



Published in final edited form as:

J Sch Health. 2013 March ; 83(3): 223–229. doi:10.1111/josh.12018.

CHILE: An Evidence-Based Preschool Intervention for Obesity Prevention in Head Start

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Abstract

BACKGROUND—Obesity is a major concern among American Indians and Hispanics. The Child Health Initiative for Lifelong Eating and Exercise (CHILE) is an evidence-based intervention to prevent obesity in children enrolled in 16 Head Start (HS) Centers in rural communities. The design and implementation of CHILE are described.

METHODS—CHILE uses a socio-ecological approach to improve dietary intake and increase physical activity. The intervention includes: a classroom curriculum; teacher and food service training; family engagement; grocery store participation; and health care provider support.

RESULTS—Lessons learned from CHILE include: the need to consider availability of recommended foods; the necessity of multiple training sessions for teachers and food service; the need to tailor the family events to local needs; consideration of the profit needs of grocery stores; and sensitivity to the time constraints of health care providers.

CONCLUSIONS—HS can play an important role in preventing obesity in children. CHILE is an example of a feasible intervention that addresses nutrition and physical activity for preschool

children that can be incorporated into HS curricula and aligns with HS national performance standards.

Obesity is a serious public health concern for individuals of all ages, including preschool age children.^{1,2} Children are disproportionately affected by obesity if they are American Indian, Hispanic, in rural areas, or in low-income families.^{3,4} Data from New Mexico, a largely rural state, indicate that 41% of American Indian and 32% of Hispanic kindergarten students are overweight or obese.⁵ Rural communities, particularly American Indian and Hispanic populations, are under-represented in obesity prevention research.^{4,6-10}

Diet and physical activity are modifiable risk factors that contribute to obesity. The majority of US children do not consume diets that meet the recommendations set forth in the Dietary Guidelines for Americans, nor do they achieve adequate levels of daily physical activity.^{11,12} Because children spend a large portion of their time in school, the school setting is an ideal place to address nutrition and physical activity habits.

Head Start (HS) is a comprehensive program that provides educational, social, health, nutritional, and other services to children from low-income households. In 2008, there were more than 7200 children enrolled in HS centers in New Mexico.¹³ HS is an ideal environment for involving families in obesity prevention because of its established programs in rural areas that focus on improving children's nutritional status, providing basic nutrition education, promoting sufficient physical activity, and requiring family involvement.

The Child Health Initiative for Lifelong Eating and Exercise (CHILE) was a 5-year efficacy trial. The evidence-based intervention incorporates national HS performance standards and existing evidence for effective obesity prevention, and includes approaches and activities developed during prior research with American Indian and Hispanic communities.¹⁴ Carried out over 2 school years (2008- 2010) the trans-community intervention for HS children and their families promotes increased physical activity; increased consumption of fruits, vegetables, and whole grains; decreased consumption of sugar-sweetened beverages and high-fat foods; and decreased television viewing. The study was conducted in 6 rural American Indian pueblos and 10 predominantly Hispanic communities in New Mexico. HS centers were stratified on Body Mass Index (BMI) and race/ethnicity prior to random assignment to intervention (N=8) or control (N=8) conditions. This intervention was unique in that, to our knowledge, it was the first randomized controlled trial addressing obesity prevention in preschool age children enrolled in Head Start centers in American Indian and Hispanic communities. This paper describes the design and implementation of an evidence-based obesity prevention intervention.

DESIGNING THE INTERVENTION

Theoretical Model

Health behaviors are affected by multiple layers of relationship within a community. The socio-ecological model¹⁵ served as the framework for the CHILE intervention. Five levels of influence are described in the model: *individual or intrapersonal*, *interpersonal*, *organizational*, *community*, and *public policy*. Applied to the school setting, a socio-ecological model suggests integrating classroom activities and instruction with changes in the larger school environment (eg, the cafeteria) and with intervention in the home and community.¹⁶ The CHILE intervention includes 6 components that address nutrition and physical activity at multiple levels. These include: a classroom curriculum; staff professional development (PD); foodservice recommendations; family engagement; community grocery store participation; and local health care provider involvement.

Selection of Evidence

Recommendations for the primary prevention of obesity in preschool age children are outlined in national guidelines. In 2006, when CHILE was designed, guidelines included the 2005 Dietary Guidelines for Americans,¹⁷ as well as recommendations from the Centers for Disease Control and Prevention¹⁸ and the American Heart Association.¹⁹ A review of the scientific literature provided further insights for intervention development, including the following approaches: targeting locations where children spend the majority of their time (preschool and home), involving influential persons such as parents and health care providers, and focusing on the food environment. The research team crafted the CHILE intervention using these national guidelines, a review of the literature, and results from their previous work in rural American Indian and Hispanic communities.¹⁴ The specific evidence-base for each component is discussed in the following sections.

Process of Tailoring the Intervention

The CHILE research team created an intervention that was appropriate for the HS environment and that would complement existing HS curricula and requirements. The research team used three methods to adapt the intervention to suit the needs of the rural communities and HS settings, including formative assessment, a pre-intervention period, and a meeting at mid-intervention for participants (“CHILE Summit”).

Conducted over 12 months in 4 rural HS venues, the formative assessment²⁰ included 31 semi-structured interviews (with HS directors and staff, grocery store managers, and primary care providers); classroom observations; dietary recalls for children; and food availability/pricing assessments in community grocery stores. During the pre-intervention phase the research team provided staff orientation and PD at 6 sites, parent orientation at one site, and family night presentations at 3 sites. Events were designed to provide interactions with HS staff and families without compromising the baseline studies scheduled for the following year. For example, PD sessions focused on healthy growth and development of preschool age children rather than on nutrition and physical activity. The CHILE Summit was organized to allow participants to provide feedback to the research team after Year 1 of the intervention through a day-long workshop which included focus groups and in-depth group discussions. At least one person from each of the 8 intervention HS centers was present, with 29 total attendees.

These methods allowed the research team to work with HS administrative, teaching, and foodservice staff, as well as health care providers, and grocery store managers, to develop and refine the CHILE intervention. For example, formative assessment revealed the need to create recruitment and intervention materials for families and communities in both English and Spanish. Interviews with the grocery store managers emphasized that the stores could not be expected to provide upkeep for the grocery store component. Therefore, the intervention was developed so that the research team could initiate and maintain the intervention in the grocery store with monthly visits (further details are provided below). Food availability assessments ensured that foods included in the CHILE curriculum would be available in rural communities in New Mexico. Pre-intervention contact with HS staff informed approaches for interacting with HS centers and enabled the research team to align four elements of the intervention directly with the HS program: the curriculum satisfies multiple HS learning domains; the classroom, foodservice, and family components meet established federal HS Performance Standards; PD sessions meet standards for state licensing requirements; and nutrition activities meet state HS nutrition requirements. Feedback from the CHILE Summit resulted in adjustments to the intervention process, such as modifying the physical activity reporting document, and emphasizing that fruits and vegetables could be canned or frozen if not available fresh.

INTERVENTION COMPONENTS

CHILE Nutrition and Physical Activity Curriculum

The curriculum forms the core of the CHILE intervention, addressing health behaviors at the level of the child. Children participate in developmentally appropriate lessons, establishing the groundwork for eating more fruits and vegetables and being more physically active.

CHILE nutrition curriculum—The nutrition curriculum is based on the developmental phenomenon wherein preschool age children are typically unwilling to try new foods,^{21–24} and on evidence that children who eat more fruits and vegetables have lower risk for becoming overweight or obese.²⁵ Research has shown that children need 8 to 12 exposures to a novel food before developing a preference for that food.²⁶ Based on this evidence, the CHILE nutrition curriculum, in combination with the foodservice component, provides children with repeated opportunities to taste new fruits and vegetables.

The nutrition curriculum is intended for implementation over a two-year period aligning with the HS 2-year program that serves 3- and 4-year-old children. All lessons incorporate one or more HS learning domains, including literacy, math, and science. The goal of each CHILE nutrition lesson is to provide children with multiple opportunities to taste a fruit or vegetable.

CHILE physical activity curriculum—The physical activity curriculum is based on recommendations by the National Association of Sport and Physical Education that preschool age children should have at least 60 minutes of unstructured (free-play) and at least 60 minutes of structured (adult-led) physical activity each day.²⁷ The intervention provides HS teachers with the necessary tools, equipment and lessons needed to incorporate an additional 30 minutes of physical activity per day into classroom time. The curriculum was developed by individuals trained in child development, education and exercise, and incorporates age-appropriate activities from the Pathways physical activity curriculum, a curriculum developed for American Indian schoolchildren.²⁸ The physical activities promote language development, literacy, mathematics, creative arts, social and emotional development and physical health and development, and enhance learning through movement-based instruction. Most activities are short in duration (5 to 10 minutes), require little space, and use a minimum amount of equipment.

Professional Development

Quarterly PD sessions for HS staff provide information about physical activity and nutrition for preschool children as well as technical assistance for appropriate implementation of the CHILE intervention. Sessions are designed to increase content knowledge, as well as HS staff skills and self-efficacy using an engaging, hands-on approach. Training sessions are given prior to the start of each of 8 nutrition modules, over a 2-year period.

The PD emphasizes increasing fruit, vegetable and whole grain consumption; switching to low-fat dairy products; reducing sugar-sweetened beverage and high-fat food consumption; increasing physical activity and decreasing television time; the benefits of physical activity; and guidelines for physical activity. The PD includes hands-on use of the curriculum, in which the instructor leads teachers in lessons from the PA curriculum. New equipment for the classroom and take home materials for the families are also introduced to staff.

Foodservice

During each module, while CHILE nutrition lessons are conducted in class, the same fruit and vegetable are incorporated in the school menu. The in-class nutrition lessons combined

with foods in the menus provide children with a total of eight exposures to each novel fruit and vegetable. The foodservice component includes policy and related behavioral changes to food purchasing and menus. Policy changes recommended for foodservice include switching to ordering whole grain and low-fat dairy products and modifying food preparation methods (e.g. reducing fat content in ground beef).

Family Engagement

Families play an important role in the prevention of obesity²⁹ and HS parents are expected to participate with HS activities regularly. CHILE built on these existing standards by including a family component which consists of take home materials (newsletters and activity cards) and family events similar to those in the Pathways study.^{30,31}

Take home materials—Nutrition materials include recipes and shopping lists that coordinate with the curriculum lessons. They provide updates about CHILE-related activities at HS and include practical information such as how to reduce fat in ground beef and identify whole grain foods. They direct families to look for materials at their CHILE-participating grocery store. Physical activity materials recommend activities for families, and encourage them to turn off the television and be more active. The materials provide tips, ideas and guidelines for engaging preschool children in physical activity. Occasionally the family materials include items to promote physical activity, such as a beach ball for each family, or the book, *“The Berenstain Bears and Too Much TV.”*

Family events—Family events provide an opportunity for families to participate in activities that promote healthy eating and increased physical activity. These events reinforce the CHILE messages through relevant activities designed for parents. For example, parents practice label-reading, participate in a CHILE physical activity, and have an opportunity to talk with the local health care provider.

Grocery Store

Retail food environments influence dietary habits and an abundance of energy-dense nutrient-poor foods, deceptive marketing practices, confusing claims, limited availability and higher (real or perceived) cost of healthier foods, and lack of physical access to grocery stores have all been implicated in the obesity epidemic.^{32–35} The CHILE Grocery Store component aims to increase availability and visibility of healthier food options, and provides recipes and nutrition-related information to families at point of decision. Shelf labels with the CHILE logo identify CHILE-promoted foods. A CHILE information rack contains recipes and informational brochures. Recipes are aligned with the modules at the HS (during every module 6 new recipes are introduced that include the fruit, vegetable, and whole grain promoted in the module). Brochures include information on the CHILE project and CHILE-related messages. Opportunities to increase availability and visibility of healthier food options are explored with grocery store managers during monthly visits to the store.

Health Care Provider

The CHILE intervention included health care providers as change agents as part of the socio-ecological model.^{15,36} Local health care providers, including physicians, nurse practitioners, nurses, and physicians’ assistants, are encouraged to support the CHILE goals in their practice, to provide messages consistent with CHILE, and to support and participate in CHILE family events. The inclusion of local health care providers in this manner helps increase the sustainability of the project, and strengthens community-level connections for the HS.

IMPLEMENTATION: HOW CHILE WAS PUT INTO PRACTICE

Successful implementation of the 6 components of CHILE started with a Memorandum of Agreement (MOA) that delineated roles and responsibilities for participating HS centers and the University research team. The MOA was signed by an official representative of the HS, an official representative of the tribe (where applicable), and the Principal Investigator of the CHILE study. Obtaining the first 2 MOAs was an extended process as sites were identified and study protocols were established; the additional 14 MOAs were obtained over a period of 5 months.

Following the MOA, the CHILE Community Engagement Specialist (CES) played a key role in ensuring that CHILE activities (i.e. implementation of the curriculum and foodservice component) were planned and carried out at the HS centers. The CES met with HS administrators before the start of each school year, kept in frequent contact regarding upcoming events, followed up with teachers regarding curriculum implementation, and encouraged HS staff to submit completed research forms. Of the 2688 potential nutrition lessons (8 lessons \times 8 modules \times 42 classrooms across 8 HS centers), 1935 (72%) were reported completed by HS teachers. Completion rates increased steadily in the first year of the intervention, with 63% of lessons completed in Year 1, and 81% of lessons completed in Year 2. The target fruit or vegetable was reported as included in 433 out of 512 (85%) possible meals or snacks, with no difference between years 1 and 2.

A total of 64 quarterly PD sessions (8 sessions \times 8 HS) were held during the 2 years of intervention. Sessions lasted 2 to 3 hours and were held at the HS centers. Sessions were led by the CHILE nutritionist and the CHILE exercise scientist, or by other trained professional members of the research team. Teachers or teaching assistants and head cooks or assistant cooks were present at each session. Administrative staff (eg, directors, nutrition coordinators) attended sessions on an irregular basis.

Family engagement was implemented through take home materials and family events. The take home materials for each module were provided to teachers during each PD session. Teachers were asked to send the materials home with their students during each module. Family events were held quarterly during the first year of intervention, and consisted of a brief presentation on nutrition or physical activity by a CHILE team member or by the local health care provider. During the second year, in response to feedback from the HS centers, family events were stand-alone events (not part of HS parent meetings) and done in the fashion of a health fair. A total of 24 family events were held the first year, and 16 the second year.

The CHILE nutritionist recruited seven stores to participate in the intervention (one store was shared by 2 sites). At the start of each module, CHILE staff filled the CHILE rack with brochures and recipe cards (6 new recipes per module) and placed CHILE shelf labels in front of target foods throughout the store.

A physician member of the CHILE research team recruited local health care providers at each of the 8 intervention sites, conducted initial visits and provided a package which outlined the project and explained the provider's role in the CHILE study. Providers were also given national guidelines on the prevention of obesity from the American Academy of Pediatrics,²⁹ and the book entitled "*The Berenstain Bears and Too Much TV*" for the clinic's library. Providers were invited to 2 family events each year (2 events \times 8 HS centers = 16 total). They gave presentations at 14 family events the first year, and attended and participated in 10 family events the second year.

LESSONS LEARNED

Integrating the diverse needs of multiple communities-- in particular, allowing for cultural norms that varied from site to site-- while maintaining strict fidelity to the intervention design was a goal and challenge throughout the implementation period. During implementation, elements of each component were refined and adapted or noted for future use, including: considering seasonality of fresh fruits and vegetables; need for repetition and inclusion of both teaching and foodservice staff in PD sessions; need to bolster family participation; fitting the intervention into the business focus of grocery stores; and working within the limited time that health care providers have available.

Nutrition and Physical Activity Curriculum

Some CHILE foods are not aligned with growing seasons, which proved problematic, particularly when fresh foods were suggested for lessons and recipes. For example, peach lessons were conducted in late fall, when fresh peaches were either not available or prohibitively expensive. In this situation, HS staff members were encouraged to use frozen or canned fruits and vegetables without added sugar or fat. Teachers reported completing more lessons in Year 2 than in Year 1, suggesting that uptake and integration of CHILE may take time for teachers to achieve.

Professional Development

Although PD was delivered quarterly, frequent repetition of the guidelines and recommendations were required. Reviewing information was especially important in locations where staff turnover was high. Inclusion of foodservice staff, coordinators and administrators in PD was also important, fostering their investment in the project.

Foodservice

Implementation of changes to HS menus varied across centers. Some on-site cooks had authority to change menus and order new foods, while others had no authority to do so. Implementation occurred more rapidly at HS centers with more autonomous kitchen staff. For example, a switch from 2% to 1% milk was almost immediate at one HS, whereas another struggled to persuade their foodservice manager to purchase fresh sweet potatoes rather than canned. HS centers required varying levels of effort from the CHILE nutritionist in order to achieve buy-in from those who control food purchasing and menu selection.

Family Engagement

Family event participation varied by site and from Year 1 to Year 2. In Year 1, family events were incorporated into required monthly parent meetings and were in lecture format. Following feedback from the HS staff, the family events were changed to booth-style health fairs in Year 2. CHILE provided teachers with signs to advertise the event, and invitations for children to decorate and deliver to parents. Attendance at family events also increased when a physical activity performance was included; knowing that their child was going to “perform” brought many parents to the events with cameras in hand.

Grocery Store

Store owners/managers were willing to participate in CHILE as long as it did not detract from their business. That CHILE promoted the store at family events and on printed take home materials for families was attractive to store management and seen as a benefit to the store. Store managers were supportive of CHILE, so long as they were not required to devote employee time or resources to the initiative. It was important to introduce the store employees to the project and the materials so that they understood the purpose and would

not inadvertently undermine intervention efforts. For example, the produce section manager in one store reported that he had initially thrown away CHILE labels because he did not know why they were on the shelves.

Health Care Provider

Because health care providers were recruited to participate in the communities that they served, the providers that attended family events knew the families, and were enthusiastic about working with their patients outside a clinical setting. Additionally, local health care providers were able to connect people with community resources. However, time was always a challenge with the health care providers. Many expressed interest in CHILE; however their schedules and workloads often prevented them from attending meetings and events. Accommodating their schedules and incorporating CHILE into previously scheduled events (eg, a clinic staff meeting) increased their participation.

IMPLICATIONS FOR SCHOOL HEALTH

Head Start centers can play an important role in addressing the epidemic of obesity in children. However schools, including preschools, often have policies and curricula that preclude or make it difficult to add new programs to their already busy schedule. CHILE is an example of an evidence-based intervention that emphasizes nutrition and physical activity for preschool children and that can be readily incorporated into the curricula because it is aligned with Head Start national performance standards.

Acknowledgments

We express our deepest appreciation and sincere thanks to all of the teachers, staff, and administration at the participating Head Start centers, as well as families and other community members who assisted in the development and implementation of the CHILE study. We also wish to thank all members of the CHILE research team. Thank you to Theresa Cruz for help preparing the manuscript. CHILE was funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) – grant No. 1 R01 DK7²958-01.

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