the feeding practices across child care contexts (HS, CACFP and non-CACFP), that may have contributed to this lower overweight incidence, has not yet been examined.

**Nutrition training for providers.** The ENHANCE pilot intervention showed that improvements in both formal and informal nutrition education such as mealtime conversations regarding healthy foods, focusing on children’s internal cues improved providers’ self-efficacy and feeding knowledge. The Academy and researchers have emphasized the importance of training providers to improve nutrition in child care. It is recommended that training should address providers’ misconceptions and educate providers about the importance of healthful feeding practices, nutrition education to children and family communication. The About Feeding Children study involving 568 child care centers located in 4 western states found that providers were substantially less likely to receive training in child feeding than in nutrition or child development. Recent consensus on obesity prevention priorities in child care highlighted the need to evaluate the content and level of nutrition training required for providers to improve their feeding practices.

Few studies have examined mealtime feeding practices of providers in HS and child care settings and factors influencing providers’ feeding practices. Knowledge acquired through an investigation of feeding practices can be used to enhance the understanding of behavioral factors that determine why providers who influence children's eating use the feeding practices they do.
Figures and Tables

Figure 2.1. Six C’s ecological model\textsuperscript{19}
### Table 2.1. Selected guidelines for feeding in group settings

<table>
<thead>
<tr>
<th>Feeding Practice Guidelines</th>
<th>CACFP&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Head Start&lt;sup&gt;b&lt;/sup&gt;</th>
<th>NAEYC&lt;sup&gt;c&lt;/sup&gt;</th>
<th>ADA&lt;sup&gt;d&lt;/sup&gt;</th>
<th>CFOC&lt;sup&gt;e&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean and safe</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Family-style service (self-serve)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Adults sit with children</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Adults eat the same food as children</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Adults model</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Children self-regulate intake</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Allow time for meals</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Allow for seconds of nutritious foods</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Not forced to eat/resist clean plate</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Avoid using food as reward/punishment</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Serve variety of foods with cultural and ethnic preferences</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Adults understand &amp; respect children’s hunger/satiety cues</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Provide repeated exposure to new/novel foods.</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>Children decide the amount of foods they eat.</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Menu and Food served</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Menus reflect actual food and beverages served</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Menus posted or made available to parents</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Substitutions noted on menus in advance of the meal or snack</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Any substitutions should be of equal nutrient value</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Food served consistent with DGA</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Children in part-time programs receive 1/3 of the daily nutrient requirements</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Children in full-time programs receive 1/2 to 2/3 of daily nutrient needs</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5 or more servings of fruits/vegetables per day</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Fruits and vegetables high in vitamin C and vitamin A 3times/week</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Fresh or Frozen fruits and vegetables</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>If canned, fruits should be packed in water, not syrup</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>If canned, vegetables should be low in sodium</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>If canned, rinse fruits and vegetables to reduce added sugar or Na</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Limit juice (less than 4-6 oz per day)</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>1/2 of all grains should be whole grains</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>Low fat or fat free milk</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Promote foods high in nutrients and low in fat, sugar, sodium</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Limit foods high in energy, sugar, sodium and low in vitamins and minerals</td>
<td></td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>Water made available throughout the day</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Frequency of meals</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
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</table>
Table 2.1 (cont.)

<table>
<thead>
<tr>
<th>Feeding Practice Guidelines</th>
<th>CACFP&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Head Start&lt;sup&gt;b&lt;/sup&gt;</th>
<th>NAEYC&lt;sup&gt;c&lt;/sup&gt;</th>
<th>ADA&lt;sup&gt;d&lt;/sup&gt;</th>
<th>CFOC&lt;sup&gt;e&lt;/sup&gt;</th>
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<tbody>
<tr>
<td>Offer meals and snacks every 2-3 Hours</td>
<td>—</td>
<td>—</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>At least one meal and two snacks or two meals and one snack</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>offered for children in care for 8 hours or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At least two meals and two snacks or three snacks and one meal</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
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</tr>
<tr>
<td>offered for children in care more than 8 hours</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Portion sizes</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Use USDA portion sizes</td>
<td>—</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Child-sized portions</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>Child-sized equipment/utensils</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
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<td>USDA meal pattern requirements</td>
<td>✓</td>
<td>—</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Nutrition Training</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Display posters, pictures and decorations that communicate</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>nutrition messages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated part of curriculum</td>
<td>—</td>
<td>✓</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Nutritional Training for providers based on ADA benchmarks</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>Nutritional Training for providers on their own health</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Nutrition training for cooks to plan, prepare, serve nutritious</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>meals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrition Education for children and families</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Regular schedule to train providers</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
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<tr>
<td>Consult with nutritionists for: menu planning and evaluation;</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
<td>—</td>
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<tr>
<td>nutritional information and training for cooks, providers, families</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Parents encourage child care to serve healthy foods</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
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</tr>
<tr>
<td>Training at a minimum must include instruction, appropriate to</td>
<td>✓</td>
<td>—</td>
<td>—</td>
<td>—</td>
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</tr>
<tr>
<td>the level of staff experience and duties, on the Program’s meal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>patterns &amp; meal counts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accommodate children with special nutrition needs/ food allergies</td>
<td>—</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Recognize and treat a food allergy based reaction.</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
<td>—</td>
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</tbody>
</table>


References


45. Murphy SP, Yaktine AL, Suitor CW, Moats S. Child and adult care food program: Aligning dietary guidance for all. Child and Adult Care Food Program: aligning dietary guidance for all. 2010.


95. Shunk JA, Birch LL. Girls at risk for overweight at age 5 are at risk for dietary restraint, disinhibited overeating, weight concerns, and greater weight gain from 5 to 9 years. *J Am Diet Assoc*. 2004;104(7):1120-1126.


Chapter 3.
Risk Factors for Overweight/Obesity in Preschool Children:
An Ecological Approach

Abstract
Identification of risk factors is critical to preventing the childhood obesity epidemic. Risk factors that contribute to obesity are multifactorial. However, limited research has focused on identifying obesity risk factors using an ecological approach. Baseline self-report survey data from the STRONG Kids program were used. The sample consisted of 329 parent-child dyads recruited from childcare programs in east-central Illinois. Child height and weight were measured and converted to age-and sex-specific z-scores using standard growth charts. An ecological model provided the theoretical framework for the selection of 22 previously reported childhood obesity risk factors. Multiple logistic regression analyses were used to identify risk factors. Out of 22 potential risk factors, three were found to be significantly associated with child overweight/obesity. These included child nighttime sleep duration ($\chi^2 = 8.56$, $p=0.003$), parent BMI ($\chi^2 = 5.62$, $p=0.01$), and parental restrictive feeding for weight control ($\chi^2 = 4.77$, $p=0.02$). Children who slept for eight hours and less were 2.2 times more likely to be overweight/obese (95% confidence interval [CI]: 1.3–3.7) while children with an overweight/obese parent were 1.9 times more likely to be overweight/obese (95% CI: 1.12–3.2). Finally, children whose parents used restrictive feeding practices were 1.75 times more likely to be overweight/obese (95% CI: 1.06–2.9). Using an ecological approach, we conclude that childhood obesity prevention efforts may benefit from targeting the key risk factors of child sleep duration, parent BMI, and parental restrictive feeding practices as focus areas for obesity prevention.

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1This chapter appeared in its entirety in the Childhood Obesity journal. Dev DA, McBride BA, Fiese BH, Jones BL, Cho HK, on behalf of the STRONG Kids Research Team. Risk factors for Overweight/Obesity in preschool children: An ecological approach. Childhood Obesity. 2013; 9(5):399-408. This article is reprinted with the permission of the publisher.
Introduction

In the United States, childhood obesity rates have tripled in the past decade, with more than one-quarter of American children aged 2-5 years overweight.\(^1\) This obesity epidemic is fueled in part by excess childhood weight gain. Dramatic increases in childhood obesity foreshadows serious health consequences (e.g. early risk for much of adult morbidity and mortality\(^2\) and premature death,\(^3,4\) type 2 diabetes,\(^5,6\) hypertension and hyperlipidemia,\(^7,8\) cardiovascular disease,\(^8-11\) asthma and sleep apnea,\(^12,13\) lower self-esteem\(^14\) and psychological and social stress\(^15,16\). Overweight/obesity tracks from childhood into adulthood and is difficult to treat successfully in the long-term.\(^17\) Therefore the Institute of Medicine recommends that prevention is crucial to combat the childhood obesity epidemic.\(^18\)

Although effective action to prevent the childhood obesity epidemic requires an evidence base of early life risk factors, unfortunately this evidence base is still very incomplete\(^19,20\). Despite the increasing prevalence of obesity in preschool children, researchers have focused on risk factors in school-age children and adolescents\(^17,21\). Existing prevention strategies, focused on late childhood and adolescence, are largely unsuccessful because eating behaviors are already established by school age\(^22\). Further, few studies have tried to capture the complete picture of childhood obesity risk factors. Most studies have included fewer predictors of overweight, such as: parental obesity\(^23,24\), breastfeeding duration,\(^25\) childhood television use,\(^26,27\) diet,\(^25,28\) and nighttime sleep duration\(^29\). However, these risk factors often do not occur in isolation. It is well accepted that there is no single cause of childhood obesity, but co-actions at multiple levels (e.g. genetic, cellular, physiological, psychological, social, and cultural) determine outcomes\(^30\).

The current study fills the gap in current literature by identifying early determinants of childhood overweight/obesity in preschool aged children based on the Six C’s\(^31\) ecological model as a theoretical framework for this study. The Six-Cs model identifies five spheres of environmental influence (child, clan, community, country, culture) and one of genetic influence (cell) as being important determinants of childhood weight status (Figure 2.1)\(^31\). The Six C’s model illustrates that a child’s weight status is influenced by the intake and expenditure patterns of the child, but these patterns are embedded within the larger ecology of the child’s family, community and demographic characteristics\(^31\).

Using the Six C’s ecological framework as a guiding principle for the selection of potential risk factors we tested the hypothesis that child overweight/obesity will be associated
with 22 previously reported potential risk factors - child ethnicity, gender, nighttime sleep duration, time spent at home watching television (TV) per day, TV in view where family eats most meals, TV in bedroom, breastfeeding duration, family status (single parent vs. two parent), maternal education, parent Body Mass Index (BMI), family history of overweight/obesity, parent nutrition label knowledge, participation in Women Infants and Children (WIC) supplemental assistance program, age of attendance in childcare, childcare nutrition policies, child’s diet intake, fat content of milk, sugar, corn syrup, honey added to baby’s formula prior to 1 year of age, perceived dietary quality, neighborhood social cohesion, physical activity opportunities and parental feeding practices. The goal of this study was to assess the influences of each of these previously reported potential risk factors on child overweight/obesity, and to determine if any of these risk factors would stand out as clear starting points for targeting key risk factors in future childhood obesity prevention programs.

Methods

Participants

The current study used data from the ongoing Synergistic Theory and Research on Obesity and Nutrition Group (STRONG) Kids (SK) longitudinal study of preschool children recruited at age two from Head Start programs and licensed childcare centers in four small urban communities in east central Illinois. The initial wave of SK centers was recruited from a sample with unequal probability of selection among licensed preschools in a 4-county diverse geographic area in the Midwest that met the following inclusion criteria: 1) Head Start program operating within the grantee agency providing Head Start services in the target communities, or childcare center licensed by the Illinois Department of Children and Family Services. 2) Located within 65 miles of the study center in one of 4 small urban areas targeted to maximize racial/ethnic diversity. 3) Enrolled a minimum of 24 children in the targeted age range of 2-5 years to recruit into the study. These criteria identified 38 eligible preschools, 36 of which agreed to participate (94% school response rate) in the larger STRONG Kids study. Parents gave informed written consent for their children to participate. All procedures in this study protocol were approved by the University of Illinois at Urbana-Champaign Institutional Review Board. Data were collected from self-administered questionnaires with validated scales completed by
the child’s parent/primary care-giver. Height and weight was collected from 407 children at their respective childcare centers.

Out of 407 children in our sample we excluded ten (2%) children because they were underweight. Sixty eight children from some ethnic groups were excluded due to small sample size (i.e., Hispanic – 22, American Indian – 6, Hawaiian Native of Pacific Islander – 2, Asian – 38) in order to limit the underestimation of the effect of some risk factors prevalent in these groups. This resulted in a total sample of 329 preschool children, with 103 Black and 226 White children for use in the analyses. We created a binary dependent variable- BMI-for-age for preschool children – healthy weight (BMI-for-age 5th & < 85th) and overweight/obese (≥85th percentile).

Procedures and Measures

Independent Variables: Potential risk factors. We chose putative risk factors on the basis of previously reported associations with overweight/obesity, or plausible prior hypotheses using the Six C’s ecological model as the theoretical framework. We cross checked the results of our literature search against systematic reviews57,58. Overall, we identified 27 potential risk factors. Measures for 22 of the 27 potential risk factors were available from baseline data on SK Wave1 cohort. Forty one variables of these 22 potential determinants were used in the regression model because some constructs were based on multiple indicators (Table 3.1).

Dependent variable: Child Body Mass Index (BMI)-for age. Height and weight were measured by trained research staff following a protocol developed by the World Health Organization (WHO) for measuring children ≥ 2 years of age59. SK research assistants received intensive training on height and weight measurement for preschool children, until they achieved ninety percent agreement with the trainer.

Overweight and Obesity Definition. The dependent variable was BMI, converted to age-and sex-specific z- scores using the 2000 growth charts published by the Centers for Disease Control and Prevention (CDC)60-65. Overweight is defined as greater or equal to the 85th percentile, while obese is defined as greater or equal to the 95th percentile in accordance with CDC guidelines61. Several expert and advisory groups have recommended BMI as the preferred measure for evaluating overweight/obesity among children and adolescents 2 to 19 years of age62,64.
Data Analysis

Descriptive statistics (mean, SD, frequencies) were calculated for all variables. Missing values for forty one risk variables used in the final model ranged from 3% to 10.4%. We examined missingness by using Little’s missing completely at random (MCAR) test and determined that the values were not MCAR. We then used multiple imputation to analyze patterns of missing values and the pattern chart revealed monotonicity in the data. Therefore we used a multiple imputation with logistic regression model to impute less than 10% of the data. The imputed data were used for further analysis. Prior to running the regression model, data screening procedures were performed to identify outliers, test for normality and correlations between risk variables. Variance inflation factors (VIF) were used to check for multicollinearity. This procedure indicated that no serious multicollinearity problems existed among the independent variables. We calculated internal consistency statistics (Cronbach’s alpha) for measures such as parental feeding practices. Proposed risk factors were entered into the final model in which all variables were analyzed simultaneously using multiple logistic regression using stepwise regression with forward selection. We used binary logistic regression because our dependent variable (child weight status) was dichotomous (i.e., healthy weight vs. overweight/obese). Statistical analyses were performed using the Statistical Package for the Social Sciences, Version 17 (SPSS, Inc., Chicago, IL) and Statistical Analysis System, Version 9.3 (SAS Institute Inc., Cary, NC).

Results

Two hundred forty one children (73.3%) were healthy weight, while 88 (26.7%) were overweight/obese (i.e., 17.6% overweight and 9.1% obese). We combined overweight and obese children, based on previous research suggesting that children who are overweight are at risk of becoming obese. There were no outliers, the final Cronbach α for all survey measures was acceptable (≥.65) and the potential risk variables included in the regression model were not significantly correlated. Distribution of the 22 potential risk factors categorized based on preschool BMI is shown in Table 3.1.

We entered the 22 risk factors (forty one variables) into the regression model where we analyzed all variables using multiple logistic regression. Out of 22 risk factors, we found three to be significantly associated with child overweight/obesity (Table 3.2). These significant risk
factors included: child nighttime sleep duration ($\chi^2=8.56$, $p=0.003$), parent BMI ($\chi^2=5.62$, $p=0.01$), and parental feeding practice- restriction for weight control ($\chi^2=4.77$, $p=0.02$) where parents control the child’s food intake with the purpose of decreasing or maintaining the child’s weight.

These results suggest the risk for development of overweight/obesity in preschool aged children who slept for eight hours and less per night was about 2.2 times of that preschool aged children who slept for 9 and more hours (odds ratio [OR] 2.2, 95% confidence interval [CI]: 1.3 to 3.7). Further, the risk for development of overweight/obesity in preschool children with an overweight/obese parent was about 1.9 times higher than preschool children of parents with normal BMI (OR 1.9, 95% CI 1.12 to 3.2). Finally, the risk for development of overweight/obesity in preschool children where parents use restrictive feeding practices for weight control was 1.75 times higher as compared to parents not using controlling feeding practices (OR: 1.75, 95% CI: 1.06 to 2.9).

Discussion

Using an ecological model we simultaneously considered a broad set of early childhood risk factors for obesity, a key developmental period for prevention. We found that three (nighttime sleep duration, parental BMI and parent feeding practice- restriction for weight control) of 22 putative early childhood obesity risk factors were significantly associated with overweight/obesity. Because these factors were examined simultaneously, our results support using an ecological framework to identify risk factors as compared to bivariate relationships because risk factors do not occur in isolation. This study identifies specific influences in early life that might be suitable targets for childhood obesity prevention efforts.

Nighttime Sleep Duration. A positive association between nighttime sleep duration and overweight/obesity risk in preschool children was revealed. This result is consistent with current literature. A meta-analysis conducted to evaluate current evidence for the relationship between child sleep duration and overweight/obesity risk concluded that current studies from around the world show that short sleep duration is consistently associated with development of overweight/obesity in children and young adults, but not in older adults. In school-age children, several studies have consistently reported that short sleep duration was an independent risk factor.
for obesity, yet few studies have examined the relationship between short sleep duration and obesity in preschool children.

Drawing from a nationally representative sample of 2,281 children aged 3–12 years, Snell and colleagues concluded sleeping less than 8 hours a night was correlated with higher BMI and being overweight at Time 1 (baseline) and Time 2 (after 5.5 years), while sleeping between 10 and 11 hours a night was correlated with not being overweight at Time 1 (baseline) and Time 2 (after 5.5 years). Therefore for the purpose of our analyses we defined “short sleep” as 8 hours or less. Although daytime napping is very common in preschool children, previous studies did not find an association between daytime sleep and obesity. Aforementioned evidence indicates that insufficient nighttime sleep among preschool-aged children may be a lasting risk factor for subsequent obesity.

Shortened sleep duration has been hypothesized to influence weight status through decreased physical activity due to tiredness and increased energy intake given greater opportunity to eat. Another pathway is through influence on the hypothalamic mechanisms that regulate body weight and metabolism via key hormones such as leptin and ghrelin. Hunger and appetite increase with lower leptin levels and higher ghrelin levels and both low leptin and high ghrelin levels have been linked to short sleep duration.

**Parent Body Mass Index (BMI).** Confirming previous observations, a significant risk factor that emerged in this study was parental overweight/obesity. There is an extensive evidence base to support the relationship between parental obesity and childhood overweight. Parental obesity is also related to children’s fat intake, snack food consumption, and a higher preference for high-fat foods and a lower preference for vegetables. Children of overweight parents are also less active and more likely to prefer sedentary activities than children of parents with normal weight. The family environment including parental modeling of eating can influence children’s dietary behaviors. Children’s dietary intake is also associated with parental diet. Therefore the link between parent BMI and child BMI identified in this study, most certainly represents genetic as well as environmental influences on childhood overweight/obesity. Therefore engaging parents in child-or family-focused prevention efforts is an effective strategy for childhood obesity prevention.

**Restriction for Weight Control.** Consistent with previous research, findings from the current study suggest parental feeding practice – restriction for weight control is a risk factor for
overweight/obesity during the preschool years. This is concerning given that previous research has shown that restrictive feeding practices have negative outcomes in the context of both child weight and child eating behaviors. In the context of child weight, Faith et al. 2004 showed higher restriction at age 5 years predicted higher BMI z-scores at age 7 years among low risk children (defined as having a normal weight mother)\textsuperscript{81}. Likewise, Francis et al. 2005 reported higher child weight and adiposity associated with higher use of restrictive feeding\textsuperscript{76}. High levels of control over children’s food intake have been linked with subsequent disinhibited child eating\textsuperscript{82, 83} and childhood overweight\textsuperscript{84-87}.

In the context of child eating in children ages 3-5, Fisher and Birch demonstrated that children made more requests for and more attempts to obtain the restricted food than unrestricted food, while restricted access increased subsequent intake and greater increases in behavioural response to restricted food\textsuperscript{82, 83}. However most of this evidence comes from cross-sectional studies and it is unclear whether parents are restrictive in response to children’s unhealthy weight gain, or if restriction leads to unhealthy weight gain.

There are several strengths of this study (e.g. high effect size in primary findings and an ecological framework that acknowledges that obesity is a multi-factorial disease) that provide valuable new insights to the determinants of early childhood obesity. However this study is not without limitations. Cross-sectional studies such as the current investigation are limited to identifying associations rather than confirming causality. Risk factors such as diet and physical activity were assessed using self-reports that might be the reason for some non-significant findings. All risk factors identified by other studies such as parity, smoking during pregnancy, maternal BMI pre-pregnancy, could not be assessed because of unavailability of data. Future studies should focus on including these risk factors as well as identifying mediational and moderational processes. The current sample was recruited from advertisements given to parents using center-based childcare for their preschool children, so generalization is limited. Finally, the current results can only be generalized to black and white ethnicities, since other ethnic minority groups in our sample were excluded because they were under-represented. Other studies would benefit from using an ecological approach to identify potential risk factors. Future interventions that focus on child sleep, parental feeding practices, and engaging parents, in additional to improving nutrition and increasing physical activity, might lead to desired results and long-term healthful behaviors for obesity prevention in children. Future larger longitudinal and observation
studies should also focus on extending findings to ethnic minority groups, and determining predictors of restrictive feeding practices and short sleep duration.

**Conclusions**

This study identifies three key early life risk indicators for childhood overweight/obesity in preschool children (i.e., parent BMI, child nighttime sleep duration and parental restrictive feeding); using an ecological approach with a simultaneous analysis of 22 risk factors that acknowledges obesity is a multifactorial disease. Engaging and educating parents about the importance of sleep and not using restrictive feeding practices may add to the efficacy of childhood obesity prevention and intervention programs. Childhood obesity prevention efforts may benefit from targeting these key risk factors as focus areas for obesity prevention. Although excess weight gain is an outcome of an energy imbalance owing to consumption of energy dense foods and decreased physical activity, it is important to extend the overweight/obesity prevention efforts to engage parents in child- or family- focused obesity prevention efforts; establish sleep routines for children, and increase awareness about the negative impact of restrictive feeding practices. When parents are involved in childhood obesity prevention efforts the shared familial characteristics in the environment such as improved nutrition and increased physical activity can help prevent excess weight gain in children. Similarly, shortened nighttime sleep duration in early life is a modifiable risk factor with important implications for overweight/obesity prevention. Increasing parental awareness of the importance of sleep and helping parents to establish an appropriate sleep schedule for young children may be useful in preventing childhood obesity. These three risk indicators can provide an effective starting point for childhood obesity prevention efforts that would allow for the optimal use of limited resources targeting young children. Future interventions might focus on environmental changes targeted in early childhood, which are independently related to the risk of overweight/obesity.
### Table 3.1. Distribution of potential childhood overweight/obesity risk factors stratified by preschool BMI (n=329)

<table>
<thead>
<tr>
<th>Potential Risk Factors</th>
<th>Level in 6Cs Model</th>
<th>Children's BMI status (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Normal</td>
</tr>
<tr>
<td><strong>Child Ethnicity</strong>[^32]</td>
<td>Cell</td>
<td>30.7</td>
</tr>
<tr>
<td>NH Black</td>
<td></td>
<td>69.3</td>
</tr>
<tr>
<td>NH White</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Child Gender</strong>[^33]</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>53.5</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>46.5</td>
</tr>
<tr>
<td><strong>Night time child sleep duration</strong>[^34]</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>9 and more hours</td>
<td></td>
<td>76.3</td>
</tr>
<tr>
<td>8 hours and less</td>
<td></td>
<td>23.7</td>
</tr>
<tr>
<td><strong>Time spent at home watch TV/ day</strong>[^35]</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>&lt;2 hours per day</td>
<td></td>
<td>83.0</td>
</tr>
<tr>
<td>&gt;2 hours per day</td>
<td></td>
<td>17.0</td>
</tr>
<tr>
<td><strong>TV in view where family eats most of meals</strong>[^35,^36]</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>56.4</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>43.6</td>
</tr>
<tr>
<td><strong>TV in bedroom</strong>[^35]</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>33.2</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>66.8</td>
</tr>
<tr>
<td><strong>Breastfeeding duration</strong>[^35]</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>Never breastfed</td>
<td></td>
<td>31.5</td>
</tr>
<tr>
<td>Breastfed less than 6 months</td>
<td></td>
<td>33.6</td>
</tr>
<tr>
<td>Breast fed 6 months and more</td>
<td></td>
<td>34.9</td>
</tr>
<tr>
<td><strong>Family status</strong>[^37]</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>Single parent family (Single, separated, divorced, widowed)</td>
<td></td>
<td>28.6</td>
</tr>
<tr>
<td>Two parent family (married, Cohabiting, civil union)</td>
<td></td>
<td>71.4</td>
</tr>
<tr>
<td><strong>Maternal Education</strong>[^38]</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>None, grade school, high school</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Some college, technical school</td>
<td></td>
<td>32.8</td>
</tr>
<tr>
<td>College graduate, post graduate</td>
<td></td>
<td>55.2</td>
</tr>
<tr>
<td><strong>Parent Body Mass Index (BMI)</strong>[^39]</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>Normal: 18.5-24.9 kg/m^2</td>
<td></td>
<td>48.5</td>
</tr>
<tr>
<td>Overweight and Obese: &gt; 25kg/m^2</td>
<td></td>
<td>51.5</td>
</tr>
<tr>
<td><strong>Family history of overweight or obesity</strong>[^39]</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>70.5</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>29.5</td>
</tr>
<tr>
<td>Potential Risk Factor</td>
<td>Level in 6Cs Model</td>
<td>Children's BMI status (%)</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>--------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal</td>
</tr>
<tr>
<td><strong>Parent nutrition label knowledge</strong>&lt;sup&gt;30&lt;/sup&gt;</td>
<td>Clan</td>
<td>12.4</td>
</tr>
<tr>
<td></td>
<td>Inadequate</td>
<td>29.0</td>
</tr>
<tr>
<td></td>
<td>Adequate</td>
<td>58.5</td>
</tr>
<tr>
<td><strong>Participation in WIC</strong>&lt;sup&gt;41&lt;/sup&gt;</td>
<td>Community</td>
<td>62.7</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>37.3</td>
</tr>
<tr>
<td><strong>Age of attendance in childcare</strong>&lt;sup&gt;42,43&lt;/sup&gt;</td>
<td>Country</td>
<td>59.8</td>
</tr>
<tr>
<td></td>
<td>&lt; 9 months</td>
<td>40.2</td>
</tr>
<tr>
<td><strong>Childcare nutrition policies</strong>&lt;sup&gt;44,45&lt;/sup&gt;</td>
<td>Country</td>
<td>33.6</td>
</tr>
<tr>
<td></td>
<td>Non-CACFP</td>
<td>54.4</td>
</tr>
<tr>
<td></td>
<td>CACFP</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>Child Diet Intake</strong></td>
<td>Child</td>
<td>2.41</td>
</tr>
<tr>
<td><strong>Mean (SD)</strong></td>
<td></td>
<td>(1.02)</td>
</tr>
<tr>
<td>Milk/day&lt;sup&gt;49,50&lt;/sup&gt;</td>
<td></td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>(0.77)</td>
<td>0.99</td>
</tr>
<tr>
<td>Sugar Beverages/ day&lt;sup&gt;46,47&lt;/sup&gt;</td>
<td></td>
<td>1.30</td>
</tr>
<tr>
<td></td>
<td>(0.99)</td>
<td>(1.09)</td>
</tr>
<tr>
<td>100% Juice/day&lt;sup&gt;48&lt;/sup&gt;</td>
<td></td>
<td>1.66</td>
</tr>
<tr>
<td></td>
<td>(0.86)</td>
<td>(0.95)</td>
</tr>
<tr>
<td>Fresh Fruits/ day&lt;sup&gt;89&lt;/sup&gt;</td>
<td></td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>French fries/ day&lt;sup&gt;90&lt;/sup&gt;</td>
<td></td>
<td>1.38</td>
</tr>
<tr>
<td></td>
<td>(0.82)</td>
<td>(0.91)</td>
</tr>
<tr>
<td>Vegetables/ day&lt;sup&gt;89&lt;/sup&gt;</td>
<td></td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>(0.32)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>Fast foods/ day&lt;sup&gt;48&lt;/sup&gt;</td>
<td></td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>(0.61)</td>
<td>(0.57)</td>
</tr>
<tr>
<td>Candy sweets/ day&lt;sup&gt;90&lt;/sup&gt;</td>
<td></td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>(0.53)</td>
<td>(0.44)</td>
</tr>
<tr>
<td>Salty snacks / day&lt;sup&gt;90&lt;/sup&gt;</td>
<td></td>
<td>20.3</td>
</tr>
<tr>
<td><strong>Fat content of milk</strong></td>
<td>Child</td>
<td>65.1</td>
</tr>
<tr>
<td>1% or skim</td>
<td></td>
<td>14.5</td>
</tr>
<tr>
<td>2% or low fat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole milk and flavored cow milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sugar, corn syrup, honey added to baby’s formula prior to 1 year of age</strong>&lt;sup&gt;51&lt;/sup&gt;</td>
<td>Child</td>
<td>96.3</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>3.7</td>
</tr>
</tbody>
</table>
Table 3.1. (cont.)

<table>
<thead>
<tr>
<th>Potential Risk Factor</th>
<th>Level in 6Cs Model</th>
<th>Children's BMI status (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Normal</td>
</tr>
<tr>
<td>Perceived Dietary Quality(^{52})</td>
<td>Clan</td>
<td>4.62 (6.18)</td>
</tr>
<tr>
<td>Neighborhood Social Cohesion(^{53})</td>
<td>Community</td>
<td>3.46 (0.79)</td>
</tr>
<tr>
<td>Physical Activity Opportunities(^{54})</td>
<td>Clan</td>
<td>2.91 (0.73)</td>
</tr>
<tr>
<td>Parental Feeding Practices(^{55,56})</td>
<td>Clan</td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td></td>
<td>4.13 (0.91)</td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td>3.78 (0.62)</td>
</tr>
<tr>
<td>Child Control</td>
<td></td>
<td>2.43 (0.62)</td>
</tr>
<tr>
<td>Emotional regulation</td>
<td></td>
<td>1.46 (0.57)</td>
</tr>
<tr>
<td>Balance and variety</td>
<td></td>
<td>4.26 (0.65)</td>
</tr>
<tr>
<td>Food as Reward</td>
<td></td>
<td>2.18 (0.84)</td>
</tr>
<tr>
<td>Involvement</td>
<td></td>
<td>2.90 (0.94)</td>
</tr>
<tr>
<td>Modeling</td>
<td></td>
<td>3.63 (0.89)</td>
</tr>
<tr>
<td>Pressure</td>
<td></td>
<td>2.49 (0.77)</td>
</tr>
<tr>
<td>Restriction for health</td>
<td></td>
<td>2.83 (0.89)</td>
</tr>
<tr>
<td>Restriction for weight control</td>
<td>1.60 (0.48)</td>
<td>1.74 (0.51)</td>
</tr>
<tr>
<td>Teaching about nutrition</td>
<td>3.32 (1.09)</td>
<td>3.38 (1.07)</td>
</tr>
</tbody>
</table>

Superscripts represent references for potential risk factors of childhood overweight/obesity to be included in the model. Abbreviations: NH, Non-Hispanic; BMI, Body Mass Index; WIC, Women Infants Children; CACFP, Child and Adult Care Food Program.
Table 3.2. Relationship between risk factors and overweight/obesity in preschool children (2-5 y) using multiple logistic regression (n=329)

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>β</th>
<th>SE</th>
<th>Wald’s $\chi^2$</th>
<th>P-value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nighttime child sleep duration</td>
<td>0.7877</td>
<td>0.2692</td>
<td>8.5615</td>
<td>0.0034</td>
<td>2.198</td>
<td>1.297</td>
</tr>
<tr>
<td>Parent BMI</td>
<td>0.6399</td>
<td>0.2698</td>
<td>5.6262</td>
<td>0.0177</td>
<td>1.896</td>
<td>1.118</td>
</tr>
<tr>
<td>Restriction for weight control</td>
<td>0.5611</td>
<td>0.2567</td>
<td>4.7767</td>
<td>0.0288</td>
<td>1.753</td>
<td>1.060</td>
</tr>
</tbody>
</table>

Abbreviations: BMI, Body Mass Index; CI, Confidence Interval; SE, Standard Error
References


71. Taheri S. The link between short sleep duration and obesity: We should recommend more sleep to prevent obesity. *Arch Dis Child*. 2006;91(11):881.


85. Shunk JA, Birch LL. Girls at risk for overweight at age 5 are at risk for dietary restraint, disinhibited overeating, weight concerns, and greater weight gain from 5 to 9 years. *J Am Diet Assoc.* 2004;104(7):1120-1126.


87. Shunk JA, Birch LL. Girls at risk for overweight at age 5 are at risk for dietary restraint, disinhibited overeating, weight concerns, and greater weight gain from 5 to 9 years. *J Am Diet Assoc.* 2004;104(7):1120-1126.


Chapter 4.

Academy Of Nutrition and Dietetics Benchmarks for Nutrition in Child Care (2011): Are Child Care Providers Across Contexts Meeting Recommendations? ¹

Abstract

The Academy of Nutrition and Dietetics (Academy) recommends feeding practices for child care providers to establish nutrition habits in early childhood to prevent obesity. With over 12 million US children in child care, little is known about child care providers’ feeding practices. The purpose of this study was to examine child care providers’ feeding practices to assess whether providers met the Academy’s benchmarks and if attainment of benchmarks varied across child care contexts (Head Start [HS], Child and Adult Care Food Program [CACFP] and non-CACFP). Cross-sectional data was collected in 2011 and 2012 where 118 child care providers completed self-administered surveys regarding their feeding practices for 2-5-year-old children. Chi-square tests and Analysis of variance were used to determine variation across contexts. HS providers sat more frequently with children during meals ($P=0.01$), ate the same foods as children ($P=0.001$) and served meals family-style ($P<0.0001$) more often, compared to CACFP and non-CACFP providers. HS providers ($P=0.002$), parents ($P=0.001$) and children ($P=0.01$) received more nutrition education opportunities compared to CACFP and non-CACFP. HS providers encouraged more balance and variety of foods ($P<0.05$), offered healthier foods ($P<0.05$), modeled healthy eating ($P<0.001$), and taught children about nutrition ($P<0.001$) compared to CACFP and non-CACFP providers. Providers across all three contexts used significantly more non-internal than internal mealtime verbal comments ($P<0.0001$). HS providers had greater compliance with the Academy’s benchmarks compared to CACFP and non-CACFP providers. Possible reasons for this compliance may be attributed to HS nutrition performance standards and increased nutrition training opportunities for HS staff. HS programs can serve as a model in implementing the Academy’s benchmarks.

Introduction

The position statement released in 2011 by the Academy of Nutrition and Dietetics (Academy): Benchmarks for Nutrition in Child care\(^1\) provides guidance for child care providers in meeting benchmarks for healthful mealtime feeding practices for pre-school children (aged 2-5 years) to help them develop long-term positive eating behaviors and prevent obesity. Specifically, the Academy recommends that providers model and encourage healthful eating, support children’s hunger and satiety cues, serve meals family-style and not pressure children to eat\(^1\).

Child care providers play an important role in shaping the health of our nation’s children. More than 12 million preschool children attend child care, and typically consume half to three quarters of their daily energy while in full-time child care programs\(^2\)-\(^5\), making this an ideal setting for the promotion of healthful eating. Child care programs serve as homes away from home, where children develop early nutrition-related behaviors that continue to shape their food habits and nutrient intake patterns- potential risk factors in obesity- through adolescence and adulthood\(^6\)-\(^10\). Young children are more likely than older children to be influenced by adults in an eating environment\(^11\). Among the social factors within the child care environment, providers’ feeding practices were highly associated with children’s dietary intake\(^12\). Therefore child care providers offer potential opportunities for shaping children’s dietary intake and eating behaviors\(^13\), and should be a primary focus for childhood obesity prevention. However, existing obesity prevention strategies are mainly focused on late childhood and adolescence and have limited success because eating behaviors are already established by school age\(^10\).

Achieving the Academy’s benchmarks\(^1\) is a public health priority given that the prevalence of obesity among US preschool children is at an all-time high with 26.7% of preschool children overweight or obese\(^14\). Obese preschoolers are predominantly at risk because of the strong trajectory of overweight and its spectrum of comorbidities [e.g. type 2 diabetes\(^15\),\(^16\),cardiovascular disease\(^17\)-\(^20\)] in adolescence and adulthood\(^21\)-\(^23\). Epidemiological evidence suggests child care experiences during the preschool years have a significant impact on weight status in childhood\(^24\),\(^25\). Thus, achieving the Academy’s benchmarks can benefit many low-income, minority children attending child care and their families at greatest obesity risk\(^1\). Yet, to our knowledge research evaluating adherence to the Academy’s benchmarks (2011)
with a focus on provider feeding practices has not been published, indicating a prime opportunity for obesity prevention has been missed.

Variation in child care nutrition policies create different policy-based contexts (i.e., (Head Start [HS], Child and Adult Care Food Program [CACFP] and non-CACFP) that can play an important role in how the Academy’s benchmarks are addressed. The U.S. Department of Agriculture’s supplemental nutrition assistance program CACFP provides reimbursement for meals and snacks to 3.2 million low income preschool children daily, but lacks nutrient-based standards. Participating sites have to comply with meal pattern requirements to get reimbursed for the meals. HS programs not only follow the CACFP meal pattern requirements, but are also required to follow HS Performance Standards for child nutrition that require providers to use feeding practices that are similar to the Academy’s benchmarks. However, research evaluating adherence to HS standards is lacking. Further, given that licensing agencies in most states do not require specific feeding standards in child care, it is unlikely that centers not falling under HS mandates would adhere to a formal set of healthful feeding practices such as those outlined in the Academy’s benchmarks.

Despite the variation in nutrition policies across child care contexts, to our knowledge no published studies have evaluated how provider feeding practices vary across these policy-based contexts. Without such information it is difficult to plan training or implement obesity prevention efforts. Therefore, the objective of this study was to examine child care providers’ feeding practices to assess whether providers met the Academy’s benchmarks, and if attainment of benchmarks varied across contexts (HS, CACFP and non-CACFP). We hypothesized that federally-regulated HS programs would be more proficient in achieving the Academy’s benchmarks than programs enrolled in CACFP; and programs that are neither HS nor CACFP (non-CACFP).

Methods

This study was approved by the University of Illinois Urbana-Champaign Institutional Review Board for research involving human subjects. All subjects provided written informed consent before participating in the study.
Study Sample

Participants were providers recruited from center-based child care programs participating in the STRONG Kids (SK) program a larger longitudinal study at UIUC examining parental and home determinants of childhood obesity. Child care programs in three small urban communities were recruited from a sample with unequal probability of selection among licensed programs in a 3-county diverse geographic area in the Midwest that met the following inclusion criteria: 1) HS program operating within the grantee agency providing HS services in the target communities, or child care center licensed by the State regulatory agency; 2) Located within 65 miles of the study center in one of 4 small urban areas targeted to maximize racial/ethnic diversity; and 3) Enrolled a minimum of 24 children in the age range of 2-5 years. These criteria identified 38 eligible programs from all child care centers present in the 3-county area, of which 36 (6HS, 17CACFP, 13non-CACFP) agreed to participate in SK program. For this sub-project, 24 center directors (6HS, 11CACFP, 7 non-CACFP) agreed for their providers to participate.

Survey Administration and Data Collection

Provider recruitment began in August 2011 and data collection was completed in February 2012. Center directors distributed consent forms to providers who met the eligibility criteria- employed full-time at the child care program, were present with children at lunchtime or, at a minimum during snack time; and taught children ages 2 years and up. Providers who consented to participate could complete the survey online or in a paper format. Upon survey completion providers were mailed $10 gift card. A total of 123 child care providers completed and returned the surveys (80% response rate). Data for five of the 123 participants was excluded from analyses because they reported only caring for children < 2 years.

Measures. To assess provider compliance with the Academy’s benchmarks we used previously validated instruments:

Demographic Characteristics. Provider characteristics across contexts are presented in Table 4.1.

Nutrition and Physical Activity Self-Assessment in Child care (NAP-SACC). was developed to describe the nutrition, physical activity environment and practices of child care. Items from NAP-SACC included meals served family-style, nutrition education opportunities provided to providers, children and parents.
Child Feeding Questionnaire (CFQ) and Comprehensive Feeding Practices Questionnaire (CFPQ) are valid measures that assess parents’ attitudes and feeding practices with pre-school children. Therefore slight modifications to the wording of the questions were made to reflect practices of child care providers. e.g. “My child should always eat all of the food on her plate.” was modified to “Children at my table should always eat all of the food on their plate.” Brann 2010 used this same approach to examine family daycare providers’ feeding practices and reported internal consistencies >0.65. Mean scores were calculated for each subscale, with possible mean item scores ranging from 1 to 5 with higher scores indicating a greater tendency toward these practices (e.g. 5=always agree). Due to skewed responses on food as reward items on CFPQ with very little variation across responses, this subscale was dropped from subsequent analyses.

Mealtime Provider Verbal comments checklist. Providers completed a checklist of 20 provider comments to assess if providers’ mealtime verbal communication was supportive of children’s internal cues of hunger and satiety. Providers responded if they used the specific verbal comment during mealtimes using a Likert scale of 1= Never to 5 = Always. Participant responses were summarized by creating a dichotomous YES/NO variable by collapsing the Likert scale responses - Never to NO (i.e. provider does not use the specific verbal comment) and; responses – Rarely, Sometimes, Mostly, Always were collapsed to YES (i.e. provider uses the specific verbal comment). The sum of non-internal, internal and total verbal comments used by each provider was calculated. The percentage of their use of non-internal verbal comments was calculated using the formula: sum of all non-internal verbal comments used by the provider/sum of total comments used by the provider *100. The percentage of internal comments was calculated using the formula: sum of all internal comments/sum of total comments used by the provider *100.

The provider survey with the above measures was reviewed by six early childhood and nutrition experts and pilot tested with 5 providers. Reliability for final survey measures was acceptable, with Cronbach alphas ranging from 0.65 to 0.88 (Table 4.2).

Data Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences, Version 17 (SPSS, Inc., Chicago, IL). All data were imported directly from survey monkey (SurveyMonkey.com, LLC; Palo Alto, CA) into SPSS. Descriptive statistics and
Cronbach’s alpha was calculated to determine internal consistency of measures. For categorical variables we used the $\chi^2$ test of homogeneity in a contingency table to test the null hypothesis that a particular variable is distributed similarly across different levels of the child care contexts (HS, CACFP and non-CACFP). Further, we used the z-test to compare column proportions and adjusted p-values with bonferroni method. For continuous variables we used one way Analysis of Variance (ANOVA) to test the equality of means for HS, CACFP and non-CACFP and Tukey post hoc mean separation test to determine which means were different. Spearman rank correlations were used to examine the relationship between provider nutrition training, feeding attitudes and feeding practices. The alpha level for all analyses was set at $P \leq 0.05$.

**Results and Discussion**

**Provider Characteristics**

The final sample consisted of 118 providers enrolled from 24 center-based child care programs (6HS, 11CACFP, 7 non-CACFP). As shown in Table 4.1, no significant differences were found across HS, CACFP and non-CACFP provider characteristics.

**Academy’s Benchmarks for Child Feeding Practices and Nutrition Education**

Overall, most providers were promoting healthy feeding by not using controlling feeding practices (pressure, restriction) and serving healthy foods to children. However, we found significant differences between HS, CACFP and non-CACFP providers for 10 of the 12 Academy’s benchmarks (Table 4.3). In each case, HS providers reported practices more consistent with the Academy’s benchmarks than CACFP and non-CACFP providers. e.g. a higher proportion of HS staff used family-style meal service and modeled healthy eating. Further, HS providers, parents and children received significantly more nutrition training opportunities compared to their CACFP and non-CACFP counterparts (Table 4.3).

Providers across contexts, did not meet the Academy’s recommendation that they should work with children to understand their feelings of hunger and satiety. Providers can support children to recognize their feelings of hunger and satiety by using internal mealtime verbal comments (e.g. “Are you full?”) to cue children to their internal hunger and satiety signals. However, providers used significantly more non-internal mealtime verbal comments than internal comments ($P<0.0001$). The most frequent non-internal comments used by all providers
included “Mmm. Mmm. It’s good, eat some” (93% of providers), “Are you done?” (96% of providers), and “You want some more?” (97% of providers).

Verbally cueing children to attend to hunger and satiety can support their self-regulation of energy intake; however research demonstrates that adults’ mealtime verbal communication is predominantly detrimental to children’s attention to internal cues of hunger and fullness\(^{38-40}\). Adults override children’s internal cues by controlling food intake, rewarding and restricting food\(^{41-43}\). Birch and colleagues found that children who were cued to the amount of food on their plate showed less responsiveness to hunger and satiation as compared to children who were cued to their hunger and satiation while eating\(^{41}\). Limited child care evidence also suggests Dutch\(^{12}\) and HS\(^{37}\) providers used significantly more non-internal verbal cues than internal cues. Our findings are consistent with previous research and extend the results reported by Ramsay\(^{37}\) indicating that this pattern was consistent across all three child care contexts.

Developing training for providers that focuses on using internal verbal comments during mealtimes for cueing children to understand their hunger and satiety is a feasible and low-cost approach that can help children self-regulate their energy intake\(^{44}\).

Most CACFP (66%) and non-CACFP (93%) providers did not meet the Academy’s recommendation of serving foods and beverages family-style, where children select their own portions and serve themselves\(^1\)(Table 4.3). Serving meals family-style allows children the control over the type and amount of food on their plates, and helps them self-regulate their energy intake\(^1\) as they learn to put the right amount of food on their plate based on their internal hunger and satiety signals\(^{45,46}\). Family-style also increases the ability of teachers to model healthy eating compared to pre-plated service\(^{47}\). Similarly, sitting and eating meals together with children have been related to young children’s healthy eating practices in child care settings\(^{47,48}\). Therefore CACFP and non-CACFP providers need to reevaluate their approach to pre-plated food service by serving meals family-style at least during one mealtime\(^{47}\), using internal verbal cues\(^{37}\), and sitting and eating meals with children to model healthy eating\(^{48}\).

The Academy discourages use of controlling feeding practices because they negatively impact upon child eating\(^{49,50}\) and are a risk factor for childhood obesity\(^{51,52}\). However, we found a significant positive relationship between staff nutrition training and restricting foods for weight control (r=0.24,\(P<0.05\)) where providers control the child’s food intake with the purpose of decreasing or maintaining child’s weight. We also found a significant positive relationship...
between providers who were concerned about children’s weight and the use of controlling feeding practices e.g. restriction of particular foods \(r=0.38,P<0.001\), pressure to eat \(r=0.332,P<0.001\), restriction for health \(r=0.277,P<0.01\) and restriction for weight control \(r=0.23,P<0.05\). Therefore staff training should discourage use of controlling feeding practices.

This exploratory study is not without limitations. Data collection was limited by use of convenience sample of child care programs and providers. The data collected were self-reported and not observational, which may have led to response bias among child care providers. The CFQ and CFPQ measures adapted for use with child care providers were originally developed to assess parental feeding practices. Also, child care providers were asked to respond to the questionnaire based on the preschool-aged children in their care. It is possible that different feeding practices are used with children of different ages, gender and weight and such differences are not ascertained in this study. These results may not apply to child care centers and providers that have demographics other than the study sample. In spite of these limitations, this is the first study to evaluate if child care providers are meeting the Academy’s benchmarks across child care contexts.

**Conclusions**

Possible reasons for compliance to the Academy’s benchmarks (2011) by HS providers may be attributed to HS nutrition performance standards\(^{27}\) that require HS providers to use feeding practices that are similar to the Academy’s benchmarks. This underscores the potential importance of child care policies that provide guidance for improving provider-child interactions at meal-time to improve child eating behaviors. Awareness of differences in nutrition policies across child care contexts is critical when food and nutrition professionals accommodate providers’ training needs. HS programs can serve as a model in implementing the Academy’s benchmarks, and CACFP programs would be well served in adopting policies similar to HS nutrition standards. The advantage to adopting such policies when participating in the CACFP program goes beyond reimbursement for food; it can provide exposure to, and support of the Academy’s benchmarks to prevent childhood obesity. By strengthening policies and training that are more aligned with the Academy’s benchmarks\(^{1}\), child care providers can be in a unique position to prevent childhood obesity by instilling positive eating behaviors related to self-regulation of the preschool-aged children in their care. In order to reach this goal though, future research is warranted to identify staff challenges in meeting benchmarks; and examine provider
and program characteristics that might influence providers’ feeding practices. Future large-scale observational studies with validated measures are warranted not only to examine compliance to benchmarks across child care contexts but also the impact of such compliance (or lack thereof) on eating behaviors (e.g. food consumption, picky eating, eating in the absence of hunger) and weight status of children.
Tables

Table 4.1. Baseline Characteristics across Head Start, CACFP and non-CACFP Child care Providers (N=118)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Head Start (n=31)</th>
<th>CACFP (n=56)</th>
<th>Non-CACFP (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not White</td>
<td>22.6</td>
<td>16.4</td>
<td>25.8</td>
</tr>
<tr>
<td>NH White</td>
<td>77.4</td>
<td>83.6</td>
<td>74.2</td>
</tr>
<tr>
<td><strong>Marital Status (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>35.5</td>
<td>39.3</td>
<td>32.3</td>
</tr>
<tr>
<td>Single Parent Home</td>
<td>33.3</td>
<td>31.2</td>
<td>44.0</td>
</tr>
<tr>
<td>Two Parent Home</td>
<td>66.7</td>
<td>68.8</td>
<td>56</td>
</tr>
<tr>
<td><strong>Have children (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>19.4</td>
<td>41.8</td>
<td>41.9</td>
</tr>
<tr>
<td>Yes</td>
<td>80.6</td>
<td>58.2</td>
<td>58.1</td>
</tr>
<tr>
<td><strong>Education (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college/ technical school (3 years) or less</td>
<td>32.3</td>
<td>55.4</td>
<td>61.3</td>
</tr>
<tr>
<td>College graduate (4 years) or more</td>
<td>67.7</td>
<td>44.6</td>
<td>38.7</td>
</tr>
<tr>
<td><strong>Child care Provider Type (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assistant Teacher</td>
<td>3.2</td>
<td>19.6</td>
<td>19.4</td>
</tr>
<tr>
<td>Lead Teacher</td>
<td>96.8</td>
<td>80.4</td>
<td>80.6</td>
</tr>
<tr>
<td><strong>Provider Age Mean(SD)</strong></td>
<td>38.06 (10.76)</td>
<td>36.51 (10.91)</td>
<td>37.22 (13.25)</td>
</tr>
<tr>
<td><strong>Work hours/week Mean(SD)</strong></td>
<td>38.22 (5.96)</td>
<td>39.78 (2.85)</td>
<td>39.8 (9.9)</td>
</tr>
<tr>
<td><strong>Years of experience as childcare provider Mean(SD)</strong></td>
<td>11.44 (9.22)</td>
<td>11.6 (8.51)</td>
<td>9.48 (9.85)</td>
</tr>
<tr>
<td><strong>Lunch Time (minutes) Mean(SD)</strong></td>
<td>33.0 (6.7)</td>
<td>32.0 (8.3)</td>
<td>36.8 (10.4)</td>
</tr>
<tr>
<td><strong>Provider Feeding Attitudes</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived provider weight Mean(SD)</td>
<td>3.2 (0.6)</td>
<td>3.04 (0.48)</td>
<td>3.08 (0.51)</td>
</tr>
<tr>
<td>Child weight Concern Mean(SD)</td>
<td>1.97 (0.96)</td>
<td>2.14 (1.1)</td>
<td>1.85 (0.85)</td>
</tr>
<tr>
<td>Perceived responsibility Mean(SD)</td>
<td>2.29 (1.34)</td>
<td>2.16 (1.23)</td>
<td>2.6 (1.35)</td>
</tr>
</tbody>
</table>

Comparisons of study groups made with Pearson’s chi-square test and analysis of variance. There were no significant differences across study groups at α = 0.05. Percentages are values within study groups. <sup>a</sup>Potential responses to provider feeding attitudes range from 1 to 5, with higher means representing a greater tendency towards the feeding attitude. Abbreviations: CACFP, Child and Adult Care Food Program. NH, Non-Hispanic
Table 4.2. Descriptive and Internal Consistency Statistics for Child care Providers (N=118) on the Child Feeding Questionnaire (CFQ) and Comprehensive Feeding Practices Questionnaire (CFPQ)

<table>
<thead>
<tr>
<th>Measures</th>
<th>No of items</th>
<th>Mean</th>
<th>SD</th>
<th>Cronbach α</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CFQ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived provider weight</td>
<td>3</td>
<td>3.08</td>
<td>0.52</td>
<td>0.72</td>
</tr>
<tr>
<td>Child weight concern</td>
<td>3</td>
<td>2.01</td>
<td>1.00</td>
<td>0.74</td>
</tr>
<tr>
<td>Perceived responsibility</td>
<td>2</td>
<td>2.30</td>
<td>1.28</td>
<td>0.67</td>
</tr>
<tr>
<td>Restriction</td>
<td>8</td>
<td>1.71</td>
<td>0.62</td>
<td>0.71</td>
</tr>
<tr>
<td>Pressure to eat</td>
<td>4</td>
<td>1.99</td>
<td>0.90</td>
<td>0.73</td>
</tr>
<tr>
<td><strong>CFPQ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child control</td>
<td>2</td>
<td>3.50</td>
<td>1.37</td>
<td>0.68</td>
</tr>
<tr>
<td>Emotional regulation</td>
<td>3</td>
<td>1.20</td>
<td>0.44</td>
<td>0.65</td>
</tr>
<tr>
<td>Balance and variety</td>
<td>4</td>
<td>4.24</td>
<td>0.79</td>
<td>0.75</td>
</tr>
<tr>
<td>Healthy foods offered</td>
<td>2</td>
<td>4.30</td>
<td>0.75</td>
<td>0.68</td>
</tr>
<tr>
<td>Pressure</td>
<td>4</td>
<td>2.00</td>
<td>0.72</td>
<td>0.67</td>
</tr>
<tr>
<td>Modeling</td>
<td>4</td>
<td>4.15</td>
<td>0.86</td>
<td>0.88</td>
</tr>
<tr>
<td>Restriction for health</td>
<td>4</td>
<td>1.95</td>
<td>0.88</td>
<td>0.69</td>
</tr>
<tr>
<td>Restriction for weight control</td>
<td>8</td>
<td>1.43</td>
<td>0.48</td>
<td>0.65</td>
</tr>
<tr>
<td>Teaching about nutrition</td>
<td>2</td>
<td>3.80</td>
<td>0.92</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Potential responses to the questions of the CFQ and CFPQ range from 1 to 5, with higher means representing a greater tendency toward these feeding attitudes and practices.
### Table 4.3. Assessment of the Academy’s Nutrition Benchmarks across HS, CACFP and non-CACFP Child care Providers (N=118)

<table>
<thead>
<tr>
<th>The Academy’s Benchmarks for Nutrition in Childcare</th>
<th>Head Start (n=31)</th>
<th>CACFP (n=56)</th>
<th>Non-CACFP (n=31)</th>
<th>$\chi^2 / F$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feeding Practices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Providers Sit with Children during Meals (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>16.33*</td>
</tr>
<tr>
<td>Rarely</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.1&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>22.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Mostly</td>
<td>12.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>17.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>87.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>73.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>45.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>Providers Eat Meals Together with Children (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>27.42***</td>
</tr>
<tr>
<td>Rarely</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.3&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>22.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Mostly</td>
<td>3.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>14.5&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>25.8&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>96.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>67.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>41.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>Meals are served Family Style (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Style</td>
<td>96.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>33.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.7&lt;sup&gt;c&lt;/sup&gt;</td>
<td>62.7***</td>
</tr>
<tr>
<td>Delivered and Served in Prepared Portions</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>23.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>13.3&lt;sup&gt;ab&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Delivered in Bulk and Portioned by Staff</td>
<td>3.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>39.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>80&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Not Applicable (not present at lunchtime)</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>Providers help children recognize their internal hunger and satiety cues and respect children’s hunger and satiety cues once expressed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provider internal verbal comments (%)</td>
<td>26</td>
<td>26.3</td>
<td>22.7</td>
<td>1.93</td>
</tr>
<tr>
<td>Provider non-internal verbal comments (%)</td>
<td>74.6</td>
<td>73.2</td>
<td>77.4</td>
<td>2.62</td>
</tr>
</tbody>
</table>
### Table 4.3 (cont.)

<table>
<thead>
<tr>
<th>Feeding Practices</th>
<th>Head Start (n=31)</th>
<th>CACFP (n=56)</th>
<th>Non-CACFP (n=31)</th>
<th>χ² / F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Restriction for Health</strong> Mean(SD)</td>
<td>1.94 (0.88)</td>
<td>1.96 (0.95)</td>
<td>1.96 (0.81)</td>
<td>0.004</td>
</tr>
<tr>
<td><strong>Restriction for Weight Control</strong> Mean(SD)</td>
<td>1.45 (0.55)</td>
<td>1.42 (0.44)</td>
<td>1.43 (0.52)</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Pressure to eat</strong> Mean(SD)</td>
<td>1.74 (0.80)</td>
<td>1.98 (0.87)</td>
<td>2.25 (1.01)</td>
<td>2.51</td>
</tr>
<tr>
<td><strong>Providers model healthful eating</strong> Mean(SD)</td>
<td>4.71ᵃ (0.52)</td>
<td>4.13ᵇ (0.80)</td>
<td>3.67ᶜ (0.96)</td>
<td>13.62***</td>
</tr>
<tr>
<td><strong>Providers teach children about nutrition</strong> Mean(SD)</td>
<td>4.33ᵃ (0.69)</td>
<td>3.84ᵇ (0.90)</td>
<td>3.23ᶜ (0.87)</td>
<td>13.2***</td>
</tr>
<tr>
<td><strong>Healthy foods are offered to children at center</strong> Mean(SD)</td>
<td>4.6ᵃ (0.55)</td>
<td>4.22ᵃᵇ (0.79)</td>
<td>4.13ᵇ (0.78)</td>
<td>3.7*</td>
</tr>
<tr>
<td><strong>Providers encourage balance and variety of foods</strong> Mean(SD)</td>
<td>4.54ᵃ (0.65)</td>
<td>4.23ᵃᵇ (0.79)</td>
<td>3.96ᵇ (0.86)</td>
<td>4.18*</td>
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</tbody>
</table>
Table 4.3 (cont.)

<table>
<thead>
<tr>
<th>The Academy’s Benchmarks for Nutrition in Childcare</th>
<th>Head Start (n=31)</th>
<th>CACFP (n=56)</th>
<th>Non-CACFP (n=31)</th>
<th>χ² / F</th>
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</thead>
<tbody>
<tr>
<td>Nutrition Training and Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training Opportunities on Nutrition provided for Staff (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rarely or Never</td>
<td>9.7ᵃ</td>
<td>42.9ᵇ</td>
<td>41.9ᵇ</td>
<td>20.99**</td>
</tr>
<tr>
<td>Less than 1 time per year</td>
<td>9.7ᵃ</td>
<td>12.5ᵃ</td>
<td>12.9ᵃ</td>
<td></td>
</tr>
<tr>
<td>1 time per year</td>
<td>35.5ᵃ</td>
<td>35.7ᵃ</td>
<td>19.4ᵃ</td>
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</tr>
<tr>
<td>2 times per year or more</td>
<td>45.2ᵃ</td>
<td>8.9ᵇ</td>
<td>25.8ᵇ³</td>
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<tr>
<td>Nutrition Education for Children provided through Standardized Curriculum (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rarely or Never</td>
<td>19.4ᵃ</td>
<td>57.7ᵇ</td>
<td>61.3ᵇ</td>
<td>15.48*</td>
</tr>
<tr>
<td>1 time per month</td>
<td>38.7ᵃ</td>
<td>23.1ᵃ</td>
<td>22.6ᵃ</td>
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</tr>
<tr>
<td>2-3 times per month</td>
<td>22.6ᵃ</td>
<td>7.7ᵃ</td>
<td>6.5ᵃ</td>
<td></td>
</tr>
<tr>
<td>1 time per week or more</td>
<td>19.4ᵃ</td>
<td>11.5ᵃ</td>
<td>9.7ᵃ</td>
<td></td>
</tr>
<tr>
<td>Nutrition Education provided for Parents (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rarely or Never</td>
<td>25.8ᵃ</td>
<td>66.7ᵇ</td>
<td>80.6ᵇ</td>
<td>23.93***</td>
</tr>
<tr>
<td>1 time per month</td>
<td>58.1ᵃ</td>
<td>29.6ᵇ</td>
<td>9.7ᵇ</td>
<td></td>
</tr>
<tr>
<td>2-3 times per month</td>
<td>9.7ᵃ</td>
<td>1.9ᵃ</td>
<td>6.5ᵃ</td>
<td></td>
</tr>
<tr>
<td>1 time per week or more</td>
<td>6.5ᵃ</td>
<td>1.9ᵃ</td>
<td>3.2ᵃ</td>
<td></td>
</tr>
</tbody>
</table>

Percentages are values within study groups. Comparisons of study groups made with Pearson’s chi-square test (categorical variables) and analysis of variance (continuous variables). Superscripts denote statistical differences across childcare contexts at α= 0.5 as revealed by z-tests with Bonferroni adjustment and Tukey post-hoc analysis. Higher means [ranging from 1(never) to 5(always)] represent a greater tendency towards the provider feeding practice. * for P < 0.05, ** for P < 0.01, and *** for P<0.001. Abbreviations: CACFP, Child and Adult Care Food Program.
References


43. Fletcher J, Branen LJ, Lawrence A. Late adolescents' perceptions of their caregiver's feeding styles and practices and those they will use with their own children. *Adolescence*. 1997;32(126).


Chapter 5.
Predictors of Head Start and Child care Providers’
Healthful and Controlling Feeding Practices with 2-to 5-year old Children

Abstract

Few child care providers meet the national recommendations for healthful feeding practices. Effective strategies are needed to address this disparity, but research examining influences on child care providers’ feeding practices has been limited. The purpose of this study was to identify determinants of child care providers’ healthful and controlling feeding practices for 2-5y-old children. In this cross-sectional study, child care providers (n=118) from 24 center-based programs (6 Head Start [HS], 11 Child and Adult Care Food Program [CACFP] funded, 7 non-CACFP) completed self-administered surveys in 2011-2012. Multi-level multivariate linear regression models were used to predict seven feeding practices. Working in a HS center predicted teaching children about nutrition and modeling healthy eating; that may be attributed to the HS performance standards which require HS providers to practice healthful feeding. Providers who reported being concerned about children’s weight, responsible for feeding children and had an authoritarian feeding style were more likely to pressure children to eat, restrict intake, and control food intake to decrease or maintain children’s weight. Providers with non-White race, who were trying to lose weight, perceived nutrition as important in their own diet, and had greater number of nutrition training opportunities were more likely to use restrictive feeding practices. Findings suggest that individual and child care level factors, particularly provider race, education, training, feeding attitudes and styles and the child care context may influence providers’ feeding practices with young children. Considering these factors when developing interventions for providers to meet feeding practice recommendations, may add to the efficacy of childhood obesity prevention programs.
Introduction

The Academy of Nutrition and Dietetics (Academy)’s position statement: Benchmarks for Nutrition in Child care\(^1\) and the Head Start (HS) performance standards\(^2\) provide guidance for child care providers regarding feeding practices for preschool children (aged 2-5 years) to facilitate long-term healthy eating behaviors and prevent obesity. Feeding practices are defined as particular behavioral approaches adult caregivers employ to control what and how much children eat\(^3\). Providers are encouraged to use healthful feeding practices (e.g. allowing children to control the amount of food they eat, modeling healthy eating and teaching children about food and nutrition) to encourage self-regulation of intake\(^4\), acceptance of new foods and development of healthful eating behaviors\(^5\). Providers are also advised to avoid controlling feeding practices (e.g. pressuring children to eat or restricting access to food) because they can contribute to the development of unhealthy eating behaviors\(^6\)-\(^9\) and childhood obesity\(^10,11\).

Despite these recommendations from the Academy; HS and child care providers are not consistently meeting feeding practice guidelines\(^12\)-\(^14\). Therefore, a better understanding is needed of factors that lead providers to use healthful and controlling feeding practices. Research with parents has found that parent race\(^15\)-\(^17\), age\(^18\), education\(^16,18,19\), feeding attitudes (perceived responsibility for feeding children and concern about child weight)\(^20\), Body Mass Index (BMI)\(^19,21\) and feeding style (extension of parenting style) predict feeding practices with 2-5-year old children\(^22\). What is not known is whether these same factors are predictive of child care providers’ feeding practices. Additionally, factors specific to the child care environment may predict providers’ feeding practices including: variation in nutrition policies that create different policy-based contexts (e.g., (HS and Child and Adult Care Food Program [CACFP] policies)\(^12,23\), providers’ years of experience\(^24\) and nutrition training\(^23\). Understanding the characteristics that influence providers’ feeding practices is crucial in developing targeted interventions that can better enable child care providers to use healthful feeding practices while reducing controlling practices.

Helping child care providers meet recommendations regarding feeding practices\(^1\) is a public health priority. More than 12 million preschool children attend child care, and typically consume half to three quarters of their daily energy while in full-time child care programs\(^25,26\). Providers’ feeding practices have been found to be highly associated with children’s dietary
intake\textsuperscript{27}. Epidemiological evidence suggests that child care experiences during the preschool years impact childhood weight status\textsuperscript{28,29}. The high prevalence of obesity among US preschool children (26.7\% are overweight)\textsuperscript{30} and the strong trajectory of overweight and its spectrum of comorbidities [e.g. type 2 diabetes\textsuperscript{31,32}, cardiovascular disease\textsuperscript{33}, in adolescence and adulthood\textsuperscript{34}, make intervening with preschool children a worthwhile goal. Addressing feeding practices of HS and CACFP providers who work with children from low-income and minority backgrounds takes on added importance given the increased obesity risk for children growing up in these contexts\textsuperscript{1}. Although providers’ feeding practices offer potential opportunities for shaping children’s dietary intake and eating behaviors\textsuperscript{35}, no published studies have focused solely on identifying predictors of provider feeding practices. The present study addresses this knowledge gap by examining the relationship between several predictors of providers’ feeding practices. Drawing from previous research with parents, we hypothesized that the following provider characteristics: non-white race\textsuperscript{15-17}, less than college level of education\textsuperscript{16,18,19}, overweight/obese status\textsuperscript{19,21}, feeding attitudes\textsuperscript{20} and authoritarian feeding style\textsuperscript{22} would predict controlling feeding practices, while authoritative feeding style\textsuperscript{22} and working in HS program\textsuperscript{12,23} would predict healthful feeding practices. In this exploratory, cross-sectional study, ‘‘prediction’’ and ‘‘predictors’’ refer to statistical prediction and do not infer causal relationships.

Methods

This study was approved by the University of Illinois Urbana Champaign Institutional Review Board for research involving human subjects. All subjects provided written informed consent before participation.

Study Sample

Provider recruitment began in August 2011 and data collection was completed in February 2012. Child care programs in three small urban communities were recruited from a sample with unequal probability of selection among licensed programs in a three-county diverse geographic area in the Midwest. Center directors distributed consent forms to providers who met the eligibility criteria- employed full-time at child care, were present with children at lunchtime or, at a minimum during snack time; and taught children ages 2 years and up. All providers completed self-administered surveys and received $10 gift card. Details on sample recruitment, survey administration and data collection are described elsewhere\textsuperscript{12}. 
Procedures and Measures

Independent Variables: Predictors of providers’ feeding practices. Putative predictors of providers feeding practices were selected based on a literature review of characteristics associated with US parents’ and providers’ feeding practices with 2-5-year old children. Thirteen potential predictors used in the regression model and references from the literature review are shown in Table 5.1.

Demographic Characteristics such as provider age, race, education are presented in Table 5.1.

Provider BMI was calculated from self-reported height and weight as body mass (kg)/height\(^2\) (m\(^2\)). Research has suggested self-reports are valid measures for assessing height and weight given substantial agreement between self-reported and measured height and weight in adult US women. BMI classifications based on World Health Organization criteria, for providers (all female) were: underweight (<18.5 kg/m\(^2\)), normal weight (≥18.5 and <25 kg/m\(^2\)), overweight (≥25 and <30 kg/m\(^2\)) and obese (≥30 kg/m\(^2\)).

Providers’ Feeding Styles were measured by the Caregiver Feeding Styles Questionnaire (CFSQ) that has been used previously with child care providers and found to be highly correlated with observed feeding styles. Following scoring guidelines, responses on the CFSQ were used to categorize providers into one of four feeding styles (authoritarian, authoritative, permissive and uninvolved).

Providers’ Feeding Attitudes were operationalized as perceived responsibility for feeding children and concern about child weight, and were measured using items from the Child Feeding Questionnaire (CFQ) that were modified for use with child care providers.

Providers’ Perception of the Importance of Nutrition in Their Diet was measured by the USDA’s Diet and Health Knowledge Survey (DHKS 1994–1996). Participants responded to 11 items regarding their perception of the importance of certain food groups and nutrients (e.g., “How important is it to you personally to choose a diet high in fruits and vegetables?” on a 5 point- Likert scale (1=not at all important, 5=very important).

Nutrition Training Opportunities were measured using items from the Nutrition and Physical Activity Self-Assessment in Child care (NAP-SACC) instrument. “Training opportunities on nutrition (other than food safety and food program guidelines) are provided for staff: Rarely or never, Less than 1 time per year, 1 time per year, 2 times per year or more.”
Dependent Variable: Providers’ Feeding Practices

The CFQ and Comprehensive Feeding Practices Questionnaire (CFPQ)\textsuperscript{31,42}, originally developed to measure parental feeding attitudes and practices, were adapted, validated, and used to measure healthful and controlling feeding practices for this study\textsuperscript{13,43}. Mean scores were calculated for each subscale, with possible mean item scores ranging from 1 to 5 with higher scores indicating a greater tendency toward these practices (e.g. 5=always agree).

The complete survey with the above measures was reviewed by 6 early childhood and nutrition experts and pilot tested with 5 providers. Reliability for final survey measures was acceptable, with Cronbach’s alpha ranging from 0.65 to 0.88\textsuperscript{12}.

Data Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences, Version 17 (SPSS, Inc., Chicago, IL) and SAS, Version 9.3 (SAS Institute Inc., Cary, NC, USA). Significance levels were set at $p<0.05$ for all analyses. Descriptive statistics (means, SD, frequencies) and Cronbach’s alpha were calculated to determine internal consistency of measures. Missing values for predictors used in the final model ranged from 0 to 13%. Little’s missing completely at random\textsuperscript{44} (MCAR) test was used to determine the missing values were MCAR. Based on this MCAR pattern, multiple imputation with logistic regression was used to impute 13\% of the data. Imputed data were used for further analysis. Prior to running the regression models, data were screened for violations of the regression assumptions\textsuperscript{45}. Errors were normally distributed\textsuperscript{46} and variance inflation factors\textsuperscript{47,48} suggested that no serious multicollinearity problems existed among the independent variables. Due to the multilevel nature of the data where each provider was nested in a child care center, multilevel multivariate linear regression was conducted using PROC GENMOD in SAS. Seven independent models, each predicting a different feeding practice, were fit with the same predictors.

Results and Discussion

The final sample consisted of 118 providers (80\% response rate) from 24 center-based child care programs (6HS, 11CACFP, 7 non-CACFP). Potential predictors such as provider demographics, individual level (e.g. feeding style and attitudes) and center-level characteristics
(policy contexts, nutrition training opportunities) are shown in Table 5.1. Significant predictors of providers’ healthful (modeling healthy eating, teaching about nutrition, allowing children to control the amount of food they eat) and controlling (pressure to eat, restriction, restriction for health and restriction for weight control) feeding practices are shown in Table 5.2. Several of the potential predictors that we examined were associated with child care providers’ feeding practices. The childcare policy-based context was related with healthful feeding practices. As hypothesized, Head Start providers were more likely to teach children about nutrition than non-CACFP providers and more likely to model healthy eating than CACFP and non-CACFP providers (Table 5.2). This finding may be attributed to the HS performance standards which require providers to model healthful eating and teach children about nutrition. CACFP and non-CACFP programs lack similar requirements. Further, as required by Head Start standards, HS providers sit and eat the same foods as children during meals and serve meals family style more often than CACFP and non-CACFP providers12. These practices allow providers to model healthy eating and teach about nutrition23,49.

Although HS providers were more likely to use healthful feeding practices, no differences were found across HS, CACFP and non-CACFP providers’ use of controlling feeding practices. There are many possible reasons for this finding. First, in Head Start food insecure and obese children may be eating at the same table that may pose a challenge for HS providers to maintain a healthy eating environment. For example, research has suggested that HS staff often work with children from food insecure households, and often address their concern regarding food insecurity by buying extra food to feed hungry children, giving food to families to take home, and feeding children more on Mondays and Fridays50-52. Although HS providers receive significantly greater nutrition training opportunities than CACFP and non-CACFP providers12; their concern about food scarcity and overweight may override any training they have had about avoiding controlling feeding practices. This potential challenge is also demonstrated by our results that restricting foods for weight control was predicted by greater nutrition training opportunities (Table 5.3).

Providers’ concern about children’s weight and perceived responsibility for feeding the children were related to greater use of controlling feeding practices, consistent with research on parents21,53 and family day-care providers43 (Table 5.3). Parents of overweight children, who are
concerned about their child’s weight, are more likely to use restrictive feeding practices, with the intention of improving the child’s overall nutritional intake.\textsuperscript{21,53}

Providers’ feeding styles were predictive of both healthful and controlling feeding practices (Tables 5.2 and 5.3). Providers with an uninvolved feeding style were more likely to practice healthful feeding by allowing children to control what, when, and how much they ate. However, for parents, an authoritative feeding style is associated with healthful feeding. A possible explanation for this inconsistent finding is that providers allow children to have control within the structured child care environment. Unlike allowing a child to have control in the home environment, in a child care center there are restrictions on the foods a provider is able to offer to a child and the times of day these foods can be offered. Consistent with the literature on parental feeding practices,\textsuperscript{54} providers with authoritarian feeding styles were more likely to use controlling practices (i.e. pressuring children to eat and restricting access to food). As pressure and restriction have been linked with negative child outcomes, including dislike of foods they are pressured to eat,\textsuperscript{9,55} food fussiness,\textsuperscript{55,56} and inability to self-regulate food intake,\textsuperscript{6,57,58} our results highlight the need to educate providers regarding healthful feeding practices. A majority of the providers (73%) in this study were overweight/obese (Table 5.1). Interestingly, restrictive feeding was used by providers who were themselves trying to lose weight, were concerned about child’s weight and perceived nutrition to be important in their diet (Table 5.3). This suggests that these providers were allowing the practice of restricting their own energy intake to influence how they fed the children in their classrooms. Recent expert consensus on priorities for obesity prevention research in child care, highlighted the need to address staff’s own health challenges (low income without insurance, at risk for health disparities) before they undertake new health promotion efforts.\textsuperscript{59} Current evidence suggests that the most successful childhood obesity interventions involve parents (e.g. Planet Health\textsuperscript{60} and Hip-Hop to Health Jr.\textsuperscript{61}). Since providers act as surrogate parents and play a critical role during child care mealtimes, it is surprising that only a few interventions have focused on providers as targets for change, indicating a missed opportunity for obesity prevention. Taken together, there is a need to equip providers who are interested in nutrition, losing weight and are concerned about children’s weight with resources to help maintain a healthy weight and life-style for themselves, without transferring the practice of restricting food intake to children in their care. Focusing on providers to represent healthy environmental influences, may add to the efficacy of childhood obesity prevention programs.
This study is not without limitations. Our ability to generalize to the larger population of child care providers is limited by the use of a convenience sample. The cross-sectional nature of this study means that causality cannot be inferred. Future longitudinal work would help to elucidate the direction of feeding relationships seen in this study. The data collected were self-reported and not observational, which may have led to response bias. Further, the CFQ and CFPQ measures adapted for use with providers were originally developed to assess parental feeding practices. Also, providers were asked to respond to the questionnaire based on the preschool-aged children in their care. It is possible that different feeding practices are used with children of different ages, gender and weight, and such differences are not ascertained in this study. Thus, these results may not apply to child care centers and providers that have different demographics from the study sample. Despite these limitations, this study adds to the literature by being the first to examine predictors of child care providers’ feeding practices across child care policy contexts.

Conclusions

Our findings provide important insights into child care provider characteristics that are associated with healthful and controlling feeding practices. These findings have several implications for the development of programs to improve child care providers’ feeding practices; food and nutrition professionals can play a primary role in each of these.

- Since HS providers were more likely to use healthful feeding practices as required by HS standards; CACFP and non-CACFP programs would be well served by adopting the HS standards related to feeding practices. For CACFP centers this could be written into the requirements for participation in the CACFP program and monitored by each center’s sponsor. For non-CACFP centers, state licensing requirements could require the use of healthful feeding practices.
- Training about feeding practices could be required of (or suggested for) providers who have less than a college education to work in a licensed center. Providers’ concern about children’s weight, perceived importance of nutrition and interest in losing weight may be ways to engage providers in nutrition education that focuses on feeding practices.
- Greater use of controlling feeding practices was predicted by non-White race, underscoring the need to acknowledge cultural influences on feeding practices. Programs should tailor
efforts to their population of providers. Since greater controlling feeding practices were associated with non-White race it would be valuable to determine if ethnic background e.g. Hispanic or other possible variables such as acculturation would be accounting for this result.

- Consistent with previous research\textsuperscript{23}, restriction for weight control where providers controlled the child’s food intake with the purpose of decreasing or maintaining the child’s weight was predicted by greater nutrition training opportunities. Future work should evaluate the content and level of nutrition training required for child care providers to ensure use of healthful feeding practices.

This preliminary study takes a leading step to identify provider-level predictors of feeding practices in child care. Future work is warranted to determine child-level factors (adiposity, BMI, dietary intake, eating behavior, temperament & food preferences) and policies (state laws and centers’ individual polices) that predict provider feeding practices. Although, the Academy has released a position statement regarding healthful feeding practices, there are several unknowns about the relationships between predictors, feeding practices and child diet intake. Recent literature from parents has presented the complexity of the relationships between feeding practices and child dietary intake. For example, a permissive feeding style moderated the relationship between parental feeding practices and child consumption of energy dense foods\textsuperscript{62}. Future studies should evaluate the impact of feeding practices, moderating effects of identified predictors and also the bidirectional effects of caregiver-child interactions on child diet intake. In order to meet this goal though, a critical first step is to overcome the limitations of instruments that measure interrelating levels of feeding practices on child eating\textsuperscript{63}. Further, qualitative methods should be used to explore the staff motivations and challenges regarding feeding practices. Engaging and educating both parents and providers about the importance of feeding practices as recommended by The Academy and providing strategies to overcome barriers may add to the efficacy of programs focused on combatting early childhood obesity.
### Tables

**Table 5.1.** Potential Predictors (demographics, individual and center-level characteristics) of Child Care Providers Feeding Practices (n=118)

<table>
<thead>
<tr>
<th>Demographic Factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Not White</td>
<td>20.3</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>79.7</td>
</tr>
<tr>
<td><strong>Education (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Some college or technical school or less</td>
<td>50.8</td>
</tr>
<tr>
<td>College graduate or more</td>
<td>49.2</td>
</tr>
<tr>
<td><strong>Have Children (%)</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>35.6</td>
</tr>
<tr>
<td>Yes</td>
<td>64.4</td>
</tr>
<tr>
<td><strong>Provider BMI (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Normal Weight (≥18.5 and &lt;25 kg/m$^2$)</td>
<td>26.3</td>
</tr>
<tr>
<td>Overweight (≥25 and &lt;30 kg/m$^2$)</td>
<td>25.4</td>
</tr>
<tr>
<td>Obese (≥30 kg/m$^2$)</td>
<td>48.3</td>
</tr>
<tr>
<td><strong>Provider Age Mean (SD)</strong></td>
<td>37.1</td>
</tr>
<tr>
<td></td>
<td>(11.45)</td>
</tr>
</tbody>
</table>

| Individual Level Characteristics of Providers             |       |
| **Provider Trying to Lose Weight? (%)**                   |       |
| No                                                       | 33.9  |
| Yes                                                      | 66.1  |
| **Feeding Style (%)**                                     |       |
| Authoritative                                            | 19.5  |
| Authoritarian                                            | 30.5  |
| Permissive                                               | 28.8  |
| Uninvolved                                               | 21.2  |
| **Years of Experience Mean (SD)**                        | 10.95 |
|                                                          | (9.02) |
| **Provider Feeding Attitudes**¹ Mean (SD)                 |       |
| Child Weight Concern⁰                                     | 2.02  |
| Perceived Responsibility⁰                                | 2.30  |
| Perceived Nutritional Importance of Providers¹           | 3.46  |
| Diet ¹                                                    | 0.49  |

| Child care Level Characteristics of Providers             |       |
| **Child care Policy Context (%)**                         |       |
| Non-CACFP                                                 | 26.3  |
| CACFP                                                     | 47.5  |
| Head Start                                                | 26.3  |
| **Nutrition Training Opportunities for staff (%)**        |       |
| Less than 1 time per year                                 | 45.8  |
| More than 1 time per year                                 | 54.2  |

Superscripts represent references for potential predictors of provider feeding practices to be included in the model

¹Potential responses range from 1 to 5, with higher means representing a greater tendency toward the feeding attitude

Abbreviations: CACFP, Child and Adult Care Food Program. NH, Non-Hispanic
Table 5.2 Predictors of Provider’s Healthful feeding practices for 2-to 5-year old children

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Healthful Feeding Practices</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Modeling</td>
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<tr>
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<td>β</td>
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<tr>
<td>Race</td>
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</tr>
<tr>
<td>Not White</td>
<td>-0.02</td>
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<td>Non-Hispanic White (reference group)</td>
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</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Some College or Technical School or Less</td>
<td>-0.13</td>
</tr>
<tr>
<td>College Graduate or More (reference group)</td>
<td></td>
</tr>
<tr>
<td>Have Children</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>-0.11</td>
</tr>
<tr>
<td>Yes (reference group)</td>
<td></td>
</tr>
<tr>
<td>Provider BMI</td>
<td></td>
</tr>
<tr>
<td>Normal Weight</td>
<td>-0.11</td>
</tr>
<tr>
<td>Overweight</td>
<td>0.06</td>
</tr>
<tr>
<td>Obese (reference group)</td>
<td></td>
</tr>
<tr>
<td>Provider Age</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>-0.22</td>
</tr>
<tr>
<td>Yes (reference group)</td>
<td></td>
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<tr>
<td>Provider Trying to Lose Weight</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Yes (reference group)</td>
<td></td>
</tr>
<tr>
<td>Feeding Style</td>
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<tr>
<td>Authoritative</td>
<td>0.35</td>
</tr>
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<td>Authoritarian</td>
<td>0.25</td>
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<tr>
<td>Permissive</td>
<td>0.42</td>
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<tr>
<td>Uninvolved (reference group)</td>
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<tr>
<td>Years of Experience</td>
<td>0.00</td>
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<td>Providers’ Feeding Attitudes</td>
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<tr>
<td>Child Weight Concern</td>
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<td>Perceived Responsibility</td>
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<tr>
<td>Perceived Nutritional</td>
<td>0.19</td>
</tr>
<tr>
<td>Importance of Providers’ Diet</td>
<td></td>
</tr>
<tr>
<td>Child Care Policy Context</td>
<td></td>
</tr>
<tr>
<td>Non-CACFP</td>
<td>-0.84***</td>
</tr>
<tr>
<td>CACFP</td>
<td>-0.40</td>
</tr>
<tr>
<td>Head Start (reference group)</td>
<td></td>
</tr>
<tr>
<td>Nutrition Training Opportunities</td>
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</tr>
<tr>
<td>&lt; 1 Time/Year</td>
<td>-0.22</td>
</tr>
<tr>
<td>&gt; 1 Time/Year (reference group)</td>
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</tbody>
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* p < .05, ** p < .01, *** p < .001
Table 5.3 Predictors of Provider’s Controlling feeding practices for 2-to 5-year old children

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Pressure to Eat</th>
<th>Restriction for Health</th>
<th>Restriction for Weight Control</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>β</td>
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<tr>
<td>Race</td>
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<tr>
<td>Not White</td>
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<td>0.24</td>
<td>0.34***</td>
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<td>0.34***</td>
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<td>Education</td>
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<tr>
<td>Some College or Technical School or Less</td>
<td>0.28*</td>
<td>0.12</td>
<td>0.20</td>
</tr>
<tr>
<td>College Graduate or More (reference group)</td>
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<tr>
<td>Have Children</td>
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<tr>
<td>No</td>
<td>0.43*</td>
<td>0.19</td>
<td>0.34**</td>
</tr>
<tr>
<td>Yes (reference group)</td>
<td></td>
<td></td>
<td>0.40**</td>
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<tr>
<td>Provider BMI</td>
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<tr>
<td>Normal Weight</td>
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<td>0.18</td>
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<td>Overweight</td>
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<td>0.14</td>
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<td>Obese (reference group)</td>
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<tr>
<td>Provider Age</td>
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<td>0.01</td>
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<td>Provider Trying to Lose Weight</td>
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<tr>
<td>No</td>
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<td>-0.06</td>
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<td>Yes (reference group)</td>
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<td>Feeding Style</td>
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<td>0.26**</td>
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<td>Experience</td>
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<td>Provider’s Feeding Attitudes</td>
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<td>Child Weight Concern</td>
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<td>Perceived Responsibility</td>
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<td>0.09</td>
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<td>Nutritional Importance of Providers’ Diet</td>
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<td>Child Care Policy Context</td>
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<td>Non-CACFP</td>
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<td>0.24</td>
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<tr>
<td>CACFP</td>
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<td>0.24</td>
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<td>Nutrition Training Opportunities</td>
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<td>&lt; 1 Time/Year</td>
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<td>-0.20**</td>
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</tbody>
</table>

* p < .05, ** p < .01, *** p < .001
References


Chapter 6.

From Policy to Practice: Head Start and Child Care Providers’ Motivators, Barriers and Facilitators to Family Style Meal Service

Abstract

This paper presents a qualitative investigation of the motivators, barriers and facilitators for using family style meal service (FSMS) from the perspective of 18 child care providers serving preschool children in Head Start (HS), Child and Adult Care Food Program (CACFP) funded and non-CACFP centers. HS and CACFP providers reported being motivated to use FSMS because it created pleasant mealtimes, opportunities to role model healthy eating, and healthful child development. CACFP and non-CACFP providers reported not using FSMS because it was resource intensive, messy, unhygienic, and seemed to violate CACFP policy. HS and CACFP providers recommended strategies to overcome these barriers. They suggested that FSMS becomes easier with practice and teaching children self-help skills during play time can avoid messes during mealtimes. Findings from this study have implications for programming, policy and research.
Introduction

Childhood Obesity

Prevalence in preschool children. Obesity rates in the United States have dramatically increased during the past 20 years and are among the highest in the world\(^1\). Recent national data from the National Health and Nutrition Examination Survey indicate that 27% of 2-5 year old US children are overweight (≥85th to <95th percentile for age- and sex adjusted percentiles for body mass index) or obese (≥95th percentile age- and sex-adjusted percentiles for body mass index)\(^2\).

Childhood obesity consequences. The prevalence of childhood obesity among preschoolers is of particular concern because excess weight during early childhood increases the risk for obesity and its associated health complications in adolescence and adulthood\(^3\). Overweight in childhood is a precursor of long-term health complications such as type 2 diabetes\(^4\), hypertension and hyperlipidemia, cardiovascular disease\(^5\), and asthma and sleep apnea\(^6\). Childhood obesity has also been linked with low self-esteem\(^7\), psychological and social stress\(^8\), and poor academic performance\(^9\). Obesity in early childhood has been projected to contribute significantly to increased morbidity and mortality in adulthood\(^10\) and premature death\(^1\).

Importance of the preschool years. The preschool years are a formative period for many weight-related outcomes such as dietary intake, eating behaviors and physical activity. During this period children make a quick transition from suckling to consuming a modified adult diet\(^1\). They also learn about food and portions sizes, and develop food preferences more than during any other developmental period\(^1\). Eating behaviors acquired during the preschool years continue to shape children’s food habits and nutrient intake patterns (potential risk factors for obesity) through adolescence and adulthood\(^1\).

Early Care and Education Programs (ECE): An Avenue for Early Childhood Obesity Prevention

The large number of young children that are cared for in ECE programs means that these settings provide an unparalleled opportunity to reach the majority of U.S. preschool children. Fifty seven percent of children under the age of 6 (or 12 million children) are cared for in center-based
ECE programs. These children spend, on average, 30 hours per week in ECE and children in full-time care typically consume half to three quarters of their daily energy while in care.

Importance of early childhood educators for the development of healthy eating behaviors. ECE providers play a vital role in promoting children’s health and reducing their risk for obesity by shaping their dietary consumption patterns and eating behaviors. The number of meals that young children consume in child care along with the fact that young children are more likely than older children to be influenced by adult caregivers in their eating environment provides early childhood educators with a unique opportunity to instill healthy eating habits in young preschool children. Early childhood educators’ feeding practices (or behaviors and decisions about what, when, and how to feed young children) are highly associated with children’s dietary intake. Epidemiological evidence suggests that child care attendance during the preschool years has a significant impact on weight status in later childhood.

Despite increased interest in ECE-based obesity prevention efforts, recent reviews have highlighted both the incipiency and paucity of obesity prevention research in ECE programs. A 2011 review regarding obesity prevention practices in ECE programs suggested an opportunity for improving ECE providers’ feeding practices for promotion of children’s healthful eating, yet a limited number of interventions have been developed to address feeding practices. Further, most existing obesity prevention strategies are focused on late childhood and adolescence, and have had limited success given that eating behaviors are already established by school entry.

Feeding practice recommendations for early childhood educators. In 2011, three national organizations released major reports outlining recommendations for child care policies and practices designed to reduce the childhood obesity rates. First, in their Benchmarks for Nutrition in Child Care, the Academy of Nutrition and Dietetics (Academy) outlined a set of comprehensive standards that provide guidance for early childhood educators regarding feeding practices that facilitate long-term healthy eating behaviors and obesity prevention. Drawing on extensive research, this position statement calls for child care providers to use healthful feeding practices (e.g. allowing children to control the amount of food they eat, modeling healthy eating and serving meals family-style) that encourage children’s self-regulation of intake, acceptance of new foods and healthy eating. This position statement also recommends that providers avoid controlling feeding practices (e.g. pressuring children to eat or restricting access to food) that
have been linked to the development of unhealthy eating behaviors and childhood obesity. Second, in a complimentary position statement, the Institute of Medicine’s (IOM) *Early Childhood Obesity Prevention Policies: Goals, Recommendations, and Potential Actions* examined the evidence and provided guidance on obesity prevention policies for children up to 5 years of age. Among the IOM recommendations was a call for state child care regulatory agencies to require early childhood educators to practice healthful feeding including family style meal service with children in their care (Recommendation 4-4). Third, the American Academy of Pediatrics (AAP) recently released the third edition of *Caring for our children: National health and safety performance standards; Guidelines for early care and education programs*. This document focuses on best practices in nutrition, physical activity, and screen time for all types of ECE settings, and includes explicit recommendations for feeding practices within ECE programs. Taken together, these three science-based sets of recommendations underscore that ECE programs are important settings for early childhood obesity prevention efforts. They also provide a clear framework regarding healthful feeding practices (e.g. family style meal service) for early childhood educators for shaping the health of our nation’s children and significantly reducing the alarming obesity rates among young children.

*The importance of responsive feeding practices*

Recent research suggests that how young children are fed by their caregivers is important for the development of healthy eating behaviors and the prevention of obesity. There is some evidence that when children are given little control over what, when or how much they eat, they are less likely to eat in response to hunger and stop eating when they are full. Drawing on this evidence, parents and other adult caregivers are encouraged to practice responsive feeding with young children. Responsive feeding is based on the theoretical framework of responsive parenting that elucidates a reciprocal relationship between the adult caregiver and the child. Responsive feeding promotes children’s attention to and interest in feeding, support of their internal cues of hunger and satiety, capability to communicate needs to their caregiver with discrete and meaningful signs, and successful advancement to independent feeding.

**Family Style Meal Service (FSMS)**. A unique avenue for implementing responsive feeding within the ECE setting is to practice FSMS. When FSMS is used, children are allowed to serve themselves and selecting their own portions from communal dishes and pitchers placed
on the table. FSMS allows children to actively participate in selecting their food and determining their portion sizes in response to their internal cues of hunger and fullness.

FSMS is a widely endorsed feeding practice. The Head Start Program Performance Standards require the use of FSMS while the USDA Child and Adult Care Food Program (CACFP) recommends this approach. The Academy of Nutrition and Dietetics advocates FSMS to encourage improved self-regulation of intake in children, while the AAP and the APHA encourages the use of FSMS for socialization during meals as well as children’s fine motor development skills. Further, the Institute of Medicine recommends FSMS because it presents an exclusive opportunity to implement responsive feeding in the ECE setting.

**FSMS and child outcomes.** Several positive child outcomes have been identified when ECE programs practice FSMS, including social, emotional, and gross and fine motor skill development. Allowing children to serve themselves as part of FSMS helps them practice social and motor skills including taking turns, passing bowls around the table, saying “please” and “thank you”, and using serving spoons to move food from a bowl to their plate. Young children also improve their eye-hand coordination when they serve themselves as part of FSMS.

Self-serving, an important dimension of FSMS, has an intriguing relationship with childhood overweight. Preschool-aged children who served themselves wasted less food and ate around 25% less than children who were served pre-plated meals. Therefore when children serve themselves and select their portion sizes it enhances their understanding of their internal hunger and fullness cues; thereby supporting their self-regulation of energy intake.

Self-regulation is of growing interest in efforts to prevent childhood obesity. Self-regulation in eating refers to the capability (innate and socialized) to eat and not eat in response to internal cues of hunger and fullness. Evidence suggests that young children have the ability to self-regulate their caloric intake as early as infancy. Further, young children’s caloric intake may vary from meal to meal, but their intake over 24-hour periods is more stable, providing additional evidence for self-regulation. Although research demonstrates that young children are aware of their feelings of hunger and fullness, this ability begins to diminish by 5 years of age. Therefore, serving meals family style to preschool children in ECE programs may help leverage the opportunities identified by research to encourage better self-regulation of energy intake.
FSMS also has a positive impact on early childhood educators’ ability to role model healthy eating and provide nutrition education during mealtimes. Grant and colleagues (2008) demonstrated that early childhood educators, who used FSMS, were significantly more likely to try new foods with the children and talk with the children about food than educators who served pre-plated meals or cared for children who brought their own lunches.

**Family style meal service across policy-based contexts.** Although FSMS has benefits for child development and is widely recommended by national organizations, it is not used in all child care settings. Variation in nutrition policies across child care contexts is likely an important determinant of whether FSMS is used. ECE programs may fall into one of three nutrition policy contexts: Child and Adult Care Food Program (CACFP)-funded, Head Start (HS), or programs that only fall under the state’s licensing requirements (referred to throughout this paper as non-CACFP programs). CACFP is a federally funded program that provides reimbursement for meals and snacks to 3.2 million low income preschool children daily. CACFP guidelines allow providers to choose between family style and pre-plated meal service. HS programs are required to follow the HS Performance Standards for child nutrition which require HS providers to use FSMS. In general, non-CACFP centers are not required to use FSMS because most states’ licensing requirements do not require or promote a specific method of meal service. The impact of these policy contexts can be seen in empirical work that has shown that HS providers practice FSMS significantly more often than CACFP or non-CACFP providers.

Given these differences by policy context it is unfortunate that no study has examined the perceptions of FSMS of child care providers in different policy contexts. This information would be helpful for efforts designed to promote FSMS in ECE programs. The current study fills this gap in the literature by addressing the following research question: What are child care providers’ motivators, barriers and facilitators regarding family-style meal service across the three policy-based contexts (HS, CACFP-funded, and non-CACFP).
Methods

We took a qualitative approach to examining child care providers’ perspectives on family style meal service for several reasons. First, the use of semi-structured interviews best matches the objectives of this project: to describe, explain and understand a complex concept (family style meal service)\(^\text{41}\). Second, the literature does not provide a solid foundation for the development of a quantitative instrument to explore early childhood educators’ perceptions of FSMS and how those perceptions influence their feeding practices in ECE settings. Third, semi-structured interviewing was chosen for this study as this method has been recommended for enabling a more conversational approach, eliciting richer descriptions regarding the participant’s beliefs and attitudes, and encouraging the participant to become more like a partner in the research\(^\text{42}\). This approach also allows the interviewer to delve into unexpected responses\(^\text{43}\). This study was approved by the University of Illinois at Urbana Champaign Institutional Review Board for research involving human subjects.

Design and Population

Participants were recruited from a pool of 118 providers at 24 licensed center-based child care programs (6 HS, 11 CACFP, 7 non-CACFP) in Central Illinois that had participated in a larger study focused on the determinants of childhood obesity\(^\text{40}\). All providers were employed full-time at the child care program; were present with children at lunchtime or, at a minimum, during snack time; and taught children between ages 2 to 5 years. Participants for this study were selected using maximum variation purposive sampling to allow for diverse perspectives regarding FSMS\(^\text{44}\). Providers were sampled based on their child care context (HS, CACFP, or non-CACFP) to account for the variation in child care nutrition policies. Findings from the larger study suggest that HS providers served meals family style significantly more often than CACFP and non-CACFP providers\(^\text{40}\). As such, for the current study, providers were sampled so that there was an equal distribution of HS, CACFP and non-CACFP providers in order to account for the variation in the nutrition policies across contexts. Providers were also selected so that the sample included variation in providers’ race, marital status, number of their own children, education, feeding style and age to allow for diverse perspectives regarding FSMS.
Recruitment

Out of 118 providers who completed a survey as part of the larger study, 90 provided informed consent to participate in an interview, if contacted. Potential interview participants were randomly selected from the pool of 90 providers and directly contacted by phone or email. All providers who were contacted agreed to participate. To determine the number of interview participants, the concept of saturation was employed. Saturation involves conducting interviews until additional interviews reveal no new information on the topic being studied. Researchers agreed that saturation was achieved after 15 interviews. An additional three interviews confirmed that saturation had been reached. Providers received a $25 gift card for participating and all participants provided written informed consent before being interviewed.

Data Collection

We modified a semi-structured interview protocol from the About Feeding Children Study in order to inquire about the motivators, barriers and facilitators that child care providers experienced in using FSMS as well as seventeen other feeding practices recommended by the Academy. Motivators were defined as reasons to use family style meal service, barriers were defined as factors that inhibited providers’ ability to serve meals family style, and facilitators were defined as factors that promoted providers’ ability to serve meals family style. In asking about facilitators, we also asked for advice on how to overcome commonly cited barriers to using FSMS. The interview protocol was reviewed for content by a panel of ECE experts and pilot-tested with seven child care providers for face validity. All interviews were conducted by the lead author in unoccupied classrooms within the ECE setting, and lasted approximately one hour. The interviewer began by assuring providers that individual responses would not be shared with anyone outside the research team, and that data were not being collected to evaluate program practices. Providers’ perceptions regarding several recommended feeding practices (including FSMS) were gathered as part of a closed card sorting task. Providers were presented with 18 cards that described a feeding practice. Providers were then asked to indicate whether or not they used that feeding practice. If they used the feeding practice, they were asked to explain why they used it, the benefits of using it, and to respond to some common barriers to using it from other providers. If they did not use the practice, they were asked to explain why not. The
FSMS card read: “Children are served foods and beverages family style where children select their own portions and serve themselves.” The full interview protocol is provided in Table 6.1.

Data Analysis

All interviews were digitally recorded and transcribed verbatim by a professional transcription agency. The first author checked transcripts against the voice recordings to confirm accuracy. The data were then imported into NVivo, a qualitative data analysis software (QSR International Pty Ltd. Version 9, 2010). Data analysis involved moving through the six steps of thematic analysis outlined by Braun and Clarke. Becoming familiar with the data. Generating initial codes (categories) and applying them to interview transcripts. Creating potential themes by examining all quotes associated with each code and organizing codes into themes. Refining themes by examining all codes and quotes associated with a theme, collapsing several themes into one theme, and eliminating themes. Defining and naming themes by describing the essence of each theme and giving it a compelling name. Producing the report. Following this approach, we decided before we started coding that we were interested in motivators, barriers, and facilitators to using family style meal service and coded specifically for these rather than allowing research questions to evolve through the coding process.

Both the first and second authors analyzed the data. One author coded all interview transcripts, and developed a code book in NVivo using three components: code name/label, full definition, and example quotes that best illustrated each code. This code book was then given to the second author who applied the codes to the transcripts. Applying codes to raw data enabled the authors to examine how their data supported or contradicted the developed codes, resolve any discrepancies and revise the coding scheme. In addition, the constant comparison method was used by two authors in generating initial codes, and then developing themes from the codes. The third author reviewed the coding scheme and themes as they were developed, and differences in themes generated were reconciled prior to summarization. Further, the authors worked together to choose representative quotes to be used in this paper.
Results

Description of the Sample

The study sample included equal numbers of providers from HS programs, CACFP-funded centers, and non-CACFP centers. The demographic characteristics of the sample are presented in Table 6.2. The providers in the study sample represented a range of marital statuses, 50% were married, 39% single, and 11% divorced or widowed. About half the sample had some college or a technical degree and the other half had a college degree or more education. All six of the HS providers in the sample served meals family style, as compared to four CACFP providers and no non-CACFP providers. This distribution is representative of the sample for the larger study (n=118) where 96% of the HS providers, 34% of the CACFP and 7% of the non-CACFP providers used FSMS40.

Motivations for Using FSMS

The ten providers who reported serving meals family style (six from Head Start programs and four from CACFP-funded centers) articulated many reasons for serving meals family-style. They explained that FSMS resulted in pleasant mealtimes because FSMS was easier to conduct, reduced child distress, and encouraged communication at meals. These providers also suggested that FSMS provided opportunities for healthful child development because they perceived FSMS to allow children to self-regulate their food intake by eating in response to their hunger and fullness, as well as learn social, self-help, vocabulary, and math skills. Providers also reported that serving meals family style offered opportunities for modeling healthy eating. In addition, all of the providers who used FSMS strongly endorsed it. Some teachers did talk about FSMS being integrated in the curriculum so they were expected to do it. However, none of them suggested that such an approach did not have a benefit, expressed a preference for an alternative style of meal service or explain that they served meals family style only because they were expected to do so.

Pleasant Mealtimes

Ease of service. Four of the providers who used FSMS explained that serving meals family style was easier than serving meals in other ways. These providers explained that because
all of the food was on the table and the children were serving themselves, they did not have to move around the room as much. As one Head Start teacher explained:

If you sit and do family style, you won’t feel like you have to get up as much because you pass it to the children, and then if they need help, you can do hand over hand or you’re just sitting with them having a conversation. So it’s not as hard to be up running around doing things.

**Reduced child distress.** In addition to being easier, many providers indicated that FSMS also reduced child anxiety related to the meal. As suggested by a CACFP provider, FSMS is calmer because the children serve themselves with a choice of selecting their own portions, and thereby do not object to having foods they did not want to eat on their plates. She explained:

They (children) can say yes and no instead of it (food) being on their plate and causing distress if something is on their plate that they don’t like. Right now, we don’t have too much of that, but I’ve seen it before where the kids get really distressed if it’s something that they know they don’t like, or they think they know they don’t like, and it’s on the plate.

**Encourages communication.** The providers also reported that a benefit of FSMS was that it promoted communication between the providers and children. By not having to put food on each child’s plate or retrieve second helpings from the kitchen, providers indicated they had more time to sit and talk with the children. One Head Start teacher said that meal time was one of the few times that she was able to talk and connect with the children she cared for. She explained her reason for preferring FSMS as:

to get that connection with them, to get them to sit-down, this is how we all eat together. We talk about our day and stuff like that. Because in this type of place, this is sometimes the only time that they get to talk about things like that over a meal.

In addition to facilitating communication between providers and children, some providers also felt that using FSMS gave the children more opportunities to talk among themselves. “Well, there was a lot of communication between the teacher and the kids. And that family-style setting worked out really well with everybody. And it was a lot calmer during eating times.”
Promotes Child Development

Beyond making for more pleasant mealtime experiences for both children and staff, many of the providers who served meals family style felt FSMS had benefits for child development, especially as it relates to self-regulation, social and self-help skills.

Allows for self-regulation. Some providers explained that they used FSMS because it allowed the children to self-regulate their food intake. When asked why she thought it was important to allow children to select their own portions, a Head Start teacher explained, “because they may be hungry, and if they get hungry, they’re going to get a little more. And if they’re not hungry, they’re not going to get that much.” These providers also explained that allowing children to self-regulate their food intake decreased the amount of food that was wasted because the children ate most of what they put on their plates.

Children learn about social and self-help skills. Many providers in our sample who served meals family style also suggested such an approach where children serve themselves provides opportunities for children to learn about social skills such as patience, turn taking, sharing and passing food, table manners and self-help skills. Several of these providers felt it was important for the children to learn basic table manners at the child care center. When asked why it was important to use FSMS, a provider from a CACFP center explained, “it’s the manners thing. I mean you don’t go to a restaurant and eat on the floor or eat wherever you want to. You eat at a table, and they need to be accustomed to that.” Other providers explained that because FSMS requires that a child takes food from a communal serving dish, children learn social skills such as waiting one’s turn and sharing. The providers also thought that FSMS allowed them to teach children how to use utensils, an important self-help skill. A Head Start teacher explained, “the kids learn how to scoop, and use the tongs to get their food and put it on their plate.” In addition, modeling was identified as an important benefit of FSMS. Finally, some providers indicated that FSMS was helpful because children learned about proportions and counting (one scoop, two spoons etc.).

Facilitates modeling of healthy eating. Some providers who used FSMS suggested this approach allowed opportunities for them to model healthy eating because they were sitting with the children and sharing food. A Head Start teacher explained, “They're sitting down and we're talking about food and what they're eating. And sometimes it's like encouraging them to eat it.
If they see you eating it, they'll try it.” Similarly, other providers explained that when food was served family style, the children served as role models for one another in that a child might try a food that she saw another child happily eating.

Integrated in curriculum. Finally, one provider, from a CACFP center, explained that one reason she used FSMS because it was a part of the curriculum. She explained that FSMS was,

Something that we’re told to do from the beginning, and it’s just something, a practice that we follow every day, and breakfast, snack, lunch, everything. It’s just integrated into our curriculum. It’s kind of expected for us to do it.

Barriers to FSMS and Strategies to Overcome these Barriers

Data from the eight providers who were not using FSMS, revealed six barriers to using FSMS. Although these providers were adamant in their reasoning for why FSMS was difficult to implement, data from their counterparts that were practicing FSMS revealed suggestions for overcoming each of these barriers. Below we present each barrier and suggestions for overcoming it offered by providers who were using FSMS.

Difficult to change. Some providers explained that it would be hard to use FSMS because they had not done it before, and it would be difficult to change from what they were comfortable doing. A provider from a non-CACFP center explained, “it (FSMS) would be a big change here, and since they (the center) haven’t incorporated that, I think some of the children would make it – it would be a bigger deal making the changeover.” The providers who were using FSMS offered several suggestions for providers who thought making a change would be difficult. These providers suggested that FSMS would become easier over time. A CACFP provider said, “if you keep doing it over and over, they (the children) will get it. They will eventually get it.” Additionally, two providers at CACFP centers suggested that starting with a snack or meal that was easy for children to serve themselves (such as finger foods, meals that are not too hot) might be a good way to ease into FSMS.

Messy and unhygienic. Many providers that did not use FSMS explained that they did not allow children to serve themselves because it would be too messy and unhygienic. A provider from a non-CACFP center explained that allowing children to serve themselves from a
communal serving dish would result in “a mess. It would be food everywhere. It would be food everywhere. They can barely hold their cups to keep from dropping their milk.” A provider from a non-CACFP center explained that she was reluctant to use FSMS instead of having the providers plate food, because allowing children to serve themselves would be unhygienic. She explained:

he’s laying there picking his nose. Do you really want his hand in the container before he hands it to his next buddy? Here’s the chips and all my germs. So if (for) nothing else, for hygiene’s sake. We wear gloves, we use the service utensils and things like that. I think for hygiene it’s probably a better idea to do it the way we’re doing it.

These providers were concerned that allowing young children to take food from a communal dish would result in messy spills and the transfer of germs.

In talking about their own approaches to mealtime, the providers who were using FSMS offered several useful suggestions for providers who are concerned about mess and hygiene. The most commonly mentioned solutions were for providers to consistently use FSMS because children will eventually learn to serve themselves, to teach the children how to serve themselves and to accept that messes are a part of learning and children can be taught to clean the messes. A provider from a CACFP center suggested:

if you keep doing it over and over, they will get it….Have them help clean up the mess and they’ll eventually get it. It takes a while, but they do. It’s real easy in our room. I have five to a table, so they actually serve and pass and serve and it’s really easy

A provider from a CACFP center suggested:

the mess thing is something I think they (teachers) just need to get over because I’m particular about messes, too, but it’s something I just had to let go of. They’re kids, and they’re not trying to make a mess or cause a mess. But they need that experience and that hands on. So that’s kind of something that the teachers themselves need to just get in the mindset of it’s a mess (that) can be cleaned up. It’s not a big deal! The sticking the fingers and the hands, it’s happened before. And you just – that’s a teaching moment. “No, we don’t grab. We use the spoon or the scoop”. And I think just through practice is a best way to get over it.
Providers who were serving meals family style also offered many useful and practical strategies to teach children to serve themselves by using fake foods, sand, clay and water to practice scooping food in a bowl and pouring water. Sand box games include ladling, pouring, smearing, scooping that mirror skills required for self-serving during meals. Therefore playing these games can help children with their motor development and also self-help skills during mealtimes to avoid messes. Further, these providers suggested useful strategies for helping children learn to serve themselves such as reminding children when they are serving themselves to “Hold the bowl with both hands”; “Keep the pitcher in the air and hold the glass while serving”, “Sit up to the table”, “Don’t feed the floor”; showing children how to scoop and pour foods; and holding a child’s hand when s/he is learning how to scoop foods.

Providers who were using FSMS also suggested that messes should be expected and accepted as a part of the learning process and providers could teach children to wash their hands before each meal and clean up after themselves (e.g. making paper towels available to children). In helping teachers change their mindset about messes a CACFP teacher gave an analogy and explained “I mean if paint gets on the floor; you’re not going to paint anymore? No. You’re going to still paint but try to help teach them to help you clean the paint. It’s the same principle”

**Resource intensive.** Some providers who were not using FSMS thought this approach would be resource intensive. In particular, they mentioned that it would require more time and labor from the providers and kitchen staff, and they would become overwhelmed by having to help the children serve themselves.

“I mean you look at cost-wise for buying extra bowls and the big spoons and all of that extra, and I know – and we’ve only got one cook who does the dishes and the cooking and ordering, and the mopping and sweeping of all the kitchen. It would be a lot of extra on her part as well.”

A different perspective on this issue emerged from the interviews of providers that were using FSMS. These providers suggested that FSMS is easier because they did not have to get up during the meal, and that such an approach also saves time because children serve themselves. A CACFP provider explained:
I think that the family-style dining works the best. Have all the food available in the middle, and so you don’t have to leave the table necessarily. You just kind of reach over and help the kids if they need it, or they can help themselves.

Other providers suggested that engaging the children during mealtimes by having them set the table using a placemat protocol and cleaning up made FSMS easy.

**Children cannot self-regulate.** Self-regulation in eating is the ability that helps children to eat according to hunger and fullness signals. Providers not using FSMS explained that children cannot select their own portions because they will make problematic selections such as over-serving themselves, leaving inadequate food for other children, or only eating foods they like. Additionally, some of these providers were concerned that some children will not serve themselves enough, and will be hungry later. The section below describes these responses and underscores how some providers do not trust children’s self-regulation skills; underlining an important opportunity for nutrition education.

**Children make problematic selections.** A concern mentioned by some providers who did not use FSMS was that if they allowed the children to serve themselves, they would make problematic selections. Most of these providers were concerned that some children would take too much food, which would not leave enough for other children as well as potentially lead to overeating. A provider from a non-CACFP center explained:

> they can’t select their own portions – I mean their own portion size – I mean because everybody’s got to get some. And if everybody wants a lot of chicken, somebody won’t get some. Or if everybody wants a lot of mashed potatoes, somebody won’t get some.

A provider from a CACFP center was also concerned that children might only take the foods that they enjoy eating or take too little food and be hungry after the meal. When providers who served meals family style were prompted for advice to overcome this barrier, their responses elucidated that they believed that children can self-regulate their intake and should be allowed to eat according to their hunger and fullness.

A Head Start provider explained:

> I don’t want to say, ‘Well, you need to eat another bite.” “You need to put more scoops on your plate.” Because I want them to decide if they think they’re hungry or not.
Another Head Start provider stated:

They will know when they’re hungry and when they’re not hungry. We don’t want to force them to choose their foods. We have it prepared and enough portions for all the children at the table. But they get to decide whether they’re going to put a scoop or two scoops on their plate.

Providers who served meals family style also admitted that children might serve themselves too much food. However, they suggested that providers set a rule about how much each child is allowed to take for their first serving and remind the children that they have to share the food with other children. A Head Start provider explained her approach:

We always tell them to take two spoonfuls… And so we show them, one, two. The spoons aren’t so big where they can get a whole lot. But you do have those kids that just keep, keep, keep and you’ve got to keep reminding them, “How many do we get?” and they’ll say, “Two.” And then also I’ll tell them, “Save some for your friends. And then after everybody has some, if you’re done, you can get more. But you’ve got to save some for your friends.” And they’re usually like, “Okay.”

Although the suggestion to provide a rule about how much each child can take may prevent children from taking too much food, it also undermines an important dimension of FSMS—that children should select their own portion sizes in response to internal hunger and satiety cues.

**Children are too young.** Some providers who did not use FSMS said the children they cared for were too young and did not have the motor skills required to be able to serve themselves. A provider from a non-CACFP center explained:

They’re two. If we allow them to serve their own portions, it will be a real mess. It’s just easier, a lot easier for us to line up the plates to put the entrée and the vegetable on each one. … I could see that as a good idea certainly in the school age, kindergarten age kids where they should learn how to serve themselves. But this age, no, I think it’s a little young yet.
The providers who were using FSMS suggested that children could serve themselves if they were given a chance to practice the motions that are necessary for taking food from a serving dish and putting it on a plate. A CACFP provider explained her approach:

When you’re not at lunch and dinner we use sand, we use moon clay, we use water, we use actual one fourth, one third, one half serving cups…And we use those and we practice the dipping, the serving... Now there are times for mashed potatoes they do need help. They do. But that’s just the consistency of the potatoes and that kind of thing. But I think when they try this skill out – and you need to be very practical about (this) – this is how you do it.

In this way the providers suggested using meal times as well as other times and activities to practice the motions needed for self-service.

**Perceived conflict between FSMS and CACFP guidelines.** Finally, one provider from a CACFP center who did not use FSMS expressed a concern over a perceived conflict between FSMS and CACFP guidelines. This provider explained that she thought allowing children to serve themselves was in conflict with the CACFP guidelines regarding meal pattern requirements in child care. She explained:

It’s easy to do family-style at breakfast and snack, which we try to do as much as we can. At lunchtime, it’s basically impossible because you have to serve them a certain amount. And everything has to be served at the same time. So it’s not like you can say, “Well, pour a half a glass…of milk, and if you want more, you can just choose another half a glass later.” They have to have their entire portion in front of them. Even though it goes back to accreditation saying, “Just let them serve themselves, and put two green beans on their plate, if they would like to just try two green beans. They have control over what they put on their plate.” The other side of it is … the Food Program (CACFP) is saying, “You must serve these children this amount. It all must be on the plate. It all must be in the cup. It all must be served together at the same time.” So it’s that discrepancy again of what one of our programs, so to speak, is saying is an okay thing, and then it goes against what the other program is saying.
The CACFP guidelines only require that sufficient portion sizes be made available to children, but do not require providers to put a certain amount of food on each child’s plate.

**Discussion**

Although FSMS is widely endorsed for developmental and nutritional reasons, many child care providers do not follow this recommendation\(^{38,40}\). It is only within HS programs that FSMS is required. A possible positive benefit that has resulted from HS’ emphasis on FSMS has been a reduction in the obesity rates of children attending such programs\(^5\). The present study examined motivators, barriers and facilitators to FSMS among providers across a continuum of child care policy-based contexts (HS, CACFP-funded and non-CACFP). These findings contribute new insights regarding providers’ perceptions concerning FSMS across contexts and can have several implications for policy makers, program planners, practitioners (center directors, providers and food service coordinators) for implementing FSMS in child care.

Findings from the semi-structured interviews indicate that providers who served meals family style associated it with positive benefits for children such as self-regulation in eating, and learning social and self-help skills. These perceived motivators for using FSMS are consistent with the literature on this approach\(^{32,33}\). This evidence suggests that providers can be convinced to use FSMS by promoting the benefits of allowing children to self-select their portion sizes for the development of self-regulation of energy intake. It is encouraging that self-regulation resonated with the providers in the current study as a motivator to serve meals family style.

Further, providers in this study valued FSMS because it resulted in pleasant mealtimes, encouraged communication and offered greater opportunities for providers to model healthy eating. These providers’ reasons for using FSMS are consistent with the rationale described in the *Caring for our Children* report for recommending FSMS. Furthermore, research has shown that child care providers are more likely to model tasting of new foods when children are allowed to serve themselves during FSMS\(^{38}\). In addition, no HS or CACFP provider who served meals family style mentioned that they practice FSMS only because they are *required* to follow it.

Taken together, the rationale and research-based outcomes for implementing FSMS are reflected in providers’ motivators for FSMS in this study; that further underscores the importance of FSMS not only as a research-based healthful feeding recommendation, but also an effective feeding practice in the field.
CACFP and non-CACFP providers, who did not serve meals family style, described many barriers such as time constraints, food wastage, and mess alluding to the impracticality of letting children serve themselves. However, Branen and colleagues\textsuperscript{55} found that FSMS did not significantly increase food wastage or the amount of time required for eating as compared to the pre-portioned food service in preschoolers. Another barrier was faulty portion size selection; specifically that children might over serve themselves when allowed to self-serve. Although, research has shown that children can self-regulate, and eat less when they serve themselves\textsuperscript{32,33}, limited evidence does suggest that allowing preschoolers to self-serve without guidance resulted in larger portion sizes and intake relative to plated portions\textsuperscript{56}. Therefore, early childhood educators should provide guidance to help children learn to self-select age-appropriate portion sizes by providing physical assistance to scoop foods as well as verbal instruction to cue children to their internal signals of hunger and satiety (e.g. “Take one scoop now and you may have another if you are still hungry later”, “Are you full?” “Does it make your tummy happy?”)\textsuperscript{56,57}. Verbally cueing children to attend to hunger and satiety can support their self-regulation of energy intake\textsuperscript{57}.

Limitations

The study findings must be interpreted within the framework of methodological limitations resulting from a small, non-representative sample of providers. As is the case with all non-probability samples, the participants in this qualitative interview study may not represent the larger population of all center-based providers which impedes our ability to make generalizations beyond the study itself. However, we used maximum variation sampling to ensure that providers represented a variety of backgrounds and experiences, specifically in relation to the kind of ECE programs where they cared for children. We also provided a detailed description of the providers who made up our sample and the ECE settings where they work so that other researchers, practitioners, and policymakers may make their own judgments about whether the findings from our study can be translated to the settings they are interested in.
Strengths

This study provides insight into ECE providers’ perspectives on FSMS. In order to encourage ECE providers to use FSMS, it is important to explore why some providers use this style of meal service and how they understand its benefits. Equally important is to understand why other providers are reluctant to use FSMS and how to help them overcome these barriers. In this area, our study has a unique strength in that we asked providers who are using FSMS for practical and easily implemented recommendations for overcoming commonly cited barriers. Given that these recommendations are coming from their peers, not researchers who may be seen as removed from the day-to-day work of ECE, they may be an important tool for persuading providers to use FSMS.

Implications for Practice and Programming

Few childhood obesity interventions in ECE settings focus on improving providers’ feeding practices. Centering intervention efforts on serving meals family style where providers sit and eat meals together with children, model healthful eating and children select their own portions and serve themselves is 1) inclusive of healthful feeding strategies such as division of responsibility, responsive feeding and supporting children’s self-regulation of energy intake and 2) limits use of controlling feeding practices (such as pressuring children to eat and restricting access to food) that negatively impact upon child eating and are an established risk factor for childhood obesity. Given that extensive provider training is cost and resource intensive, implementing FSMS is a low-cost option to implement healthful feeding in child care programs. Further, nutrition education efforts should focus on non-CACFP providers to help them implement FSMS. Participation in CACFP programs with policies requiring providers to practice FSMS should be encouraged. CACFP policies could go beyond reimbursement for food to also provide support for responsive feeding.

Provider support and instruction are crucial to the development of children’s self-serving skills. Providers should be present with children during mealtimes to provide instruction about age-appropriate portion sizes, use verbal cues to help children pay attention and eat according to their internal hunger and fullness cues, and physically assist children to serve themselves, monitor and ensure sanitation. Like any developmental activity, providers should be patient initially, as our data suggests that FSMS becomes easier with practice.
Findings from the current study also highlight how child care providers who are not using FSMS might benefit from reevaluating their perceptions regarding the barriers to FSMS, and by learning from the experiences of HS and CACFP providers. This advice can be delivered to ECE providers through multiple mechanisms such as policy documents that recommend FSMS, Cooperative Extension programs for ECE providers such as Texts4Teachers\textsuperscript{60}, and various child care interventions such as I am Moving, I am Learning\textsuperscript{61}, and Hip Hop for Health Jr.\textsuperscript{62}.

**Implications for Policy**

Findings from the current study also underscore the value in taking a bottom-up and collaborative approach with ECE providers to inform researchers and policy makers regarding their perceptions of FSMS. By taking these providers’ perceptions into consideration, researchers and policy makers can not only make policy recommendations, but also offer practical strategies and targeted solutions to help ECE providers overcome barriers and effectively implement FSMS.

This study underscores the need to revise policies regarding FSMS in child care settings. First, it is imperative that the definition of FSMS includes allowing children to select their own portions and serve themselves. These practices promote self-regulation of energy intake\textsuperscript{55}; are in line with the Academy’s benchmarks\textsuperscript{22} and recommendations from the IOM\textsuperscript{23}. Although, HS and CACFP programs support FSMS, their policies could be strengthened by including specific recommendations about allowing children to self-serve. Second, CACFP could clarify their policy regarding meal pattern requirements to resolve potential discrepancies (perceived or real) with other standards that recommend family-style meal service. It is important for CACFP to clarify the policy and teach sponsors and program officers that the child care providers are only responsible for making the appropriate portion sizes of foods available to children during mealtimes, but they are not responsible for feeding those portion sizes to the children. Finally, the policies regarding FSMS for HS and CACFP programs should be consistent, and also updated with new research and IOM recommendations.

**Implications for Research**

Although informative, findings from the current study highlight the need for future research that examines child care administrators’ perceptions of FSMS. Since one of the barriers identified in the current study is that FSMS is resource intensive, future research should focus on
conducting a cost-benefit analysis to determine the true cost of using FSMS as compared to pre-portioned service. Further, limited empirical data is available on the impact of FSMS on child food intake. In addition, research is needed that explores strategies for implementing FSMS in a way that address the specific needs of different groups of children (such as food insecure and overweight children, picky eaters, and children who have dietary restrictions and allergies) when they are all eating at the same table and sharing the same food. Finally, future studies should focus on determining individual differences in children’s self-serving behaviors that might be moderated by weight status, the child’s responsiveness to food cues, appetite, varying palatability of foods and combination of foods served across meals.

**Conclusions**

FSMS is a widely recommended as a best practice for feeding preschool children in group settings. Providers’ motivators for using FSMS are consistent with the research highlighting the healthful benefits of FSMS, and reiterate its effectiveness in practice. Nevertheless, many providers refrain from using FSMS owing to its perceived impracticality for allowing children to self-serve. The present study offers new insights not only regarding providers’ barriers to FSMS, but also strategies from providers to help overcome these barriers and allow for effective implementation of FSMS in child care settings. Providers should be encouraged to adopt FSMS, because the long-term health consequences and learning opportunities of FSMS outweigh any barriers related to its practical implementation.
Table 6.1. Child care Provider Semi structured Interview Protocol

**Introduction**
Thank you very much for agreeing to participate in this interview. My name is Dipti Dev, I am a student at University of Illinois at Urbana-Champaign.

Today, I am going to interview you about your views regarding feeding guidelines for preschool aged children (2-5 years) attending child care. This study is not an assessment of whether your program is meeting certain standards, for example the Head Start or CACFP standards. We expect that most programs have not adopted many of these guidelines. This is because these guidelines are not currently an explicit part of any child care standards. Through this study we wish to take a collaborative approach with child care providers and bridge disconnect between policy makers and child care staff. This interview is a chance for you to describe some of the challenges you are facing to implement these guidelines in your program.

Everything you say will be kept confidential. You will not be quoted by name. Our report on the interviews will describe the range of views expressed by staff across programs, but specific comments will not be attributed to specific individuals or programs. I also ask that you not repeat any of our discussion after you leave today.

I would like to record our interview discussion using this digital recorder so I can listen to it later, when I write up my notes. No one outside of our research team will listen to the recordings. After my notes are finalized, I will erase/destroy the recordings. If you want to say anything that you don’t want recorded, please let me know and I will be glad to pause the digital recorder. Do you have any objections to my recording our discussion?

The discussion will last about an hour, and we will not take any formal breaks. But please feel free to get up at any time to stretch or use the restroom.

Once again, thank you for coming today. Do you have any questions before we get started?

**Interview Sequence**

**Part 1. Sorting the cards**
Here is a stack of cards that list guidelines for feeding children (2-5 years) in child care.
Could you put these cards into 3 piles:
1. One pile for guidelines that your center uses,
2. One for guidelines that the center doesn't use, and
3. One for guidelines that you haven’t heard about or are unsure about*

Now, could you sort the cards your **center uses** into another 3 piles:
1. Those that are easy to do,
2. Those that you sometimes find hard to do, and
3. One pile for really hard to do.
Table 6.1 (cont.)

**Part 2. Follow-up to explore provider motivators, facilitators and barriers.**

Let’s begin with guidelines that your center uses:

a. Interviewer moves through each card in the stack of guidelines that are “easy to do.”
   i. What are the main reasons for doing this? / What do you think are the most important reasons for following these guidelines (Motivators)
   ii. Why is this easy to do? (Facilitators)
   iii. What advice would you give to providers who say that they are not able to follow this guideline? (Facilitators)

b. Interviewer moves through each card in the stack that are “sometimes hard to do” and then “really hard to do.”
   i. Why is this hard to do? / What prevents you from meeting this guideline? (Barriers).
   ii. What are the main reasons for doing this? / What do you think are the most important reasons for following this guideline (Motivators)
   iii. If you could change one thing to make this guideline easy to do, what would it be? / What would make it easier to meet this guideline? (Facilitators)

c. Let's look at this stack here. (Interviewer points to stack that aren't used.)
   i. Why do you think the center doesn't use these? / What are the main reasons for the center not doing this? / What prevents the center from doing this? (Barriers)

**Part 3. Conclusion** We are about done. Is there anything else you would like to add?

Do you have any questions?
Table 6.2. Baseline Characteristics across Head Start, CACFP and non-CACFP Child Care Providers (n=18)

<table>
<thead>
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<th>Characteristic</th>
<th>Head Start (n=6)</th>
<th>CACFP (n=6)</th>
<th>Non-CACFP (n=6)</th>
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<tr>
<td>Race</td>
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<tr>
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<tr>
<td>Education</td>
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<td>4</td>
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</tr>
<tr>
<td>College graduate (4 years or more)</td>
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<td>2</td>
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<tr>
<td>Feeding Style&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>Mean(SD)</td>
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<td>41.23 (12.1)</td>
<td>41.56 (17.06)</td>
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</table>

Abbreviations: CACFP, Child and Adult Care Food Program. NH, Non- Hispanic. <sup>a</sup>Provider feeding style was measured by the Child Feeding Style Questionnaire (Hughes et al., 2007)


44. Patton MQ. Qualitative research and evaluation methods. 2002.


50. Welsh E. Dealing with data: Using NVivo in the qualitative data analysis process. 2002;3(2).


Chapter 7.
Project Implications

Implications for Policy

**Providers’ feeding practices vary across child care contexts.** In this project, it was consistently found that the child care policy-based contexts impacted providers’ feeding practices where HS providers had an increased compliance to the Academy of Nutrition and Dietetics (Academy) benchmarks for nutrition in child care as compared to CACFP and non-CACFP providers. First, HS providers met the Academy’s benchmarks significantly more often as compared to CACFP and non-CACFP providers (e.g., use of family style meal service, sitting and eating meals together with children). Second, HS providers were more likely to use healthful feeding practices (e.g., modeling healthy eating and teaching children about nutrition) as compared to the CACFP and non-CACFP providers. In addition, during the qualitative interviews HS providers offered practical strategies to help their CACFP and non-CACFP counterparts to overcome barriers regarding family style meal service. Taken together, these findings imply that the child care contexts (HS, CACFP and non-CACFP) are associated with providers’ feeding practices.

Possible reasons for an increased compliance of HS providers to healthful feeding practices as elucidated in the Academy’s benchmarks may be attributed to HS nutrition performance standards. These federal standards require HS providers to use feeding practices that are similar to the Academy’s benchmarks. In contrast, CACFP and non-CACFP programs lack standards regarding providers’ feeding practices. This relationship between child care contexts and providers’ feeding practices underscores the importance of child care policies that provide guidance for improving provider-child interactions at meal-time to improve child eating behaviors. HS programs can serve as a model in implementing the Academy’s benchmarks, and CACFP programs would be well served in adopting policies similar to HS nutrition standards. For CACFP centers this could be written into the requirements for participation in the CACFP program and monitored by each center’s sponsor. For non-CACFP centers, state licensing requirements could require the use of healthful feeding practices. For CACFP and non-CACFP centers, strengthening policies and training that are more aligned with the HS performance standards for child nutrition goes beyond reimbursement for food, and can provide exposure to,
and support of the Academy’s benchmarks to instill long-term positive eating behaviors to prevent obesity in young children.

Given the broad implications of this conclusion, the most important insights emerging from the data for effective implementation of feeding practice policies include the need to: a) take a “bottom-up” rather than “top down” approach and determine child care staff’s perceptions (motivators, facilitators and barriers) regarding feeding practice policies; b) Engage HS staff as “collaborative problem solvers” to provide practical strategies to overcome challenges to feeding practice recommendations in the field; and c) Examine factors other than the child care contexts that may contribute to HS programs’ increased compliance to the Academy’s benchmarks. One possible reason for an increased adherence of HS programs to the Academy’s benchmarks maybe attributed to the federal HS performance standards for child nutrition. These federal standards are very similar to the Academy’s benchmarks; however CACFP and non-CACFP programs lack such standards. Therefore, the federal performance standards might be responsible for HS providers’ compliance to healthful feeding practices. Taken together, HS programs can serve as a model for other child care programs.

In order for this model to be fully implemented in other child care contexts, it is critical to determine how the HS standards are operationalized in order to develop and implement training and interventions for HS staff. Given that HS providers receive significantly more training opportunities each year than CACFP and non-CACFP providers, and are involved in execution of interventions such as “I am Moving I am Learning”, it is important to determine the role of such trainings, interventions, nutrition education curriculum materials and individual program policies for achieving HS performance standards in other settings. Such studies will also help screen the most effective trainings, interventions and individual center policies that can be adapted and targeted to CACFP and non-CACFP providers. While determining the possible reasons for HS providers’ success is important to deliver targeted materials to other child care settings, it is also worthwhile to determine the resources and cost required to implement such trainings, curriculum and intervention materials. Since child care settings other than HS and CACFP programs are not federally funded, it is important to consider low cost, efficient and feasible means to improve providers’ feeding practices in the non-funded child care settings.

This study is timely because it provides new insights on the role of child care programs in combating the issue of childhood obesity, a priority of both the Administration for Children
and Families’ (ACF) Child Care and Development Fund (CCDF) program, as well as the Illinois Department of Human Services (IDHS), lead CCDF agency for the State of Illinois\textsuperscript{8}. Recent publications by the Institute of Medicine\textsuperscript{9} and national organizations\textsuperscript{10} have recommended specific health-related standards for child care providers to be implemented at the state-level to prevent early childhood obesity in preschool children. Furthermore, the recently approved Healthy, Hunger Free Kids Act\textsuperscript{11} requires the US Secretary of Agriculture to collaborate with the US Secretary of Health and Human Services to encourage states to develop child care standards that address healthful eating, increased physical activity time and reduced screen or sedentary activity time for young children. This study also takes an important first step in providing a science-base that will inform States’ efforts to incorporate healthful eating for responding to these calls to action through policy changes or providing resources and training to child care staff.

Another emerging strategy being implemented by states is incorporating health and wellness standards into their child care Quality Rating Improvement Systems (QRIS). These systems are a voluntary and comprehensive approach to improving the quality of child care; and have become a recent focus to prevent childhood obesity in early care and education settings\textsuperscript{12}. QRISs are an appealing mechanism for implementing obesity prevention efforts in child care for several reasons. First, providers who participate in the QRIS and accomplish the entry level of QRIS standards are publicly acknowledged, making them more competitive in the market place. Second, providers who participate in the QRIS receive several resources and support (e.g. professional development and training for staff including one-on-one coaching and mentoring, grants to procure materials or equipment as well as financial incentives such as child care subsidy, reimbursement and rewards). These incentives may encourage providers to participate in the QRIS in order to improve their program quality. Last, due to the voluntary nature and the supportive and resourceful infrastructure tied to the QRIS may make this approach more cooperative and thereby confirming to the standards, than those who rely on legislative or regulatory mandates\textsuperscript{13}. QRIS programs in states mainly focus on CACFP participation and physical activity time. Most states focusing on obesity prevention have included improving food but not feeding in the QRIS. This indicates a missed opportunity. Only a few states have included feeding practices recommendations for providers’ in their QRISs. For example, Arizona’s QRIS known as “Quality First” has five levels of star ratings, and includes family
style meal service and allowing children to decide how much to eat, while avoiding “clean plate” strategies. Similarly, South Carolina QRS known as the “ABC program” focuses on sitting and eating meals together with children, and avoiding food as reward or punishment\textsuperscript{8}. Findings from the current research can make an important and valuable contribution to help strengthen the QRIS standards regarding providers’ feeding practices by not only recommending healthful feeding practice guidelines but also offering practical and low-cost strategies that can be incorporated in the trainings to help providers overcome their barriers and thereby increase the feasibility and compliance to the QRISs.

**Implications for practice and programming**

The research findings have several implications for the development of programs to improve child care providers’ feeding practices; food and nutrition professionals can play a primary role in each of these.

First, owing to the differences in providers’ feeding practices across policy-based contexts (HS, CACFP and non-CACFP), *awareness of differences in nutrition policies across child care contexts is critical when nutrition professionals accommodate providers’ training needs*. Furthermore, due to the lower compliance of non-CACFP providers to the Academy’s benchmarks as compared to the HS and CACFP providers, efforts for nutrition education and interventions for improving child feeding should place a greater emphasis on non-CACFP providers.

Second, this research identifies many provider-level characteristics that influence their feeding practices that are crucial in developing targeted interventions that can better enable child care providers to use healthful feeding practices while reducing controlling practices. *Training about feeding practices could be required of (or suggested for) providers who have less than a college education in order to work in a licensed center*. Greater use of controlling feeding practices was predicted by non-White race, underscoring the need to acknowledge cultural influences on feeding practices. Programs should tailor efforts to their population of providers. Recent expert consensus on priorities for obesity prevention research in child care highlighted the need to address staff’s own health challenges (low income without insurance, at risk for health disparities) before they undertake new health promotion efforts\textsuperscript{14}. This study identifies focus areas to help staff address their own health. Providers’ concern about children’s weight,
perceived importance of nutrition in their own diet and interest in losing weight may be ways to engage providers in nutrition education that focuses on feeding practices.

Since providers play a critical role during child care mealtimes\textsuperscript{15}, it is surprising that few interventions have focused on providers as targets for change, indicating a missed opportunity for obesity prevention. Current evidence suggests that the most successful childhood obesity interventions involve parents (e.g. Planet Health\textsuperscript{16} and Hip-Hop to Health Jr.\textsuperscript{17}). Taken together, there is a need to equip providers who are interested in nutrition, losing weight and are concerned about children’s weight with resources to help maintain a healthy weight and life-style for themselves, without transferring the practice of restricting food intake to children in their care. \textit{Focusing on providers to be role models to represent healthy environmental influences may add to the efficacy of childhood obesity prevention programs.}

Last, \textit{this research offers feasible and low cost avenues to implement healthful feeding strategies in child care.} Given that an increased cost of healthful foods is a widely documented barrier by child care administrators for promoting healthy eating in child care\textsuperscript{18,19}, this study provides valuable insights regarding low cost healthful feeding strategies. First is mealtime verbal communication where providers are trained to focus on internal verbal comments (e.g. “Are you full?”) rather than non-internal verbal comments (e.g. “Are you done?”). This simple strategy of focusing on internal verbal comments during mealtimes can help children pay attention to their internal signals of hunger and fullness while eating, and facilitate self-regulation of their energy intake\textsuperscript{20}. Yet, this opportunity has been missed. Consistent with research on parents\textsuperscript{21-23}, the current study found that child care providers in all contexts (HS, CACFP and non-CACFP) used significantly more non-internal mealtime verbal comments than internal comments. The most frequent non-internal comments used by all providers included “Mmm. Mmm. It’s good, eat some”, “Are you done?”, and “You want some more?”). Developing training for providers that focuses on using internal verbal comments during mealtimes for cueing children to understand their hunger and satiety is a feasible and low-cost approach that can help children self-regulate their energy intake\textsuperscript{20}. An example checklist to help providers use internal rather than non-internal verbal cues to help children self-regulate their energy intake, and avoiding controlling food intake, rewarding and restricting food is provided in Table 7.1\textsuperscript{24}. 

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A second valuable finding emerging from the present research is the advice offered by providers as a response to caregivers who posed barriers to family style meal service (FSMS). This advice from HS and CACFP providers is hands-on, and can be incorporated along with the recommendation of FSMS for ease of implementation\(^4\). Further, given these recommendations are coming from providers that use FSMS as opposed to researchers, ECE providers may be more willing to change in their feeding practices since this advice is coming from their peers in HS and CACFP programs. Centering intervention efforts on serving meals family style where providers sit and eat meals together with children, model healthful eating and children select their own portions and serve themselves is: 1) inclusive of healthful feeding strategies such as division of responsibility, responsive feeding and supporting children’s self-regulation of energy intake\(^1\); and 2) refrains use of controlling feeding practices such as pressuring children to eat and restricting access to foods that negatively impact upon child eating \(^25\), and are an established risk factor for childhood obesity\(^26\). Given that extensive provider training is cost and resource intensive, implementing FSMS with the practical strategies to overcome barriers and facilitate implementation is a low-cost option to implement overall healthful feeding in child care programs. In order to reach this goal though, it is imperative to have a holistic approach towards implementation of family style where providers sit and eat meals together with children; model healthful eating and children select their own portions and serve themselves.

These low-cost, feasible strategies can be delivered to ECE providers through multiple mechanisms such as policy documents, Cooperative Extension programs for ECE providers such as Texts 4 Teachers\(^27\), and various child care interventions such as I am Moving I am Learning\(^7\), and Hip Hop Health Jr\(^17\).

**Implications for research**

**Relationship between predictors, feeding practices and child dietary intake.** This study takes a leading step to understand providers’ feeding practices and their predictors across child care contexts. Although, the Academy has released a position statement regarding healthful feeding practices, there are several unknowns about the relationships between predictors, feeding practices and child diet intake. Recent literature from studies involving parents has delineated the complexity of the relationships between feeding practices and child dietary intake (e.g., a permissive feeding style moderated the relationship between parental feeding practices and child consumption of energy-dense foods\(^28\)). Future studies should evaluate the impact of feeding
practices, moderating effects of identified predictors and also the bidirectional effects of caregiver-child interactions on child diet intake. For example, the limited empirical research regarding FSMS and child outcomes underscores the need to evaluate the impact of FSMS on child eating behaviors and diet intake. Further, future studies should focus on determining individual differences in children’s self-serving behaviors that might be moderated by weight status, child’s responsiveness to food cues, appetite, and varying palatability of foods and combination of foods served across meals. Additionally, providers’ approach to feeding a child may be dependent on child-level moderating variables such as child temperament and child food preferences. Future work is therefore warranted to determine the bi-directionality of provider-child relationships such as child-level factors (adiposity, dietary intake, eating behavior, temperament, food preferences, dietary restrictions, food insecurity) and policies (state laws and centers’ individual polices) that predict provider feeding practices. Taking these variables into consideration is imperative when attempting to better understand providers’ feeding practices and child eating behaviors and the factors that shape them. These new studies will help expand the knowledge base needed to inform interventions and training materials regarding strategies for implementing healthful feeding practices that addresses specific needs such as food insecurity, childhood obesity, dietary restrictions and child eating behaviors. Future research should evaluate the content and level of nutrition training required for child care providers to ensure use of healthful feeding practices such as FSMS.

**Measurement of providers’ feeding practices and child outcomes.** In order to meet the goal of examining the relationship between predictors on feeding practices and child diet intake, a critical first step is to overcome the limitations of instruments that measure interrelating levels of feeding practices on child eating\(^29\). Most studies on feeding have focused on the home environment and the discipline of food parenting has dramatically evolved over-time. Yet, recently issues on feeding measurements with parents have been highlighted\(^23\). These include a disagreement on important constructs of interest such as feeding style, feeding practice, eating behaviors- self regulation in eating and how to best measure those constructs. The limited research that has tracked childcare provider feeding practices has relied on modified versions of self-report measures originally developed to assess parental feeding practices\(^2,30\). However a major limitation of these studies is that the adapted CFQ is not validated for use in childcare. Although self-report instruments for assessing parental practices are widely used and are reliable
and validated measures\textsuperscript{31}, the childcare environment is unlike the home environment with respect to policies, number of children, and teachers. This study showed that providers’ feeding practices significantly vary across policy-driven child care contexts (HS, CACFP and non-CACFP). The lack of validated instruments to quantify feeding practices among childcare teachers is a critical barrier to efforts that seek to evaluate the impact of feeding policies on preschool children’s eating behaviors and weight outcomes. Drawing from the current study, future efforts are needed to encourage researchers to be sensitive to the identified predictors of providers’ feeding practices during development and validation of provider feeding measures. Further, qualitative methods should be used to explore the staff motivations and challenges regarding feeding practices. Engaging and educating both parents and providers about the importance of feeding practices as recommended by The Academy and providing strategies to overcome barriers may add to the efficacy of programs focused on combatting early childhood obesity.

**A Collaborative and Bottom-up approach.** In the present study, child care provider perspectives, attitudes and practices around feeding across policy driven contexts were explored in an effort to better inform the development of healthful feeding interventions in child care and feeding practice measures. The qualitative interviews improved the interface between the researchers and providers, and provided insight regarding providers’ beliefs about FSMS. A major highlight emerging from this study included practical strategies from providers to help overcome barriers to FSMS\textsuperscript{4}. This collaborative approach with the providers is useful for elucidating provider understanding and views regarding feeding practices that varied across the child care policy based contexts. Further, getting community members involved is an added value in itself for enhancing health\textsuperscript{29}. This takes on added importance given that providers’ characteristics such as trying to lose weight, attitudes, perceived importance of nutrition in their own diet impacted their feeding practices in this study\textsuperscript{3}. Since providers’ face health challenges, efforts should be focused on improving provider’s health first, before they undertake healthful feeding responsibilities, so that they can be effective role models\textsuperscript{14}. Yet, such methods of involving the community have been overlooked in the feeding literature\textsuperscript{29}. Consistent with a collaborative approach adopted by this study, Hughes and colleagues (2013) encourage researchers to design studies that seek involvement and inputs of community for feeding measures to reflect the realities of how children are actually being fed. This feedback from the community may overcome challenges of current feeding instruments by improving measurement
and understanding of feeding practices, and ultimately advance the knowledge base on the
development of eating behaviors and childhood obesity. Furthermore, the CLOCC program made
recommendations for proper implementation and sustainability of policy changes in child care,
based on their experience to explore the impact of policy changes (nutrition, physical activity
and screen time) on child care center practices and environments. Based on their work, the
Consortium to Lower Obesity in Chicago Children (CLOCC)\textsuperscript{32} recommended that in order to
create most sustainable policy changes to create healthier child care settings requires a
combination of “Big P” or governmental-level policies with “Little P” of individual child care
centers adding policy information to their operations manual. For this successful combination,
CLOCC recommends that government entities need to work in collaboration with child care
providers to ensure adequate resources and support for successful implementation\textsuperscript{32}. Taken
together, this underscores the need for taking a collaborative and bottom-up approach with the
community in the development of feeding measurement and practice literature. Therefore, in
addition to providers, future efforts should focus on understanding the perspectives of childcare
administrators and staff (food service personnel, caterers) regarding healthful feeding practices
and improving nutrition in child care. Building on this collaborative approach where providers
identified increased cost as a barrier to FSMS, future research should focus on conducting a cost-
benefit analysis to determine the true cost of using family-style meal service over pre-portioned
service. Such research efforts for engaging the community by identifying their needs and helping
them to overcome barriers may improve the feasibility and implementation of policies and
practices regarding healthful feeding and obesity prevention in child care settings.

\textbf{Focus on family day care homes.} This project focused on licensed child care centers
including Head Start programs, with providers caring for preschool children aged 2-5 years.
Therefore the study findings and implications only apply to these center-based child care
programs, and cannot be generalized to other child care contexts such as day care homes.
Research in day care homes is limited, so future studies should focus on examining family day
care providers’ feeding practices.
### Tables

Table 7.1. Mealtime verbal comments to encourage healthy eating behaviors and prevent obesity in pre-school children

<table>
<thead>
<tr>
<th>Feeding practices</th>
<th>Instead of this….</th>
<th>Use this</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cue children to recognize their internal signals of</td>
<td>“Are you done?”</td>
<td>“Are you full?”</td>
</tr>
<tr>
<td>hunger and satiety to support self-regulation</td>
<td>“You want some more?”</td>
<td>“If you are hungry, you can have some more”</td>
</tr>
<tr>
<td></td>
<td>“Let’s see you make a happy plate.”</td>
<td>“Does it make your tummy happy?”</td>
</tr>
<tr>
<td></td>
<td>[clean plate]</td>
<td>“Does your body have what it needs?”</td>
</tr>
<tr>
<td></td>
<td>“Hurry up, it’s time to go. Lunch time is over.”</td>
<td></td>
</tr>
<tr>
<td>Gently encourage children to try new foods without</td>
<td>“Can you put a little tiny bit on your plate?</td>
<td>“You can touch and smell it first, and see if you like it. You don’t</td>
</tr>
<tr>
<td>pressure</td>
<td>Just try it?”</td>
<td>have to eat it.”</td>
</tr>
<tr>
<td></td>
<td>Given if you do not want to eat it, you need to take a “no thank-you bite”</td>
<td>Model, by eating the food yourself and say “Yummy! I like it! It tastes</td>
</tr>
<tr>
<td></td>
<td>You need to try the salad, you have not touched it.</td>
<td>good! Will you like to try it?”</td>
</tr>
<tr>
<td>Do not restrict foods</td>
<td>You need to eat your veggies, before you get fruit</td>
<td>Keep offering variety of foods. Model by eating the food yourself, so</td>
</tr>
<tr>
<td></td>
<td></td>
<td>that children get comfortable with new foods</td>
</tr>
<tr>
<td></td>
<td>You will not get more milk/ bread, if you do not eat your veggies</td>
<td>Remind children that if there is a particular food that they are very</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fond of, that you will always have it again.</td>
</tr>
</tbody>
</table>
References


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