Influence of teachers' personal health behaviors on operationalizing obesity prevention policy in Head Start preschools: A project of the Children's Healthy Living Program (CHL)

Authors: Monica Esquivel¹, Claudio R. Nigg², Marie K. Fialkowski¹, Kathryn L. Braun², Fenfang Li¹, Rachel Novotny¹

¹ University of Hawai'i at Mānoa, Department of Human Nutrition Food & Animal Sciences

² University of Hawai'i at Mānoa, Office of Public Health Studies, John A. Burns School of Medicine

This project is supported by the Agriculture and Food Research Initiative Grant no. 2011-68001-30335 from the USDA National Institute of Food and Agricultural Science Enhancement Coordinated Agricultural Program, the staff of the Children's Healthy Living Program, Honolulu Community Action Program Head Start Program

Abstract

Objective: To quantify Head Start (HS) teacher mediating and moderating influence on effect of a wellness policy intervention.

Methods: Twenty-three HS classrooms within two previously randomized communities from a larger randomized community trial participated. The 7 month multi-component intervention included policy changes to food served and service style, wellness initiatives for employees paralleling classroom activities for preschoolers on the benefits of physical activity (PA) and healthy eating, and training and technical assistance. The intervention effects on nutrition and PA practices in classrooms were measured through observations. Questionnaires assessed teachers' knowledge, beliefs, priorities and misconceptions around child nutrition and monthly surveys assessed changes in teachers' personal health behaviors and status to measure the intervention effect on teachers and their influence on the intervention effect on classroom practices.

Results: Teacher health behaviors played a moderating role, strengthening the intervention effect. A greater intervention effect on the PA practices and promotion in classrooms was found where teachers reported higher than average improvements in their own health status and behaviors.

Conclusions and Implications: This multi-component intervention was successful in improving the PA environment of HS classrooms. Multi-component interventions which target children and teachers may produce greater effect on the PA environment in classrooms.

1 Introduction

2 Childhood overweight and obesity is defined as having a body mass index (BMI) for age
3 above the 85th percentile. It is a serious public health concern in the United States (US),¹⁻² and
4 increases risk for cardiovascular disease, diabetes, cancer, and for adult overweight and obesity.³⁻
5 ⁶ Prevalence of childhood obesity is especially high in Native Hawaiian and Pacific Islander
6 children.⁷⁻⁹ In Hawai‘i, about 39% of children entering kindergarten are overweight or obese.⁹

7 An obesogenic environment refers to the social and built environments (e.g., policies,
8 food availability, access to physical activity (PA), norms) that encourage people to eat more
9 calories than they expend, leading to obesity.¹⁰ The already high prevalence of unhealthy weight
10 combined with the dynamic interactions between personal and built environmental factors
11 contribute to risk for developing obesity and has created a need for multi-level interventions that
12 address various environmental factors and influences of obesity¹⁰.

13 The early childhood years present a sensitive time when a child’s lifelong eating habits
14 and risk for future obesity are developed.^{11,12} Childcare centers are good venues for obesity
15 prevention. About half of US children under age five spend a significant amount of time in these
16 centers, where they consume two-thirds of their daily nutritional needs through meals and
17 snacks.¹³⁻¹⁴ Many US states have made progress towards implementing childcare center licensing
18 requirements preventing childhood obesity, but such requirements are not currently in place in
19 Hawai‘i.¹⁵

20 Head Start (HS) is a federally funded preschool program serving low-income children
21 three to five years of age.¹⁶ HS teachers have an influential role in assuring compliance with
22 nutrition policies, thus serving as a potential leverage point for obesity prevention efforts through

policy change.¹⁷⁻¹⁸ Successful HS interventions have used collaborative approaches and have provided training and technical assistance for new policy implementation and facilitated employee wellness activities to support childhood obesity prevention efforts.¹⁹⁻²⁴ For example, Lanigan's wellness policy intervention was based on three principles; that providers would be more likely to adopt childhood obesity prevention practices if 1) they felt that failure to do so would be damaging to children, 2) they felt they could make a difference in children's eating habits and 3) were provided with training and tools to make changes. The intervention collaborated with teachers to create center goals for obesity prevention and provided education, training, and resources to implement their goals. The study found positive correlations between center staff's feeding knowledge, misconceptions, and self-efficacy and observed childcare center meal time feeding practices, nutrition education, and family communication, suggesting that teachers are an influencing factor on classroom practices.²³ Another employee wellness intervention, targeting improving the health status and behaviors of preschool teachers, demonstrated a positive effect on teachers' self-efficacy for communicating nutrition information to parents and on frequency of fruits and vegetables served at centers, suggesting that interventions promoting teacher wellness can have effects that impact child health, in this case increasing the availability of fruits and vegetables in classrooms.²² Other studies have demonstrated teachers' feeding styles influence child food consumption²⁵ and that teachers' lack of concern about childhood obesity becomes a barrier to prevention efforts.¹⁸ These influences, along with the findings on the effects of employee wellness on classroom availability of fruits and vegetables, suggest that teacher-level characteristics could explain some level of intervention effectiveness or ineffectiveness in these studies. It is plausible that teachers, who are making

improvements to their own personal health habits, including physical activity and eating, may place a greater emphasis on PA and healthy eating in their classrooms.

Mediation and moderation analysis offers a means of improving understanding of intervention and program outcomes.²⁶ A mediating variable is a one that accounts for the significant relationship observed between an independent and dependent variable, providing potential explanation for the results seen.²⁷ For example, an intervention successful at improving child behaviors, like PA level, as a result of a policy intervention may be explained by an intervention effect on the social or psychosocial variables, such as improved attitudes of intervention implementers on PA. On the other hand, a moderating variable affects the direction and/or strength of the relationship between an independent and dependent variable. This third variable represents an interaction effect between those variables, and provides information on conditions in which an intervention can achieve the desired results.²⁷ A moderation analysis may determine that a PA intervention was successful at improving the PA levels of females, but not males, thus identifying gender as a moderating variable. Childhood obesity prevention interventions have yielded varying levels of effect on child and environmental outcomes, but often lack mediation and moderation analysis, resulting in imprecise implications for future practice.¹⁸⁻²⁵ Baranowski and Russell provide a model for intervention evaluation, specifically designed to enhance the understanding of how interventions yield desired outcomes.²⁶ Implementation of this analysis can provide more information on the mechanisms behind intervention effects, thus improving precision of recommendations for practice.

This study's primary objective was to build evidence on the influence of HS teachers' on the effect of childcare center wellness policies on the nutrition and PA environment of HS classrooms in Hawaii. i. Specifically, the focus is on HS teachers' health status, eating and PA

behaviors, and efficacy, misconceptions, and knowledge related to child nutrition and priority placed on childhood obesity prevention. Figure 1 depicts the framework for this study based on the social ecologic model, specifically the relationship between the wellness policy intervention, the teacher level mediating and moderating variables, the classroom environment and child level outcomes related to obesity. We hypothesized that the intervention effect on the HS PA and nutrition environment would be explained (mediated) in part by teacher's prioritization of child nutrition and beliefs that were consistent with evidenced based practices for childhood obesity prevention, as measured by the Child Care Provider Healthy Eating and Activity survey (CCPHEA). Improvements in teachers' scores, such as teacher priority, could explain why the intervention was effective at improving the classroom PA environment. Greater priority placed on childhood obesity, prevention, and healthy eating by teachers as a result of the intervention, could explain why the policy intervention that included activities that promoted classroom PA were more effective at improving the classroom environment. We also hypothesized that teachers' own personal health behaviors, physical activity and healthy eating and health status would also influence (moderate) the intervention effect on the classroom environment.

Methods

Setting

This research was embedded within the randomized community trial, the Children's Healthy Living Program for Remote Underserved Minority Populations in the Pacific Region (CHL).²⁸ Twenty-three HS classrooms located in two communities on O'ahu joined the study, including 11 HS classrooms in the intervention group, and 12 HS classrooms in the delayed-intervention group. After teachers completed informed consent, children from the 23 HS

classrooms were recruited to participate at HS orientation meetings and in their classrooms by the researcher and/or HS teacher. Parents of children at HS provided consent for child participation. This research was approved by the Institutional Review Board from University of Hawai‘i at Mānoa.

Intervention

The multi-component intervention was seven months long, and aimed to support teachers in implementing wellness policies to promote nutrition and PA in their classrooms to affect multiple contributing factors to obesity-food availability, classroom activities and practices and social norms. Described more fully elsewhere²⁹, this included changes to meal service style and types of food served, e.g., 100% fruit juice was removed from meal and snack menus and only whole fresh or canned fruit was offered as the fruit component. Teachers were supported with classroom resources from the Healthy Habits for Life curriculum, training and technical assistance and through monthly employee wellness activities that reinforced their role as models for healthy eating and PA in the classroom. Figure 1 lists the intervention activities that were included. Monthly wellness topics were parallel to classroom resources; for example, for one month the wellness activity for teachers was on the benefits of physical activity with walk-a-mile maps around their centers and the classroom activity included a read and dance poem about the heart and being active. Policy implementation and teacher wellness activities started in October 2013, the second month of the HS program year, following baseline data collection and ended in May 2014.

Assessment Tools

Table 1 lists the three assessment tools that were used. The Environment and Policy Assessment and Observation (EPAO) tool assessed changes in the nutrition and PA environment of the classroom as a result of policy.³⁰ The protocol consisted of a full-day visit to review documents and observe activities. EPAOs were completed by graduate student interns who were trained by the researcher and who were blinded to the study arm of the classrooms being observed. One or two interns simultaneously observed each of the classrooms at baseline in April-May 2013 and a year later in April-May 2014.

The Child Care Provider Health Eating Activity Survey (CCPHEA) is a validated tool developed by Lanigan and colleagues that assesses child care providers' efficacy, knowledge, misconceptions and priorities regarding their role in child feeding, nutrition and obesity prevention (Table 1).²³ It was selected to demonstrate the mediating role of teachers on the effect of policy implementation on environmental changes (EPAO scores). HS staff in intervention and delayed intervention classrooms completed the survey prior to participation in the wellness policy training in August 2013 and at again in April-May 2014.

A monthly survey assessing teacher health status, diet habits and PA behaviors was adapted from a previous study, prompting teachers to assess changes in their own health status, diet and PA behaviors (11 items in total) as a result of the monthly employee wellness activities.³¹ Survey items were used to calculate a Health Behavior Indicator (HBI) score (Table 1). HBI scores were used in the moderation analysis of HS teachers' health status on the intervention effect.

Statistical Analysis

Paired t-tests were used to assess HS center-level changes. Multiple regression models were used to compare HS center-level outcomes in nutrition and PA practices between the intervention and delayed intervention classrooms, controlling for baseline scores.

To test the mediating effect of teacher CCPHEA scores (efficacy, priority, knowledge, misconceptions) on the intervention effect of class-level, Baron and Kenny's criteria for the establishment of mediation were followed.²⁷ A series of linear regression models were estimated to test whether detected effects of the intervention on class-level outcomes were mediated by teacher CCPHEA. For mediation to be inferred, the association originally found between the intervention and the outcome variables had to be decreased or eliminated after mediators were added to the model.²⁷

To test the moderating effect of teacher HBI scores (teachers' health status, diet and PA behaviors) on the intervention effect of class-level outcomes, teacher HBI scores were dichotomized to 1=scores at or above the mean or, 0=scores below the mean. An interaction term was then created between the intervention variable (coded as 1=treatment group and 0=delayed intervention group) and HBI variables and added to the regression models.

Statistical significance for all tests was set at $p < 0.05$ for 2-tailed tests and conducted using SAS© version 9.4 (Chapel Hill, North Carolina).

Results

The teacher sample included 46 teachers from 23 HS classrooms, two teachers per HS classroom. EPAOs were completed at baseline and at 7-month follow up for all 23 classrooms. CCPHEA surveys were completed by one or both HS teachers in each classroom at baseline and

153 follow up. In cases where both teachers completed CCPHEA surveys, the mean score of the two
154 teachers was used for analysis.

155 No baseline significant difference was observed between intervention HS classes and
156 delayed intervention HS classes in EPAO-total score nutrition and PA environment, or in teacher
157 CCPHEA scores on misconception, knowledge, or priority related to child nutrition (Table 2).
158 Only the baseline mean teacher CCPHEA efficacy score was significantly higher in the
159 intervention classrooms (mean=7.00, SD=1.00) than in the delayed intervention classrooms
160 (mean=6.10, SD=0.80).

161 Teacher HBI scores ranged from 3 to 10.8 out of a possible 0 to 11. There was no
162 significant difference in the mean average monthly teacher HBI scores between intervention and
163 delayed intervention classrooms (7.67 ± 2.00 and 7.27 ± 2.11 , $p=0.88$).

164 General linear regression model results on the differences between intervention and
165 delayed intervention groups' follow-up EPAO-PA and EPAO-total scores, adjusting for baseline
166 scores and testing for CCPHEA-priority mediation, are presented in Table 3. There were no
167 significant differences in EPAO-nutrition or any of the other CCPHEA scores between the
168 intervention and delayed intervention groups. Mediation analysis found evidence of a mediating
169 effect for only CCPHEA-priority on the intervention effect on EPAO-total but not on EPAO-PA
170 (See Table 3). The difference on EPAO-total between the two groups was reduced by 0.2 points
171 from 1.1 to 0.9 and the difference between groups was no longer significant at $p=0.05$ level.

172 Moderation analysis demonstrated that in classrooms where teachers reported above
173 average HBI scores, the intervention had a greater effect on the EPAO-PA and EPAO-total
174 scores than classrooms where teachers reported below average HBI scores (Table 4). The
175 classrooms in which teachers reported above-the-mean improvements in their own health

behaviors also showed greater intervention effect on EPAO-PA and EPAO-total scores (See Figure 2).

Discussion

The findings suggest positive effects of a policy intervention on the HS PA environment. More importantly, they demonstrate the significant impact that HS teachers' personal health behaviors, as well as the priority they place on child nutrition, have on the success of a classroom-based intervention. However, the policy intervention, which included changes to meal-service style and types of foods and beverages served, did not have a significant impact on the HS nutrition environment.²⁹ Other components of the intervention that aimed at improving teachers' level of PA, for example worksite wellness lessons on the benefits of PA and maps outlining a one-mile walking path near their center, alongside classroom activities that supported PA were effective at improving the PA environment in these classrooms.

Other interventions similarly show greater changes observed in the PA components of the classroom environment than the nutrition components. In the DECAL study, significant effects of policy intervention on both the nutrition and PA components of the EPAO scores showed a smaller proportion of improvement in the nutrition sub-areas (2 out of 8) compared with the PA sub-areas (5 out of 8).²⁰

However, in this study, there was a mediating relationship between CCPHEA-priority scores and the intervention effect. In classrooms where higher priority was given to child nutrition, there was an observed increase in intervention effect. Lanigan's ENHANCE intervention program found positive correlations between other CCPHEA variables, but not priority, and intervention effect on the classroom environmental factors.²³ In a qualitative study, beliefs held by HS teachers, such as low priority placed on childhood obesity, were identified as

barriers to obesity prevention efforts.¹⁸ The current study's finding that teacher priority about child nutrition influence the intervention effect quantitatively supports past qualitative evidence that the lack of priority placed on childhood obesity by HS teachers can be a barrier to prevention efforts.¹⁸

A moderating effect of teachers' own health behaviors and status was found on the intervention effect on the classroom environment. Teachers who reported improvements in their own PA levels, weight control, dietary habits, skills and knowledge on nutrition, above the mean, saw greater intervention effect on the PA classroom environment than teachers who showed no improvements. Other child care provider employee wellness interventions demonstrated similar effects of intervention activities on classroom outcomes, primarily related to foods offered in the classroom.^{22, 23} Both of these findings support the influential role teachers play in facilitating a nutrition and PA promoting environment in preschool settings. It is likely that teachers who are moving towards improvements in their own health behaviors and status will give rise to classrooms where obesity-prevention efforts are better supported. For example, a teacher who is increasing his/her own physical activity level may be more likely to engage in physical activity with children or may have experienced the benefits of physical activity personally, feeling more motivated to promote physical activity in the classroom. Figure 1 demonstrates how the intervention and outcomes address multiple factors that influence obesity, the organizational or school environment, the social interactions and relationships that occur in these places and lastly the behaviors that can develop in these settings. The findings from this study suggest that an intervention that includes multiple components within the organizational or school environment, in this case employee wellness coupled with classroom based activities can produce a greater intervention effect on aspects of the classroom environment. The results of this study support the

need for multi-component interventions that influence classroom practices as well as teachers who are responsible for implementing nutrition and health policy.

This study has some limitations. The reliance on single assessments of classroom observations and on self-reported changes in teachers' health status, diet and PA behaviors is limiting. Repeat and alternative assessments should be included in future investigations. Finally, while the communities included in the research study were previously randomized and matched based on US census data on race/ethnicity, income and size²⁸, the sample is limited to this geographic region of Hawai'i and may not be generalizable.

Implications for Research and Practice

The findings from this study demonstrate the effects of a policy intervention for childhood obesity prevention on classroom-level outcomes, including the influence that teacher-level variables have on the intervention effect, the first of its kind in Hawai'i. This study supports the hypothesis that HS teachers serve as a leverage point for creating environments that promote PA and possibly a gatekeeper for childhood obesity prevention in preschool settings. Future research and intervention efforts could be targeted at improving teachers' health practices, such as healthy eating and physical activity, delivered through employee-sponsored worksite wellness initiatives or be incorporated into extension education curriculum. Wellness activities and campaigns may be able to capitalize teachers as role models of health for children in their classroom by providing suggestions on how to be active with the children during active play or healthy lunch ideas. Effort to increase the effects of wellness policies in preschools should be multi-level and consider including components focused on helping teachers make positive changes in their personal health behaviors. Future research efforts should include more focused assessments of changes that occur from employee wellness initiatives that affect specific aspects

of the PA environment in classrooms. This could include identifying if the improvement in HBI scores comes primarily from improvements in PA level. Additional studies on how to significantly improve the nutrition environment are needed, as well as interventions that include other factors related to obesity, like parent and home environments, that are likely to influence childhood obesity and dietary intake.

References

1. Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *JAMA*. 2003;291(23):2847-2850.
2. 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.
3. Ogden CL, Flegal KM. Changes in terminology for childhood overweight and obesity. *Natl Health Stat Report*. 2010;25(25):1-5.
4. Freedman DS, Mei Z, Srinivasan SR, Berenson GS, Dietz WH. Cardiovascular risk factors and excess adiposity among overweight children and adolescents: the Bogalusa Heart Study. *J Pediatr*. 2007;150(1):12-17 e12.
5. Freedman DS, Khan LK, Dietz WH, Srinivasan SR, Berenson GS. Relationship of childhood obesity to coronary heart disease risk factors in adulthood: the Bogalusa Heart Study. *Pediatrics*. 2001;108(3):712-718.
6. Freedman DS, Khan LK, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. The relation of childhood BMI to adult adiposity: the Bogalusa Heart Study. *Pediatrics*. 2005;115(1):22-27.
7. Novotny R, Fialkowski MK, Li F, et al. Systematic review of prevalence of young child overweight and obesity in the United States- Affiliated Pacific region compared with the 48 contiguous states: the Children's Healthy Living Study. *Am J Public Health*. 2015; 105 (1): e22-35.

- 289 8. Baruffi G, Hardy CJ, Waslien CI, Uyehara SJ, Krupitsky D. Ethnic differences in the
290 prevalence of overweight among young children in Hawai'i. *J Am Diet Assoc.*
291 2004;104(11):1701-1707.
- 292 9. Pobutsky A, Bradbury E, Reyes-Salvail F, Kishaba G. Overweight and obesity among Hawai'i
293 children aged 4 to 5 years enrolled in public schools in 2007-2008 and comparison with a
294 similar 2002-2003 cohort. *Hawai'i J Med Public Health.* 2013;72(7):225-236.
- 295 10. Huang TT, Drewnoski A, Kumanyika S, Glass TA. A systems-oriented multilevel
296 framework for addressing obesity in the 21st century. *Prev Chronic Dis.* 2009;6(3):A82.
- 297 11. Nicklaus S. Development of food variety in children. *Appetite.* 2009;52(1):253-255.
- 298 12. Serdula MK, Ivery D, Coates RJ, Freedman DS, Williamson DF, Byers T. Do obese children
299 become obese adults? A review of the literature. *Prev Med.* 1993;22(2):167-177.
- 300 13. Federal Interagency Form on Child and Family Statistics. America's children: key national
301 indicators of well-being 2013. Washington DC: U.S. Government Printing Office.
- 302 14. U.S. Department of Education NCfES, National Education Surveys Program. Child care:
303 percentage of children ages 3-6, not yet in kindergarten, in center-based care
304 arrangements by child and family characteristics, and region, selected years 1995-2007.
305 <http://www.childstats.gov/americaschildren/tables/fam3b.asp?popup=true>. Accessed
306 February 6, 2013.
- 307 15. Benjamin SE, Cradock A, Walker EM, Slining M, Gillman MW. Obesity prevention in child
308 care: a review of U.S. state regulations. *BMC Public Health.* 2008;8:188.

- 309 16. Administration for Children and Families: About Head Start.
310 <http://www.acf.hhs.gov/programs/ohs/about/head-start>. Accessed April 4, 2014.
- 311 17. Lumeng JC, Kaciroti N, Sturza J, et al. Changes in Body Mass Index Associated With Head
312 Start Participation. *Pediatrics*. 2015;135(2): e449-e456.
- 313 18. Hughes CC, Gooze RA, Finkelstein DM, Whitaker RC. Barriers to obesity prevention in
314 Head Start. *Health Aff*. 2010;29(3):454-462.
- 315 19. Ward DS, Benjamin SE, Ammerman AS, Ball SC, Neelon BH, Bangdiwala SI. Nutrition and
316 PA in child care: results from an environmental intervention. *Am J Prev Med*.
317 2008;35(4):352-356.
- 318 20. Lyn R, Maalouf J, Evers S, Davis J, Griffin M. Nutrition and PA in child care centers: the
319 impact of a wellness policy initiative on environment and policy assessment and
320 observation outcomes, 2011. *PCD*. 2013;10:E83.
- 321 21. Alkon A, Crowley AA, Neelon SE, et al. Nutrition and PA randomized control trial in child
322 care centers improves knowledge, policies, and children's body mass index. *BMC Public*
323 *Health*. 2014;14(1):215.
- 324 22. Gosliner WA, James P, Yancey AK, Ritchie L, Studer N, Crawford PB. Impact of a worksite
325 wellness program on the nutrition and PA environment of child care centers. *Am J Health*
326 *Promot*. 2010;24(3):186-189.
- 327 23. Lanigan JD. The relationship between practices and child care providers' beliefs related to
328 child feeding and obesity prevention. *J Nutr Educ Behav*. 2012;44(6):521-529.

- 329 24. de Silva-Sanigorski AM, Bell AC, Kremer P, et al. Reducing obesity in early childhood:
330 results from Romp & Chomp, an Australian community-wide intervention program. *Am J*
331 *Clin Nutr*. 2010;91(4):831-840.
- 332 25. Hughes SO, Patrick H, Power TG, Fisher JO, Anderson CB, Nicklas TA. The impact of child
333 care providers' feeding on children's food consumption. *J Dev Behav Pediatr*.
334 2007;28(2):100-107.
- 335 26. Baranowski T, Russell J. Understanding the mechanisms of change in children's physical
336 activity programs. *Exer Sport Sci Rev*. 2005;33(4):163-168.
- 337 27. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological
338 research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol*.
339 1986;51(6):1173-1182.
- 340 28. Wilken LR, Novotny R, Fialkowski MK, et al. Children's Healthy Living (CHL) Program for
341 remote underserved minority populations in the Pacific region: rationale and design of a
342 community randomized trial to prevent early childhood obesity. *BMC Public Health*.
343 2013;13:944.
- 344 29. Esquivel MK, Nigg C, Fialkowski MK, Braun K, Li F, Novotny R. Head Start Wellness
345 Policy Intervention in Hawaii: A project of the Children's Healthy Living Program
346 (CHL). *Childhood Obesity*. 2015;12(1):26-32.
- 347 30. Ward D, Hales D, Haverly K, Marks J, Benjamin S, Ball S, Trost S. An instrument to assess
348 the obesogenic environment of child care centers. *Am J Health Behav*. 2008;32(4):380-
349 386.

31. Yin Z, Parra-Medina D, Cordova A, et al. Miranos! Look at us, we are healthy! An
environmental approach to early childhood obesity prevention. *Child Obes.*
2012;8(5):429-439.

Figure 1. Conceptual framework of suggested mediating and moderating effects of teacher level outcomes that may influence the relationship between the wellness policy intervention and changes in classroom and child outcomes, within the social-ecological model of obesity prevention.

Figure 2. The Environment and Policy Assessment and Observation (EPAO) Total and Physical Activity (PA) mean scores for intervention and delayed-intervention group at follow up by teachers' reported improvements in health behaviors and indicators below or above the mean.

Figure 1

Figure 2

Table 1: Assessment tools and scoring methodology used for measuring intervention effect on the classroom environment and the teachers' influence on that relationship.

Assessment Tool Description	Assessment Items		Scoring Methodology
Environment and Policy Assessment and Observation (EPAO)²⁸ <i>Tests the effect of policy implementation and intervention on nutrition and PA classroom environment</i>	Nutrition Sub-Areas	Physical Activity (PA) Sub-Areas	-Items (n=81) coded 0, 1, or 2 (0= least desirable, 2= most desirable) -Mean of each sub-area items multiplied by 10 (range 0-20) for a sub-area score -Mean of 8 nutrition sub-areas=total nutrition score -Mean of 8 PA sub-areas=total PA score -Mean of total nutrition and PA scores= total EPAO score for each classroom at baseline and follow-up
	1. Fruits and Vegetables	1. Active opportunities	
	2. Grains	2. Sedentary opportunities	
	3. High Sugar High Fat Foods	3. Sedentary environment	
	4. Beverages	4. Portable play environment	
	5. Nutrition Environment	5. Fixed play environment	
	6. Staff Nutrition Behaviors	6. Staff PA behaviors	
	7. Nutrition Training and Education	7. PA training and education	
Child Care Provider Healthy Eating and Activity (CCPHEA) Survey²³ <i>Assess teachers' efficacy, knowledge, and misconceptions about child nutrition and priority placed on childhood obesity prevention</i>	8. Nutrition Policy	8. PA policy	- Responses coded 1 to 4 ("strongly disagree" to "strongly agree") with a lower score for the more desirable response. -Four category scores calculated (efficacy, misconceptions, knowledge, priority) by summing the category
	1. Healthful eating and activity practices in child care can counter less healthful practices in a child's home.		
	2. How children eat while at child care has little or no effect on food habits and beliefs because those are formed at home (reverse scored).		
	3. Child care settings contribute to children's eating habits.		
	4. When children serve themselves, they are likely to eat more.		
	5. Giving children a food treat to reward good behavior is an effective way to manage a classroom.		
	6. Society has gone overboard limiting sweets and other desirable food.		
	7. In your role working with children, what priority do you put on health promotion and childhood obesity prevention?		

Table 1: Assessment tools and scoring methodology used for measuring intervention effect on the classroom environment and the teachers' influence on that relationship.

Assessment Tool Description	Assessment Items	Scoring Methodology
	<p>8. In your role working with children, how much time are you willing to spend encouraging healthful activity and eating in order to prevent childhood obesity?</p> <p>9. How often do you communicate with parents about their child's food consumption while in your care?</p> <p>10. Child care providers should eat the same food as the children in their care.</p> <p>11. Children should participate in all aspects of mealtime/snack while at child care (preparing, serving, and cleaning up).</p> <p>12. It is important for child care providers to sit with children while they eat.</p> <p>13. When a child asks for more food, it is important to check to see if they are still hungry before giving them more.</p> <p>14. A picky eater should be left alone rather than pressured to try new food.</p>	<p>items (range 3-20)</p> <ul style="list-style-type: none"> - Efficacy: questions #1-3 - Misconception: questions #4-6 - Feeding Knowledge: questions #10-14 - Priority: questions #7-9
<p>Monthly teacher health status, diet habits and PA behavior survey²⁹</p> <p><i>Changes in teacher health status, diet habits and PA behaviors</i></p>	<p>Have you seen an improvement in your knowledge and skills of physical activities?</p> <p>Have you seen an improvement in your knowledge and skills of nutrition and healthy eating?</p> <p>Have you seen an increase in physical activity?</p> <p>Have you been choosing water over soda and sugary drinks?</p> <p>Have you been eating more vegetables and fruits?</p> <p>Have you been reducing your portion size?</p> <p>Have you seen an improvement in your overall physical health?</p> <p>Have you seen any loss of body weight?</p> <p>Have you seen any improvement in your cholesterol?</p> <p>Have you seen any improvement in your blood pressure?</p> <p>Have you seen any improvement in your mental health?</p>	<p>- "Yes" = 1 and "No" = 0</p> <p>- Sum of responses calculated each month (range 0-14)</p> <p>- Mean of each month's total taken to create one Health Behavior and Indicators score per classroom</p>

Table 2 Covariate adjusted means of class-level Environment and Policy Assessment and Observation (EPAO) nutrition, physical activity (PA) and total scores and Child Care Provider Healthy Eating and Activity (CCPHEA) misconception, priority, knowledge and efficacy related to child-nutrition at post-intervention, comparing the intervention and control classrooms*

Variables	Intervention Group Mean (SE)	Control Group Mean (SE)	<i>P</i> value**
EPAO-Nutrition	14.9 (0.40)	14.9 (0.39)	0.98
EPAO- PA	16.5 (0.45)	14.3 (0.43)	0.002
EPAO- Total	15.7 (0.33)	14.6 (0.32)	0.039
CCPHEA-Misconceptions	6.5 (0.20)	6.4 (0.21)	0.847
CCPHEA- Priority	9.8 (0.37)	9.5 (0.40)	0.641
CCPHEAS-Knowledge	9.7 (0.41)	10.0 (0.43)	0.534
CCPHEA- Efficacy	6.1 (0.35)	5.6 (0.38)	0.321

* General linear regression model adjusted for baseline values;

** Global F test that at post-intervention, the difference in means between the two groups is zero.