Growing Healthy Kids: A School Enrichment Nutrition Education Program to Promote Healthy Behaviors for Children

Abstract
The Growing Healthy Kids Program is a school-based nutrition education program that teaches students in Kindergarten through 2nd grade about healthy eating, physical activity, and how their body uses food. Pre- and post-knowledge data is collected from the students to measure changes in nutrition knowledge. In the first 2 years of the program, significant improvements in nutrition knowledge were found in all three grades. Teachers reported that students were more aware of the importance of nutrition and were making healthier meal and/or snack choices at the end of the program.

Introduction
Childhood obesity rates have more than doubled in the United States over the last 30 years (CDC, 2013). The "F as in Fat" report (Robert Wood Johnson Foundation, 2009) recognizes the important role schools play in the lives of our nation's families and highlights the critical need for schools to improve their nutrition- and health-related programs. Teaching children the importance of eating healthy and being physically active encourages them to develop and maintain healthy habits throughout their lives.

Physical activity levels and eating behaviors are influenced by environmental factors, including families,
community organizations, health care providers, faith-based institutions, businesses, government agencies, the media, and schools (Wechsler, McKenna, Lee, & Dietz, 2004). Well-designed and implemented school programs have potential to promote healthy eating, physical activity, and reduced sedentary time. Also, academic performance may be associated with good nutrition, physical activity, physical education, and nutrition programs (Wechsler et al., 2004). CDC has recommended that schools "implement health education that provides students with the knowledge, attitudes, skills and experiences needed for lifelong healthy eating and physical activity" (Guideline 5) (CDC 2011). Nutrition interventions based on promoting behavior change have proven effective in changing dietary behaviors among children. School-based nutrition interventions have potential to positively affect youth. To be successful, nutrition education programs require a systematic approach that combines knowledge of determinants of behavior with effective strategies and an evaluation plan (Hoelscher, Evan, Pacel, & Kelder, 2002). The objectives of the Growing Healthy Kids through Healthy Communities school enrichment kits (GHK-SEK) program were to improve teacher and student nutrition knowledge and to potentially change their attitudes and behaviors.

Development of the Program

The Growing Healthy Kids through Healthy Communities school enrichment kits (GHK-SEK) were developed by SNAP-Ed Extension educators/assistants and adapted for the GHK-SEK program. The objective was to reach all K-2 grade students with nutrition education to enhance the health curriculum. The GHK-SEK strategy engages teachers to provide direct education through easy-to-use nutrition kits. The kits contain five lessons plus an optional lesson for each of the K-2 grades (Tables 1, 2, and 3). The lessons are based on the Social Cognitive Theory (SCT), which emphasizes the role of reinforcement in changing behavior (McKenzie, Neiger, & Thackerary, 2013; Bandura, 2001). For example, in the first grade school enrichment kits, direct reinforcement is used when students receive a special stamp for participating and answering questions correctly during the nutrition lessons. Each lesson meets at least one health standard for Lincoln Public Schools (LPS) and/or the National Health Standards (UNL EdMedia, 2013; CDC, 2013). Tables 1, 2, and 3 provide the learning objective, main topic, SCT constructs, and national standards for each lesson within the curriculum for each grade. Nutrition experts (n=3) reviewed all lessons for accuracy of information and a curriculum specialist reviewed the lessons for age appropriateness and aligning with the National Health Standards. Lessons were revised accordingly. All resources for each lesson are included in the kit.

The kits allow teachers with limited nutrition training to provide accurate and current nutrition information and increase the amount of classroom time spent on health and nutrition. Summer training workshops were held for K-2 teachers. Objectives of the first training were to 1) introduce the teachers to the curriculum, 2) educate them on basic nutrition concepts, and 3) demonstrate how to teach nutrition utilizing the kits. Three 4 hour workshops were conducted; one for each grade level. Workshops allowed the teachers to learn about the lessons and activities included in each kit and how to implement the lessons in their classroom. Pre post-test evaluations were conducted which included knowledge and self-efficacy questions after each workshop and teachers received an evaluation after they implemented the curriculum. In subsequent summer workshops, teachers were educated on the new school lunch guidelines, ways to incorporate physical activity into the classroom, and additional nutrition education resources available to them. Statistical analysis (t-test) was conducted between
those who attended the workshop and those who did not. IRB approval was obtained from the University of Nebraska-Lincoln and the LPS system.

The school enrichment program started with 12 LPS Title I elementary schools, and in 2009 the program expanded to all Title 1 and non-title K-2 grade classrooms in LPS (n=39 schools).

**Table 1.**
Kindergarten Lessons, Objectives, Activities, SCT Constructs, & National Health Education Standards

<table>
<thead>
<tr>
<th>Lesson Topic &amp; Time</th>
<th>Learning Objectives</th>
<th>Activities</th>
<th>SCT Constructs</th>
<th>National Standards</th>
</tr>
</thead>
</table>
| **Introduction** (Extension Educator: One, 30-minute activity) | • Identify the importance of hand washing & when it should be performed  
• Demonstrate proper hand washing | • GloGerm Hand Washing Activity  
• Administer Pre-test | • Outcome expectations  
(benefits of hand washing)  
• Self-efficacy  
• Facilitation (knowledge) | • NHES 7: Demonstrate healthy practices & behaviors that maintain or improve personal health. |
| **1: Food Guide Adventures** (Teacher: Three, 20-minute activities & one 5-minute activity) | • To explain why food is important to good health  
• To name the 5 basic food groups that keep the body healthy  
• I know an old lady  
• "The Food Groupie Adventures" DVD | • MyPlate Activity Mat  
• Where does my food go?  
• I know an old lady  
• "The Food Groupie Adventures" DVD | • Behavioral Capacity (knowledge, poster, handouts)  
• Social Support (parent letters)  
• Self-efficacy  
• Collective-efficacy  
• Observational learning (Food Groupie characters)  
• Outcome | • NHES 1: Identify that healthy behaviors affect personal health.  
• NHES 7 |
<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Activities</th>
<th>Behavioral Capacity</th>
<th>Self-efficacy</th>
<th>Outcome Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2: Fun Food Groups</td>
<td>To name 5 basic food groups that keep the body healthy</td>
<td>Go with Grains, Vegetable Variety, Fun with Fruit, Dairy, Powerful Protein</td>
<td>Behavioral Capacity</td>
<td>Self-efficacy</td>
<td>Outcome Expectations</td>
</tr>
<tr>
<td>3: Mealtime Matters</td>
<td>Show ways to make breakfast part of the daily morning routine</td>
<td>Keep them clean, Begin with breakfast, Cook it!</td>
<td>Behavioral Capacity</td>
<td>Self-efficacy</td>
<td>Outcome Expectations</td>
</tr>
<tr>
<td>4: Healthy Habits</td>
<td>Describe healthful meals and snacks</td>
<td>A sticky experiment, MyPlate</td>
<td>Behavioral Capacity</td>
<td>Self-efficacy</td>
<td>Outcome Expectations</td>
</tr>
</tbody>
</table>

NHES 1

NHES 7
<table>
<thead>
<tr>
<th><strong>5: Fantastic Five Senses</strong>  (Teacher: Three, 20-minute activities)</th>
<th><strong>Optional Lesson</strong>  (Teacher: Two, 20-minute activities)</th>
<th><strong>Final Lesson: Snack/Physical Activity</strong>  (Extension Educator: One, 30-minute activity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Make decisions about healthful food choices (avoiding fatty foods)</td>
<td>- Name the five senses</td>
<td>- To name the 5 basic food groups that keep the body healthy</td>
</tr>
<tr>
<td>- Sandwich</td>
<td>- Sounds and Smells</td>
<td>- Describe healthful meals and snacks</td>
</tr>
<tr>
<td>- Fun Foods bingo game</td>
<td>- Taste and Touch</td>
<td>- Make decisions about healthful food choices</td>
</tr>
<tr>
<td>- Outcome expectations (negative and positive)</td>
<td>- Colors</td>
<td>- Explain how</td>
</tr>
<tr>
<td>- Self-regulation (providing feedback)</td>
<td>- Behavioral Capacity (knowledge)</td>
<td>- Make a healthy snack (Pudding Cup)</td>
</tr>
<tr>
<td>- Self-efficacy</td>
<td>- Self-efficacy</td>
<td>- Physical Activity game</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Administer Post-test</td>
</tr>
<tr>
<td>- NHES 1: Recognize that there are multiple dimensions of health</td>
<td>- NHES: Describe ways to prevent communicable diseases.</td>
<td>- NHES 1</td>
</tr>
<tr>
<td></td>
<td>- NHES 7</td>
<td>- NHES 7</td>
</tr>
</tbody>
</table>
regular physical activity contributes to good health

Table 2.
First Grade Lessons, Objectives, Activities, SCT Constructs, & National Health Education Standards

<table>
<thead>
<tr>
<th>Lesson Topic &amp; Time</th>
<th>Learning Objectives</th>
<th>Activities</th>
<th>SCT Constructs</th>
<th>National Standards</th>
</tr>
</thead>
</table>
| **Introduction**    | • Identify the importance of hand washing & when it should be performed  
                     • Demonstrate proper hand washing | • GloGerm Hand Washing Activity  
                     • Administer Pre-test | • Outcome expectations (benefits of hand washing)  
                     • Self-efficacy  
                     • Facilitation (knowledge) | • NHES 7: Demonstrate healthy practices & behaviors that maintain or improve personal health. |
| **1: Food and Your Body, Part 1, Why My Body Needs Food** | • List reasons why the body needs food  
                     • Identify the benefits that healthful snacks provide for the body | • Book: "Berenstain Bears and Too Much Junk Food" | • Behavioral Capacity (knowledge)  
                     • Outcome expectations (benefits)  
                     • Self-efficacy  
                     • Self-regulation (feedback)  
                     • Observational learning (through Berenstain Bears characters) | • NHES 1  
                     • NHES 2  
                     • NHES 7 |
### 2: Food and Your Body, Part 2, How My Body Uses Food
(Teacher: Three, 20-minute activities)
- Name parts of the body that are used to eat and digest food
- Identify the benefits that healthful snacks provide for the body
- What's inside me apron
- What's inside me t-shirt
- Behavioral Capacity (knowledge)
- Self-efficacy
- NHES 1

### 3: The 5 Food Groups
(Teacher: Three, 20-minute activities)
- Name foods in the five basic food groups and foods in the "other foods" category
- Choose and record a favorite healthful food from each of the five food groups
- MyPlate group lesson
- MyPlate Discovery
- MyPlate Puppets
- Food group booklet
- Observational learning (Mr. Chef)
- Behavioral Capacity (knowledge)
- Social support (parent newsletter)
- Self-efficacy
- Outcome expectations (benefits)
- Collective-efficacy
- NHES 1
- NHES 7

### 4: What is a Balanced Meal?
(Teacher: Three, 20-minute activities)
- Define the term "healthful meals"
- Plan a balanced breakfast
- Group Lesson, Meal planning/Healthy Breakfast
- Apple Pocket Wall Chart
- A Healthy meal on MyPlate
- Behavioral Capacity (knowledge)
- Self-regulation (feedback)
- Collective-efficacy
- NHES 1
- NHES 5: Identify situations when a health-related decision is needed
<table>
<thead>
<tr>
<th>5: Healthy Snacking  (Teacher: Three, 20-minute activities)</th>
<th>- Identify the benefits that healthful snacks provide for the body</th>
<th>- Group Lesson, healthful snacks</th>
<th>- Behavioral Capacity (knowledge)</th>
<th>- NHES 7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Apple pocket wall chart</td>
<td>- Outcome expectations (benefits)</td>
<td></td>
<td>- NHES 1</td>
</tr>
<tr>
<td></td>
<td>- Healthy snacks activity sheet</td>
<td>- Self-efficacy</td>
<td></td>
<td>- NHES 7</td>
</tr>
</tbody>
</table>

| Optional Lesson  (Teacher: Five, 10-minute activities)       | - Identify healthful foods and snacks                         | - Foods from A to Z Poster      | - Outcome expectations           | - NHES 1 |
|                                                             | - Identify the benefits of dairy products                     | - Fun with Fruits & Vegetables Worksheet | - Observational Learning        |          |
|                                                             |                                                                | - Eat Healthy Foods Worksheet   | - Facilitation                   |          |
|                                                             |                                                                | - Germs Get Around Booklet      |                                  |          |
|                                                             |                                                                | - "MOO 2 YOU" Video             |                                  |          |

| Final Lesson: Snack/Physical Activity  (Extension Educator: One, 30-minute activity) | - To name the 5 basic food groups that keep the body healthy | - Make a healthy snack (Trail Mix) | - Outcome expectations           | - NHES 1 |
|                                                                 | - Describe healthful meals and snacks                         | - Physical Activity game        | - Self-efficacy                  |          |
|                                                                 | - Make decisions about healthful food choices                | - Administer Post-test          | - Observational learning         | - NHES 7 |
• Explain how regular physical activity contributes to good health

Table 3.
Second Grade Lessons, Objectives, Activities, SCT Constructs, & National Health Education Standards

<table>
<thead>
<tr>
<th>Lesson Title &amp; Time</th>
<th>Learning Objective</th>
<th>Main topics in each Lesson</th>
<th>SCT Constructs</th>
<th>National Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>Identify the importance of hand washing &amp; when it should be performed</td>
<td>GloGerm Hand Washing Activity</td>
<td>Outcome expectations (benefits of hand washing)</td>
<td>NHES 7: Demonstrate healthy practices &amp; behaviors that maintain or improve personal health.</td>
</tr>
<tr>
<td>(Extension Educator: One, 30-minute activity)</td>
<td>Demonstrate proper hand washing</td>
<td>Administer Pre-test</td>
<td>Self-efficacy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Facilitation (knowledge)</td>
<td></td>
</tr>
<tr>
<td><strong>1: A Healthy Lifestyle</strong></td>
<td>Illustrate behaviors that promote good health</td>
<td>Physical Activity</td>
<td>Behavioral Capacity (knowledge)</td>
<td>NHES 1</td>
</tr>
<tr>
<td>(Teacher: Two, 40-minute activities)</td>
<td>Trace the digestive process</td>
<td>&quot;Sometimes&quot; foods</td>
<td>Observational learning (through &quot;The King&quot;)</td>
<td>NHES 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Digestion Question</td>
<td>Self-efficacy</td>
<td></td>
</tr>
<tr>
<td><strong>2: MyPlate</strong></td>
<td>Name the five food groups and foods from each section of the MyPlate</td>
<td>Introduction to MyPlate</td>
<td>Behavioral Capacity (MyPlate poster in classroom and handout, knowledge)</td>
<td>NHES 1</td>
</tr>
<tr>
<td>(Teacher: Two, 40-minute activities)</td>
<td>Identify foods</td>
<td>Food Heads</td>
<td></td>
<td>NHES 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MyPlate Puzzle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3: Plan for Health
*(Teacher: Two, 40-minute activities)*

- Demonstrate how to choose healthful food versus unhealthful foods
- Develop a day's menu that contains a variety of foods from MyPlate

#### Activity
- **Food Ball Toss**

#### Behavioral Capacity (knowledge)
- **Snack Smart Game**
- **Menu Planner**

#### Outcome expectations (benefits)
- **Self-efficacy**
- **Collective-efficacy**

#### NHES
- **7**
- **8: Make requests to promote personal health**

### 4: Food Variety
*(Teacher: Two, 30-minute activities)*

- Explain why balanced meals are important
- Name the five food groups and food from each section of the MyPlate

#### Activity
- **Nutrition SpinZone Game**
- **F&V Bingo**

#### Behavioral Capacity
- **Self-efficacy**
- **Collective-efficacy**

#### Self-regulation
- **Self-regulation (through feedback)**
- **Observational learning (through peers)**

#### NHES
- **1**
- **5**

### 5: Making Choices
*(Teacher: Two, 40-minute activities)*

- Describe healthful meals and snacks
- Make decision about healthful

#### Activity
- **Find the fat experiment**
- **MyPlate Go Fish/Concentration**

#### Behavioral Capacity (knowledge and environment)
- **Self-efficacy**
- **Outcome expectations**

#### NHES
- **5**
- **7**
### Optional Lesson
(teacher: One, 30-minute, & One, 10-minute activities)
- Describe healthy eating concepts
- Describe healthful meals and snacks
- Identify foods in each food group
- Apple Writing Worksheet
- Eat Smart with MyPlate worksheet
- Outcome expectations
- Self-efficacy
- Facilitation

### Final Lesson: Snack/Physical Activity (Extension Educator: One, 30-minute activity)
- To name the 5 basic food groups that keep the body healthy
- Describe healthful meals and snacks
- Make decisions about healthful food choices
- Explain how regular physical activity contributes to good health
- Make a healthy snack ("Cheese Creature": Cheese stick, pretzels, raisins)
- Physical Activity game
- Administer Post-test
- Outcome expectations
- Self-efficacy
- Observational learning

NHES 1
NHES 5
NHES 1
NHES 7
Implementation

The LPS Health Curriculum Specialist assisted with recruiting K-2 teachers within LPS schools (n=18, non-Title 1 schools) to participate, ultimately leading to 100% participation in eligible non-Title I classrooms. At the beginning of each school year, Extension educators scheduled GHK-SEK lesson times with K-2 teachers (n=129).

Once scheduled, an Extension educator delivered the GHK-SEK to the classroom and presented the first lesson on hand washing. During this class, students complete a pre-test to measure their nutrition knowledge. The kit remained in the classroom for 15 days for the teacher to use. The teachers could use the five lessons to enhance the health text used in the school system. After completion of the lessons, a survey was sent to the teacher to complete. The Extension educator returned to teach the final lesson (healthy snacking or physical activity), administer the nutrition knowledge post-test, and pick up the kit.

Evaluation

Matched pre- and post-test data sets from 7,861 K-2 grade students were analyzed by grade group using a paired t-test (significance set at p = 0.05) to evaluate change in nutrition knowledge. Comparing pre- and post-test evaluations was an important step in documenting the impact of the Growing Healthy Kids program (Jayaratne, Bradley, & Driscoll, 2009). Students in each grade were asked a different question(s) based on lesson topics in the GHK-SEK. Questions were based on the evaluation measures for the Expanded Food and Nutrition Education Program (EFNEP) and Supplemental Nutrition Assistance Program-Education (SNAP-ED) programs (Townsend, Johns, Shilts, & Farfan-Ramires, 2006; Townsend, 2006). The paper-based surveys consisted of one question on selecting an appropriate breakfast item for kindergarteners; two questions on selection of a fruit and vegetable for first graders; and three questions on food group identification for second graders.

A significant increase in nutrition knowledge was found in all three grades in the non-Title I schools (n=18 schools) during the first two years the curriculum was implemented (Vierregger, Albrecht, Hall, Sehi, & Koszewski, 2013) (Table 4). An additional question was added to the Kindergarten and first grade pre post-test in the third year of implementation. Due to the reading level of the students, time to complete the pre post-test is balanced with time to conduct a lesson during the designated teaching time. The most notable increases in nutrition knowledge were in the second grade results, where students' knowledge increased from 58.9% in the pre-test to 81.4%, answering all three questions correctly in the post-test, demonstrating a 22.5% increase in nutrition knowledge in Year 2.

Table 4.
Percent Change in Student's Average Test Scores from Pre- to Post-Test, Paired T-Tests
(Percent of students who answered 100% of questions correctly)

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>First Grade</th>
<th>Second Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>Post-Test</td>
<td>Difference</td>
</tr>
<tr>
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</tbody>
</table>
Teachers completed a Classroom Data form after the 3-week session, including demographic information on students, how much time they spent teaching the GHK curriculum, and lessons used. After using the kits, teachers were emailed a follow-up survey to report on their experience. The survey included their own self-reported health changes; teacher reported student preferences to curriculum activities and efficacy, and outcome expectations. Eighty percent of teachers taught five lessons provided in the GHK curriculum. Most (87%) of the teachers (n = 72) who responded (62.5% response rate) to the survey reported they "more confident in teaching nutrition," and 80% of respondents reported that they "have become more aware of nutrition." Over half of the teacher respondents reported increased physical activity, improved hand washing, and healthier meal and/or snack choices after teaching the curriculum to their students (n= 140) (Hall et al., 2013). Two confidence scales were created for "efficacy expectations" (13 questions) and "outcome expectations" (6 questions) (scale: 1=not at all confident to 4=very confident). The outcome expectations did not have a significant difference between those who attended or did not attend the teacher workshop; however, the efficacy expectations score was significantly higher (p<0.1) for those who attended the workshop.

The most notable change teachers observed in their students was an increased awareness of nutrition. While there was some variation among all three grades, more than half of the teachers who responded to the survey reported students were making healthier meal and/or snack choices and have improved hand washing.

**Conclusions and Future Considerations**

Significant increases in students' nutrition knowledge were found among all three grades during the first 2 years of the Growing Healthy Kids program. Teachers reported improved confidence in teaching nutrition and increased awareness of nutrition. Teachers also reported that students had an increased awareness of nutrition, were making healthier meal and snack choices, and improved hand washing. Sustainability of the program in the LPS district will be explored with stakeholders. Plans are currently in progress to develop a GHK-SEK handbook for national distribution.

**Acknowledgements**

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**References**


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