Examining Nutrition and Physical Activity Policies and Practices in Maryland's Child Care Centers

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Abstract

Background: Child care settings provide opportunities for obesity prevention by implementing nutrition/physical activity best practices. This study examines how center policies, provider training, family education, and center demographics relate to best practices for nutrition/physical activity in Maryland's child care centers.

Methods: A survey, including minor modifications to The Nutrition and Physical Activity Self-Assessment for Child Care (Go NAP SACC), was sent by e-mail to center directors statewide. Best practice sum scores (dependent variable) were calculated, including physical activity (17 items), feeding environment (18 items), and food served (19 items). Adjusted regression models analyzed the number of nutrition/physical activity policies, provider training topics, and family education opportunities related to best practice scores.

Results: Response rate was 40% ($n=610/1506$) with 69% independent centers (vs. organization sponsored), 19% with Child and Adult Care Food Program (CACFP enrolled), and 50.2% centers with majority ($\geq 70\%$) Caucasian children and 16.8% centers with majority African American children. Centers reported 40.8% of physical activity best practices, 52.0% of feeding environment best practices, and 51.6% of food served best practices. Centers reported (mean) 7.9 of 16 nutrition/physical activity-relevant policies, 6.9 of 13 provider training topics, and 4.4 of 8 family education opportunities. Regression models yielded associations with best practices: policies and provider training with feeding environment ($B=0.26$, $p<0.001$; $B=0.26$, $p=0.001$, respectively); policies with foods served ($B=0.22$, $p=0.002$); and policies, provider training, and feeding environment with physical activity ($B=0.19$, $p=0.001$; $B=0.24$, $p=0.010$; $B=0.38$, $p<0.001$).

Conclusions: Nutrition/physical activity best practices in child care are supported by specific policies, provider training, and family education activities.

Keywords: child care; early care and education; feeding; nutrition; physical activity; policy

Background

Childhood obesity increases the risk for chronic diseases, including early-onset cardiovascular disease, type 2 diabetes mellitus, and sleep disorders.^{1–3} In the United States, 13.9% of children ages 2–5 years are obese,⁴ with increased rates among low-income and ethnic minority preschoolers. Data from the Special Supplemental Nutrition Program for Women, Infants, and Children Parti-

cipants and Program Characteristics (WIC PC) are used by the Centers for Disease Control to track the prevalence of obesity among children ages 2–4 years from low-income families.⁵ In 2014, the prevalence of obesity from WIC PC was 14.5% (specifically, 18.0% American Indian/Alaskan Native, 17.3% Hispanic, 12.2% non-Hispanic white, 11.9% non-Hispanic black, and 11.1% Asian/Pacific Island children). Maryland's population is diverse (51.5% non-Hispanic white, 30.7% non-Hispanic black, 9.8%

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Hispanic, and 6.6% Asian⁶) offering the opportunity to gather information from child care centers serving a racially and ethnically diverse population.

More than 10 million US children ages 0–5 years are enrolled in child care, with many children consuming 2–3 meals/day and participating in physical activity through structured and unstructured play,⁷ creating a unique opportunity for providers to influence children in developing healthy eating and physical activity (HEPA) habits. The National Resource Center for Health and Safety in Child Care and Early Education has established standards based on the Dietary Guidelines for Americans 2010 and national Child and Adult Care Food Program (CACFP) requirements⁷ (a federal program that subsidizes meals to child care centers serving low-income families⁸). In Maryland, all licensed child care centers that serve food are required to comply with CACFP standards,⁹ however, compliance is assessed only among CACFP-enrolled centers. Federal law does not mandate physical activity time or limits to sedentary time in child care. Beginning in 2016 (after completion of this study), Maryland state law required planned daily activities, sufficient materials/equipment for physical activity, and limits on screen time.¹⁰ The Nutrition and Physical Activity Self-Assessment (NAP SACC) was developed by childhood obesity researchers to assist child care center compliance with standards and guidelines.¹¹ In 2015, the NAP SACC was revised via inclusion of additional content areas (*i.e.*, screen time and outdoor play) and updated recommendations (called “Go NAP SACC”).^{12,13} This tool is commonly used by researchers to assess nutrition and physical activity policies and practices in child care centers.^{14–16}

Recent studies and national reports suggest variability in the implementation of nutrition and physical activity policies and practices. A 2016 report on child care licensing regulations found that only 20% of US child care centers fully met “healthy weight practice” regulations.¹⁷ Multiple studies found that child care centers serve high-sugar/sodium/fat foods, provide minimal fruits/vegetables and whole grains, with limited access to water.^{18–20} Although most centers report limiting screen time and providing physical activity opportunities, a recent study found only one-third had written policies in place.²¹ Variation in physical activity practices is common, affected by availability of outdoor play space, play equipment, and weather conditions; indoor physical activity is often substituted with sedentary play or screen time.^{22–24} Beyond a description of practices, there is limited information on the implementation of nutrition and physical activity policies and practices in child care.

The Social Ecological Model is a useful framework to examine how environmental factors relate to the implementation of nutrition and physical activity policies and practices in child care.^{25,26} The interplay among ecological levels is a key element of the Social Ecological Model.²⁵ For example, child care center policies may relate to individual health behaviors through the interplay across

ecological levels, including policy implementation within classrooms or teacher/family reinforcement of messaging. This study examines how center policies, provider training, and family education relate to the implementation of nutrition and physical activity best practices in child care centers.

Beyond federal and state-specific nutrition and physical activity policies for child care, each center may develop center-level policies, similar to school district wellness policies in place for schools since 2006.²⁷ There is limited literature on child care center policies and policy implementation,²⁸ however, initiatives have begun in large organization-sponsored centers. For example, in 2011, the YMCA of the United States developed HEPA standards to be implemented in its sponsored child care centers,²⁹ however, the implementation and impact of these standards have not been reported. Additional research is needed to examine associations between center-level policies and nutrition/physical activity best practices.

Nutrition/physical activity training for early child care providers has been shown to increase children’s consumption of healthy foods and physical activity^{30–33} by equipping them to build healthy habits into children’s daily activities. Yet, a recent systematic review noted that additional studies are needed to fully understand the role of provider training in health promotion in child care.³⁴

Families of young children are essential partners in child care health promotion efforts through creating a home environment that complements a health-promoting child care environment.³⁵ Engaging families to increase knowledge and opportunities for HEPA behaviors has been shown to strengthen child care interventions and improves children’s anthropometric outcomes.^{36–39} Child care centers may facilitate this partnership through family engagement opportunities, which may support overall nutrition and physical activity best practices in child care centers.

In addition to examining center policies, provider training, and family education, the demographic characteristics of families served by centers may also relate to nutrition/physical activity best practices. Few studies have examined demographic characteristics of the children served by centers.

The purpose of this study is to examine how center policies, provider training, family education, and center demographics relate to best practices for nutrition (specifically, the feeding environment and foods served) and physical activity in Maryland’s child care centers.

Methods

Sample

Maryland child care centers (actively licensed in 2014), providing care for children ages 0–5, were included (exclusion criteria: before or afterschool only or home-based day care). Contact information for 2690 licensed centers or before/afterschool care sites was provided by the state department of education. Verification of contact information,

removal of duplications, and eligibility determination resulted in inclusion of 1506 centers (primary reason for exclusion: only offer before/after care for school aged children). An e-mail survey link (SurveyMonkey, San Mateo, CA) was sent to the points of contact for all centers, specifying that the survey be completed by the director or a person knowledgeable about the center's nutritional policies and practices. An initial e-mail was sent followed by five reminder e-mails. The center staff completing the survey received one professional development hour as part of licensure requirements from the state department of education. Survey responses were accepted from December 2014 to February 2015. The protocol was approved by the Institutional Review Boards of the University of Maryland and Maryland Department of Health.

Measures

The survey included center-level demographics (19 items), which were used to generate center size (no. of children enrolled, dichotomized at 50 students or more/less), organization sponsored (independent center or sponsored by a large organization, such as the YMCA), subsidy voucher acceptance (yes/no), CACFP participation (yes/no), and race/ethnicity of the student body [estimated percentages by race/ethnicity, almost none (<10%), some (1%–30%), half (40%–60%), most (70%–90%) or almost all (>90%), used to generate two dummy variables for (1) most/all Caucasian and (2) most/all African American students vs. not].

Adapted questions from the Go NAP SACC were included in the survey (specifically, items from the child nutrition, child physical activity, outdoor play and learning, and screen time assessments).¹³ The online survey consisted of questions related to best practices for foods served, feeding environment, and physical activity, modified as follows:

1. Order of response options listed least to greatest (original: last item was best practices, therefore response option magnitude fluctuated; e.g., healthy foods were listed least to greatest, whereas unhealthy foods were listed greatest to least).
2. Expanded response options to include never vs. rarely, rather than combining never/rarely as in the original.
3. Separation of items that represented multiple constructs (dark green and dark orange vegetables; red and deep yellow vegetables).

For this analysis, each item was dichotomized (best practices reported vs. not reported) and summed to create best practice sum scores for each construct.

Additional items slightly modified from the Go NAP SACC include six questions with checklist responses for (1) written nutrition policies, (2) written physical activity policies, (3) provider training for nutrition, (4) provider training for physical activity, (5) family education for nutrition and family education for physical activity. These were modified by asking participants to indicate which topic/

policy was covered (in the original, the response set includes a range of items, *i.e.*, 0 topics, 1–4 topics, and 5–8 topics). Reporting per topic is shown in Table 1. Each question was summed to generate a continuous score representing the number of policies/topics present/offered by a center.

To examine test–retest reliability, a subset of questions was repeated at the end of the survey. A subsample of 369 centers received physical activity questions twice, and 336 centers received nutrition/feeding questions twice. Spearman rank correlations (SCC) were significant for physical activity (SCC=0.85, $p<0.001$) and nutrition/feeding (SCC=0.80, $p<0.001$).

A scoring protocol was developed by applying scores of 1–4 (worst to best practice), mirroring the scoring protocol used for prior versions of the NAP SACC.⁴⁰ A best practice sum score was calculated for each of the subscales: physical activity (17 items), feeding environment (18 items), food served (19 items). Cronbach's alpha was used to examine internal consistency of scales/subscales.

Analyses

All analyses were conducted in SPSS version 22.0 (IBM Corp., 2013). To examine relationships between demographic variables (independent variables, “IVs”) and best practice scores (continuous, dependent variables, “DVs”), independent *t* tests and analysis of variance (ANOVAs) with least significant difference (LSD) *post hoc* testing were used. Three separate regression models were conducted for each of the DVs to examine relationships with IVs [center demographics (dichotomous, entered together in step 1) and number of nutrition/physical activity-relevant center policies, number of provider training topics, and number of family education topics (continuous, entered together with demographics in step 2)].

Results

Sample

Of the 1506 surveys, 610 child care centers responded (40%). Head Start centers were included, but based on low response rate (3.6%, $n=19$) and significantly higher nutrition best practice scores compared with non-Head Start centers [feeding environment $t(626)=3.54$, $p<0.001$ and foods served $t(487)=2.04$, $p=0.02$], they were excluded, leaving an analytic sample of 588. All 24 Maryland counties were represented.

Center characteristics (Table 2) found in more than two-thirds of centers were independent (vs. organization sponsored), had more than 50 children, and accepted subsidy vouchers (Table 2). Fewer than 20% participated in CACFP, a slightly lower proportion than typically observed statewide (~30% of centers are CACFP enrolled in Maryland). Approximately 50% of centers had a student body of mostly ($\geq 70\%$) Caucasian students, 16.8% of centers had mostly ($\geq 70\%$) African American students, with the remaining centers having a diverse student body (33.0% had no single-race majority). Centers

Table 1. Nutrition/Physical Activity Center Policies, Provider Training, and Family Education

% Reported	Nutrition	% Reported	PA
Written Center Policy			
71.8	Beverages provided to children	51.9	Not taking away PA to manage challenging behaviors
76.5	Foods provided to children	32.0	Education for families on children's PA
14.8	Nonfood fundraisers	71.4	Amount of time provided each day for indoor and outdoor PA
47.4	Healthy mealtime environments	41.8	Limiting long periods of seated time for children
48.5	Foods offered during holidays/celebrations	54.8	Planned and informal PA education
42.5	Planned and informal nutrition education for children	48.5	Teacher practices that encourage PA
29.8	Professional development on child nutrition	74.1	Shoes and clothes that allow children and teachers to actively participate in PA
51.5	Teacher practices to encourage healthy eating		
35.7	Not offering food to calm children or encourage appropriate behavior		
Provider training topics covered			
58.2	Communicating with families about child nutrition	75.0	Encouraging children's PA
58.5	Food and beverage recommendations for children	46.3	Communicating with families about encouraging children's PA
62.4	Creating a healthy mealtime environment	65.0	Limiting long periods of seated time for children
49.5	Importance of variety in the child diet	73.6	Children's motor skill development
64.8	Our program policies on child nutrition	58.2	Our program policies on PA
56.3	Using positive feeding practices	38.6	Recommended amounts of daily PA for young children
61.2	Serving sizes for children		
Family education topics covered			
54.6	Food and beverage recommendations for children	65.3	Children's PA included encouraging children's PA
52.7	Creating a healthy mealtime environment	61.7	Children's PA included children's motor skill development
55.8	Importance of variety in the child diet	41.7	Children's PA included limiting long periods of seated time for children
65.0	Our program policies on child nutrition		
47.6	Using positive feeding practices		
PA, physical activity.			

that did not serve food (~10%) were not included in the food served best practice score. On average, centers reported 9.36 (SD=2.97) feeding environment best practices, 9.8 (SD=3.14) food served best practices, and 4.89 (SD=2.53) physical activity best practices, representing 52.0%, 51.7%, and 40.8% of possible items reported, respectively.

Feeding Environment Best Practices

Associations between demographic variables and best practice scores are presented in Table 2. Organization-sponsored centers reported higher feeding environment best practice scores compared with independent centers. Remaining demographic factors were not associated with

the feeding environment best practice score. Regression analyses are presented in Table 3. Race (two dummy-coded variables; majority African American and majority Caucasian), organization sponsored, and CACFP participation were included as covariates. A number of center policies and provider training topics were related to feeding environment best practice, accounting for 20% of the variance in feeding environment score.

Food Served Best Practices

CACFP-participating centers had higher food served best practice scores in bivariate models (Table 2). In adjusted models, centers that were majority African American

Table 2. Demographics by Nutrition and Physical Activity Practices

	In each group (%)	Feeding environment best practices, (n = 588), (18 total best practices)	t/F	Food served best practices, (n = 529), (19 total best practices)	t/F	PA best practices, (n = 588), (17 total best practices)	t/F
Overall mean $\pm$ SD (range)		9.36 $\pm$ 2.97 (2–18)		9.80 $\pm$ 3.14 (2–19)		4.89 $\pm$ 2.53 (0–12)	
Center size			0.28		–1.72		–1.15
>50 Students	64.8	9.38		9.63		4.80	
<50 Students	35.2	9.30		10.13		5.05	
Organization sponsorship			–2.39*		0.18		0.55
Independent	69.0	9.16		9.81		4.85	
Organization sponsored	31.0	9.79		9.76		4.97	
Subsidy voucher acceptance			0.25		0.43		1.40
Accept	73.1	9.34		9.77		4.80	
Not accept	26.9	9.41		9.91		5.13	
CACFP participation			0.91		3.42*		–1.16
Not participating	80.6	9.26		9.61		4.92	
Participating	19.4	9.54		10.68		4.61	
Race/ethnicity of student body			2.76		1.84		4.01*
Majority Caucasian ($\geq 70\%$)	50.2	9.14		9.88		4.75 ^a	
Majority African American	16.8	9.19		9.26		4.52 ^b	
Majority not Caucasian or African American	33.0	9.76		9.98		5.29 ^{a,b}	

^{a,b}Pairwise by group based on LSD multiple comparison test ($p < 0.05$).

* $p < 0.05$.

CACFP, Child and Adult Care Food Program; LSD, least significant difference; SD, standard deviation.

had lower food served best practice scores, while CACFP-participating centers and centers with a greater number of center policies reported engaging in more food served best practices (Table 3). The final model accounted for 8% of the variation in food served best practice.

Physical Activity Best Practices

In bivariate models (Table 2), both centers with a majority of African American student body and with a majority of Caucasian student body reported lower physical activity best practice scores in comparison with racially diverse centers (Table 2). Regressions (Model 3, Table 3) revealed that both majority of African American student body and CACFP participation were associated with lower physical activity best practice scores. In addition, a number of center policies, provider training topics, and family education topics were all uniquely predictive of physical activity best practice score. The fully adjusted model (step 2) accounted for 23% of the variance in physical activity best practice score.

Discussion

This study sought to understand nutrition and physical activity best practices in a diverse, statewide sample of child care centers. Centers reported that they implemented approximately half of the nutrition (feeding environment and foods served) best practices and fewer than half of the physical activity best practices. Center demographics, nutrition/physical activity-relevant center policies, and number of provider training and family education topics offered by the center were each examined and, to some extent, associated with best practices.

CACFP participation was associated with a greater number of food served best practices, even though all licensed child care centers in Maryland that serve food are required to follow CACFP standards (compliance, however, is only assessed among CACFP-enrolled centers).⁹ Several studies have shown that CACFP-enrolled facilities are more likely to engage in healthy feeding practices compared with non-CACFP facilities.^{40–42} The current

Table 3. Three Regression Models Predicting Feeding Environment, Food Served, and Physical Activity Best Practices

	Model 1: Predicting feeding environment				Model 2: Predicting food served				Model 3: Predicting PA best practices			
	best practices				best practices							
	B	Standard error	Significance	R ²	B	Standard error	Significance	R ²	B	Standard error	Significance	R ²
Step 1												
Intercept	9.513	0.237		0.02	9.700	0.259		0.04	5.53	0.21		0.02
Majority Caucasian ^a	−0.593	0.275	0.031*		0.059	0.303	0.846		−0.417	0.253	0.101	
Majority African American ^b	−0.545	0.372	0.143		−1.063	0.393	0.007*		−0.42	0.25	0.016*	
Organization sponsorship ^c	0.627	0.264	0.018*		−0.124	0.291	0.670		0.06	0.25	0.824	
CACFP participation ^d	0.204	0.326	0.532		1.437	0.343	<0.001**		−0.413	0.293	0.160	
Step 2												
Intercept	7.120	0.300		0.20	8.756	0.362		0.08	2.546	0.331		0.23
Majority Caucasian	−0.261	0.250	0.295		0.183	0.300	0.541		−0.360	0.226	0.112	
Majority African American	−0.342	0.337	0.311		−0.980	0.388	0.012*		−0.640	0.301	0.034*	
Organization sponsorship	0.457	0.241	0.058		−0.262	0.289	0.366		−0.157	0.223	0.481	
CACFP participation	−0.498	0.301	0.098		1.143	0.346	0.001**		−0.538	0.261	0.040*	
No. of center policies	0.258	0.056	<0.001**		0.219	0.067	0.001**		0.189	0.057	0.001**	
No. of provider training topics	0.257	0.064	<0.001**		0.034	0.077	0.662		0.236	0.087	0.007*	
No. of family education topics	0.090	0.090	0.317		−0.036	0.107	0.737		0.377	0.099	<0.001**	

^a≥70% Caucasian, coded in reference to <70% Caucasian student body.

^b≥70% African American, coded in reference to <70% Caucasian student body.

^cCoded in reference to independent center vs. organization sponsored.

^dCoded in reference to not participating.

* $p < 0.05$, ** $p < 0.01$.

study and the existing literature support the importance of strong nutrition guidelines and oversight, both of which the CACFP provides.

The current study found that centers with a majority of African American student body reported fewer food served best practices and physical activity best practices, compared with centers without a majority of African American student body. Given the importance of culture in food, future studies should further explore the role of the race/ethnicity of the student body as it relates to foods provided in child care centers.

Centers sponsored by a large organization reported more feeding environment best practices compared with independent centers. Organization-sponsored centers may have greater access to resources, supplies, and provider training opportunities to support a healthy feeding environment. Given the overall decentralization of child care centers (in comparison with schools, with school district oversight), strategies are needed to support independent centers in meeting best practices.

Centers that had more comprehensive nutrition/physical activity-relevant policies reported more best practices in

all three areas (feeding environment, foods served, and physical activity). A growing body of research supports comprehensive wellness policies in child care to promote healthy weight practices.^{43,44} The federal government has mandated written wellness policies for school districts serving school-aged children that participate in USDA meal programs,⁴⁴ however, no such legislation exists in child care.

Training for child care providers is key to enhance provider knowledge and practices related to healthy weight in children and foster center policy development.^{30–33,36–38,45} Report of offering a greater variety of provider training opportunities was associated with more feeding environment and physical activity best practices in the current study, but not food served best practices. The decision of foods provided in a child care center setting is often made by the director or food service staff, and not the classroom providers, perhaps explaining this null finding. Additional research is needed related to specific training opportunities that are effective in supporting a health-promoting environment and knowledge around nutrition and physical activity.

Child care staff are often trained to address healthy center-based practices. However, the level of parent engagement needed to form collaborative relationships that promote healthy practices at both centers and homes is understudied. In the current study, family education opportunities were positively associated with meeting more physical activity best practices. Strategies to engage with parents are emerging, as shown by a study in Connecticut that reached 73% of parents by training community health workers to engage in brief (1–3 minutes) interactive education modules with parents at pickup and drop-off times and in group sessions.⁴⁶ A qualitative study with staff and parents using a method focused on family engagement, with solution-focused and motivational principles, found that training staff to teach and motivate parents increased the confidence of staff to work with parents around healthy lifestyle topics.⁴⁷ Further research into strategies to enhance parent engagement is recommended to realize the opportunity that child care centers present as untapped resources for obesity prevention.⁴⁸

This study had both strengths and limitations. Strengths include a large, diverse, statewide sample of child care centers and the use of a commonly used tool to examine nutrition/physical activity best practices in child care. The primary limitation is the low response rate (40%), raising concerns about representation and reporting bias. It was not possible to examine factors associated with not responding as the state does not have a central database of child care center demographics. In addition, the survey examined the number of policies, provider training topics, and family education opportunities available related to nutrition/physical activity. Greater precision in each of these areas would yield additional information. Finally, this cross-sectional survey does not consider ongoing improvements in healthy weight best practices related to nutrition/physical activity.

This study provides foundational information for future studies examining specific center-based policies and rela-

tionships with healthy nutrition/physical activity practices. Further descriptive research related to demographics of centers and the populations served is needed to identify variables and association with implementation of best practices. Qualitative studies exploring center-based and family environment factors would be particularly useful in learning more about the context of health-promoting practices and behaviors. In addition, studies examining HEPA practices for the youngest children in center-based care, 0–2 years of age, including a focus on breast feeding support, are needed. Finally, expanding a study such as this to include a focus on family child care homes is needed.

In conclusion, comprehensive center policies, provider training, and family education opportunities are positively associated with nutrition/physical activity best practices in child care centers, illustrating the opportunities for child care centers to contribute to healthy habits and obesity prevention among young children.

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