

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Faculty Publications, Department of Child, Youth,
and Family Studies

Child, Youth, and Family Studies, Department of

2014

Predictors of Head Start and Child-Care Providers' Healthful and Controlling Feeding Practices with Children Aged 2 to 5 Years

Dipti A. Dev

University of Nebraska-Lincoln, ddev2@unl.edu

Brent A. McBride

University of Illinois at Urbana Champaign, brentmcb@illinois.edu

Katherine E. Speirs

University of Illinois at Urbana Champaign, kspeirs@illinois.edu

Sharon M. Donovan

University of Illinois at Urbana Champaign, sdonovan@illinois.edu

Hyun Keun Cho

Western Michigan University, hyunkeun.cho@wmich.edu

Follow this and additional works at: <http://digitalcommons.unl.edu/famconfacpub>

 Part of the [Developmental Psychology Commons](#), [Family, Life Course, and Society Commons](#), [Other Psychology Commons](#), and the [Other Sociology Commons](#)

Dev, Dipti A.; McBride, Brent A.; Speirs, Katherine E.; Donovan, Sharon M.; and Cho, Hyun Keun, "Predictors of Head Start and Child-Care Providers' Healthful and Controlling Feeding Practices with Children Aged 2 to 5 Years" (2014). *Faculty Publications, Department of Child, Youth, and Family Studies*. 114.

<http://digitalcommons.unl.edu/famconfacpub/114>

This Article is brought to you for free and open access by the Child, Youth, and Family Studies, Department of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Faculty Publications, Department of Child, Youth, and Family Studies by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Predictors of Head Start and Child-Care Providers' Healthful and Controlling Feeding Practices with Children Aged 2 to 5 Years

Dipti A. Dev, PhD; Brent A. McBride, PhD; Katherine E. Speirs, PhD; Sharon M. Donovan, PhD, RD; Hyun Keun Cho, PhD

Corresponding author — Dipti A. Dev, PhD, Department of Child, Youth, and Family Studies, University of Nebraska, 135 Home Economics Bldg, Lincoln, NE 68588-0236. E-mail: dipti.dev2@gmail.com

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 is limited. The purpose of this study was to identify determinants of child-care providers' healthful and controlling feeding practices for children aged 2 to 5 years. In this cross-sectional study, child-care providers ($n = 118$) from 24 center-based programs (six Head Start [HS], 11 Child and Adult Care Food Program [CACFP] funded, and seven non-CACFP) completed self-administered surveys during 2011-2012. Multilevel multivariate linear regression models were used to predict seven feeding practices. Working in an HS center predicted teaching children about nutrition and modeling healthy eating; that may be attributed to the HS performance standards that require HS providers to practice healthful feeding. Providers who reported being concerned about children's weight, being 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 nonwhite race, who were trying to lose weight, who perceived nutrition as important in their own diet, and who had a greater number of nutrition training opportunities were more likely to use restrictive feeding practices. These 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.

Keywords: Head Start, Child and Adult Care Food Program, Feeding practices, Child-care providers, Nutrition

The Academy of Nutrition and Dietetics' position statement on benchmarks for nutrition in child care¹ and the Head Start (HS) performance standards² provide guidance for child-care providers regarding feeding practices for preschool-aged children (aged 2 to 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 (eg, 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 (eg, pressuring children to eat or restricting access to food) because they can contribute to the development of unhealthy eating behaviors⁶⁻⁹ 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 (ie, perceived responsibility for feeding children and concern about child weight),²⁰ body mass index (BMI),^{19,21} and feeding style predict feeding practices with children aged 2 to 5 years.²² What is not known is whether these same factors are predictive of child-care providers' feeding practices. In addition, factors specific to the child-care environment may predict providers' feeding practices, including variation in nutrition policies that create different policy-based contexts (eg, 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 practices¹ is a public health priority. More than

D. A. Dev is an assistant professor, Department of Child, Youth, and Family Studies, University of Nebraska, Lincoln; at the time of the study, she was a doctoral degree student in the Division of Nutritional Sciences, University of Illinois at Urbana-Champaign, Urbana. **B. A. McBride** is a professor, Department of Human and Community Development, Child Development Lab; **K. E. Speirs** is a postdoctoral research associate, Family Resiliency Center, Department of Human and Community Development; and **S. M. Donovan** is a professor, Department of Food Science and Human Nutrition, all at the University of Illinois at Urbana-Champaign, Urbana. **H. K. Cho** is an assistant professor, Department of Statistics, Western Michigan University, Kalamazoo; at the time of the study, he was a doctoral degree student, Department of Statistics, University of Illinois at Urbana-Champaign, Champaign.

12 million preschool-aged 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.²⁷ Epidemiologic evidence suggests that child-care experiences during the preschool years influence childhood weight status.^{28,29} The high prevalence of obesity among US preschool-aged children (26.7% are overweight)³⁰ and the strong trajectory of overweight and its spectrum of comorbidities (eg, type 2 diabetes)^{31,32} and cardiovascular disease³³ in adolescence and adulthood³⁴ make intervening with preschool-aged 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.¹ Although providers' feeding practices offer potential opportunities for shaping children's dietary intake and eating behaviors,³⁵ no published studies have focused solely on identifying predictors of childcare providers' 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 non-white race,¹⁵⁻¹⁷ less than college level of education,^{16,18,19} overweight/obese status,^{19,21} feeding attitudes,²⁰ and authoritarian feeding style²² would predict controlling feeding practices, whereas authoritative feeding style²² and working in an HS program^{12,23} would predict healthful feeding practices. In this exploratory, cross-sectional study, "prediction," and "predictors" refer to statistical prediction and do not imply causal relationships.

Methods

This study was approved by the University of Illinois at 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 during February 2012 from center-based child-care programs participating in the STRONG Kids program, a larger longitudinal study at the University of Illinois at Urbana-Champaign that examines parental and home determinants of childhood obesity.¹⁰ Child-care programs in three small urban communities were recruited from a sample with nonprobability 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 (ie, employed full-time at child care; present with children at lunchtime or, at a minimum, during snack time; and taught children aged 2 years and older). All providers completed self-administered surveys and received a \$10 gift card. Details on sample recruitment, survey administration, and data collection are described elsewhere.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 children

Table 1. Potential predictors (demographics, individual, and center-level characteristics) of child-care providers' feeding practices in a study to identify determinants of healthful and controlling feeding practices for children aged 2 to 5 years at 24 center-based programs (N = 118)^a

Demographic factor	%
Ethnicity/race¹⁵⁻¹⁷	
Other races plus Hispanics	20.3
Non-Hispanic white	79.7
Education^{16,18,19}	
Some college or technical school or less	50.8
College graduate or more	49.2
Have children	
No	35.6
Yes	64.4
Provider's body mass index^{19,21}	
Normal weight (≥ 18.5 and < 25)	26.3
Overweight (≥ 25 and < 30)	25.4
Obese (≥ 30)	48.3
Provider age (mean $y \pm$ standard deviation) ¹⁸	37.1 \pm 11.45
Individual-level characteristics of providers	
Provider trying to lose weight?⁴³	
No	33.9
Yes	66.1
Feeding style²²	
Authoritative	19.5
Authoritarian	30.5
Indulgent	28.8
Uninvolved	21.2
Years of experience (mean $y \pm$ standard deviation) ²⁴	10.95 \pm 9.02
Provider feeding attitudes^b (mean \pm standard deviation)	
Child weight concern ²⁰	2.02 \pm 1.00
Perceived responsibility ²⁰	2.30 \pm 1.29
Perceived nutrition importance of providers' diet ²⁰	3.46 \pm 0.49
Child-care—level characteristics of providers	
Child-care policy context^{12,23}	
Non-CACFP ^c	26.3
CACFP	47.5
Head Start	26.3
Nutrition training opportunities for staff²³	
< 1 time per year	45.8
> 1 time per year	54.2

^a References are for potential predictors of provider feeding practices to be included in the model.

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

^c CACFP = Child and Adult Care Food Program.

Table 2. Significant predictors of child-care providers' healthful and controlling feeding practices for children aged 2 to 5 years from 24 center-based programs

Predictor	Healthful Feeding Practices			Controlling Feeding Practices		
	Modeling	Teaching about Nutrition	Child Control	Pressure to Eat	Restriction for Health	Restriction for Weight Control
	β ± standard error					
Race						
Other races plus Hispanics	-.02±.19	.07±.18	-.12±.28	.38±.24	.35±.10***	.04±.11
Non-Hispanic white (reference group)						
Education						
Some college or technical school or less	-.13±.12	-.02±.17	-.44±.23	.28*±.12*	.20±.13	.10±.09
College graduate or more (reference group)						
Have children						
No	-.11±.15	-.23±.24	-.18±.34	.43*±.19	.34±.11**	.16±.09
Yes (reference group)						
Provider's body mass index						
Normal weight	-.11±.18	.02±.21	-.33±.34	.29±.18	.18±.14	.13±.12
Overweight	.06±.16	.15±.18	-.06±.22	-.11±.14	.11±.11	-.03±.09
Obese (reference group)						
Provider age	-.00±.01	-.01±.01	.03±.02	.01±.01	.00±.00	.00±.01
Provider trying to lose weight						
No	-.22±.20	-.10±.12	-.22±.36	.13±.14	-.06±.17	-.31±.09***
Yes (reference group)						
Feeding style						
Authoritative	.35±.26	.37±.30	.32±.45	.37±.20	.18±.14	-.01±.11
Authoritarian	.25±.19	.26±.29	.39±.23	.65±.22**	.24±.11*	.34±.12**
Indulgent	.42±.22	.23±.25	.62±.25*	.26±.21	.06±.10	.03±.10
Uninvolved (reference group)						
Years of experience	.00±.01	-.01±.02	-.01±.02	-.00±.01	.01±.01	.01±.01
Child weight concern	-.08±.05	.04±.05	-.11±.10	.16±.07*	.12±.04**	.09±.04*
Perceived responsibility	.07±.05	.08±.06	-.03±.09	.11±.05*	.09±.05	.01±.03
Perceived nutrition importance of provider's diet	.19±.19	.37±.20	.23±.29	-.16±.12	.26±.08**	.25±.09**

Table 2. Significant predictors of child-care providers' healthful and controlling feeding practices for children aged 2 to 5 years from 24 center-based programs (cont.)

Predictor	Healthful Feeding Practices			Controlling Feeding Practices			
	Modeling	Teaching about Nutrition	Child Control	Pressure to Eat	Restriction for Health	Restriction for Weight Control	
Child-care policy context							
Non-CACFP ^a	-.84±.24***	-.98±.24***	-.50±.37	.31±.24	.01±.11	-.11±.12	
CACFP	-.40±.22	-.39±.25	-.39±.42	.10±.24	.00±.13	-.12±.12	
Head Start (reference group)							
Nutrition training opportunities							
<1 Time/y							
>1 Time/y (reference group)	-.22±.17	-.21±.18	.01±.31	-.05±.17	-.11±.07	-.20**±.07	

^a CACFP = Child and Adult Care Food Program.

* $P < 0.05$

** $P < 0.01$

*** $P < 0.001$

aged 2 to 5 years. Thirteen potential predictors used in the regression model and references from the literature review are shown in Table 1.

Demographic characteristics³⁶ such as provider age, race, and education are presented in Table 1. Provider BMI was calculated from self-reported height and weight as body mass (in kilograms)/height (in meters²). Research has suggested that 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.³⁷ BMI classifications based on World Health Organization³⁷ criteria for providers (all women) were: underweight (<18.5), normal weight (≥18.5 and <25), overweight (≥25 and <30), and obese (≥30). Providers' feeding styles were measured by the Caregiver Feeding Styles Questionnaire²² 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 Caregiver Feeding Styles Questionnaire were used to categorize providers into one of the following feeding styles: authoritarian (high demanding, low responsive), exhibits extensive control during feeding; authoritative (high demanding, high responsive), exhibits adequate control though reasoning and involvement with shared feeding responsibility with children; and permissive or child-controlled feeding style, allows the child to control the feeding relationship, including what, when, and how much to eat. Little control by permissive caregivers is further classified as indulgent (low demanding, high responsive) and uninvolved (low demanding, low responsive) or indifferent.²² 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.¹² Providers' perception of the importance of nutrition in their diet was measured by the US Department of Agriculture Diet and Health Knowledge Survey 1994-1996.³⁸ Participants responded to 11 items regarding their perception of the importance of certain food groups and nutrients (eg, "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 to 5 = very important). Nutrition training opportunities were measured using items from the Nutrition and Physical Activity Self-Assessment in Child-Care instrument^{39,40}: "Training opportunities on nutrition (other than food safety and food program guidelines) are provided for staff: Rarely or never, less than one time per year, one time per year, two times per year or more."

Dependent Variable: Providers' Feeding Practices. The CFQ and Comprehensive Feeding Practices Questionnaire,^{41,42} originally developed to measure parental feeding attitudes and practices, were adapted, validated, and used to measure healthful (ie, modeling healthy eating, teaching about nutrition, allowing children to control the amount of food they eat) and controlling feeding practices (ie, pressure to eat, restriction, restriction for health, and restriction for weight control) for this study.^{13,43} Mean scores were calculated for each subscale, with possible mean item scores ranging from one to five with higher scores indicating a greater tendency toward these practices (eg, 5 = always agree).

The complete survey with the above measures was reviewed by six early childhood and nutrition experts and pilot

tested with five providers. Reliability for final survey measures was acceptable, with Cronbach's alpha ranging from .65 to .88.¹²

Data Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences, version 17 (2008, IBM-SPSS, Inc) and SAS, version 9.3 (2011, SAS Institute Inc). Significance levels were set at $P < 0.05$ for all analyses. Descriptive statistics (means, standard deviation and frequencies) and Cronbach's alphas 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 random⁴⁴ (MCAR) test was used to determine whether 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. Before running the regression models, data were screened for violations of the regression assumptions.⁴⁵ Errors were normally distributed,⁴⁶ and variance inflation factors^{47,48} suggested that no serious multicollinearity problems existed among the independent variables. Due to the multi-level 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 (6 HS, 11 CACFP, and 7 non-CACFP). Potential predictors such as provider demographics and individual-level (eg, feeding style and attitudes) and center-level characteristics (policy contexts and nutrition training opportunities) are shown in Table 1. Significant predictors of providers' healthful and controlling feeding practices are shown in Table 2. Several of the potential predictors that we examined were associated with child-care providers' feeding practices. Consistent with parent literature,^{15-17,20,22,43} controlling feeding practices were predicted by nonwhite race, less than college education, authoritarian feeding style, providers' feeding attitudes (ie, child weight concern and perceived responsibility), and providers who perceived nutrition as important in their own diet and who were themselves trying to lose weight (Table 2). The child-care-policy-based context was related to healthful feeding practices. As hypothesized, HS 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 2). This finding may be attributed to the HS performance standards that require providers to model healthful eating and teach children about nutrition. CACFP and non-CACFP programs lack similar requirements. Further, as required by HS 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 providers.¹² These practices allow providers to model healthy eating and teach about nutrition.^{23,49}

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, the co-occurrence of food insecurity and obesity in HS children 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 foodinsecure 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 Fridays.⁵⁰⁻⁵² Although HS providers receive significantly greater nutrition training opportunities than CACFP and non-CACFP providers,¹² 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 the results of this study where restricting foods for weight control was predicted by greater nutrition training opportunities (Table 2).

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 parents^{21,53} and family day-care providers⁴³ (Table 2). 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.^{21,53}

Providers' feeding styles were predictive of both healthful and controlling feeding practices (Table 2). Providers with an indulgent 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.²² A possible explanation for this inconsistent finding is that providers allow children to have control within a 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,⁵⁴ providers with authoritarian feeding styles were more likely to use controlling practices (ie, pressuring children to eat and restricting access to food). Because pressure and restriction have been linked with negative child outcomes, including dislike of foods they are pressured to eat,^{9,55} food fussiness,^{55,56} and inability to self-regulate food intake,^{6,57,58} the results highlight the need to educate providers regarding healthful feeding practices.

A majority of providers (73%) in this study were overweight/obese (Table 1). Interestingly, restrictive feeding was practiced by providers who were themselves trying to lose weight, were concerned about children's weight, and who perceived nutrition to be important in their own diet (Table 2). 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.⁵⁹ Current evidence suggests that the most successful childhood obesity interventions involve parents (eg, Planet Health⁶⁰ and Hip-Hop to Health Jr⁶¹). Because 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. There is a need to equip providers who are interested in nutrition and losing weight, and who are concerned about children's weight, with resources to help them maintain a healthy weight and lifestyle for themselves without transferring the practice of restricting food intake to the 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. The ability to generalize the findings to a 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; that may have led to response bias. Further, the CFQ and Comprehensive Feeding Practices Questionnaire 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, sex, and weight, and such differences were not ascertained in this study. Thus, these results may not apply to child-care centers and providers that have different demographics from the present study sample. Despite these limitations, this study adds to the literature by being the first to examine predictors of childcare providers' feeding practices across child-care policy contexts.

Conclusions

These study 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.

- Because 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 in order to work in a licensed center. Providers' concern about children's weight, perceived importance of nutrition, and interest in losing weight themselves may be ways to engage providers in nutrition education that focuses on feeding practices.
- Greater use of controlling feeding practices was predicted by nonwhite race, underscoring the need to acknowledge cultural influences on feeding practices. Programs should tailor efforts to their population of providers. Because greater controlling feeding practices were associated with nonwhite race it would be valuable

to determine whether race or other possible variables such as acculturation account for this result.

- Consistent with previous research,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 (eg, sex, adiposity, BMI, dietary intake, eating behavior, temperament, and food preferences) and policies (eg, state laws and centers' individual policies) that predict providers' feeding practices. Although the Academy of Nutrition and Dietetics 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.⁶² Future studies should evaluate the influence of feeding practices, moderating effects of identified predictors and also the bidirectional effects of caregiver-child interactions on child diet intake. To meet this goal, a critical first step is to overcome the limitations of instruments that measure interrelating levels of feeding practices on child eating.⁶³ Further, qualitative methods should be used to explore 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 combating early childhood obesity.

References

1. Benjamin Neelon SE, Briley ME. Position of the American Dietetic Association: Benchmarks for nutrition in child care. *J Am Diet Assoc.* 2011;111(4):607-615.
2. Office of Head Start. Legislation and regulations: Head Start program performance standards (45 CFR part 1304.23 child nutrition). <http://eclkc.ohs.acf.hhs.gov/hslc/standards/Head%20Start%20Requirements/1304/1304.23%20Child%20nutrition.htm>. Accessed October 6, 2012.
3. Ventura AK, Birch LL. Does parenting affect children's eating and weight status? *Int J Behav Nutr Phys Act.* 2008;5:15.
4. Satter E. Child care feeding policy. <http://www.ellynsatter.com/ellyn-satters-division-of-responsibility-in-feeding-i-80.html>. Accessed April 26, 2013.
5. Hendy H, Raudenbush B. Effectiveness of teacher modeling to encourage food acceptance in preschool children. *Appetite.* 2000;34(1):61-76.
6. Carper J, Orlet Fisher J, Birch LL. Young girls' emerging dietary restraint and disinhibition are related to parental control in child feeding. *Appetite.* 2000;35(2):121-129.
7. Robert Batsell W, Brown AS, Ansfield ME, Paschall GY. "You will eat all of that!": A retrospective analysis of forced consumption episodes. *Appetite.* 2002;38(3):211-219.

8. Birch LL, Fisher JO, Davison KK. Learning to overeat: Maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. *Am J Clin Nutr*. 2003;78(2):215.
9. Galloway AT, Fiorito LM, Francis LA, Birch LL. "Finish your soup": Counterproductive effects of pressuring children to eat on intake and affect. *Appetite*. 2006;46(3):318-323.
10. Dev DA, McBride BA, Fiese BH, Jones BL, Cho H, on behalf of the STRONG Kids Research Team. Risk factors for Overweight/Obesity in preschool children: An ecological approach. *Child Obes*. 2013;9(5): 399-408.
11. Rodgers RF, Paxton SJ, Massey R, et al. Maternal feeding practices predict weight gain and obesogenic eating behaviors in young children: A prospective study. *Intl J Behav Nutr Phys Act*. 2013;10(1): 24.
12. Dev DA, McBride BA. The STRONG Kids Research Team. Academy of Nutrition and Dietetics benchmarks for nutrition in child care (2011): Are child-care providers across contexts meeting recommendations? *J Acad Nutr Diet*. 2013;113(10):1346-1353.
13. Erinoshio TO, Hales DP, McWilliams CP, Emunah J, Ward DS. Nutrition policies at child-care centers and impact on role modeling of healthy eating behaviors of caregivers. *J Acad Nutr Diet*. 2012;112(1): 119-124.
14. Sigman-Grant M, Christiansen E, Branan L, Fletcher J, Johnson SL. About feeding children: Mealtimes in child-care centers in four western states. *J Am Diet Assoc*. 2008;108(2):340-346.
15. Freedman MR, Alvarez KP. Early childhood feeding: Assessing knowledge, attitude, and practices of multi-ethnic child-care providers. *J Am Diet Assoc*. 2010;110(3):447-451.
16. Tylka TL, Eneli IU, Van Diest, Ashley M. Kroon, Lumeng JC. Which adaptive maternal eating behaviors predict child feeding practices? An examination with mothers of 2- to 5-year-old children. *Eat Behav*. 2013;14:57-63.
17. Evans A, Seth JG, Smith S, et al. Parental feeding practices and concerns related to child underweight, picky eating, and using food to calm differ according to ethnicity/race, acculturation, and income. *Matern Child Health J*. 2011;15(7):899-909.
18. Bante H, Elliott M, Harrod A, Haire-Joshu D. The use of inappropriate feeding practices by rural parents and their effect on preschoolers' fruit and vegetable preferences and intake. *J Nutr Educ Behav*. 2008;40(1):28-33.
19. Brown KA, Ogden J, Vögele C, Gibson EL. The role of parental control practices in explaining children's diet and BMI. *Appetite*. 2008;50(2): 252-259.
20. de Lauzon-Guillain B, Musher-Eizenman D, Leporc E, Holub S, Charles MA. Parental feeding practices in the United States and in France: Relationships with child's characteristics and parent's eating behavior. *J Am Diet Assoc*. 2009;109(6):1064-1069.
21. Cachelin FM, Thompson D. Predictors of maternal child-feeding practices in an ethnically diverse sample and the relationship to child obesity. *Obesity*. 2013;21(8):1676-1683.
22. Hughes SO, Patrick H, Power TG, Fisher JO, Anderson CB, Nicklas TA. The impact of child care providers' feeding on children's food consumption. *J Dev Behav Pediatr*. 2007;28(2):100.
23. Sigman-Grant M, Christiansen E, Fernandez G, et al. Child care provider training and a supportive feeding environment in child care settings in 4 states, 2003. *Prev Chron Dis*. 2011;8(5):A113.
24. Nahikian-Nelms M. Influential factors of caregiver behavior at mealtime: A study of 24 child-care programs. *J Am Diet Assoc*. 1997;97(5):505-509.
25. Administration for Children and Families. Pathways and partnerships for childcare excellence. http://www.acf.hhs.gov/programs/ccb/ta/pubs/pathways/pathways_partnerships_v1.pdf. Updated 2010. Accessed October 6, 2012.
26. Larson N, Ward DS, Neelon SB, Story M. What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. *J Am Diet Assoc*. 2011;111(9):1343-1362.
27. Gubbels J, Kremers S, Stafleu A, Dagnelie P, De Vries N, Thijs C. Childcare environment and dietary intake of 2-and 3-year-old children. *J Hum Nutr Diet*. 2010;23(1):97-101.
28. Lumeng JC, Gannon K, Appugliese D, Cabral H, Zuckerman B. Preschool child care and risk of overweight in 6-to 12-year-old children. *Int J Obes*. 2004;29(1):60-66.
29. Maher EJ, Li G, Carter L, Johnson DB. Preschool child care participation and obesity at the start of kindergarten. *Pediatrics*. 2008;122(2):322.
30. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *JAMA*. 2012;307(5):483-490.
31. Goran MI, Ball GDC, Cruz ML. Obesity and risk of type 2 diabetes and cardiovascular disease in children and adolescents. *J Clin Endocrinol Metab*. 2003;88(4):1417.
32. van Vliet M, Van der Heyden JC, Diamant M, et al. Overweight is highly prevalent in children with type 1 diabetes and associates with cardiometabolic risk. *J Pediatr*. 2010;156(6):923-929.
33. Bao W, Srinivasan SR, Wattigney WA, Berenson GS. Persistence of multiple cardiovascular risk clustering related to syndrome X from childhood to young adulthood: The Bogalusa Heart Study. *Arch Intern Med*. 1994;154(16):1842.
34. Biro FM, Wien M. Childhood obesity and adult morbidities. *Am J Clin Nutr*. 2010;91(5 suppl):1499S-1505S.
35. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: Conception to adolescence. *J Law Med Ethics*. 2007;35(1):22.
36. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. CDC growth charts: United States. *Ado Data* 2000;(314):1.
37. Craig BM, Adams AK. Accuracy of body mass index categories based on self-reported height and weight among women in the United States. *Matern Child Health J*. 2009;13(4):489-496.
38. York-Crowe EE, White MA, Paeratakul S, Williamson DA. The diet and health knowledge survey: Development of a short interview format. *Eating Behav*. 2006;7(3):235-242.
39. Benjamin SE, Neelon B, Ball SC, Bangdiwala SI, Ammerman AS, Ward DS. Reliability and validity of a nutrition and physical activity environmental self-assessment for child care. *Int J Behav Nutr Phys Act*. 2007;4:29.
40. Ammerman AS, Ward D, Benjamin SE, et al. An intervention to promote healthy weight: Nutrition and physical activity self-assessment for child care (NAP SACC) theory and design. *Prev Chronic Dis*. 2007;4(3):A67.
41. Birch L, Fisher J, Grimm-Thomas K, Markey C, Sawyer R, Johnson S. Confirmatory factor analysis of the child feeding questionnaire: A measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite*. 2001;36(3):201-210.
42. Musher-Eizenman D, Holub S. Comprehensive feeding practices questionnaire: Validation of a new measure of parental feeding practices. *J Pediatr Psychol*. 2007;32(8):960.
43. Brann LS. Child-feeding practices and child overweight perceptions of family day care providers caring for preschool-aged children. *J Pediatr Health Care*. 2010;24(5):312.
44. Little RJ. A test of missing completely at random for multivariate data with missing values. *J Am Stat Assoc*. 1988;83(404):1198-1202.
45. Tabachnick BG. *Using Multivariate Statistics*. 6th ed. Cambridge, UK: Pearson; 2012.
46. Field A. *Discovering Statistics using SPSS*. Thousand Oaks, CA: Sage Publications; 2009.
47. Liu R, Kuang J, Gong Q, Hou X. Principal component regression analysis with SPSS. *Comput Methods Programs Biomed*. 2003;71(2):141-147.

48. Schroeder MA, Lander J, Levine-Silverman S. Diagnosing and dealing with multicollinearity. *West J Nurs Res*. 1990;12(2):175-187.
49. Fisher JO, Rolls BJ, Birch LL. Children's bite size and intake of an entrée are greater with large portions than with age-appropriate or self-selected portions. *Am J Clin Nutr*. 2003;77(5):1164-1170.
50. Gooze RA, Hughes CC, Finkelstein DM, Whitaker RC. Obesity and food insecurity at the same table: How head start programs respond. *Prev Chron Dise*. 2012;9:E132.
51. Lumeng JC, Kaciroti N, Frisvold DE. Changes in body mass index Z score over the course of the academic year among children attending head start. *Acad Pediatr*. 2010;10(3):179-186.
52. Sigman-Grant M, Christiansen E, Fernandez G, et al. Hungry Mondays: Low-income children in childcare. *J Hunger Environ Nutr*. 2008;2(4):19-38.
53. Francis LA, Hofer SM, Birch LL. Predictors of maternal child-feeding style: Maternal and child characteristics. *Appetite*. 2001;37(3):231-243.
54. Hughes SO, Power TG, Orlet Fisher J, Mueller S, Nicklas TA. Revisiting a neglected construct: Parenting styles in a child-feeding context. *Appetite*. 2005;44(1):83-92.
55. McPhie S, Skouteris H, McCabe M, et al. Maternal correlates of preschool child eating behaviours and body mass index: A cross-sectional study. *Int J Pediatr Obes*. 2011;6(5-6):476-480.
56. Gregory JE, Paxton SJ, Brozovic AM. Pressure to eat and restriction are associated with child eating behaviours and maternal concern about child weight, but not child body mass index, in 2-to 4-year-old children. *Appetite*. 2010;54(3):550-556.
57. Birch LL, Fisher JO. Mothers' child-feeding practices influence daughters' eating and weight. *Am J Clin Nutr*. 2000;71(5):1054.
58. Fisher JO, Birch LL. Parents' restrictive feeding practices are associated with young girls' negative self-evaluation of eating. *J Am Diet Assoc*. 2000;100(11):1341-1346.
59. Ward DS, Vaughn A, Story M. Expert and stakeholder consensus on priorities for obesity prevention research in early care and education settings. *Child Obes*. 2013;9(2):116-124.
60. Austin SB, Field AE, Wiecha J, Peterson KE, Gortmaker SL. The impact of a school-based obesity prevention trial on disordered weightcontrol behaviors in early adolescent girls. *Arch Pediatr Adolesc Med*. 2005;159(3):225.
61. Fitzgibbon ML, Stolley MR, Schiffer L, Van Horn L, Kaufer-Christoffel K, Dyer A. Two-year follow-up results for Hip-Hop to Health Jr: A randomized controlled trial for overweight prevention in preschool minority children. *J Pediatr*. 2005;146(5):618-625.
62. Hennessy E, Hughes SO, Goldberg JP, Hyatt RR, Economos CD. Permissive parental feeding behavior is associated with an increase in intake of low-nutrient-dense foods among American children living in rural communities. *J Acad Nutr Diet*. 2012;112(1):142-148.
63. Hughes SO, Frankel LA, Beltran A, et al. Food parenting measurement issues: Working group consensus report. *Child Obes*. 2013;9(suppl 1): S95-S102.

Acknowledgments — This research was funded, in part by grants from the US Department of Health and Human Services Administration of Children and Families/ Office of Planning, Research, and Evaluation (grant no. 90YR0052) and the Illinois Trans-disciplinary Obesity Prevention Program Seed Grant Program to the lead authors. The larger longitudinal study STRONG Kids research initiative from which child-care centers were recruited was funded, in part, by grants from the Illinois Council for Food and Agricultural Research, the University of Illinois Health and Wellness Initiative, and the US Department of Agriculture (no. 793-328). No potential conflict of interest was reported by the authors.