Third Grade Student’s Ability to Articulate Lessons Learned in a Health Education Program

A Thesis

Presented in Partial Fulfillment of the Requirements for

the Degree Master of Science in the Graduate

School of The Ohio State University

By

Catessa Louise Simon, B.S.
Graduate Program in Allied Medical Professions

*****

The Ohio State University
2012

Master’s Examination Committee:

Dr. Maryanna D. Klatt, Adviser

Dr. Gail L. Kaye

Dr. Marcia L. Nahikian-Nelms
ABSTRACT

Fuel for Learning (FFL) is the combination of a nutrition education program, Food Fit (FF), and a classroom stress prevention program, Move-Into-Learning (MIL), reformatted to be delivered via DVD in classrooms during the school day. The objective of this study was to determine the type of knowledge 3rd graders acquired from FFL, the in-school obesity/stress prevention program used as the study intervention. Third grade students (n=143) attending a public and private school in and around Columbus, OH were selected to participate in FFL. Students individually listed what they learned from participating in FFL on a “Healthy Tool Box” worksheet in response to the question, “What might be in your healthy tool box as you move forward?” Participants were also asked to generate what they learned from the FFL program in group classroom interviews.

Quantitative analysis consisted of coding student answers as either reflecting nutrition or stress reduction strategies, and percentages were used to describe the quantity of the Tool Box spaces utilized to articulate nutrition vs. stress reduction knowledge. A T-test for Equality of Means and chi-square test were used to determine significant differences between genders and schools in terms of type of knowledge acquired in FFL. Qualitative analysis consisted of analyzing the group classroom interviews.
interviews to gather common themes in knowledge articulated. Interviews were analyzed by a panel of science professionals.

Results indicated that 75.8% of all Tool Box spaces described learned nutrition knowledge. Both the public and private school students used the majority of spaces to indicate nutrition knowledge (81.2% and 66.8%, respectively), but a greater proportion of public school students used the majority of their Tool Box spaces to describe nutrition knowledge (63% and 18%, respectively). A t-test for the equality of the percentage of nutrition-based responses for public and private schools concluded that there was no statistically significant difference (mean (standard deviation): 81.2% (23.5%) and 66.8% (19.8%) respectively) in the percentage of nutrition-based responses between the two groups. No significant differences were found between schools or genders in terms of type of knowledge articulation.

Review of knowledge placed in the Tool Box work sheet revealed five common themes: choose healthy foods, the importance of eating breakfast, choose low sugar foods, read nutrition labels, and be aware of the correct serving size for each food. Common themes that emerged in the qualitative interviews included the importance of: healthy lifestyle, healthy food and beverage choices, focus on thoughts other than what is causing stress, and engage in calming, stress reduction activities. Knowledge articulated on the individual Tool Box work sheet was consistent with the answers generated in the group classroom interviews.

Children participating in FFL successfully recalled both nutrition and stress reduction knowledge that can aid in preventing obesity, but were able to generate more
nutrition knowledge learned from the program than stress reduction knowledge in both the individual and group settings. Health education programs need to address nutrition, physical activity, and stress prevention concurrently to effectively address the obesity epidemic. FFL may serve as a model for future school obesity/stress prevention programs that can be delivered in the classroom, during the school day.
ACKNOWLEDGEMENTS

I would like to acknowledge my advisor, Dr. Maryanna Klatt, for guiding me through my thesis. I was very lucky to have an advisor that was as patient and genuinely invested in my success and wellbeing as she. I would also like to acknowledge Dr. Marcia Nahikian-Nelms and Dr. Gail Kaye for serving on my committee. I am very thankful to have their support and guidance through this process.

I would like to thank Dr. Susan White for her assistance with my data analysis; I truly would not have been able to do it without her! I would also like to thank Dr. Chris Taylor and Dr. Kay Wolf for their advice and assistance along the way.
VITA

January 28, 1988 ........................................................................................................ Born – Winchester, Virginia

May 2010 .............................................................................................................. B.S. Human Nutrition & Foods, West Virginia University

2010-2012 ................................................................................................................. Combined MS/DI Program in Medical Dietetics
The Ohio State University

FIELD OF STUDY

Major Field: Allied Medical Professions
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>ii</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>iii</td>
</tr>
<tr>
<td>Vita</td>
<td>iv</td>
</tr>
<tr>
<td>List of Tables</td>
<td>viii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>ix</td>
</tr>
</tbody>
</table>

Chapters:

1. Introduction
   - Background of the Problem: Obesity and Stress | 1
   - Trying to Address the Problem, but Widening the Gap | 3
   - Addressing the Problem | 4
   - Fuel for Learning | 5
   - List of Abbreviations | 8
   - List of Definitions | 9

2. Literature Review
   - Why Schools are an Appropriate Place to Implement Wellness Policies | 11
   - Examples of Health Education Programs | 12
   - Existing School Mindfulness and Yoga Programs | 19

3. Methodology
   - Overview of Program | 27
   - Subjects | 31
   - Evaluation | 31
   - Data Analysis | 32
### Third Grade Student’s Ability to Articulate Lessons Learned in a Health Education Program

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>33</td>
</tr>
<tr>
<td>Introduction</td>
<td>33</td>
</tr>
<tr>
<td>Methods: Overview of the Program</td>
<td>34</td>
</tr>
<tr>
<td>Results</td>
<td>38</td>
</tr>
<tr>
<td>Discussion</td>
<td>44</td>
</tr>
<tr>
<td>Implications for Research and Practice</td>
<td>47</td>
</tr>
</tbody>
</table>

5. Conclusions and Implications

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conclusions</td>
<td>51</td>
</tr>
<tr>
<td>Limitations</td>
<td>51</td>
</tr>
<tr>
<td>Recommendations</td>
<td>52</td>
</tr>
</tbody>
</table>

References

54
**LIST OF TABLES**

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Listing of Current Health Education Programs Used In Schools</td>
</tr>
<tr>
<td>3.1</td>
<td>Examples of FFL usage of Social Cognitive Theory’s Constructs</td>
</tr>
<tr>
<td>3.2</td>
<td>Examples of FFL usage of TTM Independent Variables</td>
</tr>
<tr>
<td>3.3</td>
<td>FFL usage of Appreciative Inquiry in Resiliency Activities</td>
</tr>
<tr>
<td>4.1</td>
<td>Examples of FFL usage of Social Cognitive Theory’s Constructs</td>
</tr>
<tr>
<td>4.2</td>
<td>Examples of FFL usage of TTM Independent Variables</td>
</tr>
<tr>
<td>4.3</td>
<td>FFL usage of Appreciative Inquiry in Resiliency Activities</td>
</tr>
<tr>
<td>4.4</td>
<td>Sample Classroom Interview Questions</td>
</tr>
</tbody>
</table>
Chapter 1: Introduction

Background of the Problem: Obesity and Stress

The National Center for Health Statistics reports that approximately 12.5 million (17%) children and teens between the ages of 2-19 years old in the United States are classified as obese; rates of childhood obesity steadily increased during the 1980s and 1990s, and today childhood obesity is more than three times as prevalent as in the 1980s.\textsuperscript{1} Generally, as the education of the head of the household increases the odds of having obese children decreases in both girls and boys, but obesity affects children in all socioeconomic levels; 24% of obese children live in households that are at or above 350% of the poverty level are obese, 38% live in households that are between 130-350% of the poverty level, and another 38% live in households that are below 130% of the poverty level.\textsuperscript{1}

Children that live in poverty are more likely to become overweight or obese possibly because their caregivers lack adequate resources to provide a healthy lifestyle.\textsuperscript{2} Poverty stricken families that reside in low income neighborhoods are more likely to have high rates of violence and crime; this causes playing outside to be unsafe and results in children spending extensive amounts of time inside their homes engaging in sedentary activities such as watching television and playing videogames. Also, low income neighborhoods may not have a grocery store in close proximity forcing residents to purchase foods at convenience stores that charge higher prices than grocery stores and offer lower selections of healthy foods.\textsuperscript{2} Being overweight or obese can adversely affect children’s health, self esteem, and social standing. Health complications that can develop are diabetes, metabolic syndrome, diseases of the heart, sleep apnea, early
maturation, and musculo-skeletal injuries.\textsuperscript{2} Children that are overweight or obese can suffer from low self esteem and low social standing due to teasing and discrimination.\textsuperscript{2}

Nationally, children’s schedules are full of activities with little to no time for unstructured play; unstructured play is important because it is the natural way that children learn how to structure their own time, develop their personalities, and explore their interests.\textsuperscript{3} Lack of down time also reduces time that is available to spend with family. Common signs of stress in children are fatigue, headache, stomach ache, clinging to parents, bedwetting, thumb sucking, loss of interest in activities once enjoyed, tearfulness due to minor upsets, and behavioral problems; but, it is also common for stressed children to show no signs.\textsuperscript{4,5} Common stressors for children are school work, need to get good reports, and not enough time with parents; research has shown that the amount of stressors that a child has increases with age, especially the amount of stress that children harbor for school.\textsuperscript{3,6}

Children that live in poverty stricken homes may face more stressors such as lack of food, unstable living conditions, and violence present in the neighborhood than children that live in financially stable homes. Facing those stressors can result in poor coping strategies and lead to poor behavior problems and poor academic performance.\textsuperscript{7,8} The effects of familial psychological stress on childhood obesity was studied in a longitudinal, cross sectional cohort study on children from birth to age 6 which found that families that suffered from chronic levels of stress were more likely to have obese children.\textsuperscript{9}

Animal and human studies have found that stress can either increase or decrease appetite. Clinical studies on rats have found that mild and severe stressors decrease normal food intake, but can increase intake of highly palatable food (e.g. sweetened condensed milk), and human studies on stress and nutrient density have shown that periods of high stress and high workload is positively associated with higher fat, higher calorie diets than periods of low
stress and low workload. Additional human studies have found that stress-eating (eating in response to stress with the intention of making one feel better) was significantly associated to obesity in females, suggesting that females are more likely to indulge in food to help relieve stress than males.

**Trying to Address the Problem, but Widening the Gap**

Section 204 of The Child Nutrition and Women, Infants, and Children Reauthorization Act of 2004 and Healthy Hunger-Free Kids Act of 2010 requires all school districts that participate in the National School Lunch Program to adopt and implement a wellness policy, but both laws provide no funding for implementation. Both laws rely on teachers, administrators, students, and community members to collaborate to develop the wellness policies. Even though legislation was able to identify childhood obesity as a problem, they lack the expertise to address it as indicated by the lack of funding and direction provided to support wellness programs.

An example of legislation inadequately addressing childhood obesity is that physical education (PE) programs are on the decline in America. The No Child Left Behind Act of 2001 did not include PE as a part of the core curriculum in schools, which resulted in school systems cutting PE programs due to budget cuts and increasing focus on other academics. The National Association for Sport and Physical Education recommends that elementary schools should offer 150 minutes of PE a week, but only 7-8% of schools meet this recommendation nationwide. Some schools that offer PE do not have a certified PE teacher, but require classroom teachers to teach PE; classroom teachers are not qualified to adequately deliver PE, and can lack enthusiasm needed to be effective role models for healthy living.
**Addressing the Problem**

Mindfulness Based Stress Reduction (MBSR) is one approach to addressing child stress. MBSR is a combination of traditional Buddhist meditation, Hatha yoga, and clinical and psychological practice aimed to increase nonjudgmental awareness of what the body is feeling and experiencing in the present moment in order to strengthen and relax the musculoskeletal system.\(^7, 13\) Mindfulness-Based Interventions teach mindfulness, the art of being in the present moment. Mindfulness-Based Interventions in the schools have emerged as mindfulness training has been shown to be an effective way for children and adolescents to deal with high levels of stress by helping them reframe stress, and impact their ability to focus.\(^13\) And in a recent study with 99 4\(^{th}\) and 5\(^{th}\) graders, mindfulness was found to be positively correlated with performance on inhibitory control.\(^13\)

Another studied method for reducing stress in children is yoga. Teaching yoga to children in schools has the potential to offer children coping strategies, outlets for activity, emotion regulation, self control, and social connection.\(^14\) Yoga’s positive effects on mental and physical health is well documented in adults, and other research suggests that yoga helps children have better academic grades, behavior in school, health, and self esteem. Research has also suggested that yoga can assist in the management of obesity, diabetes, asthma, attention deficit disorder, and attention deficit hyperactivity disorder; research indicates that both yoga and MBSR may warrant further investigation in terms of stress reduction in children.\(^14\)

Providing wellness activities in school is appropriate because it is where children spend the majority of their day and is the place where some children consume the majority of their daily nutrient intake. Health topics can be easily incorporated into core curriculum subjects such as math, science, and reading, and provide real world case studies for children, such as examining the effects of a high sodium diet when learning about osmolarity in chemistry class.
Also, the school environment provides outlets for children to practice good health behaviors because children must choose foods to eat in the cafeteria, what to buy in the vending machines, how to handle stress, and how to increase physical activity.

**Fuel for Learning**

Fuel for Learning (FFL) is a combination of two existing health education programs, Food Fit (an obesity prevention program) (FF), and Move-into-Learning (a stress reduction program) (MIL) that have been tested on inner city elementary populations. FF and MIL were adapted to a DVD delivery format to increase the number of classrooms able to receive the benefits of these two successful programs. FFL aims to address childhood obesity though combining FF and MIL, utilizing physical activity, nutrition, and stress management delivered via an interactive DVD lead by classroom teachers. Fuel for Learning consists of eight weeks of weekly 45 minute nutrition lessons and daily 10 minutes of yoga movements, all delivered by the DVD. Social Cognitive Theory and the Transtheoretical Model served as the theoretical basis for the nutrition portion of FFL, while the Theory of Appreciative Inquiry (AI), and Experiential Learning served as the conceptual frameworks for the yoga and resiliency building portions of the program.

The obesity prevention lessons highlighted Social Cognitive Theory (SCT), developed from Bandura’s Social Learning Theory, which states that people learn from their personal experiences and the experiences of others from seeing what outcomes result from specific behaviors. SCT has been successful in instituting behavior change, including dietary behaviors, and suggests that the personal and environmental factors and behaviors are all related and influence each other. If an individual has self efficacy and believes that he is in charge of his health and decisions, he will be able to overcome challenges and make changes to behavior which will result in changing the environment and person.
Additionally, the nutrition portion utilized The Transtheoretical Model (TTM), which is founded on change being a process in which a person moves thorough different stages until the change becomes habitual. There are five stages to change that a person can go through until the change is successfully made: precontemplation, contemplation, preparation, action, and maintenance. The stages are not linear; a person can begin at any stage and can progress or regress to any stage.

The yoga movement segment of the FFL learning program reinforced the weekly nutrition lessons every day via auditory reminders of the nutrition concepts. The daily yoga/mindfulness movement was an experiential learning activity for the 3rd graders to experience the impact of movement on their ability to focus and attend to academic lessons presented after the 10 minutes of yoga. Experiential learning consists of using one’s experiences to obtain knowledge through concrete experience and abstract conceptualization while organizing knowledge through reflective observation and active experimentation. Depending on one’s learning preferences, a learner has opportunities to experience, reflect, think, and act as he moves through the learning process.

The last segment of the weekly DVD program ended with a 10 minute resiliency activity drawing upon the Theory of Appreciative Inquiry (AI) that has been successfully utilized to foster organizational change. AI has been used in organizations in times of necessary change to help move the organization into the future by involving members of the organization. AI has also been used to bring forth individual change in students. AI’s main premise is that focusing on the positive provides more motivation than only focusing on negative aspects. In this health education program, the resiliency activities offered the children an opportunity to focus on the positive features of their own lives. The children were conceptualized to be the agents of organizational change within their own lives.
This study is a post test of knowledge acquisition to answer the following research questions concerning the FFL program with the intent of guiding further refinement of the program:

1. Could 3rd grade students demonstrate what they had learned at the completion of the intervention?
2. What type of knowledge (nutrition vs. stress reduction/coping strategies) did the children articulate in an individual written setting vs. group oral setting?
3. Was there a gender difference between the types of knowledge that the children articulated?
4. Was there a difference in types of knowledge acquisition demonstrated between the two sample schools?
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADA</td>
<td>American Dietetic Association</td>
</tr>
<tr>
<td>AI</td>
<td>Appreciative Inquiry</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>CATCH</td>
<td>Child and Adolescent Trial for Cardiovascular Health</td>
</tr>
<tr>
<td>COP</td>
<td>Communities of Practice</td>
</tr>
<tr>
<td>FF</td>
<td>Food Fit</td>
</tr>
<tr>
<td>FFL</td>
<td>Fuel for Learning</td>
</tr>
<tr>
<td>MIL</td>
<td>Move into Learning</td>
</tr>
<tr>
<td>MBSR</td>
<td>Mindfulness Based Stress Reduction</td>
</tr>
<tr>
<td>NHES</td>
<td>National Health Education Standards</td>
</tr>
<tr>
<td>SNA</td>
<td>School Nutrition Association</td>
</tr>
<tr>
<td>SNE</td>
<td>Society for Nutrition Education</td>
</tr>
<tr>
<td>TorweY-C</td>
<td>Training of Relaxation with Elements of Yoga for Children</td>
</tr>
<tr>
<td>TTM</td>
<td>Transtheoretical Model</td>
</tr>
<tr>
<td>Definition</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Extension Services</td>
<td>Land grant university service that provides research based information to citizens in agriculture, home economics, environmental preservation, business development, youth development with the intention of building and developing the community.</td>
</tr>
<tr>
<td>Mindfulness</td>
<td>State of awareness in which one examines one’s feelings, thoughts, and experiences without judgment.</td>
</tr>
<tr>
<td>Obesity</td>
<td>Excess body weight in children as indicated by a BMI for age percentile equal to or greater than the 95th percentile on the 2000 Centers for Disease Control and Prevention Growth Charts.</td>
</tr>
<tr>
<td>Overweight</td>
<td>Excess body weight in children as indicated by a BMI for age percentile between 85 and 94th percentile on the 2000 Centers for Disease Control and Prevention Growth Charts.</td>
</tr>
<tr>
<td>Stress eating</td>
<td>Eating in response to stress with the intention of making one feel better.</td>
</tr>
<tr>
<td>Wellness program</td>
<td>Program that aims to improve and maintain health and wellness by promoting a healthy diet, physical activity, and stress reduction.</td>
</tr>
<tr>
<td>Program</td>
<td>Diet Focused</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Food Fit (FF) (Columbus, OH)</td>
<td>X</td>
</tr>
<tr>
<td>Move into Learning (MIL) (Columbus, OH)</td>
<td></td>
</tr>
<tr>
<td>Gimme 5 (USA)</td>
<td></td>
</tr>
<tr>
<td>Children and Adolescent Trial for Cardiovascular Health (CATCH) (USA)</td>
<td></td>
</tr>
<tr>
<td>Nutrition Detectives (Independence, Missouri)</td>
<td>X</td>
</tr>
<tr>
<td>Eat Well, Keep Moving (Baltimore, MD)</td>
<td></td>
</tr>
<tr>
<td>Little Flower Yoga (New York City, NY)</td>
<td></td>
</tr>
<tr>
<td>Self Discovery Program (United Kingdom)</td>
<td></td>
</tr>
<tr>
<td>Training of Relaxation with Elements of Yoga for Children (TorweY-C) (Germany)</td>
<td></td>
</tr>
<tr>
<td>Bent on Learning (New York, NY)</td>
<td></td>
</tr>
<tr>
<td>Be a Fit Kid (Oregon)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.1: Listing of Current Health Education Programs Used In Schools
Chapter 2: Literature Review

Why Schools are an Appropriate Place to Implement Wellness Policies

Schools are an appropriate place to implement a wellness program because it is where children spend their greatest proportion of waking hours. It is the position of the American Dietetic Association (ADA), School Nutrition Association (SNA), and Society for Nutrition Education (SNE) that wellness initiatives in schools are essential for improving children’s health and academic performance. The rationale behind the ADA, SNA, and SNE’s position is that foods consumed at school accounts for 33% to 50% of some participants’ dietary intake, children’s levels of physical activity have decreased, children do not consume adequate amounts of fruits and vegetables, and rates of childhood obesity and overweight have increased in the past 30 years.

A health education program can supplement the curriculum that is suggested by The National Health Education Standards (NHES) which provides eight recommendations for pre-kindergarten to 12th grade students. The eight NHES standards include: students will comprehend concepts related to health promotion and disease prevention to enhance health; students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors; students will demonstrate the ability to access valid information and products and services to enhance health; students will demonstrate the ability to use interpersonal communication skills to enhance health and avoid or reduce health risks; students will demonstrate the ability to use decision-making skills to enhance health; students will demonstrate the ability to use goal-setting skills to enhance health; students will demonstrate the ability to use
the ability to practice health-enhancing behaviors and avoid or reduce health risks; and students will demonstrate the ability to advocate for personal, family, and community health. An in-school wellness program would provide students opportunities to learn about health and wellness to help meet the suggested national standards.

Examples of Health Education Programs

Food Fit

Food Fit (FF) is a six-week after-school program grounded in Social Cognitive Theory (SCT) for 4th, 5th, and 6th-grade children. FF aimed to affect inadequate intakes of fruit and vegetables, over consumption of sugar sweetened beverages, and excessive intake of packaged snack foods. Nutrition lessons were delivered in person by trained dietetic undergraduate students and lasted approximately 30-45 minutes. Lesson content included: Choosing lower calorie alternatives for snack foods, Choosing one serving of a packaged snack food, Choosing beverages without added sugar, Choosing cereals with a low amount of added sugar, Eating fruit and choosing whole fruit for breakfast and snacks, and Eating vegetables and choosing raw vegetables for a snack.

Structurally, lessons followed the following format: Introduction, Benefits and Consequences, Modeling and Taste Testing, Role Playing, and Wrap Up. The Introduction consisted of introducing the topic and the main objectives of the lesson. Benefits and Consequences consisted of interactive activities in which the children experienced the positive and negative effects of the targeted behavior. Modeling and Taste Testing consisted of the children observing their instructor perform the targeted behavior and provide reinforcement for the children to partake in the behavior. Children also got to taste a highlighted healthy food or beverage. During Role Playing, children practiced performing the targeted behavior in two
different scenarios: with parents or guardians and with peers. During the Wrap Up, the instructor reviewed the key objective of the lesson and answered the participant’s questions.

SCT constructs evaluated were behavioral capabilities, self efficacy, and expectations. A pre and post test was administered at each lesson to measure behavioral capabilities, self efficacy, and expectations pertaining to the skills and objectives of the current lesson. Each child completed a pre and post intervention food behavior assessment. Analysis of data found significant improvements in the following health behaviors: consuming more fruits and vegetables as snacks (p =0.0014), increased consumption of citrus fruits and juice (p=0.0209), increased consumption of raw vegetables (p=0.0006), and increased use of the food label to determine food selection (p=0.0017). Significant improvements were found for composite behavioral capabilities scores in lessons two (p =0.001), five (p =0.001), and six (p =0.001) with significant improvements for self efficacy in lessons one (p=0.006), two (p =0.001), three (p =0.006), and five (p =0.015), and significant improvements for expectations in lessons one (p =0.01), three (p =0.001), and six (p =0.001).

The structure of the FF program was based upon SCT, consisting of six constructs which are reciprocal determinism, behavioral capability, expectations, self efficacy, observational learning, and reinforcement. Reciprocal determinism results from the person, behavior, and environment reacting together and influencing each other; this requires the environment and attitudes to be affected. Behavioral capacity requires the individual to know what he should do and how he should accomplish it and leads to the expectations constructs, which involves educating the person to what results he can expect. Self efficacy is the individual’s belief that he can successfully make a change, self efficacy can be built by setting small, specific, attainable
goals that are easy for the person to achieve. Observational learning provides role models successfully doing the desired behavior and provides opportunities to learn from another’s experiences.\textsuperscript{15}

Reinforcements are important to sustain the repetition of the new behavior. Positive reinforcements, such as rewarding oneself for meeting a personal goal, increase the likelihood that the behavior will be repeated while negative reinforcements, such as getting hurt while exercising, decrease the likelihood that the behavior will be repeated. Extrinsic reinforcements are rewards given by outside sources, such as a program distributing gift cards for completing a task; intrinsic rewards are rewards that the individual gives herself, such as buying a new dress for meeting a goal of running three miles. Establishing an intrinsic reward pattern is important for sustaining long term change to reinforce a desired behavior because after an extrinsic reward is discontinued, the likelihood that the desired behavior will continue will decrease.\textsuperscript{15}

The Transtheoretical Model (TTM), also known as the Stages of Change Model, is founded in change being a process in which a person moves thorough different stages until the change becomes habitual. FF and the obesity prevention portion of FFL utilized TTM in the design of the weekly lessons. In TTM there are five stages to change that a person can go through until the change is successfully made: precontemplation, contemplation, preparation, action, and maintenance.\textsuperscript{15, 16} These stages are not linear; a person can begin at any stage and can progress or regress to any stage.

An individual in the precontemplation stage has no intention to change his behaviors; the proper intervention to reach individuals in this stage is to increase awareness about the benefits of the change and the consequences of not changing. Individuals in the contemplation stage are thinking about changing within the next six months; the best way to reach people in this stage is to motivate the individual and provide plans to begin change. Individuals in the
preparation stage intend to begin making the change within the next 30 days; the best way to affect changers in this stage is to provide specific plans to act and set goals. Individuals in the action stage have been engaged in the change for 0-6 months; people in this stage need support, reinforcement, and feedback on their progress. People in the maintenance stage have been making the change for at least six months; these people need reminders to continue the change and be provided with strategies to cope with setbacks.

The processes of change are the steps that people need to take in order to successfully move through the stages of TTM; interventions should use the processes of change as independent variables to target desired behaviors. The experiential processes are used in the beginning stages of change; they are Conscious Raising, Dramatic Relief, Environmental Re-evaluation, Social Liberation, and Self Re-evaluation. Conscious Raising requires the individual to learn the causes, consequences, and benefits of a particular behavior. Dramatic Relief entails that the person’s emotions be effected to make the desired behavior favorable; Dramatic Relief can be produced through role plays, personal testimonies, and media campaigns. Environmental Reevaluation allows the individual to think about how a particular behavior affects the other people in his environment. Social Liberation requires the intervention to provide opportunities for people that are underprivileged to be educated and participate in activities they might otherwise not participate. Self Reevaluation requires the individual to evaluate his self image with and without the targeted behavior; Self Reevaluation can be facilitated by providing role models and imagery exercises.

The behavioral processes are used in the later stages of change; they are Stimulus Control, Helping Relationship, Counter Conditioning, Reinforcement Management, and Self Liberation. Stimulus Control promotes the targeted behavior by providing cues to exercise the desired behavior and removing cues for the undesired behavior. Helping Relationships provides
social support to continue the desired behavior; Helping Relationships can be provided through support groups, counselor involvement, and buddy systems. Counter Conditioning calls for the intervention to teach new behaviors that can substitute for the undesired behavior. Reinforcement Management provides consequences for not participating in the desired behavior and rewards for participating in the desired behavior; an intervention can provide Reinforcement Management through positive self statements and group recognition. Self Liberation allows the individual to believe that he can perform the desired behavior and commit to continue it; interventions can facilitate self liberation by building self efficacy.

**Gimme 5**

Gimme 5 is an in school nutrition education program based upon SCT. Twelve 45-55 minute lessons were delivered over six weeks to 4th and 5th grade students; the intervention lasted two years with base line data collected when children were in the 3rd grade. Lessons taught students how to ask for fruits, vegetables, and juice through interactive role plays; enhanced preference for fruits, vegetables, and juice through taste testing; taught students how to prepare snacks and meals that featured fruits, vegetables, and juice; trained students to set goals to eat more fruits, vegetables, and juices; and taught students how to cope when goals were not obtained. Parents received a weekly newsletter suggesting how to increase fruit, vegetable, and juice consumption and providing fast, easy recipes for the children to make under parental supervision. Every two weeks a 10-15 minute video tape was sent home featuring a regionally popular athlete that modeled and emphasized targeted behaviors. Schools were randomly matched based on similar characteristics. Results indicated small differences between treatment and control groups on asking behavior (P<0.05), knowledge (p<0.001), social norms (p<0.10), self efficacy of eating fruits and vegetables (p<0.10), and eating vegetables (p<0.01) in the third year. Parental interviews indicated that 94% of families completed the
snack preparation homework from the weekly newsletter in the third year; parents also indicated that 86% of families received the take home videos but only 65% of families watched at least one video.\footnote{21}

**Child and Adolescent Trial for Cardiovascular Health**

The Child and Adolescent Trial for Cardiovascular Health (CATCH) was a school health education program implemented in the classroom over three years for 3rd, 4th, and 5th grade students.\footnote{22} Third grade students received 15 lessons, fourth grade students received 24 lessons, and fifth grade students received 16 lessons. Of the 55 available lessons that were delivered over three years, 47 were devoted to nutrition with 8 focusing on physical activity. Students participated in taste testing and food preparation in the classroom. Family packets were sent home containing activities for children to complete with their parents. Family Fun Nights were also hosted to provide taste testing of healthy foods, booths, and activities focusing on physical activity and healthy eating. Fruit and vegetable consumption was encouraged and reinforced in every nutrition lesson, in the family packets, during the Family Fun Nights, and during the taste testing opportunities. While CATCH successfully decreased fat consumption and increased physical activity in children, it had little effect on increasing fruit and vegetable consumption with significant increases only being seen in the Texas sample for fruit consumption (p< 0.02).\footnote{22}

**Nutrition Detectives**

Nutrition Detectives is an in school nutrition education program that is currently implemented in hundreds of schools in the United States and Canada.\footnote{23} The program consisted of five 20 minute mini lessons that focused on eating nutrient dense, low calorie, unprocessed foods; being aware of deceptive advertisements of foods, and reading food labels. Children got to “spy on food labels” by examining the nutrition labels of common foods in teams to determine if the food was healthy. The program was implemented by physical education
teachers. Nutrition knowledge and the ability to choose healthy foods were evaluated in subjects participating in the pilot program. Results indicated that the intervention students and parents’ nutrition knowledge significantly improved from base line (18.1% +/- 26.9, p < 0.01; and 7.9% +/- 19.9, p < 0.01, respectively), but no significant changes were made in dietary patterns in students or parents.

**Eat Well, Keep Moving**

The Eat Well, Keep Moving program was a school based wellness program aimed at 4th and 5th graders in Baltimore, MD. The program was designed to provide low cost materials that could improve the diet and activity level of students in order to fit the goals and financial constraints of the schools. Intervention materials were designed to fit into math, science, language arts, physical education, and social studies classes. The program was delivered over a two year period. Intervention and control schools were matched based on percentage of African American students attending, reading and math achievement scores, and percentage of students receiving free or reduced cost lunch; matched schools were also similar in median household income and nutrition content of menus. Eat Well, Keep Moving aimed to decrease consumption of foods high in total and saturated fat, increase consumption of fruits and vegetables to five a day or more, reduce television viewing to two hours or less per day, and increase moderate and vigorous physical activity.

Base line 24 hour food and physical activity recalls were collected as well as a Food and Activity Survey where students self reported activity and diet. A Youth Food and a Youth Physical Activity Questionnaire was also used to collect diet, physical activity, and socioeconomic data. Classroom interventions were monitored by a teacher survey after each lesson was delivered. Post intervention data was collected two years after the initial implementation of the program. Teacher surveys indicated that 71% of the nutrition and
physical activity lessons were delivered over the two year period, and that 95% of teachers rated the lessons as effective. Analysis of student knowledge about healthy living indicated that knowledge increased about nutrition (1.4 scale points; 95% CI, 0.1-2.6; P=0.05) and physical activity (0.7 scale points; 95% CI, 0.2-1.2; P=0.02) in the intervention students.

Analysis of food frequency questionnaires indicated that the percentage of total energy intake from fat at the intervention schools was reduced in comparison to the control schools (-1.4%, 95% CI -2.8 to – 0.04; P=0.04) and that the percentage of total energy from saturated fat was reduced (-0.60%; 95% CI, -1.2 to 0.01; P=0.05). The intervention school had an increase in the consumption of fruits and vegetables (0.36 serving per 4,184 kJ; 95% CI, 0.10-0.62; P=0.01) which was equal to an increase of 0.73 servings per day, and there was no evidence for a difference in physical activity.

Existing School Mindfulness and Yoga Programs

Research has demonstrated that practicing yoga is an effective method to reduce stress and improve focus. A randomized, controlled trial aimed to evaluate the feasibility and acceptability of a yoga and mindfulness program and to determine if such a program could enhance children’s coping abilities in fourth and fifth grade students in Baltimore, MD elementary schools. Students were given questionnaires to determine current responses to stress, symptoms of depression experienced, how often positive and negative emotions were experienced, and relations with people in school. The intervention group received yoga classes along with discussion about the health benefits of yoga, how to identify stress, and ways to cope with stress. Child focus groups reported that the program was well received and that the children liked the yoga; other focus groups responded that the teachers supported yoga because it could help children that suffered with behavior problems, had poor attention spans and high activity levels, and that some teachers could see a difference in their students’
behavior. The intervention group significantly improved stress responses when compared to the control in regard to intrusive thoughts (adjusted mean (standard error): 0.68 (0.07), 0.95 (0.08) respectively, P<0.05), emotional arousal (0.65 (0.07), 1.00 (0.08), p<0.01), rumination (0.76 (0.08), 1.15 (0.08), p<0.01), and involuntary engagement (0.75 (0.05), 1.05 (0.05), p<0.001).  

Move into Learning

MIL was an eight week yoga/mindfulness program implemented during the school day by service learning pre health professionals, that aimed to reduce stress and improve classroom behavior in third grade students attending a school located in an impoverished urban neighborhood. Each week, children participated in a 45 minute yoga session lead by researchers and service learning students located in a space within the school. Sessions consisted of the following format: the first 20 minutes consisted of energizing poses; the following 10 minutes were spent on poses that promoted slow breathing, postural stability, meditation, and relaxation; the last 15 minutes were spent on an interactive resiliency activity that reinforced the students’ self concept, health, and positive interactions with other classmates. Approximately eight pre health service learning university students attended the weekly session to be role models of the content; the classroom teacher participated in the yoga as well to provide an additional role model. On the other four days of the school week, the classroom teacher led the students in a 15 minute yoga session in the classroom. The yoga poses were chosen to incorporate imagery of animals, nature, and playfulness and were accompanied by music. The eight weekly themes were:

- Diaphragmatic Breathing-What a difference it makes when I am angry!
- Success-when are you #1? –Olympic medals- what would you get one for?
- What elements make you strong?-Adequate sleep, exercise
- If you were an Apple, who/what are the seeds that help you grow?
• Straightening out the roller coaster—When you feel out of control, what helps you straighten out the track?
• Who values me?
• I’m FULL: just right—not too full, not too empty: when do I feel this way?
• Healthy Toolbox: what tools do I have in MY toolbox?

Two weeks after the program, 4-5 students were randomly selected to participate in a focus group to gauge perceptions of the program. Discussions were facilitated by drawing; children were provided with crayons and paper and were asked to draw a picture of the yoga program. Neutral, open ended questions were used to generate explanations of the pictures and perceptions of the program. A dominate theme that emerged from the discussions was feeling calm and focused with an increased awareness of the body. The students learned that they changed to a calmer state as a result of participating in yoga and that they could control their feelings, possibly enhancing the children’s self efficacy to handle their emotions. The second theme to emerge was controlling one’s own behavior through newly learned coping/resiliency strategies. The interviews indicated that the students used those strategies to deal with conflict at home and school. During the intervention, the teacher encouraged the students to use deep breathing and relaxation techniques in the classroom; this suggests that including the classroom teacher was key to extend the program’s effects into the classroom. The third theme to emerge was that the program improved how the children felt about themselves and improved their self concepts. This relates to the other two themes because feeling calm and in control of one’s emotions and utilizing effective coping strategies can in itself build self esteem.

MIL is based on the Theory of Appreciative Inquiry (AI) and the concept of experiential learning. AI has been used in organizations during times of necessary change to help move the
organization into the future by involving members of the organization.\textsuperscript{18} AI’s main premise is that focusing on the positive provides more motivation than only focusing on negative aspects. AI consists of the Four Ds: Discovery, Dream, Design, and Deliver.\textsuperscript{18} The discovery phase consists of discovering what strengths and positive attributes already exist. In the dream phase members dream about where the organization can go in the future and decide how to make the ideas happen in the design phase. In the deliver phase, members actively set and achieve goals for the future. Many case studies document how organizations have utilized AI to appreciate what already exists by focusing on the positive and involving members to help determine the organization's future.\textsuperscript{18}

AI has also been utilized in schools to improve how school systems are serving their student bodies. A school district implemented AI with the intention of building collaborative learning communities within the district.\textsuperscript{29} Teams were formed at participating sites in the district composed of teachers, students, administrators, and parents with one teacher designated as the AI Coordinator/Change Agent. Teams worked together through the Four Ds to design plans for addressing topics such as transitioning between different levels of education, school schedules, diversity planning and instruction, and community/parent engagement.\textsuperscript{29} Fifty percent of sites that participated in the AI summits showed substantial evidence of transformational change as a result of participation. Examples of the district’s transformational changes are redefining the role of teachers, breaking down boundaries between elementary and secondary schools, encouraging student leadership, and redefining select grade levels. Common factors that were among the sites that accomplished transformational change were passionate leadership and a widely shared concern that was addressed by AI.\textsuperscript{29}

AI has also been used to inspire change with individual students. A five week pilot program was developed to help students that had failed state proficiency tests at least three
times and were labeled to have “no hope of graduating” by their teachers.\textsuperscript{30} The program incorporated AI into the teaching of math, science, language, and study skills in order to discover and amplify skills that students already had. After participating in the program, 86% of the participants passed the proficiency tests on the first try.\textsuperscript{30}

Experiential learning consists of using one’s experiences to obtain knowledge through concrete experience and abstract conceptualization while organizing knowledge through reflective observation and active experimentation.\textsuperscript{17} Depending on one’s learning preferences, a learner has opportunities to experience, reflect, think, and act as he moves through the learning process. Research has indicated that exercises such as yoga, dance, and other relaxing movements can increase a person’s awareness of their emotions, the emotions of others, and improve management of self; movements can also serve to promote emotional, social, physical, and cognitive integration.\textsuperscript{31} Sherborne Developmental Movements are a combination of dance and other movements that is used as a therapeutic intervention to engage participants in interactive learning through shared movement experiences. A pilot program focusing on the emotional awareness of teachers implemented movement education into an early childhood education class. During the course, future teachers learned about the effects of movement on education, taught movement education in their own classes, and got to experience movement education by doing movements in their seminar and individual classes. A survey indicated that the intervention was favorable to the teachers’ self awareness and learning process ($M = 3.4, 3.3$, respectively).\textsuperscript{31}

**Little Flower Yoga**

Little Flower Yoga in New York, NY is an example of a school based yoga program for children. Little Flower Yoga visits classrooms once a week for 45 minutes, and conducts a yoga class in the students own classroom.\textsuperscript{14} The classes are customized to meet the needs of each
school while incorporating thematic lesson plans, utilizing a variety of sensory experiences, and savasana (final relaxation). The classes allow the children to have personal reflection and engage in group activities through storytelling, songs, journaling, and art. Teachers incorporate yoga concepts into the curriculum to help student learn

Little Flower Yoga has been very well received by New York City children and schools that it has been requested in all five boroughs. Little Flower Yoga surveyed the children to determine how yoga was being perceived in three New York City schools. The child survey reported that 88.3% of the children loved the yoga classes and 91% of children would want to have yoga classes more than once a week.14 Common answers to the open ended question “after yoga class, I feel...” were: “happy and joyful, great and refreshed, calm and great about myself, like me, like I want more yoga, like I have more energy, strong, relaxed, super good and relaxed, and peaceful.”14 This indicates that children enjoy yoga and feel relaxed and rejuvenated after participation.

The Self Discovery Program

The Self Discovery Program is a controlled stress reduction program for children with learning, behavioral, and emotional difficulties, special educational needs, and for children that are at risk for being excluded from school.25 Children in the intervention group attended 45 minute sessions once a week for 12 weeks about sensory awareness, touch therapy, yoga, breath work, communication, and relaxation, food and color, the mind body connection, and positive thinking. Baseline and post intervention behavioral profiles were completed by the children’s teachers that included information about the student’s self-control in the classroom, confidence levels, communication and interaction abilities, and individual behavioral and interpersonal strengths and weaknesses for each child. When compared to the control group, the children actively involved in The Self Discovery Program significantly improved their mean
scores in self confidence (Change in mean score: 0.30, 0.89 respectively, p=0.029), confidence with teachers (0.43, 0.75 respectively, p=0.042), communication with peers (0.20, 0.79, p=0.050) and teachers (0.22, 0.94, p<0.001), and contribution in the classroom (0.31, 1.06, p<0.001).

**Training of Relaxation with Elements of Yoga for Children**

The Training of Relaxation with Elements of Yoga for Children (TorweY-C) study aimed to teach children self regulation strategies to reduce stress and improve reactions to daily stress by utilizing yoga and breathing exercises and teaching when and how to implement those tactics when confronted with stress. The program was conducted after school, and each of the 15 one hour encounters consisted of preparing the body for yoga, yoga exercises, and the final part which consisted of games and activities that the participants interacted with each other to enhance techniques that were being taught and for participants to integrate into the group.

Program effectiveness was determined by analyzing psychological and physiological feelings (such as feelings of relaxation during sessions), and comparing baseline and post intervention effect variables (such as social abilities and test anxiety). Participants experienced significant decreases in feelings of aggression, helplessness in school, and physical complaints and significant increases in static balance ability and stress coping abilities (p<0.05). Post intervention, 47.6% of participants reported that they had better control of their emotions in stressful situations, 71.4% of parents reported that their children were more calm and balanced, and 38.1% reported that their children were less aggressive, impulsive, and having less complaints.

**Bent on Learning**

Bent on Learning, a nonprofit yoga education program, provided one hour yoga classes for 12 weeks to low income, minority fourth and fifth grade students in a sample of New York City schools. The yoga curriculum aligned with New York state and national physical education
standards, and consisted of physical poses, breathing techniques, meditation, and relaxation.

Pre and post intervention surveys measuring physical (flexibility and balance) and emotional wellbeing were assessed. Results found that 50-80% of participants reported improvements in flexibility, balance, attention, liking oneself, liking how one’s body feels, class behavior, strength, sleep, and ability to calm one’s self. Results showed that post intervention, the intervention participants utilized less negative coping behaviors in response to stress than the control group (0.2 vs. 2.9. P=0.4), and the intervention group had better balance than the control group (25.5 vs. 20.5 seconds, P=0.01).²⁷

**Be a Fit Kid**

Be a Fit Kid was a 12 week fitness and nutrition after school program for children aged 6-12 years old.²⁸ The program was held three days per week, two hours per session for 12 weeks after school. The physical activity component consisted of running, jumping, yoga, and strength exercises to promote cardiovascular fitness, flexibility, strength, and bone development. The physical activity was noncompetitive and individualized to encourage unfit kids to participate. The nutrition component was derived from the US Dietary Guidelines, and provided the children with healthy food samples that reinforced the week’s nutrition lesson. The children were given nutrition packets to take home for their parents to read to them. Post intervention, participants in the Be a Fit Kid program demonstrated improvements in all body composition measures, fitness measures, nutrition knowledge, and certain dietary habits but no data was significant.²⁸
Chapter 3: Methodology

Overview of Program

FFL was a school wellness program that aimed to prevent childhood obesity by teaching children proper nutrition, stress management, and encouraging physical activity through yoga movements. The program lasted eight weeks during the school year and was implemented during the school day in student classrooms by DVD lessons facilitated by teachers. Teachers received DVDs and were oriented to Fuel for Learning. Once a week, children participated in the 45 minute interactive DVD based nutrition lesson. SCT and TTM provided the conceptual framework for the nutrition component of FFL. Tables 3.1 and 3.2 provide further explanation of how SCT and TTM were utilized. Nutrition lessons consisted of teaching children a simple message via skits performed by the researchers. Children role played situations in which the child would partake in the highlighted activity with family and friends, participated in a game in which children experienced negative consequences of the behavior, and tasted the featured healthy snack. Nutrition topics were: Choosing Lower Calorie Snack Foods; Choosing One Serving of a Packaged Snack Food; Choosing Drinks without Added Sugar; Choosing Cereals Low in Sugar; Choosing 3 Different Fruits Everyday; Choosing 3 Different Vegetables Everyday; Choosing 3 Servings from the Milk Group or Milk Alternatives Everyday; and Choosing Healthier Foods for Breakfast Every day.
<table>
<thead>
<tr>
<th>Construct</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reciprocal Determinism</td>
<td>School environment changed to allow physical activity in the classroom; attitudes towards healthy foods changed by test tasting and education.</td>
</tr>
<tr>
<td>Behavioral Capacity</td>
<td>Nutrition lessons teaching children how to read labels and why healthy foods and beverages should be chosen.</td>
</tr>
<tr>
<td>Expectations</td>
<td>Mantra that a healthy diet will help children “move, learn, and play.”</td>
</tr>
<tr>
<td>Self Efficacy</td>
<td>Role play activities, tasting healthy foods.</td>
</tr>
<tr>
<td>Observational Learning</td>
<td>Skits and teacher participation.</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>Repetition of nutrition lesson during daily yoga exercises, weekly news letter, children encouraged to teach their parents at home.</td>
</tr>
</tbody>
</table>

Table 3.1: Examples of FFL usage of Social Cognitive Theory’s Constructs
<table>
<thead>
<tr>
<th>Conscious Raising</th>
<th>Introduction of lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dramatic Relief</td>
<td>Teaching consequences of not doing desired behaviors, role playing, and nutrition games.</td>
</tr>
<tr>
<td>Environmental Re-evaluation</td>
<td>Opportunities to teach FFL content to family at home allowed participants to see themselves as role models.</td>
</tr>
<tr>
<td>Social Liberation</td>
<td>Providing disadvantaged students opportunities to taste test healthy snacks, activities, and nutrition education.</td>
</tr>
<tr>
<td>Self Re-evaluation</td>
<td>Opportunities to teach FFL content to family at home allowed participants to see themselves as role models.</td>
</tr>
<tr>
<td>Counter Conditioning</td>
<td>Nutrition lessons explained what the highlighted food could be used to replace, such as eating pretzels as a snack instead of potato chips.</td>
</tr>
</tbody>
</table>

Table 3.2: Examples of FFL usage of TTM Independent Variables
Additionally, each day of the week children participated in 10 minute segments of yoga movements which referenced the nutrition lessons they had learned on the first day of each week by reiterating the main message of the weekly nutrition lesson (for example, “Eating breakfast gives us energy to move, learn, and play.”).

The yoga/mindfulness and resiliency portions of the program were based on experiential learning theory. During the yoga, children were instructed to be mindful to how their body felt and were introduced to the resiliency topic on the last day of the week.

At the end of the week, children participated in a 10 minute long resiliency activity in which children were able to identify their own strengths. See Table 3.3 for an explanation of how FFL utilized the constructs of AI. Resiliency activities were:

- Who do I “Breathe Easy With?”
- Celebrating Your Successes
- Elements of Strength
- Getting Back on the Right Track
- If you were an APPLE, who are the seeds that help you grow?
- Who Values Me?
- Feeling Just Right
- Building a Healthy Toolbox

<table>
<thead>
<tr>
<th>Discovery</th>
<th>Children identified their own strengths and positive attributes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dream</td>
<td>Children thought about how they could use stress reduction strategies in their own lives.</td>
</tr>
<tr>
<td>Design</td>
<td>Children decided how to use stress reduction techniques.</td>
</tr>
</tbody>
</table>

Table 3.3: FFL usage of Appreciative Inquiry in Resiliency Activities
Parents were involved by receiving a weekly newsletter covering the nutrition and stress reduction lessons that their children had learned that week. As a further reinforcement of the learning, the children were directed to teach their parents what they had learned via FFL each week.

**Subjects**

Fuel for Learning was implemented in six 3rd grade classrooms in the Columbus, Ohio area. Four classrooms were from a school serving low socioeconomic students, and the other two classrooms were from a private Catholic school. The total number of participants consisted of 145 students (71 treatment, 74 control). The classrooms were assigned to be either the intervention or control/wait list group in each school.

**Evaluation**

On the last day of the intervention, each child was asked to list what they learned on a worksheet called, “Your Healthy Tool Box.” Post intervention semi-structured interviews were conducted with classrooms of students one week after the intervention had ended in order to determine dominant themes of knowledge acquisition produced in a group setting. This study used a post test of knowledge acquisition to determine:

1. Could 3rd grade students demonstrate what they had learned at the completion of the intervention?
2. What type of knowledge (nutrition vs. stress reduction/coping strategies) did the children articulate in an individual written setting vs. group oral setting?
3. Was there a gender difference between the types of knowledge that the children articulated?
4. Was there a difference in knowledge acquisition demonstrated between the two sample schools?
Data Analysis

The answers generated by the children in responses to the question, "What might be in your healthy tool box as you move forward?" were recorded for each participant. Responses listed on Tool Box worksheet were assessed to determine what children learned from each week. Answers were coded to correlate with content taught in the weekly lessons and were further divided to reflect nutrition or stress reduction strategies. Percentages of nutrition vs. stress reduction strategies were compared to one another to describe the children’s knowledge acquisition. The students answers were categorized into groups based on the percentage of nutrition based answers given: 0-25%, 26-50%, 51-75%, and 76-100%.

A T-test for Equality of Means in independent samples was used to test to determine if percentages of written nutrition responses were different between genders and schools. A chi-square test was performed to determine if there were significant differences in the distribution of the proportion of nutrition-based responses between genders and schools. The Statistical Package for the Social Sciences was used to analyze the data (SPSS Inc, version 19, Chicago, IL).

The second set of data analyzed was the classroom interviews conducted with the classroom as a whole. Audio taped interviews were transcribed verbatim and analyzed to assess if responses given in a group setting differed from the individual student responses. Four science professionals independently read the classroom interviews and identified the dominate themes that surfaced in response to each question. The children’s responses from the Tool Box worksheet were then compared to a summary of qualitative answers given by the classroom interviews in order to determine similarity/differences between individual responses and the group classroom interviews.
Chapter 4: Third Grade Student’s Ability to Articulate Lessons Learned in a Health Education Program

Abstract

Objective: To determine the type of knowledge acquired from an in-school obesity/stress prevention program.

Setting and Participants: Third grade students in classrooms located in two Midwestern schools, one private and one public school.

Main Outcomes Measures: Participant’s individual written knowledge acquisition and group classroom interviews of knowledge acquisition.

Analysis: Quantitative analysis consisted of a T-test for Equality of Means and chi-square test of the answers generated by individual 3rd grade students. Qualitative analysis consisted of common themes identified by panel members generated in the transcribed verbatim group interviews.

Results: Approximately 75% of all individual knowledge generated indicated nutrition concepts while 25% indicated knowledge of stress reduction lessons. In the interviews children articulated that exercise, stress reduction, and proper nutrition were important for healthy living. No significant differences were found between genders or schools, but a higher percentage of public school students (31.6%) reported only nutrition knowledge as compared to private school students (6.25%).
Conclusions and Implications: Children in FFL successfully recalled both stress reduction and nutrition knowledge that can aid in preventing obesity; FFL may serve as a role model for other in school obesity prevention programs.

Key Words: yoga; stress, psychological; overweight, obesity, health education

Introduction

The National Center for Health Statistics reports that approximately 12.5 million (17%) children and teens between the ages of 2-19 years old in the United States are classified as obese, which is more than three times as prevalent as in the 1980s.\(^1\) Children that live in poverty are more likely to become overweight or obese because their caregivers lack adequate resources to provide a healthy lifestyle.\(^2\) Poverty stricken families that reside in low income neighborhoods are more likely to be exposed to high rates of violence and crime; this causes playing outside to be unsafe and results in children spending extensive amounts of time inside their homes engaging in sedentary activities. Also, low income neighborhoods may not have a grocery store in close proximity forcing residents to purchase foods at convenience stores that charge higher prices and offer lower selections of healthy foods than grocery stores.\(^2\)

Being overweight or obese adversely affects children’s health, self esteem, and social standing. Health complications that can develop are diabetes, metabolic syndrome, diseases of the heart, sleep apnea, early maturation, and musculo-skeletal injuries.\(^2\) Children that are overweight or obese can suffer from low self esteem and low social standing due to teasing and discrimination.\(^2\)

Nationally, children’s schedules are full of activities with little to no time for unstructured play. Unstructured play is important because it is the natural way that children learn to structure their own time, develop their personalities, and explore their interests.\(^3\) Lack of down time also reduces time that is available to spend with family. Common stressors for
children are school work, need to get good reports, and not enough time with parents; research has shown that the amount of stressors that a child has increases with age, especially the amount of stress that children harbor for school.\textsuperscript{3,6}

Children that live in poverty stricken homes may face additional stressors such as lack of food, unstable living conditions, and violence present in neighborhood that children that live in financially stable homes do not have. Facing those stressors can result in poor coping strategies and lead to poor behavior problems and academic performance.\textsuperscript{7,8}

Mindfulness Based Stress Reduction (MBSR) is one approach to addressing child stress. MBSR is a combination of traditional Buddhist meditation, Hatha yoga, and clinical and psychological practice aimed to increase nonjudgmental awareness of what the body is feeling and experiencing in the present moment in order to strengthen and relax the musculoskeletal system.\textsuperscript{13} Teaching yoga to children in schools has the potential to offer children coping strategies, outlets for activity, emotion regulation, self control, and social connection.\textsuperscript{9, 14, 25, 26, 27} Yoga’s positive effects on mental and physical health is well documented in adults, and other research suggests that yoga helps children have better academic grades, behavior in school, health, and self esteem; research has also suggested that yoga is effective in the management of obesity, diabetes, asthma, attention deficit disorder, and attention deficit hyperactivity disorder.\textsuperscript{8, 14, 25, 26, 27} Research indicates that both yoga and MBSR may warrant further investigation in terms of stress reduction in children. Classroom health education programs need to address both obesity prevention and stress prevention concurrently to effectively address the obesity epidemic.

Fuel for Learning (FFL) is a combination of two existing health education programs Food Fit (FF), an obesity prevention program, and Move-into-Learning (MIL), a stress reduction program, that have been tested on inner city elementary populations.\textsuperscript{2,8} FF and MIL were
adapted to a DVD delivery format to increase the number of classrooms able to receive the benefits of these two successful programs. FFL addressed childhood obesity though combining FF and MIL to include physical activity, nutrition, and stress management via an interactive DVD lead by classroom teachers. FFL consists of eight weeks of weekly 45 minute nutrition lessons and daily 10 minutes of yoga movements. Social Cognitive Theory (SCT) and the Transtheoretical Model (TTM) served as the theoretical basis for the nutrition portion of FFL, while the Theory of Appreciative Inquiry (AI), and Experiential Learning served as the conceptual frameworks for the yoga and resiliency building portions of the program.

SCT is based on people learning from their personal experiences and the experiences of others from seeing what outcomes result from specific behaviors. Self Efficacy results from an individual believing that he is able to accomplish a task and that he is in charge of making decision related to the same task. SCT consists of six constructs which are reciprocal determinism, behavioral capability, expectations, self efficacy, observational learning, and reinforcement.

TTM is built upon change being a process in which a person moves thorough different stages until the change becomes common practice for the individual. There are five stages to change that a person can go through until the change is successfully made: precontemplation, contemplation, preparation, action, and maintenance. The stages are not linear; a person can begin at any stage and can progress or regress to any stage. The processes of change are the steps that people need to take in order to successfully move through the stages of TTM; the processes of change are independent variables that can be utilized to bring forth desired behaviors. The processes of change are Conscious Raising, Dramatic Relief, Environmental Reevaluation, Social Liberation, Self Reevaluation, Stimulus Control, Helping Relationship, Counter Conditioning, Reinforcement Management, and Self Liberation.
AI is founded on the idea that focusing on positive aspects provides more motivation to change than focusing on negative aspects. Many case studies suggest that AI effectively brings organizations into the future by appreciating what already exists by focusing on the organization’s current strengths.\textsuperscript{18} AI has also been used to cultivate change in individual students by identifying and strengthening their positive attributes.\textsuperscript{30} The four phases of AI are Discovery, Dream, Design, and Deliver.

Experiential learning consists of using one’s experiences to obtain knowledge through concrete experience and abstract conceptualization while organizing knowledge through reflective observation and active experimentation.\textsuperscript{17} This provides learners with opportunities to experience, reflect, think, and act while moving through the learning process. Research has indicated that experiential movements such as yoga, dance, and other relaxing movements can increase a person’s awareness of their emotions, the emotions of others as well as improve management of self.\textsuperscript{31}

This study was a post test of knowledge acquisition to answer the following research questions concerning the FFL program with the intent of guiding further refinement of the program:

1. Could 3\textsuperscript{rd} grade students demonstrate what they had learned at the completion of the intervention?
2. What type of knowledge (nutrition vs. stress reduction/coping strategies) did the children articulate in an individual written setting vs. group oral setting?
3. Was there a gender difference between the types of knowledge that the children articulated?
4. Was there a difference in knowledge acquisition demonstrated between the two sample schools?
Methods

Overview of the Program

FFL was a school wellness program that aimed to prevent childhood obesity by teaching children proper nutrition, stress management, and encouraging physical activity though yoga movements. The program lasted eight weeks during the school year and was implemented during the school day in student classrooms by DVD lessons facilitated by teachers. Teachers received DVDs and were oriented on how to use Fuel for Learning. Once a week, children participated in the 45 minute interactive DVD based nutrition lesson. SCT and TTM provided the conceptual framework for the nutrition component of FFL. SCT constructs utilized were reciprocal determinism, Behavioral Capacity, expectations, self efficacy, and observational learning. Processes of change utilized were Conscious Raising, Dramatic Relief, Environmental Re-evaluation, Social Liberation, Self Re-evaluation, and Counter Conditioning. See Tables 4.1 and 4.2 for further explanation of how the constructs were used.

Nutrition lessons consisted of teaching children a simple message via skits performed by the researchers. Children role played situations in which the child would partake in the highlighted activity with family and friends, participated in a game in which children experienced negative consequences of the behavior, and tasted the featured healthy snack. The eight weeks of nutrition topics consisted of: Choosing Lower Calorie Snack Foods; Choosing One Serving of a Packaged Snack Food; Choosing Drinks without Added Sugar; Choosing Cereals Low in Sugar; Choosing Three Different Fruits Everyday; Choosing Three Different Vegetables Everyday; Choosing Three Servings from the Milk Group or Milk Alternatives Everyday; and Choosing Healthier Foods for Breakfast Every day.
<table>
<thead>
<tr>
<th><strong>Reciprocal Determinism</strong></th>
<th>School environment changed to allow physical activity in the classroom; attitudes towards healthy foods changed by test tasting and education.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behavioral Capacity</strong></td>
<td>Nutrition lessons teaching children how to read labels and why healthy foods and beverages should be chosen.</td>
</tr>
<tr>
<td><strong>Expectations</strong></td>
<td>Mantra that a healthy lifestyle will help children “move, learn, and play.”</td>
</tr>
<tr>
<td><strong>Self Efficacy</strong></td>
<td>Role play activities and tasting healthy foods.</td>
</tr>
<tr>
<td><strong>Observational Learning</strong></td>
<td>Skits and teacher participation.</td>
</tr>
<tr>
<td><strong>Reinforcement</strong></td>
<td>Repetition of nutrition lesson during daily yoga exercises, weekly news letter, children encouraged to teach their parents at home.</td>
</tr>
</tbody>
</table>

Table 4.1: Examples of FFL usage of Social Cognitive Theory’s Constructs
<table>
<thead>
<tr>
<th><strong>Conscious Raising</strong></th>
<th>Introduction of lessons.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dramatic Relief</strong></td>
<td>Teaching consequences of not doing desired behaviors, role playing, and nutrition games.</td>
</tr>
<tr>
<td><strong>Environmental Re-evaluation</strong></td>
<td>Opportunities to teach FFL content to family at home allowed participants to see themselves as role models.</td>
</tr>
<tr>
<td><strong>Social Liberation</strong></td>
<td>Providing disadvantaged students opportunities to taste test healthy snacks, activities, and nutrition education.</td>
</tr>
<tr>
<td><strong>Self Re-evaluation</strong></td>
<td>Opportunities to teach FFL content to family at home allowed participants to see themselves as role models.</td>
</tr>
<tr>
<td><strong>Counter Conditioning</strong></td>
<td>Nutrition lessons explained what the highlighted food could be used to replace, such as eating pretzels as a snack instead of potato chips.</td>
</tr>
</tbody>
</table>

Table 4.2: Examples of FFL usage of TTM Independent Variables
The nutrition segment was followed by an instructor led daily 10-minute yoga session that the children did standing behind their desks. Experiential learning was used in the yoga segment of the FFL program by inviting the children to experience yoga movement as a stress reduction strategy. All the children participated in the daily yoga session, and were instructed to be mindful to how their body felt before, during, and after the yoga movement. The nutrition topics were reinforced in the yoga segment by repeating the main message of the weekly nutrition lesson (for example, “We can move easier into the poses if we eat until we are full and not beyond.”).

At the end of each week, children participated in a 10 minute long resiliency activity in which children were asked to identify their own strengths. The resiliency activities were based on AI to help children discover their positive attributes. See Table 4.3 for additional detail of how AI was utilized. Resiliency activities were:

- Who do I “Breathe Easy With?”
- Celebrating Your Successes
- Elements of Strength
- Getting Back on the Right Track
- If you were an APPLE, who are the seeds that help you grow?
- Who Values Me?
- Feeling Just Right
- Building a Healthy Toolbox
Discovery
Children identified their own strengths and positive attributes.

Dream
Children thought about how they could use stress reduction strategies in their own lives.

Design
Children decided how to use stress reduction techniques.

| Table 4.3: FFL usage of Appreciative Inquiry in Resiliency Activities |

Sample
FFL was implemented in six 3rd grade classrooms in the Columbus, Ohio area. Four classrooms were from a public school serving low socioeconomic students, and the other two classrooms were from a private Catholic school. The total number of participants consisted of 145 students (71 treatment, 74 control). Classrooms were randomly assigned to be intervention or control/wait list group in each school. Forty nine percent of the sample was female with 51% being male. Average age of the students was 8.9 years (standard deviation: 4.47 months) with an average BMI percentile of 58.5 (standard deviation (31 percentiles).

Procedures
On the last day of the eight week intervention, each child was asked to list what they learned from the FFL program on a worksheet called, “Your Healthy Tool Box.” Additionally, post intervention semi-structured interviews were conducted with classrooms of students one week after the intervention had ended in order to determine dominant themes of knowledge acquisition produced in a group setting.
Data Analysis

The answers generated by the children in response to the question, "What might be in your healthy tool box as you move forward?" were recorded for each participant. Responses listed on Tool Box worksheet were assessed to determine what children learned from each week. Answers were coded to correlate with content taught in the weekly lessons and were further divided to reflect nutrition or stress reduction strategies. Percentages of nutrition vs. stress reduction strategies were compared to one another to describe the type of children’s knowledge acquisition. The students answers were categorized into groups based on the percentage of nutrition based answers given: 0-25%, 26-50%, 51-75%, and 76-100%.

A T-test for Equality of Means in independent samples was used to test if percentages of written nutrition responses were different between genders and schools. A chi-square test was performed to determine if there were significant differences in the distribution of the proportion of nutrition-based responses between genders and schools.

The second set of data analyzed was the classroom interviews conducted with the classroom as a whole. Recorded interviews were transcribed verbatim and analyzed to assess if responses given in a group setting differed from the individual student responses. Sample questions asked during the interviews are available in Table 4.4. Four science professionals independently read the classroom interviews and identified the dominate themes that surfaced in response to each question. The children’s responses from the Tool Box worksheet were then compared to a summary of qualitative answers given by the classroom interviews in order to determine similarities/differences between individual responses and the group classroom interviews.
1. Why did we call it Fuel for Learning? What are the two things that fuel us to best learn?
2. What did you learn about nutrition?
3. Did you teach your parents anything about nutrition?
4. Did you look forward to yoga every day?
5. What does yoga have to do with stress?

Table 4.4: Sample Classroom Interview Questions

**Expert panel**

The panel of science professionals consisted of one dietetic intern, one senior chemist, one retired chemist, and one electrical engineer. Ages ranged from 26 to 60 years old with a mean age of 41 years old. Equal amounts of males and females participated on the panel. All members of the panel held a Bachelor’s degree with one member seeking a Master’s degree. All members of the panel were Caucasian.

**Results**

Of the 145 students, two had to be excluded due to insufficient data resulting in 143 students’ tool boxes analyzed. As a whole, 75.8% of all Tool Box answers denoted nutrition related information and 24.2% of all answers indicated stress reduction strategies. Both the public school students and the private school students primarily articulated nutrition related knowledge (81.2% and 66.8% of all Tool Box spaces, respectively). A greater amount of public school students (63%) used the majority of their Tool Box spaces (greater than 75% of available spaces) to articulate nutrition knowledge than the private school students (18%). A t-test for the equality of the percentage of nutrition-based responses for public and private schools
concluded that there was no statistically significant difference (mean (standard deviation): 81.2% (23.5%) and 66.8% (19.8%) respectively) in the percentage of nutrition-based responses in the two groups.

No difference was found for nutrition knowledge articulation between genders. Males used 76.6% of Tool Box spaces to articulate learned nutrition knowledge while females used 74.9% of Tool Box spaces to articulate learned nutrition knowledge. Private school males used 68.2% of spaces while public school males used 80.6% of spaces to articulate knowledge learned. Private school females used 65.4% of the Tool Box spaces to articulate nutrition knowledge while public school females used 79.9% of spaces. The majority of girls and boys (regardless of school) used 76-100% of Tool Box spaces to articulate gained nutrition knowledge. Levene's Test for Equality of Variances verified that there were no significant differences between boys and girls reporting nutrition knowledge (76.6% vs. 74.9%; standard deviation: 0.223, 0.244, respectively).

A large proportion of the public school students reported only nutritional responses (36.1% versus 6.25% for the private school students). In order to determine if the ceiling effect of a large percentage of students utilizing 100% of Tool Box spaces was impacting the comparison, the students were assigned to four categories based on the percentage of responses that were deemed nutrition-based: 0-25%, 26-50%, 51-75%, 76-100%. Chi square tests were performed based on these four categories versus both gender and school. The results ($\chi^2 = 11.23$, df = 1, p = 0.001) were the same as those found when performing the t-test with the percentage of nutrition responses as the dependent variable.

Review of knowledge placed in the healthy Tool Box work sheets revealed five common themes: choose healthy foods, the importance of eating breakfast, choose low sugar foods, read nutrition labels, and be aware of the correct serving size for each food. Children listed specific
healthy foods and beverages that they had tasted in the program as well as other healthy options that they encountered outside of the program. Participants wrote that they should eat breakfast everyday in order to have energy throughout the day.

Students suggested that they should consume foods low in sugar by writing that they should have water instead of soda, white milk instead of flavored milk, low sugar cereals instead of sugar sweetened cereals. Responses indicated that children thought that it was acceptable to eat high sugar foods occasionally in moderation. Children indicated that they should consume the right amount of calories from a food and suggested reading nutrition labels to only eat one serving of a snack food. Children also demonstrated that nutrition labels could be used to learn a food’s sugar content and the amount of calories that are in a serving of a packaged food.

Qualitative classroom interviews reflected similar themes of knowledge acquisition. Analysis of the general themes that were independently generated by the panel of professionals looking at the qualitative interviews indicated that children articulated considerably more nutrition knowledge than stress reduction knowledge during the group classroom interviews. Common themes of what the program taught that emerged in the qualitative interviews included: healthy lifestyle, healthy food and beverage choices, focus on thoughts other than what is causing stress, and the importance of engaging in stress reduction activities that help one remain calm. The interviews indicated that the children were able to articulate that exercise, stress reduction, and proper nutrition were all needed for a healthy lifestyle when in a group setting. The children identified healthy foods and beverages that they sampled in the program as well as other healthy foods that they began to eat at home as a result of learning about nutrition. The children identified traits of healthy food and beverage choices as being low in sugar, high in vitamins and minerals, and the food item being a fruit or a vegetable. The children articulated that yoga could be used to reduce stress and help them focus on thoughts
on things other than what is directly causing stress, and that yoga helped them reduce stress by allowing them to calm down, relax, and have fun. The children indicated that the yoga allowed them to clear their minds and refocus on things other than their stress.

**Discussion**

Despite the link between obesity and stress, few obesity prevention programs address stress management concurrently with nutrition. Continually having to face stressors can result in poor coping strategies and lead to poor behavior problems and academic performance.\(^7\)\(^8\) Human studies have found that stress-eating (eating in response to stress with the intention of making one feel better) is significantly associated to obesity in females.\(^10\) Research on the effects of yoga on children has found that yoga is an effective method to improve children’s self esteem, self confidence, control of one’s own emotions, and coping strategies.\(^14\), \(^25\), \(^26\), \(^27\)

This study indicated that FFL successfully taught children nutrition and stress reduction knowledge to students in both public and private schools, across genders. Children were able to generate more nutrition knowledge learned from the program than stress reduction knowledge in both the individual and group settings. In both settings students articulated that it was important to make healthy food and beverage choices as well as expressing specific healthy foods and beverages. The panel of professionals indicated that the children articulated that they learned how to have a healthy lifestyle. While the majority of students didn’t directly write “healthy lifestyle” in their tool boxes, many spaces were filled with elements of a healthy lifestyle.

One explanation for differences between the amount of acquired nutrition and stress reduction knowledge reported is that nutrition knowledge is more concrete for children to understand than knowledge related to stress reduction. Children can see, touch, taste, smell, and play with food. Children relate to food in a very somatic, visceral manner. Research has
indicated that children develop understanding of concrete concepts earlier than understanding of abstract concepts and judge concrete concepts more favorable than abstract concepts; abstract concepts, like stress, take time for children to become familiar with as familiarity increases with age.\textsuperscript{32}

Physical symptoms associated with psychological stressors has only recently been accepted by the medical community.\textsuperscript{33} Concepts that are difficult for adults to grasp may take even longer for children to learn and actually articulate. This could explain why knowledge related to nutrition was articulated in greater frequency than knowledge related to stress reduction; it may be easier for children to articulate nutrition because they are able to feel hunger and see and taste foods. Knowledge related to stress reduction may be harder to articulate because children may not be able to fully understand the concept of “stress.”

In this study, the articulation of nutrition knowledge was more prevalent in the public, lower socioeconomic school students than it was in the private school students. The private school students may have been more knowledgeable about nutrition due to differences in education and social standing of private and public school parents. It has been shown that there is correlation between obesity rates for children and the education levels of their parents, probably due to better knowledge and interest about healthy living.\textsuperscript{1} Research has also indicated that obesity is more prevalent in lower socioeconomic individuals when compared to individuals that have higher socioeconomic status.\textsuperscript{1} This could be due to many factors, including lack of access healthy food, expense, and limited safe places for outdoor recreation.

The Gallup-Healthways Wellbeing Index found that 9\% of households with children reported that it was “not easy to get affordable fresh fruits and vegetables” with low income households facing greater barriers to obtaining access to fruits and vegetables.\textsuperscript{33} Low income households may face barriers to access fruits and vegetables because fruits and vegetables are
more expensive than other higher calorie options. Also, low income families may consume large amounts of high fat, high sugar, processed food items that are calorie dense but are nutrient poor. \(^{34}\)

In this study, 31.7% of the public school students were eligible for free or reduced price lunch. \(^{36}\) The private school students came from a community that had a median income of $47,882 with 58% of residents holding college degrees. \(^{37}\)

In the specific schools used in this study, the private school children were exposed to more fruits and vegetables in school-served lunches than the public school children in comparing actual menus of lunch offerings. The prevalence of more fruits and vegetables in the private school menu could have made the private school children more familiar with nutrition topics than public school children. In the classroom interviews, the public schoolchildren commented that many of them had never tasted cherry tomatoes, soy milk, and plain yogurt before participating in FFL. The private school children were accustomed to a wider variety of foods with only a few children mentioning that they had never had cherry tomatoes prior to participation in FFL. Not being exposed to as many healthy foods as the private school children could have resulted in the nutrition topics being more novel to the public school students which could in turn increase their interest in nutrition topics.

Common themes that emerged from the classroom interviews and individual toolboxes indicated similar answers such as choosing healthy foods and beverages. The expert panel determined that the children had learned the intended curricular content of FFL regarding the components of a healthy lifestyle and how to reduce stress. The toolboxes primarily focused on nutrition knowledge such as reading nutrition labels, choosing low sugar foods, and being aware of the correct serving size of a packaged food. Knowledge articulated in the classroom interviews is consistent with the individual answers generated on the Tool Box work sheet as
both primarily indicated how to have a healthy lifestyle and diet. Examples of how children expressed the “healthy lifestyle” concept included: exercise; eat high fat foods in moderation; don’t drink too much soda; eat three different milk products, three different vegetables, and three different fruits every day; and have one serving of a packaged snack food.

Schools utilized in this study were a convenience sample chosen due to an existing relationship between the researchers and school systems. Subjects attended elementary schools located around Columbus, Ohio; therefore, results may not be generalizable to other students in urban and rural schools in locations other than the Midwest. Classroom environments naturally differ from one another (levels of organization, discipline etc.) and these differences were not considered, as all 3rd grade classrooms of each school participated in the study.

**Implications for Research and Practice**

In future studies, FFL should test the children’s implementation of acquired nutrition knowledge and stress reduction strategies over time. Additional research is needed to confirm the impact of yoga and MBSR to reduce stress in children and the benefits that can be realized by teaching these techniques to children. AI should be further investigated to determine if AI concepts can be successfully used in an individual setting to build personal resiliency by identifying strengths.
Chapter 5: Conclusions and Implications

Conclusions

FFL successfully taught children nutrition and stress reduction knowledge to students in both public and private schools, across genders. The articulation of nutrition knowledge was more prevalent in the public, lower socioeconomic school students than it was in the private school students. There are many possible reasons that may account for differences in knowledge articulation between the public and private schools. It is more likely that the students attending the private school were from more economically stable families than the students attending the public school. Research suggests that differing socioeconomic status could account for differences between proportions of reported nutrition knowledge between the two schools because higher income families are more likely to be able to afford nutritious foods on a regular basis and not have to rely on high calorie, nutrient poor foods that many lower socioeconomic families rely upon.\textsuperscript{1,34,35}

Stress reduction and nutrition are two very different concepts as knowledge about stress reduction is less concrete than nutrition topics. Research has indicated that children develop understanding of concrete concepts earlier than understanding of abstract concepts and judge concrete concepts more favorable than abstract concepts.\textsuperscript{32} Understanding concepts that are more abstract, such as stress, develops as children age. Abstract concepts that are difficult to understand may take even longer for children to articulate, and they may not have the semantic tools to express what they know.
Limitations

The elementary schools selected to participate were located in Columbus, Ohio; therefore, results may not be generalizable to other students in locations other than the Midwest. Also, the schools selected to participate were not randomly selected; schools were selected due to a preexisting relationship between the researchers and the schools’ administrators. Classroom environments naturally differ from one another (teaching style, students’ enthusiasm for learning, etc.) and these differences were not considered, as all 3rd graders at each school participated in the study.

Recommendations

Extension services provide many health programs to children, but none that address the effects of stress on obesity through yoga and good nutrition. FFL and extension services could form a strong partnership to distribute FFL DVDs to classrooms across the state of Ohio.

The Morrill Act of 1862 established a land grant university in every state in the nation with the intention of educating citizens in agriculture, home economics, and mechanical arts. Since its implementation, extension services have served and supported Americans and the United States by adapting to fulfill current needs. For example, during World War II Extension Services worked with farmers, families, and 4-H members to increase the nation’s food supply to meet war time demands. Currently, state Extension Services provided by land grant universities hold obligations to serve the people of their state and county through agriculture, family and consumer sciences, community and economic development, youth development, and natural resource management. FFL and Extension services could form a strong partnership because the content of FFL would fulfill Extension’s obligations of youth development and family and consumer sciences. FFL could be expanded to provide lessons about the benefits of obtaining foods produced from locally grown sources such as community gardens and farmer’s markets to
help fulfill Extension’s obligation to promote agriculture and community and economic
development.

Extension has expanded to include eXtension, a web site dedicated to provide peer
reviewed, evidence based information to the public’s convenience. Topics are organized into
Communities of Practice (COP) that provide articles, current news, events, and frequently asked
questions. FFL could contribute to eXtension by providing information about proper nutrition
and stress management for children to help further disseminate FFL’s content to children that
are not receiving FFL in their classrooms.
Works Cited


32. Caramelli N, Setti A, Maurizzi D. Concrete And Abstract Concepts In School Age Children. Psychology of Language and Communication. 2004;8(2)19-34.


