

Evaluation of the Color Me Healthy Program in Influencing Nutrition and Physical Activity in Mississippi Preschool Child Care Facilities

**Holly F. Huye, PhD, RD; Sarah Bankston, MS, RD; Donna Speed, MS, RD, LD;
Elaine F. Molaison, PhD, RD**

ABSTRACT

Purpose/Objectives

The purpose of this research was to determine the level of implementation and perceived value in creating knowledge and behavior change from the Color Me Healthy (CMH) training program in child care centers, family day care homes, or Head Start facilities throughout Mississippi.

Methods

A two-phase survey was used to initially assess participants' perception of a standardized CMH training session and later to assess overall implementation of the CMH program in child care facilities throughout Mississippi. Chi square and analysis of variance tests were used to analyze the data.

Results

Of the 516 child care workers that attended the session, 344 (66.7%) returned the follow-up evaluation. The majority of the participants worked at a child care center (81.3%), and the average number of children at the center was 75.2 ± 101.7 . At the 8-week follow-up evaluation, significantly more participants reported using nutrition lesson plans for children (83.1% vs. 95.3%) and including a nutrition component (53.5% vs. 80.1%) and a physical activity component (45.3% vs. 72.0%) for parent education ($p < 0.001$). While the other components (child physical activity lesson plans and sampling of new foods) did not increase significantly, the percent of facilities conducting these activities pre-training was above 90%.

Application to Child Nutrition Professionals

As statistics of childhood obesity continue to be a concern in the healthcare community, programs such as CMH may give child care providers the opportunity to positively influence child nutrition. This is an important first step in combating obesity in a region with high overweight/obesity prevalence rates among adults and children.

Keywords: childhood obesity; Color Me Healthy; preschool; nutrition; physical activity

INTRODUCTION

The most recent data from the United States Census Bureau indicated that 12.5 million preschool children under five years of age were in some type of child care on average for 33 hours per week in 2011 (Laughlin, 2013). Types of child care providers include relatives, non-relatives (e.g., baby sitters, neighbors, family day care providers), and organized facilities (e.g., day care or child care centers, nursery schools, Head Start [a federally funded

program]). Approximately, one-quarter of preschoolers in child care are in organized facilities. Dual income families are often charged with making important decisions regarding child care facilities for their children. With weekly costs of child care averaging \$179 per week, decisions about the type of child care may warrant financial consideration for some families (Laughlin, 2013).

In addition to financial concerns, parents may also want to consider the influences of child care related to their children's health. Due to the amount of time children spend in child care, child care providers can have a profound impact on the nutrition and eating practices of the child during this important time of growth and development (Larson, Ward, Neelon & Story, 2011). Recent research has indicated differences in food intake across different types of facilities, which can affect diet quality and may contribute to likelihood of childhood obesity (Mandal & Powell, 2014). One such study found that the likelihood of childhood obesity decreases when children are enrolled in a center-based care facility, such as Head Start as compared to relatives or non-organized facilities (Belfield & Kelly, 2013).

Obesity prevention programs for child care centers have shown successes from increased willingness to taste different foods to decreasing fat intake (Cason, 2001; Williams et al., 2002). Programs for preschoolers that incorporate nutrition education along with physical activities such as *Nutrition Relay Race* and *Let's Move, Learn, and Have Fun* are reasonably easy to implement and have had good outcomes (Geiger, 1999; Roths, Fees, Bailey, & Fitzgerald, 2002). However, having the parent involved in the learning process adds yet another dimension for encouraging healthy nutrition and physical activity (Blom-Hoffman, Wilcox, Dunn, Leff, & Power, 2008; Geiger, 1999; Roths et al., 2002; Sweitzer, et al., 2010). The family plays an essential role in shaping lifestyle behaviors of the child. Health and nutrition professionals contend that the role of the family is one of the strongest influences on childhood obesity (Davison & Birch, 2002; McCaffrey, Rennie, Wallace, & Livingstone, 2007). However, pressuring and restricting children's food consumption can lead to negative outcomes; therefore, focusing on increasing healthy foods may be a better approach for nutrition education programs for children (Epstein et al., 2001; Galloway, Fiorito, Francis, & Birch, 2006). Research has shown early life interventions, such as parent education programs implemented in the Supplemental Nutrition Program for Women, Infants, and Children, are feasible ways to persuade parents to encourage healthy eating and physical activities in preschool aged children by being role models themselves (McGarvey et al., 2004). Experts agree that educating parents on providing healthy foods during the child's preschool years and educating for positive modeling practices in the home increases chances of success; yet, parental education programs still lack the formula for complete success for reducing childhood obesity (Haire-Joshu et al., 2008; Stice, Shaw, & Marti, 2006).

Overweight and obese children could have bone and joint problems, sleep apnea, and social and psychological problems such as bullying and low self-esteem (Daniels et al., 2005; Dietz, 2004, Office of the Surgeon General, 2010; Strauss, 2000). Of further concern, obese children are at higher risk for obesity in adulthood, and thus more likely to develop chronic diseases such as coronary heart disease and type 2 diabetes (Guo & Chumlea, 1999; Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001; Freedman et al., 2005; Freedman et

al., 2009). Therefore, research suggests early interventions during the preschool years will help children learn healthful nutrition practices for prevention and reduction of overweight and obesity (Gunnell, Frankel, Nanchahal, Peters, & Smith, 1998; Harbaugh, Bounds, Kolbo, Molaison, & Zhang, 2009; Kolbo et al., 2006). The *Color Me Healthy* (CMH) program is one such program created to increase physical activity and encourage healthy eating among children at four and five years of age (CMH, 2012). Program creators developed CMH to be implemented in the child care setting and designed take home messages for parents that coincided with activities and education the children received at the child care facility. The program was first implemented in North Carolina, and researchers reported the program was indeed successful at increasing physical activity of children, and increasing children's knowledge about movement and physical activity and knowledge of healthy eating (Dunn et al., 2006). Most recently, results of a CMH intervention indicated an increase in fruit and vegetable consumption in 10 preschool classrooms randomly assigned to the experimental group (Witt & Dunn, 2012).

While prevalence of childhood obesity has steadily risen over the past years, doubling from 5% in 1976-1980 to 10.4% in 2007-2008 and increasing to 12.1% in 2009-2010 among preschool-aged children, most recent national data show a decline in obesity rates among preschoolers to 8.4% in 2011-2012 (Ogden & Carroll, 2010; Ogden, Carroll, Kit, & Flegal, 2012, 2014). However, as national rates of obesity among preschool children appear to be declining, Mississippi rates remain higher than the national average. Data from the 2010 Pediatric Nutrition Surveillance System showed 14.9% of Mississippi preschoolers as overweight and 13.7 % as obese (Centers for Disease Control and Prevention, 2012). Harbaugh et al. (2011), in a representative sample of the Head Start population in Mississippi ($N = 1,765$), found 17% of preschoolers overweight and 21% obese in 2010.

In 2012, there were just fewer than 2,000 child care providers in Mississippi (National Association of Childcare Resource and Referral Agencies, 2012). The CMH training program is an early intervention avenue explored by the Mississippi State Department of Health along with the Mississippi Department of Human Services in their efforts to reduce the prevalence of childhood obesity. The purpose of this research was to determine the level of implementation and perceived value in creating knowledge and behavior change using data collected through a pre- and post-CMH training program in child care centers throughout Mississippi.

METHODOLOGY

Survey Instruments

The CMH program was developed by North Carolina Cooperative Extension and North Carolina Division of Public Health's Physical Activity and Nutrition Branch and Nutrition Services Branch (CMH, 2012). Dunn et al. (2006), authors of the original research for the CMH program, developed the program to be used in the child care setting and designed the curriculum to increase physical activity and encourage healthy eating in preschool-aged children. The program uses colors, music, dancing, the senses, and interactive lessons to promote its key messages. Each CMH kit comes with a teacher's guide, picture cards, classroom posters, music, and a parent component made of 14 reproducible parent

newsletters which reinforce the nutrition and physical activity messages the children learn in the classroom as well as provide parent tips for inclusion of healthful eating and physical activity at home and child-friendly recipes. The CMH Advisory Committee also designed an initial survey and 8-week follow up survey to evaluate the training and overall implementation of the program.

The Mississippi State Department of Health (MSDH) adapted both surveys and included three questions related to facility characteristics. Participants were asked how many children they serve in their facilities; if their facility participated in the US Department of Agriculture (USDA) Child and Adult Care Food Program (CACFP) managed by the Mississippi Department of Education; and the type of child care facility they represented in which participants self-classified themselves as “Head Start”, “Family Day Care Home”, “Child Care Center” or “Other (specify)” facilities. In brief, the CACFP is a federally-funded program administered by state agencies that reimburses child care facilities for meals and snacks for income and age eligible children (USDA, 2013). The program helps facilities provide nutritious meals in order to develop healthy eating patterns among children. Facilities participating in the program must meet eligibility requirements set by the USDA. Head Start is a federal program that provides comprehensive services for children from birth to age 5 from low income families (US Department of Health & Human Services [USDHHS], n.d.). This school-readiness program includes education, health, social, and nutrition services. All children attending Head Start facilities are eligible to participate in the CACFP. Family day care homes provide child care for small groups of children in a licensed or approved private home (Mississippi Department of Education, 2012). In order to receive meal reimbursement, family day care homes must be sponsored by an outside organization that conducts training and monitoring as well as plans menus and assists in completing meal reimbursement forms. Child care centers may be public or private, nonprofit or for-profit and must be licensed or approved to provide care to infants and children. Child care centers serving meals and snacks may participate in the CACFP (Mississippi Department of Education, 2012).

The initial evaluation included 10 questions concerning current information and activities included in lesson plans as well as current parental education components. Participants were asked to rate the CMH training session and materials using a 4-pt Likert-style scale (1=Excellent, 2=Good, 3=Fair, and 4=Poor). The 8-week post-training evaluation included 13 questions concerning implementation of CMH in the facility, such as lesson plan components, sampling of new foods, parent education components, and the inclusion of nutrition and physical activity in child or parent components. Participants were asked to indicate their agreement related to a series of questions about increasing children’s knowledge of healthful eating and movement and physical activity as well as parental involvement in the childcare facility using a 5-point Likert-style scale (5=Strongly Agree, 4=Agree, 3=Somewhat Agree, 2=Somewhat Disagree, and 1=Disagree). The CMH curriculum materials were also rated on a 4-pt Likert-style scale (4=Very Good, 3=Good, 2=Fair, and 1=Poor).

Data Collection

The CMH program training was conducted across the state of Mississippi by the MSDH; program trainers received training from the associates of the CMH program creators. Any child care facility licensed by MSDH was eligible to attend a 2-hour CMH training after completing a Menu Writing 101 class on the latest nutrition guidelines. State child care facilities were informed of available CMH training dates via the HealthyMS.com web site, state inspections, quarterly newsletters, and consulting registered dietitians responsible for reviewing child care facilities' menus.

State child care facilities were not required to attend CMH training; however, child care workers who attended the menu writing class and the 2-hour CMH training received 5 hours of continuing education units. Upon conclusion of the CMH training program, one representative child care worker from each participating child care facility was asked to complete the initial evaluation survey. Eight-week post-training evaluations were mailed to each child care facility at 6 to 10 weeks after CMH training; surveys were coded so that no employee, director, or child care facility names were attributed to the post-training evaluation. This secondary data analysis was approved by The University of Southern Mississippi's Institutional Review Board.

Data Analyses

Statistical analyses included descriptive statistics, Chi square, and analysis of variance (ANOVA) tests. ANOVA was used to determine mean differences between type of facility and survey responses as well as mean differences in survey responses and participation in the USDA CACFP. A Chi Square test was used to compare initial and post-training survey response related to utilization of the CMH components. Data were analyzed using SPSS, version 17.0.

RESULTS AND DISCUSSION

A total of 516 initial evaluations were completed at the training, and 344 post-training evaluations were returned, indicating at least 66.7% of the trainees implemented the program; however it is unknown whether participants who did not complete the post-training evaluation implemented the program. As shown in Table 1, the majority (81.8%) of the facilities participating in CMH training were child care centers, while 9.1% were Head Start facilities, 3.5% were family day care homes, and 5.6% were classified as other types of facilities. At the initial evaluation, about half (49.6%) of the facilities involved participated in the USDA CACFP and an average of 74.2 ± 101.7 children were served at each facility; 8-week post-evaluations showed an average of 73.02 ± 87.4 children were served at each facility.

Initial Evaluation

Results from this study indicated that CMH offers a child and teacher friendly curriculum for child care facilities to provide nutrition education as well as physical activity education and opportunities that are innovative, fun, and easy to implement into daily curriculum. The majority of participants (87.7%) gave an excellent rating to the CMH training program, and 90.6% rated the CMH training materials as excellent. Additionally, almost all of the

participants of this study (96.5%) reported they would incorporate CMH materials into their facility's curriculum.

Table 1.

Mississippi Child Care Worker Demographics at Initial and Post-training Evaluation

Characteristic	Initial (N = 516)		Post (N = 344)	
	<i>n</i>	%	<i>n</i>	%
Type of Child Care Facility				
Head Start	47	9.1	32	9.3
Family day care	18	3.5	12	3.5
Child care center	422	81.8	278	80.8
Other	29	5.6	22	6.4
Participate in USDA Child and Adult Care Food Program				
Yes	252	49.6	152	45.2
No	254	50	184	54.8

The Academy of Nutrition and Dietetics supports the use of nutrition education and modeling in child care programs, stating that child care providers should be role models and encourage healthy eating (Neelon & Briley, 2011). Furthermore, child care providers spend a large portion of time with children, especially during meal times, and have an advantage in modeling healthy behaviors and influencing children's nutrition practices (Larson et al., 2011). The findings in the present study showed that the CMH program was aligned with the Academy's recommendations, as almost every participant (99.7%) reported learning new skills or concepts that would help them eat healthy and stay active, thus modeling such behaviors.

Post-training Evaluation

The post-training evaluation was used to determine perceptions of the quality of the CMH program. Following CMH training, 86.5% of the participants agreed or strongly agreed that using CMH increased children's knowledge about healthy eating, and 81.9% agreed or strongly agreed that using CMH increased children's physical activity. While the majority (83.4%) agreed or strongly agreed that using CMH increased children's knowledge about movement and physical activity, nearly half (49.2%) somewhat agreed or agreed that using CMH increased parents' involvement with the child care facility. Overall, 86.7% rated CMH curriculum materials as very good, 13% rated them as good, and only 0.3% rated them as fair.

Many preschool-focused programs have shown success by incorporating nutrition education and physical activity simultaneously. Geiger (1999) related the success of an interactive game which incorporated nutrition education in the form of a relay race. Roths, Bailey, and Fitzgerald (2002) also successfully used a game to incorporate nutrition and physical activity in the *Let's Move, Learn, and Have Fun* program, a training program for child care providers targeting the promotion of physical movement and healthy diets. Almost all (90%) of the facilities in this study receiving initial training incorporated the program into their

facility's daily routine while disseminating physical activity-related information to the parents as well.

Head Start policy mandates that facilities are required to serve varieties of foods meant to expand the child's eating experience and that children are to be encouraged to try new foods through group activities and discussions (USDHHS, 2008). These guidelines are consistent with Cason (2001) who demonstrated the importance of providing a series of lessons focusing on healthy snacking, fruit and vegetable consumption and the Food Guide Pyramid to preschool aged children. Cason found that the program not only increased the children's willingness to taste new foods, but also increased the children's consumption of each of the five food groups while decreasing their intake of fats, oils, and sweets. Similarly, one focus of the CMH program is promoting sampling of new foods, with its main focus on fruits and vegetables during meals and snacks served in the facility. Results of the present study indicated that CMH did not significantly increase sampling of new foods due to the fact that sampling of new foods prior to CMH was already at 93.1%. The Head Start policy more than likely contributed to the high percentage of facilities already sampling new foods. Even so, sampling of new foods increased to 96.5% post-CMH training.

One-way ANOVA was used to determine mean differences between child care workers at the different types of facilities and their responses to increasing children's physical activity, children's knowledge of healthful eating, movement and physical activity, and parental involvement after implementing the CMH program. While there were no significant differences found, Table 2 shows mean ratings of agreement by facility type. Each facility averaged between strongly agree and agree that CMH had increased children's knowledge of healthy eating with child care workers at Head Start facilities agreeing most strongly (4.32 ± 0.79). Workers at Head Start facilities and child care centers agreed (4.32 ± 0.75) and 4.13 ± 0.81), respectively, that using CMH increased physical activity while workers at family day care homes and other types of facilities trended slightly more towards somewhat agree, (3.92 ± 1.24 and 3.89 ± 0.90), respectively]. While responses were still favorable for increasing physical activity, workers at family day care homes, when asked if using CMH increased children's knowledge of physical activity, were less likely to agree (3.92 ± 1.31) compared to workers at other facilities. The results indicated that all facility types averaged between agree to somewhat agree when asked if CMH increased parents' involvement in the facility, with Head Start facilities more strongly agreeing (3.80 ± 1.13) than other groups.

When facilities were grouped by type, results showed that workers at Head Start facilities were more likely to strongly agree that CMH increased children's knowledge of healthful eating; increased knowledge of movement and physical activity; increased physical activity of the children; and increased parental involvement in the facility. Data trends showed that workers at family day care homes were least likely to strongly agree with these components of the program, although overall responses were still positive. As Neelon and Briley (2011) recommended, facilities should adhere to the Dietary Guidelines for Americans regarding nutrition of meals as well as incorporate nutrition information into curriculum and meet physical activity requirements for the children. Head Start programs must also adhere to USDA CACFP (2014) requirements, indicating Head Start programs may have more experience with implementing programs like CMH, as well as more resources.

Table 2. Comparison of Child Care Worker Responses between Types of Facilities from Post-CMH^b Training Evaluation

Statement “Using CMH^b has increased:”	<i>n</i>	<i>M^a</i>	<i>SD</i>
Children’s knowledge about healthful eating.			
Head Start	31	4.32	.79
Child care center	265	4.25	.90
Family day care home	12	4.08	.73
Other	18	4.11	.75
Physical activity of the children.			
Head Start	31	4.32	.75
Child care center	269	4.13	1.24
Family day care home	12	3.92	.81
Other	18	3.89	.90
Children’s knowledge about movement and physical activity.			
Head Start	31	4.32	.75
Child care center	269	4.17	1.31
Family day care home	12	3.92	.81
Other	18	4.06	.83
Parent’s involvement in our facility.			
Head Start	30	3.80	1.13
Child care center	263	3.54	1.49
Family day care home	12	3.25	1.07
Other	18	3.56	1.10

^aScale = 1 (Strongly Disagree) to 5 (Strongly Agree)

^bCMH = Color Me Healthy

Previous research suggests that CMH was effective in increasing inclusion of nutrition education in curriculum (Dunn et al., 2006). In the current study, Chi Square analysis was used to assess differences in participants’ answers related to the facilities’ curriculum on the initial and post-CMH training evaluations. Prior to the CMH training, 83.1% of facilities reported including nutrition in lessons plans, while 95.3% reported including nutrition in lesson plans after CMH training. Results for inclusion of physical activity in facility curriculum were not found to be significant. However, 94.7% of participants reported including physical activity in lesson plans prior to CMH training. This may be likely due to the fact that the USDA suggests children and adolescents should do a minimum of one hour of physical activity every day, including aerobic activity, muscle strengthening, and bone strengthening (USDA, n.d.). Nonetheless, after CMH training, facilities reporting including physical activity in their lesson plan increased to 97.4%. Overall, the CMH program was found to have favorable increases at the post-evaluation with respect to including nutrition and physical activity in the lesson plans, sampling new foods in meals and snacks, and including nutrition and physical activity in the parental education component. However, not all differences were significant. See Table 3 for a summary of the results.

Table 3. Comparison of Mississippi Child Care Worker Responses Regarding Curriculum Content at Initial and Post-CMH Training

Statement Regarding Curriculum	% Yes Initial (n/N)	% Yes Post (n/N)	<i>p</i> ^a
Are you currently including nutrition in your lesson plans?	83.1 (419/504)	95.3 (322/338)	<i>p</i> < 0.0001
Are you currently including physical activities in your lesson plans?	94.7 (480/507)	97.4 (331/340)	<i>p</i> = 0.126
Are you currently sampling new foods into the meals/snacks you serve in your facility?	93.1 (471/506)	96.5 (330/342)	<i>p</i> = 0.060
Are you currently including nutrition with your parent education component?	53.5 (264/493)	80.1 (270/337)	<i>p</i> < 0.0001
Are you currently including physical activity with your parent education component?	45.3 (219/483)	72.0 (236/328)	<i>p</i> < 0.0001

^aBased on Chi square analysis

As studies have shown, parents are the strongest influence for developing children's eating habits as well as promoting physical activity (Davison & Birch, 2002; McCaffrey et al., 2007). It stands to reason that for any child-focused physical activity and nutrition education program to be successful, it must contain a parental component. Results herein indicated using CMH significantly increased facilities' provision of nutrition information to parents by 26.6% due to the CMH parent newsletters, as well as the provision of physical activity information to the parents by 28.5%. However, participants agreed the least to the question regarding use of CMH increasing parents' involvement with the child care facility, indicating that CMH did not increase parental participation as much as it increased other areas of interest. Data related to parental involvement in the facility before CMH implementation might provide more meaningful information. Furthermore, as suggested by Davison, Lawson, and Coatsworth (2012), a family-centered focus may increase parental participation.

CONCLUSIONS AND APPLICATION

Experts suggest the sooner children learn healthy and nutritious eating, the better their chances for improved health throughout their lifetime, thereby decreasing rates of obesity (Kolbo et al., 2006). By providing CMH training and toolkits across the state, the MSDH along with the Mississippi Department of Human Services provided valuable materials and information to child care centers. A strong majority of the participants of the CMH training program rated the materials highly and almost all believed the materials could be incorporated into their facility. Similar results were found in the CMH pilot implementation across the state of North Carolina (Dunn et al., 2006). As statistics of childhood obesity continue to be a concern in the healthcare community, programs such as CMH may give child care providers the opportunity to positively influence child nutrition.

Although promising, limitations of this research must be noted. As this study relied solely on participants' perceptions, the study lacks outcomes data. Future research could include pre-CMH implementation height and weight measurements of children, as well as facility personnel, and follow-up with post-CMH height and weight measurements for comparison. Furthermore, dietary intake could also be assessed, as Witt and Dunn (2012) found the CMH program to have a positive effect on fruit and vegetable consumption among preschool-aged children. Similarly, researcher observations related to modeling of child care workers in child care facilities before and after CMH implementation could provide valuable insights.

Nonetheless, the CMH program appears to have a positive effect on increasing knowledge of healthful eating and physical activity in children as well as including nutrition and physical education for their parents. As the state of Mississippi faces one of the highest rates of obesity for adults and children in the nation, it must broaden and continue programs such as CMH. By providing multiple CMH toolkits to facilities already implementing the program as well as continuing to provide training and toolkits to child care facilities, pre-kindergarten, and possibly kindergarten classrooms across the state, the state of Mississippi can continue increasing its arsenal in its fight against obesity.

The CMH program training was based on a "Train the Trainer" model, which is an appropriate model considering child care providers may lack formal training in nutrition and physical activity (Dunn et al., 2006). The Train the Trainer model was found to be effective in providing innovative curriculum materials to child care providers for promoting healthy eating and physical activity to both children and parents. State agencies can partner with county personnel, such as extension and public health employees, and prepare them to conduct training sessions with local child care providers on how to implement the CMH program. As an incentive to attend and complete the training session, child care providers could receive the CMH kit at no cost. The CMH Web site (www.colormehealthy.com) offers the training manual and the CMH kit in bulk numbers with a discounted price for ordering a 100 plus kits. Additionally, a Spanish add-on set of materials is also available. The training manual provides all of the necessary materials needed for county personnel to host training sessions in their communities. In turn, the CMH kit includes a teacher's guide with lesson plans; therefore, child care providers attending CMH training learn how to use the curriculum and do not need to create any new lessons or materials. Rollheiser, Ross, and Hogaboam-Gray (1999) found the Train the Trainer model as an effective education dissemination strategy. Furthermore, using this model can build relationships between state and county agencies and child care facilities and ensure successful implementation of the CMH program, thus improving the overall health of children.

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BIOGRAPHY

Huye and Molaison are, respectively, Assistant Professor and Professor at The University of Southern Mississippi in Hattiesburg, Mississippi. Bankston is Patient Services Manager at Forrest General Hospital in Hattiesburg while Speed is Nutrition Services Director at the Mississippi Department of Health in Jackson, Mississippi.