Preventive Medicine xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina

Rebecca A. Battista [a,*], Hillary Oakley [a], Melissa S. Weddell [a], Lanay M. Mudd [b], J.B. Greene [c], Stephanie T. West [a]

[a] Appalachian State University, Department of Health, Leisure and Exercise Science, 111 Rivers Street, Boone, NC 28608, USA
[b] Michigan State University, Department of Kinesiology, 308 W. Circle Drive, East Lansing, MI 48824, USA
[c] Appalachian District Health Department, 126 Poplar Grove Connector, Boone, NC 28607, USA

ARTICLE INFO

Available online xxxx

Keywords:
Child care
Physical activity
Nutrition
Rural health
Obesity

ABSTRACT

Objective. To determine if child care centers in rural, Western North Carolina met recommendations for nutrition and physical activity, if focusing on nutrition and physical activity practices and policies was effective in improving the center environment, and if differences existed between centers affiliated or unaffiliated with schools.

Methods. Of 33 child care centers in three counties, 29 submitted mini-grant requests and participated in a pre-post evaluation using Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC). NAP SACC assesses compliance for nutrition and physical activity recommendations and standards. Between October 2011 and April 2012, centers participated in workshops and goal setting specific to nutrition and physical activity.

Results. At baseline, over 95% of the centers met all recommendations. However, post-intervention, Wilcoxon Signed Ranks Test ($p < 0.05$) indicated significant improvement across center types in five out of 37 nutrition and seven out of 17 physical activity standards following the intervention. Centers unaffiliated with schools made significant changes in ten nutrition standards, while those affiliated with schools improved in only two standards and decreased on one standard.

Conclusion. Overall, rural child care centers in Western North Carolina were meeting standards, they were still able to strengthen policies and practices by following NAP SACC. This was especially true for centers unaffiliated with schools. Continued financial support may assist centers in sustaining increased physical activity in children.

© 2014 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/3.0/).

Introduction

Childhood obesity continues to be a leading health concern in the United States and in children of low-income families obesity is even more prevalent (Wang and Beydoun, 2007). Rural areas, which tend to have larger proportions of low-income residents, also have a greater percentage of persons who are classified as overweight or obese. In North Carolina, rural counties have a higher percentage of residents below the average poverty levels compared to both the United States and the rest of the state (United States Census Bureau); moreover, these counties have reported that 12–23% of the children ages 2–5 years in low income families are overweight or obese (North Carolina Nutrition and Physical Activity Surveillance System).

Child care centers are now recognized as a critical place to begin tackling the obesity epidemic. The reasons are multiple: 1) more than half of children aged 3–5 years spend time in center-based child care settings; 2) children who are obese are more likely to be obese as adolescents and adults (Serdula et al., 1993); and 3) the environment of the child care center itself can impact the physical activity of children (Bower et al., 2008). Factors that influence the environment include staff modeling and encouragement, foods offered and how they are served, play equipment and spaces available to use it, and written policies guiding center practices.

In light of their potential importance for the prevention of obesity, these settings should be evaluated for compliance with health standards and promotion of healthy lifestyles. The Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) is one such intervention that can be used to address healthy weight behaviors in child care settings (Ammerman et al., 2007). It consists of a self-assessment performed by child care center directors to evaluate the nutrition and physical activity environment. The NAP SACC has been endorsed by the Center for Excellence in Training and Research Translation and the White

Abbreviation: NAPSACC, Nutrition and Physical Activity Self-Assessment for Child Care.

* Corresponding author at: 111 Rivers Street, Appalachian State University, Department of Health, Leisure and Exercise Science, Boone, NC 28608, USA.
E-mail address: battistara@appstate.edu (R.A. Battista).

http://dx.doi.org/10.1016/j.ypmed.2014.01.022
0091-7435/© 2014 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/3.0/).

Please cite this article as: Battista, R.A., et al., Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina, Prev. Med. (2014), http://dx.doi.org/10.1016/j.ypmed.2014.01.022

ARTICLE IN PRESS

House Task Force on Childhood Obesity as a tool to combat childhood obesity (Go NAP SACC). The NAP SACC program includes four steps: 1) The completion of a self-assessment questionnaire by the child care center director; 2) Goal setting; 3) Participation in workshops focused on nutrition and physical activity guidelines as well as strategies to implement center-level change; and 4) Reassessment by the child care center director (Ammerman et al., 2004). Information from the NAP SACC results provides the center with areas in need of improvement. Reliability and validity has been reported on NAP SACC with rest–retest kappa statistics ranging from 0.07 to 1.00 and percent agreement of 34.29–100.00 and validity kappa statistics of −0.01 to 0.79 and percent agreement of 0.00–93.65. However, the authors also noted over half of the validity weighted kappa statistics indicated moderate agreement and suggest the instrument is relatively stable and accurate but also encourage caution to its use as an indication of impact (Benjamin et al., 2007b).

More studies have begun to investigate the child care center environment using the NAP SACC. However, child care centers can vary widely in their organization. For example, some child care centers are affiliated with school districts and must adhere not only to state and federal guidelines but also to district policies and procedures; other child care centers may be privately owned and operated, and rely on other sources of funding, but also must adhere to state and federal guidelines. Centers unaffiliated with school districts include family and private child care centers and non-profit and for-profit centers. The small number of studies that have investigated the child care center environment have either not differentiated between the type of center (Ward et al., 2008) or only focused on one type, such as family child care centers (Trost et al., 2009). Therefore, we sought to determine if (1) rural area child care centers provided children with environments that supported and met evidence-based recommendations for good nutrition and adequate physical activity (2) a focus on policies and practices related to nutrition and physical activity improve the overall center environment and (3) there are differences between types of child care centers (affiliated versus unaffiliated with school districts).

Methods

Study Design

We analyzed the effect of a self-assessment and intervention focused on the nutrition and physical activity environments in child care centers that were either affiliated or unaffiliated with school districts located in western mountainous North Carolina. This pre-post evaluation used NAP SACC with workshops and goal-setting as the intervention.

Participants

All child care centers located in the three counties served by the local health district were invited to participate in this study. The local health department, as part of the Centers for Disease Control (CDC) Communities Putting Prevention to Work (CPPW), recruited centers by soliciting mini-grants or requests for proposals (RFP) for amounts ranging from $1000.00 to $8000.00. Funding was provided by CPPW, a nationwide initiative focused on community level chronic disease prevention which provided funding, technical assistance, and media and evaluation support throughout the project. The CPPW program defined small cities and rural areas as those with populations less than 500,000 (Bunnell et al., 2012). The RFP required grantees to outline how funds were to be used to improve nutrition and/or physical activity at their center. Award amounts were based on project goals and number of children served. To participate, centers had to agree to complete all four steps of the NAP SACC.

Centers were classified as affiliated or unaffiliated with a school district on the assumption that resources and policies related to physical activity and nutrition would differ. In this region of North Carolina, school districts are organized by county. Therefore, three school districts participated in this study. School district-affiliated centers included only elementary school pre-kindergarten (Pre-K) programs for those aged 3–5 years. Unaffiliated centers included infants through children aged five years and were classified as private child care centers such as family, non-profit centers, and/or Head Start Programs, all of which have sliding fee scales and are subsidized through the federal Child and Adult Care Food Program (CACFP). Because unaffiliated centers are not required to follow school district policies, these types of centers may have slightly different policies compared to those affiliated with schools. While all child care centers comply with state and federal guidelines these tend to include only minimal requirements. Child care centers located within elementary schools also follow policies set by their school district which may have additional requirements (e.g., foods allowed during parties and celebrations). These wellness policies are a result of the United State Department of Agriculture (USDA) requiring schools to implement their own wellness policies (USDA Food and Nutrition Service). In sum, 14 district-affiliated Pre-K programs and 19 unaffiliated centers were eligible for participating in this project.

NAP SACC

Measurements

Child care center directors/supervisors from the participating centers completed the NAP SACC evaluations in October, 2011 and April, 2012. The initial assessment (step 1) was followed by establishing center specific goals (step 2) with a trained NAP SACC consultant and participation from staff in NAP SACC directed workshops (step 3). The final assessment (step 4) was completed approximately six months after the initial assessment. The NAP SACC self-assessment tool is divided into a nutrition (NUT) section consisting of nine categories with 37 questions, and a physical activity (PA) section with five categories of 17 questions (Ammerman et al., 2004). See Tables 2 and 3. Questions are based on evidence-based practices or state/federal policies with answers addressing whether practices match policies. Each question is then scored using a 4-point Likert scale: 1 = barely met, 2 = met, 3 = exceeded, and 4 = far exceeded child care standards (Benjamin et al., 2007a,b). Specifics regarding the development of the NAP SACC are published elsewhere (Ammerman et al., 2007).

Intervention

Upon completion of the pre-test NAP SACC, child care centers were awarded their grant money; they were not allowed to purchase the requested equipment until the workshops were complete. They worked closely with the local health department to determine areas of weakness identified in the NAP SACC. From each center's pre-test information, the health department consultants assisted directors in setting goals and developing action plans. Directors were asked to choose three specific focus areas, one specific to nutrition, one specific to physical activity, and a third of their choice (e.g., a second nutrition goal or physical activity goal). Centers were also asked to focus their goals on changing/updating policy concerning nutrition and physical activity guidelines and practices rather than just on implementation of environmental changes. The focus on policy was an effort to make changes become more sustainable. After goals were set, the consultants presented a series of three workshops, 2 h in length, covering five topic areas. These workshop materials and NAP SACC Consultant training are provided at the Center for Training and Research Translation (Center TRT). Workshops were held within the first two weeks (Tuesday evenings and Saturday mornings) of the intervention and designed to improve child care staff's knowledge of nutrition and physical activity and present strategies to change current practices and policies. Workshops were held in each county at a school or church large enough to accommodate all staff. Workshop topics included the following: Working with Families, Child Care Center Environment, Healthy Eating, Physical Activity, and Staff Wellness. To receive their grant money, child care center staffs were required to have 100% attendance at all workshops. As an incentive, staffs were provided with continuing education units (CEU) for participation in the workshops.

Analysis

Pre- and post-test NAP SACC scores were entered into a Microsoft Excel database and then exported into SPSS. All statistical analyses were performed using SPSS, version 20.0. The Wilcoxon Signed Rank Test was performed to determine differences ($p < 0.05$) from pre- to post-test responses from NAP SACC for all centers and with centers separated by affiliation with school district.

Results

All 33 child care centers were eligible to participate in this project. However, 29 centers returned complete data on NAP SACC and had 100% attendance at all workshops; one center changed ownership,

Please cite this article as: Battista, R.A., et al., Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina, Prev. Med. (2014), http://dx.doi.org/10.1016/j.ypmed.2014.01.022

one center closed, and two centers had incomplete post-test evaluations. These four centers were all categorized as unaffiliated with school districts. Basic demographics about the residents of the counties where the child care centers were located are presented in Table 1. A large proportion of the residents in these counties were below the average poverty level for the state of North Carolina, based on census data. More than 85% of the population was white, non-Hispanic (United States Census Bureau).

Tables 2 and 3 list the categories, questions and responses to the nutrition and physical activity questions, respectively, before and after the intervention. Data are reported as averages for all centers in Tables 2 and 3 and for affiliated and unaffiliated with school districts in Tables 4 and 5. At baseline, only one out of 37 nutrition responses were below standard (or 1 on the 1–4 Likert scale), 'meals served family style;' while 17 out of 37 were exceeding standards (3 or above on the scale). Additionally, five nutrition standards significantly improved after the intervention period. More specifically, offerings of '100% juice during the day' and 'visibly showing nutrition in the classrooms and common areas' shifted from meeting standards (2 on a 1–4 Likert scale) to far exceeding standards (3 on a 1–4 Likert scale) while 'weekly menus including both new and familiar foods' significantly improved, it was still rated at meeting standards. For two of the three items in 'nutrition education for staff, children, and parents' centers improved from meeting to exceeding standards. After the intervention, centers still "rarely or never" (1 on a 1–4 Likert scale) served meals family style. Similar findings were seen in the physical activity responses. For baseline measures, only 'physical activity education is offered to parents' was rated below standard, and nine out of 17 responses were rated as exceeding or far exceeding standards (or 2 or 3 on the 1–4 Likert scale). In four of the five items listed in "play environment", centers significantly improved by making more fixed and portable play equipment available as well as providing adequate space for physical activity. In addition, 'visibly displaying physical activity in the classrooms and common areas' and 'training opportunities are provided for staff' and 'physical activity education is offered to parents' improved to far exceeding standards.

The 29 centers were further separated by whether they were affiliated with the school district (N = 14) or not (N = 15). Affiliated centers had at least 18 nutrition standards and 10 physical activity standards while unaffiliated centers had only 13 nutrition standards and 10 physical standards in place at pre-test, meaning they individually scored at least a 2 on the Likert scale. Table 4 illustrates only the significant changes in NAP SACC questions that occurred in the centers affiliated with school districts and those not affiliated with school districts. Specifically, unaffiliated centers made significant improvements on eight nutrition standards while affiliated centers improved in only two standards and even decreased on one standard. There were more similarities in centers in the physical activity category as both groups improved in their portable play equipment as well as provided training and education for staff and parents. In fact, the affiliated centers changed from meeting the standards (or 2 on the 1–4 Likert scale) to exceeding recommendations (3 on the 1–4 Likert scale) in portable play equipment and educational opportunities offered to parents.

Discussion

As a result of this intervention, centers were able to strengthen current nutrition and physical activity policies. Although child care centers were meeting standards for nutrition and physical activity prior to the intervention, they were able to exceed the best practice standards as a result of their participation in the NAP SACC program. Furthermore, with the guidance and supplemental funding and resources child care centers in a rural area were able to significantly improve their nutrition and physical activity environment. This study provides unique results due to the high participation rate (88%) of the centers located in rural, low-income counties in Western North Carolina.

We also discovered that centers unaffiliated with school districts improved on more standards compared to centers affiliated with school districts. This observation may be associated with the lower likelihood among unaffiliated centers that standards were already in place. For example, at pre-test, centers affiliated with school districts had written 'guidelines encouraging healthy foods for holidays or celebrations are provided to parents' while unaffiliated centers developed these guidelines after the NAP SACC intervention. Our findings are consistent with Trost et al. (2009), showing that foods offered outside of regular meals and snacks have been shown to be an area in need of improvement. Inclusion of healthy foods for holidays and celebrations is often contentious with parents and can be difficult to enforce without strict guidelines. However, understanding by both parents and child care staff that children consume as much as 20–35% of their total estimated daily caloric energy requirement during a classroom celebration provides support for guidelines (Isoldi et al., 2012).

Contrary to our expectation, some of the nutrition standards for centers affiliated with school districts decreased over the course of the NAP SACC program. While only one standard 'fruit offered canned in its own juice (no syrups), fresh or frozen' decreased significantly, it still remained as meeting recommendations. Other areas that decreased, however slightly, included questions in categories Beverages, Feeding Practices, and Foods Offered Outside of Regular Meals and Snacks. Considering the focus for the action plans and goals were on policies and grant funding was spent primarily on equipment, perhaps center directors were not as aware on nutrition related questions as they were on policy statements or physical activity related questions. Nonetheless, it should be noted the changes were relatively small from pre- to post-testing and remained similar in terms of meeting or exceeding recommendations (Table 4).

The availability of equipment to promote physical activity is important in improving physical activity participation. Best practice guidelines recommend play equipment should be available, accessible, and easily transported to various locations. Equipment type and amount is often varied at centers (McWilliams et al., 2009), but important as it is significantly related to children's time spent in moderate-vigorous physical activity (Bower et al., 2008). The funding for centers in our study most likely contributed to the improvements, noted in the Play Environment of the Physical Activity section, in availability and accessibility of play equipment as most centers, regardless of affiliation, were able to move from having 'only one type of equipment available' and 'some variety' to having 'different equipment available' and 'good variety' (see Table 3). Additionally, the workshops provided to staff members included topics related to physical activity including uses of equipment to improve physical activity levels in children. The lack of funding and resources to rural and lower income schools continues to be a concern (Greenberg et al., 2001). Our findings suggest that the importance of providing funding for centers to purchase play equipment

Table 1
Demographics of three counties in North Carolina participating in NAP SACC.

	Ashe county (Population = 27,143)	Alleghany county (Population = 11,052)	Watauga county (Population = 51,333)	North Carolina (Population = 9,656, 401)
Population < 5 years old (%)	5.1	4.9	3.7	6.5
Population below poverty level (%)	17.8	26.2	24.8	15.5
Population classified as White, non-Hispanic (%)	93.1	87.9	92.2	65.0

Please cite this article as: Battista, R.A., et al., Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina, Prev. Med. (2014), http://dx.doi.org/10.1016/j.ypmed.2014.01.022

Table 2
Mean Likert scores[a] for nutrition questions from child care centers (N = 29) before (Oct 2010) and after (April 2011) participation in NAP SACC assessment and intervention.

	Pre-intervention	Post-intervention	P value
Fruits and vegetables			
Fruit (not juice) is served ≥4 times per week	2.8	2.7	0.61
Fruit is offered canned in own juice, fresh or frozen at least some of the time	2.9	2.7	0.40
Vegetables (not including French fries, tater tots, has browns, or dried beans) are offered ≥ 3–4 times per week	2.9	3.0	0.48
Vegetables other than potatoes, corn, and green beans are offered ≥ 1–2 times per week	2.9	3.1	0.07
Cooked Vegetables are not usually served with added meat fat, margarine, or butter	3.2	3.3	0.60
Meats, fats, and grains			
Fried or pre-fried potatoes (French fries, tater tots, hash browns) are offered ≤ 2 times per week	3.2	3.3	0.64
Fried or pre-fried meats or fish are offered ≤ 2 times per week	3.0	3.1	0.51
High fat meats are offered ≤ 2 times per week	2.8	2.8	0.91
Beans or lean meats are offered ≥ 1–2 times per week	2.4	2.7	0.12
High fiber, whole grain foods are offered ≥ 2–4 times per week	2.5	2.9	0.07
Sweet or salty foods are offered ≤ 3–4 times per week	3.6	3.6	0.07
Beverages			
Drinking water is available/visible outside	3.0	3.0	0.67
Drinking water is available/visible inside	3.4	3.4	1.00
100% juice is offered ≤ 1 time per day	2.7	3.1	0.01[b]
Sugary drinks other than 100% juice are offered ≤ 1 time per week	4.0	3.9	0.16
Milk served to children ≥ 2 years of age is at least 2% or lower	2.7	3.1	0.13
Soda and other vending machines are not visible at the entrance	3.2	3.3	0.96
Menus and variety			
Menus used are on a ≥ 2-week cycle	3.4	3.2	1.00
Weekly menus include a combination of both new and familiar foods at least some of the time	2.5	2.8	0.02[b]
Weekly menus include foods from a variety of cultures at least some of the time	2.2	2.2	0.59
Feeding practices			
Staff determine if children are full before removing their plates at least some of the time	3.2	3.4	0.28
Staff determine if children are still hungry when they request seconds at least some of the time	2.8	3.1	0.20
Staff encourage children to try new or less favorite foods at least some of the time	3.5	3.5	1.00
Food is not used to encourage positive behavior all of the time	3.9	3.8	0.59
Foods offered outside of regular meals and snacks			
Guidelines encouraging healthy foods for holidays or celebrations are provided to parents	3.1	3.6	0.06
Holidays are celebrated with mostly healthy foods or non-food treats at least some of the time	2.7	3.1	0.05
Fundraising consists of selling non-food items at least some of the time	2.2	2.7	0.18
Supporting healthy eating			
Staff join children at the table for meals at least some of the time	3.4	3.5	0.17
Meals are served family style (children serve themselves) at least some of the time	1.7	1.9	0.36
Staff consume the same food and drinks as the children at least some of the time	2.7	2.8	0.63
Staff do not eat or drink less healthy foods in front of the children all of the time	3.7	3.6	0.90
Staff talk informally with children about trying and enjoying healthy foods at least some of the time	3.5	3.5	0.76
Support for good nutrition is visibly displayed in classrooms and common areas	3.0	3.4	0.03[b]
Nutrition education for staff, children, and parents			
Training opportunities are provided for staff	2.4	3.7	<0.001[b]
Nutrition education is provided for children through standardized curriculum ≥ 1 time per month	2.4	2.5	0.67
Nutrition education opportunities are offered to parents	2.0	3.6	0.00[b]
Nutrition policy			
The provider has a comprehensive written policy on nutrition and food service	3.1	3.5	0.10

[a] Scores reported on a 4 point Likert scale based on meeting recommended best practices (1 = barely met, 2 = met, 3 = exceeded, and 4 = far exceeded). Anchors for the Likert scale differed depending on the question, however 2 always represented meeting standards (e.g., 1 = rarely or never, 2 = some of the time, 3 = most of the time and 4 = all of the time).
[b] $p < 0.05$.

is also a critical component to promoting environmental changes in rural child care centers. However, changes following the NAP SACC intervention occurred beyond the availability and accessibility of equipment and staff workshop attendance. For instance, availability of space for active play improved as well as support for physical activity promotion displayed in classrooms and common areas. In regard to the unaffiliated centers, a more detailed policy regarding physical activity participation at the center was also implemented.

Providing educational support to staff and families plays an important role in improving the environment and is often neglected (Trost et al., 2009). In low income schools, K-8th grade teachers rated providing family programs and professional development as important in improving nutrition education (Hammerschmidt et al., 2011), while Dowda et al. (2004) emphasized the importance of teacher education and providing resources. While our findings indicate significant changes in training opportunities for staff this was most certainly a result of our requiring staff to attend the NAP SACC workshops. However, more important than the actual change in the amount of training available to staff was the development of a relationship between the child care centers and the local area health department. The NAP SACC materials were supplied to the child care centers through the local area health department and the child care centers worked closely with their consultants throughout the six month long process. Child care centers in rural areas often have difficulty in finding appropriate resources for training and education in nutrition and physical activity due to lack of available funding and geographical location. Therefore, discovering low cost ways to disseminate new information to child care centers regarding nutrition and physical activity or determining potential local collaborations with health agencies may be warranted. In addition, this relationship has the potential to impact the ability of these child care centers to meet nutrition and physical activity standards well beyond this intervention and the ability to assess it.

Supplying centers with equipment and educational support may improve the center physical environment however implementing written policies may assist in sustaining further desired behaviors. A focus on policy creates a supportive environment and provides incentives for positive behaviors (Sallis et al., 1998). The NAP SACC provides insights into current policy as well as environmental influences on behavior (e.g., staff food choices, staff training, staff utilization of activity related equipment). As such, centers were also asked to focus

Please cite this article as: Battista, R.A., et al., Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina, Prev. Med. (2014), http://dx.doi.org/10.1016/j.ypmed.2014.01.022

Table 3
Mean Likert Scores[a] to physical activity questions from child care centers (N = 29) before (Oct 2010) and after (April 2011) participation in NAP SACC assessment and intervention.

	Pre-intervention	Post-intervention	p Value
Active play and inactive time			
Active play time is provided to all children > 45 min each day	2.4	2.8	0.08
Teacher-led physical activity is provided to all children ≥ 2 times per week	2.8	3.3	0.07
Outdoor active play is provided for all children ≥ 2 times per week	3.3	3.4	0.71
Active play is hardly or never withheld for children who misbehave	3.2	3.3	0.25
Children are seated (excluding naps and meals) more than 30 min at a time ≤ 4 times per week	4.0	3.8	0.16
Television and video use consists of ≤ 4 h per week	3.9	4.0	0.16
Play environment			
Fixed play equipment is available	2.7	3.3	<0.001[b]
Portable play equipment consists of some variety	2.6	3.5	<0.001[b]
Outdoor portable play equipment is available on request or at all times	3.4	3.7	0.16
Outdoor play space is available	3.3	3.7	0.03[b]
Indoor play space is available not just for quiet play	3.1	3.4	0.02[b]
Supporting physical activity			
Staff provide encouragement during active play time	3.6	3.7	0.53
Support for physical activity is visibly displayed in classrooms and common areas	2.6	3.3	<0.001[b]
Physical activity education for staff, children, and parents			
Training opportunities are provided for staff	2.5	3.5	<0.001[b]
Physical activity education is provided for children though standardized curriculum at least 1 time per month	2.8	3.2	0.21
Physical activity education is offered to parents	1.9	3.2	<0.001[b]
Physical activity policy			
The provider has a comprehensive written policy on physical activity	3.1	3.4	0.28

[a] Note: Scores reported on a 4 point Likert scale based on meeting recommended best practices (1 = barely met, 2 = met, 3 = exceeded, and 4 = far exceeded). Anchors for the Likert scale differed depending on the question, however 2 always represented meeting standards (e.g., 1 = rarely or never, 2 = some of the time, 3 = most of the time and 4 = all of the time).
[b] $p < 0.05$.

on policies regarding nutrition and physical activity. While overall, child care centers in our study "exceeded recommendations" regarding nutrition and physical activity policies, unaffiliated centers significantly improved their nutrition and physical activity policies and moved towards "far exceeding recommendations" regarding their physical activity policy. Seo and Lee (2012) indicated writing and following policies is important because sites that do not have strict policies regarding children's eating and physical activity habits were more likely to have overweight/obese children. While no information was collected in our study regarding weight status of children, perhaps offering more detailed policies (e.g., children will spend at least 60 min outdoors) will provide an adequate stimulus to alter later physical activity behavior.

While it may seem some of these changes detected are relatively small, a shift in how well a center accomplished a practice (e.g., scored 2 at the pre-test and 4 at post-test) improves the overall center environment and encourages healthy behaviors. The NAP SACC Program is relatively cheap and easy to use; it was designed to allow child care centers to use on their own and adjust their policies and practices to be more sustainable (Ammerman et al., 2007). In addition, the focus of the NAP SACC program was on the environment and making necessary changes that are thought to impact behavior. Our study, like others (Benjamin et al., 2007a; Trost et al., 2009; Ward et al., 2008), did not address the potential impact on weight in the children attending the centers at the post-test. Encouraging others who utilize NAP SACC over longer periods of time (e.g., >6 months) to observe more direct outcomes such as weight is warranted.

This study has some limitations. First, child care centers had incentive to participate in this project with the grant funding provided for changes made to their center. Second, while validity and reliability has been reported and published on the NAP SACC, the large range in variability warrants hesitation. Third, the NAP SACC is a self-assessment, introducing the potential for some bias in responses. In addition, some center supervisors may not have scored as well on the post-test as they may have forgotten what they answered on the pre-test. Similarly, the

Table 4
Selected responses to nutrition questions before (October 2010) and after (April 2011) NAP SACC assessment and intervention in child care centers which were significant in either affiliated (N = 14) and/or not affiliated with school districts (N = 15).

	Affiliated with school district			Not affiliated with school district		
	Pre	Post	p Value	Pre	Post	p Value
Fruits and vegetables						
Fruit is offered canned in own juice (no syrups), fresh or frozen	3.0	2.5	0.01[b]	2.8	2.9	0.60
Meats, fats, and grains						
High fiber, whole grain foods are served ≥ 2–4 times per week	2.8	2.8	0.94	2.3	3.0	0.03[b]
Beverages						
Type of milk served to children ages 2 years and older	2.7	2.4	0.36	2.7	3.7	0.01[b]
Feeding practices						
Children are encouraged by staff to try new or less favorite food	3.6	3.2	0.13	3.5	3.8	0.03[b]
Foods offered outside of regular meals and snacks						
Guidelines encouraging healthy foods for holidays or celebrations are provided to parents	3.6	3.3	0.33	2.5	3.9	0.01[b]
Holidays are celebrated with mostly healthy foods or non-food treats at least some of the time	2.8	2.6	0.74	2.6	3.5	0.01[b]
Nutrition education for staff, children, and parents						
Training opportunities on nutrition are provided for staff	2.1	3.6	<0.001[b]	2.7	3.7	0.01[b]
Nutrition education opportunities are offered to parents	2.1	3.5	0.01[b]	2.00	3.7	<0.001[b]
Nutrition policy						
A written policy on nutrition and food service that covers most of the above topics	3.1	3.2	0.77	3.1	3.7	0.04[b]

[a] Note: Scores reported on a 4 point Likert scale based on meeting recommended best practices (1 = barely met, 2 = met, 3 = exceeded, and 4 = far exceeded). Anchors for the Likert scale differed depending on the question, however 2 always represented meeting standards (e.g., 1 = rarely or never, 2 = some of the time, 3 = most of the time and 4 = all of the time).
[b] $p < 0.05$.

Please cite this article as: Battista, R.A., et al., Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina, Prev. Med. (2014), http://dx.doi.org/10.1016/j.ypmed.2014.01.022

Table 5
Selected responses to physical activity questions before (Oct 2010) and after (April 2011) NAP SACC assessment and intervention in child care centers which were significant in either affiliated (N = 14) and/or not affiliated (N = 15) with school districts.

	Affiliated with school district			Not affiliated with school district		
	Pre	Post	P value	Pre	Post	P value
Active play and inactive time						
Active play time is provided to all children	1.8	2.5	0.03[b]	2.9	3.0	1.00
Play environment						
Fixed play equipment is available	2.8	3.3	0.05	2.5	3.2	0.02[b]
Portable play equipment consists of some variety	2.8	3.4	0.02[b]	2.3	3.6	<0.001[b]
Outdoor play space is available	3.3	3.6	0.34	3.4	3.8	0.03[b]
Supporting physical activity						
Support for physical activity is visibly displayed in classrooms and common areas	2.6	3.4	0.02[b]	2.7	3.1	0.05
Physical activity education for staff, children, and parents						
Training opportunities are provided for staff	2.1	3.5	<0.001[b]	2.8	3.5	0.01[b]
Physical activity education is offered to parents	1.6	3.1	0.01[b]	2.1	3.3	0.01[b]
Physical activity policy						
A written policy on physical activity that covers most of the above topics	3.2	3.0	0.71	3.1	3.8	0.03[b]

[a] Note: Scores reported on a 4 point Likert scale based on meeting recommended best practices (1 = barely met, 2 = met, 3 = exceeded, and 4 = far exceeded). Anchors for the Likert scale differed depending on the question, however 2 always represented meeting standards (e.g., 1 = rarely or never, 2 = some of the time, 3 = most of the time and 4 = all of the time).
[b] $p < 0.05$.

enticement of the grant funding may have made supervisors more aware of their needs at the pre-test compared to six months later at the post test. Despite these limitations, these results provide insight into standard nutrition and physical activity practices in rural area child care centers.

Conclusions

Child care centers are being utilized more frequently by many families. While centers are increasing in the numbers of children attending they are also being forced to comply with many state and federal guidelines. These guidelines often involve variables related to the nutrition and physical activity environment (e.g., foods served, time spent being active). Similar to schools, centers play an important role in the development of the child. The idea that the school environment is likely to influence childhood obesity is well accepted (Story et al., 2006). However, only recently have child care centers and their environments received similar consideration. With the relatively recent development and implementation of the NAP SACC Program, it may be too early to determine the long term impacts on child obesity. However, the continued significant improvements that are being made to child care centers have promise in addressing childhood obesity. Considering the NAP SACC was developed, based in part on the Social Cognitive Theory (Glanz et al., 2002) which emphasizes the environment and its influence on behavior, we are encouraged by the positive changes seen at the center level. Additionally, this study has shown that rural child care centers, particularly those unaffiliated with school districts, have room for improvement in the areas of physical activity and nutrition. In addition, our results support the need for resources to assist rural child care centers in making these improvements. These resources may be financial to allow equipment purchases or support providing consultants or workshops and may work best for centers not associated with schools as they tend to just meet recommendations versus more exceed or far exceed. Nonetheless, future research should focus on ways to continue to provide support for meeting recommended standards, such as providing staff training and parent educational opportunities. In addition, long term evaluation of the impact of the environment in the child care center on childhood obesity is warranted.

Conflict of interest
The authors declare that there are no conflicts of interest.

Disclosures

None.

Acknowledgments

The project was supported in part by a (cooperative agreement) (contract) with the Centers for Disease Control and Prevention (#1U58DP003053-01). Portions of this project's work involve the Communities Putting Prevention to Work initiative supported by CDC funding. However, the findings and conclusions in this paper are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. Users of this document should be aware that every funding source has different requirements governing the appropriate use of those funds. Under the U.S. law, no Federal funds are permitted to be used for lobbying or to influence, directly or indirectly, specific pieces of pending or proposed legislation at the federal, state, or local levels. Organizations should consult appropriate legal counsel to ensure compliance with all rules, regulations, and restriction of any funding sources.

The Centers for Disease Control and Prevention (CDC) supported staff training and review by scientific writers for the development of this manuscript, through a contract with ICF International (Contract No. 200-2007-22643-0003). CDC staff reviewed the paper for scientific accuracy and also reviewed the evaluation design and data collection methodology. CDC invited authors to submit this paper for the CDC-sponsored supplement through a contract with ICF International (Contract No. 200-2007-22643-0003).

We would also like to thank Stephanie Craven, Beth Fornadley, Be Active/Appalachian Partnership, Emily Ausband and Lindsey Glover for their assistance in the NAP SACC implementation and assessment. Additionally, we would like to acknowledge the assistance from CDC and ICF International for the support at the October 2012 Scientific Writing Workshop and Dr. Christina Lindan for her assistance with this manuscript.

References

Ammerman, A.S., Benjamin, S.E., Sommers, J.K., Ward, D.S., 2004. The Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) environmental self-assessment instrument. Division of Public Health, NC DHHS, Raleigh, NC, and the Center for Health Promotion and Disease Prevention, University of North Carolina at Chapel Hill. Revised May 2007.

Ammerman, A.S., Ward, D.S., Benjamin, S.E., et al., 2007. An intervention to promote healthy weight: Nutrition and physical activity self-assessment for child care (NAP SACC) theory and design. Prev. Chronic Dis. 4, A67 ([serial online], accessed October 31, 2013).

Benjamin, S.E., Ammerman, A., Sommers, J., Dodds, J., Neelon, B., Ward, D.S., 2007a. Nutrition and physical activity self-assessment for child care (NAP SACC): results from a pilot intervention. J. Nutr. Educ. Behav. 39, 142–149.

Benjamin, S.E., Neelon, B., Ball, S.C., Bangdiwala, S.I., Ammerman, A.S., Ward, D.S., 2007b. Reliability and validity of a nutrition and physical activity environmental self-assessment for child care. Int. J. Behav. Nutr. Phys. Act. 4, 29.

Please cite this article as: Battista, R.A., et al., Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina, Prev. Med. (2014), http://dx.doi.org/10.1016/j.ypmed.2014.01.022

ARTICLE IN PRESS

Bower, J.K., Hales, D.P., Tate, D.F., Rubin, D.A., Benjamin, S.E., Ward, D.S., 2008. The childcare environment and children's physical activity. Am. J. Prev. Med. 34, 23–29.

Bunnell, R., O'Neil, D., Soler, R., et al., 2012. Fifty communities putting prevention to work: accelerating chronic disease prevention through policy, systems and environmental change. J. Community Health 37, 1081–1090.

Center TRT, T. http://www.centertrt.org/ (accessed April 2, 2012).

Dowda, M., Pate, R.R., Trost, S.G., Almeida, M.J.C.A., Sirard, J.R., 2004. Influences of preschool policies and practices on children's physical activity. J. Community Health 29, 183–196.

Glanz, K., Rimer, B., Lewis, F., 2002. Health behavior and health education: theory, research and practice. Wiley and Sons, San Francisco, CA.

Go NAP SACC. http://gonapsacc.org/about-nap-sacc/our-history (accessed October 31, 2013).

Greenberg, J., Cottrell, R., Bernard, A.L., 2001. Baseline data on coordinated school health programs in the state of Ohio. Am. J. Health Stud. 29, 421–435.

Hammerschmidt, P., Tackett, W., Golzynski, M., Golzynski, D., 2011. Barriers to and facilitators of healthful eating and physical activity in low-income schools. J. Nutr. Educ. Behav. 43, 63–68.

Isoldi, K.K., Dalton, S., Rodriquez, D.P., Nestle, M., 2012. Classroom "cupcake" celebrations: observations of foods offered and consumed. J. Nutr. Educ. Behav. 44, 71–75.

McWilliams, C., Ball, S.C., Benjamin, S.E., Hales, D., Vaughn, A., Ward, D.S., 2009. Best-practice guidelines for physical activity at child care. Pediatrics 124, 1650–1659.

North Carolina Nutrition and Physical Activity Surveillance System, m. http://www.eatsmartmovemorenc.com/Data/Texts/NC%20NPASS%202011TABLE_County%20obesity%20rates.pdf (accessed May 14, 2013).

Sallis, J.F., Baumann, A., Pratt, M., 1998. Environmental and policy interventions to promote physical activity. Am. J. Prev. Med. 15, 379–397.

Seo, D., Lee, C.G., 2012. Association of school nutrition policy and parental control with childhood overweight. J. Sch. Health 82, 285–293.

Serdula, M.K., Ivery, D., Coates, R.J., Freeman, D.S., Williamson, D.F., Byers, T., 1993. Do obese children become obese adults? A review of the literature. Prev. Med. 22, 167–177.

Story, M., Kaphingst, K.M., French, S., 2006. The role of schools in obesity prevention. Future Child. 16, 109–142.

Trost, S.G., Messner, L., Fitzgerald, K., Roths, B., 2009. Nutrition and physical activity policies and practices in family child care centers. Am. J. Prev. Med. 37, 537–540.

United States Census Bureau, u. http://quickfacts.census.gov/qfd/states/37000.html (accessed November 5, 2012).

United States Department of Agriculture, e. http://www.fns.usda.gov/tn/healthy/wellnesspolicy.html (accessed October 31, 2013).

Wang, Y., Beydoun, M.A., 2007. The obesity epidemic in the United States-gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and meta-regression analysis. Epidemiol. Rev. 26, 6–28.

Ward, D.S., Benjamin, S.E., Ammerman, A.S., Ball, S.C., Neelon, B.H., Bangdiwala, S.I., 2008. Nutrition and physical activity in child care. Results from an environmental intervention. Am. J. Prev. Med. 5, 352–356.

Please cite this article as: Battista, R.A., et al., Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina, Prev. Med. (2014), http://dx.doi.org/10.1016/j.ypmed.2014.01.022