

OUTCOMES EVALUATION OF THE EAGLE  
ADVENTURE PROGRAM

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ADVENTURE PROGRAM

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## CHAPTER I

### Introduction

#### **Type 2 Diabetes**

Health disparities are prevalent in both diet and physical activity among persons from low-socioeconomic, ethnic/minority areas. Inadequate physical activity and poor dietary intake may lead to obesity-related chronic diseases such as type 2 diabetes. Type 2 diabetes accounts for 90-95% of all diabetes cases.<sup>1</sup> In the United States, reports indicate 25.8 million people (8.3% of the population) are affected by diabetes, which includes both diagnosed and undiagnosed diabetes.<sup>2</sup>

According to Indian Health Services (IHS), 16.3% of 3.3 million Native Americans (NA) and Alaska Natives (AN) have been diagnosed with diabetes compared to the 8.7% non-Hispanic whites.<sup>3</sup> In fact, NA/ANs are 2.2 times more likely to develop diabetes compared with non-Hispanic whites which indicates a great health disparity between these races.<sup>3</sup> Diabetes-related complications, including heart disease, blindness, lower limb amputations, and decreased life expectancy, can decrease quality of life and become more of a threat the longer one lives with diabetes; therefore, the increase of type 2 diabetes in children raises concern.<sup>2</sup>

The Centers of Disease Control (CDC) found NAs to have the highest prevalence of type 2 diabetes and were the only racial/ethnic group found to

have a statistically significant increase in children and adolescents.<sup>4</sup> Specifically, NA/AN youth aged 15-19 years old is evidenced by a 68% increase in diabetes from 1994 to 2004.<sup>3</sup> In order to prevent rates from increasing further, it is important that children incorporate the cornerstones of effective diabetes prevention: diet modification and physical activity (PA).

Primary prevention programs (PPP) which promote healthful behaviors, recommended by the CDC, should begin during the earlier stage of life in order to support positive outcomes.<sup>5</sup> The programs should tailor strategies to the community's available resources, culture, and preferred learning methods. Including such strategies within the intervention's structure could result in positive outcomes.

### **Purpose of Get Fresh! Eagle Adventure Program**

The Get Fresh! Eagle Adventure (EA) is a school-based, PPP that was developed by researchers at Oklahoma State University in coordination with Chickasaw Nation Get Fresh! partners. The program targets children in grades 1-3 where  $\geq 50\%$  of the children are eligible for free and reduced-priced lunches and where the proportion of NA students enrolled is greater than Oklahoma's state average ( $>19\%$ ). The goal of EA is to prevent type 2 diabetes among grade school children by helping them develop a desire to eat more fruits and vegetables (F/V) and be more physically active.

Research shows a combination of classroom curriculum, parent home components, and school food service components create the most effective programs.<sup>6,7</sup> The EA addresses multiple levels of influence such as these which are centered around four in-class lessons based on *Through the Eyes of the Eagle* book series developed by the CDC. Prior to the in-class lessons, an EA



play is presented to the children to generate interest and enthusiasm in the program. Several other components of the EA program reinforced knowledge learned in the lessons. This includes take-home folders consisting of recipes and moving activities to do with families, EA posters and banners within the school environment, and health announcements over the school's intercom system.

### **Research Aim, Question and Objectives of the Eagle Adventure program**

The overall goal of EA is to provide a vision of hope that type 2 diabetes can be prevented by altering the social desirability with respect to F/V and PA behavior modifications. The focus of this study is based on data from two schools during the Spring 2011 EA implementation in grades 1-2. The research question addressed by this study is: Do children in grades 1-2 change nutrition and PA behaviors following participation in the EA school program? To help answer this question, the following hypotheses were created:

1. HO1: There will be no significant difference in mean pre and post scores for intent to choose F/V.
  - a. HA1: There will be a significant difference in mean pre and post scores for intent to choose F/V.
2. HO2: There will be no significant difference in mean pre and post scores for preference to choose fruits.
  - a. HA2: There will be a significant difference in mean pre and post scores for preference to choose fruits.
3. HO3: There will be no significant difference in mean pre and post scores for preference to choose vegetables.
  - a. HA3: There will be a significant difference in mean pre and post scores for preference to choose vegetables.

4. HO4: There will be no significant difference in mean pre and post scores for knowledge of healthful snacks and beverages.
  - a. HA4: There will be a significant difference in mean pre and post scores for knowledge of healthful snacks and beverages.
5. HO5: There will be no significant difference in mean pre and post scores for intent to choose PA.
  - a. HA5: There will be a significant difference in mean pre and post scores for intent to choose PA.
6. HO6: There will be no significant difference in mean pre and post scores for knowledge of PA choices.
  - a. There will be a significant difference in mean pre and post scores for knowledge of PA choices.
7. HO7: There will be no significant difference in mean pre and post scores for preference to be PA.
  - a. HA7: There will be a significant difference in mean pre and post scores for preference to be PA.

Because the program is relatively new, additional objectives were set forth to address the EA program implementation process. The following process objectives were developed:

1. To determine student acceptance of EA program materials by means of a post-survey.
2. To determine student utilization of EA program materials by means of a post-survey.

### **Study Limitations**

Due to restriction of time, cost, and low prevalence of NA in some areas, the purposive sampling technique was utilized for this study. This technique limits

the ability to generalize the sample's results to the population, causing the results to be less reliable and causal inferences more difficult. Another limitation of this study was using children as the sample. Social desirability response bias and readability can be issues with children when completing surveys. To attend to these issues, survey administrators were trained appropriately. The questions were represented through both pictures and text and the survey administrator also read aloud the questions to students.

### **Definition of Terms**

Behavioral Capability: Knowledge and skills needed to perform a certain behavior.<sup>8</sup>

Built Environment: "...encompasses all the buildings, spaces, and products that are created or significantly modified by people."<sup>9</sup>

Cultural Sensitivity: Being aware that "cultural differences and similarities exist and have an effect on values, learning, and behavior."<sup>10</sup>

Culturally Competent: "The integration and transformation of knowledge about individuals and groups of people into specific standards, policies, practices, and attitudes used in appropriate cultural settings to increase the quality of services; thereby producing better outcomes."<sup>11</sup>

Culturally Responsive Teaching: "An approach that empowers students intellectually, socially, emotionally, and politically by using cultural referents to impact knowledge, skills and attitudes."<sup>12</sup>

Expectations: Anticipated outcomes of a behavior

Gestational Diabetes: High blood glucose levels during pregnancy due to insulin resistance

Health Disparities: "Differences that occur by gender, race and ethnicity, education level, income level, disability or geographic locations."<sup>13</sup>

Holistic Approach: Assessing the person based as a whole, including physical, social, mental, spiritual and environmental factors, instead of basing their health on individual factors.

Living in Balance: To be well in mind, body, emotion, and spirit.

Primary Prevention: The prevention of a disease before it occurs.

Reciprocal Determinism: A theory set forth by Albert Bandura that an individual affects and is effected by their environment and behavior.

Self-efficacy: A person's confidence in coping with barriers to change behavior; sense of control facilitates change.

Social Cognitive Theory: Interaction among behavior, environment, and personal factors predicts behavior change.

Social Desirability: When a respondent gives an answer they perceive as socially acceptable and not necessarily honest. This includes over-reporting good behavior or under-reporting bad behavior.

Social Ecological Model: Theory related to the relationships between individuals, social groups, and the environment or community.

Type 1 Diabetes Mellitus: A disease resulting from the autoimmune destruction of insulin-producing beta cells within the pancreas which consequently leads to the inability to regulate blood glucose.

Type 2 Diabetes Mellitus: A disease resulting from the body's inability to produce enough insulin or the body's resistance to insulin which consequently leads to the inability to regulate blood glucose.

## CHAPTER II

### Literature Review

#### **Type 1 and 2 Diabetes**

The American Diabetes Association (ADA) defines diabetes mellitus (DM) as “a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both”.<sup>1</sup> There are two main etiopathogenic types of diabetes. Type 1 diabetes is characterized as the absolute deficiency of insulin secretion due to the body’s immune system destroying beta cells within the pancreas.<sup>1</sup> Pancreatic beta cells are the only cells in the body that make the hormone insulin whose function is to regulate blood glucose.<sup>2</sup> Individuals diagnosed with type 1 diabetes survive by injecting or pumping insulin into their body every day based on their blood glucose levels. This form of diabetes is usually diagnosed in patients that are children or adolescents.

The second type is known as type 2 diabetes, which occurs as a result of both resistance to insulin action and inadequate compensatory insulin secretory response.<sup>1</sup> Type 2 diabetes is usually diagnosed in patients who are older in age, obese, have a family history of diabetes, history of gestational diabetes, impaired glucose metabolism, are physically inactive, and/or are of a certain race/ethnicity.<sup>2</sup> Patients with this type of diabetes control blood glucose levels through exercising, consuming healthful meals, losing excess weight, taking oral medication, and sometimes use of insulin injections.<sup>2</sup> Type 2 diabetes accounts for 90-95% of all DM cases, compared to 5-10% type 1.<sup>1</sup>

### **Related Problems, Annual Costs, and Prevalence of Diabetes**

Diabetes is the seventh leading cause of death in the United States.<sup>14</sup>

This chronic disease lowers life expectancy by up to 15 years, increases the risk of heart disease by 2-4 times, and is the leading cause of kidney failure, lower limb amputations, and adult-onset blindness, all which potentially affect one's quality of life.<sup>2,15</sup> In 2007, it was estimated diabetes accounts for \$116 billion in direct medical costs and \$58 billion in indirect costs which include disability, work loss, and premature mortality.<sup>2</sup> The average medical expenditures for people diagnosed with diabetes were 2.3 times higher than people without diabetes.<sup>2</sup>

In the United States, it is calculated 25.8 million people (8.3% of the population) are affected by diabetes, which includes both diagnosed and undiagnosed diabetes.<sup>2</sup> Around 215,000 people younger than 20 years of age have one type of DM.<sup>2</sup> Compared to the 8.3% of the U.S. population, 10% of Oklahoma's state population in 2009 had DM.<sup>16</sup>

According to IHS, 16.3% of 3.3 million NA/ANs have been diagnosed with diabetes, in which type 2 diabetes was more prevalent compared to the 8.7% non-Hispanic whites.<sup>3</sup> In 2005, the IHS reported 1,758 NA/AN youth under the age of 19 diagnosed with diabetes.<sup>3</sup> The increased magnitude of diabetes is evidenced by a 68% increase in diabetes from 1994 to 2004 in NA/AN youth aged 15-19 years.<sup>3</sup> This rapidly forming health disparity has raised significant attention to find effective methods to help prevent or delay the onset of type 2 diabetes.

### **Limited Resources Impact Children's Physical Activity and Fruit and Vegetable Intake**

The oppression and marginalization of NAs has led to many health disparities, which include increased prevalence of chronic diseases, injuries, and

poor mental health. NAs constitute around 0.9% - 1.7% of the U.S. population.<sup>17</sup> In 1999, 25.7% of the NA population was classified as living in poverty compared to 12.4% of the total U.S. population.<sup>18</sup> Minorities of low socioeconomic status, especially children, are at greater risk for poor health.<sup>13</sup> Healthful behaviors are not the sole result of individual choice; environmental factors must be considered as they can either promote such behaviors or present barriers. It is imperative that significant barriers to a healthful diet and PA, which contribute to increased risk of type 2 diabetes, are diminished amongst densely populated NA areas in order to improve the health status of already susceptible NA children.

Research has revealed substantial inequalities of access, availability, and affordability for obtaining a healthful diet in neighborhoods that are of low-income and predominantly minority. These areas have more non-chain grocery and convenience stores, whereas more affluent, predominantly white areas have better access to larger supermarkets with greater variety in healthful food choices.<sup>19-22</sup> The lack of access to larger supermarkets is partly due to the lower purchasing power of the residents and, if in rural areas, low population levels affect business decisions about location.<sup>22</sup> Not having access to large supermarkets has been associated with low intake of fruits and vegetables.<sup>23,24</sup> Foods at small grocery and convenience stores are generally energy-dense foods and less healthful food choices such as whole milk instead of skim.<sup>22,25</sup> Available produce is usually found to be less fresh, more costly and therefore unappealing. Lastly, prices are can range from 6-60% higher at small grocery and convenience stores compared to larger supermarkets.<sup>20,22</sup> A market-basket price comparison study revealed a \$16.62 price gap between nonchain and chain grocery stores.<sup>20</sup> All of these factors create a significant barrier for low-income populations to consume a healthful diet.

The increase in sedentary activities, including television viewing and video games, has led to decreased physical activity in youth. For youth living in limited resource areas, social and geographic factors create an imbalance of resources in the built environment presenting a major barrier to the promotion of PA as well. Studies have found ethnic-minority individuals living in low socioeconomic neighborhoods have fewer facilities and amenities for PA.<sup>21,26,27</sup> In addition, low-SES neighborhoods have higher levels of crime and social disorder, including litter, graffiti, and physical decay, which reduce the perceived sense of safety; therefore contributing to decreased PA and increasing risk of chronic diseases and unintentional accidents.<sup>9,28,29</sup> Having nearby access to fundamental conditions such as sidewalks and parks, which are safe and maintained, may help increase the community's PA levels.

### **Cultural Relevancy in Nutrition Education for Native American Youth**

In order for a health promotion program to help reduce health disparities, the researchers, developers, and staff must be culturally sensitive and competent about NAs historical and contemporary social injustices.<sup>30</sup> Part of being culturally competent requires the involvement of the community, especially the students' parents, in all stages of development and implementation to meet the community's personal view on what is needed and expected from the program. This partnership will establish trust, and in return will increase the likelihood of the health promotion message will be heard and implemented, leading to positive physical and mental health outcomes.<sup>31,32</sup>

### **Language and Culture**

There are few studies available describing educational strategies for teaching NA youth. Many come from qualitative studies and government assigned task forces, discussing what would be most effective for children to



have a successful educational career. It is understandable there is not one specific way of teaching all NA children as there are 565 federally recognized tribes, each with its own unique language, spiritual beliefs, and culture; thus, programs should be appropriately tailored for each site to ensure cultural competency.<sup>33,34</sup> The teachers may be culturally responsive by integrating Native language into a curriculum developed from a Native perspective. Many tribal languages have been lost during assimilation and tribal cessation. “Language and culture are inextricably linked, because one supports the other.”<sup>35</sup> Therefore, integrating the tribe’s specific language into curriculum will increase the students’ cultural identity and acceptance of the program.<sup>36</sup>

### Storytelling

Storytelling is central to the development of the EA program and CDC Eagle books. For decades, NAs have used storytelling to entertain. However, it is also used primarily to teach educational messages. Indigenous culture is based on oral tradition where the “word is what gives life and meaning to Indian history and customs.”<sup>37</sup> In a relaxed environment where everyone is comfortably arranged in a circle or half-circle, so no one is excluded, the storyteller captivates the audience with a tale filled with anthropomorphized animal characters. Stories are usually told in an indirect fashion with no “obvious moral”, compelling “persons to draw their own conclusions do their own thinking,” and learn the positive and negative consequences based on their own choices.<sup>37</sup> Thus, through this simple and entertaining method of presenting essential ideas and values, healthy lifestyle behaviors may be learned and instilled in individuals listening.

A study on preventing substance use among NA youth incorporated NA legends and stories in order to “create awareness on substance use issues along with positive and holistic concepts of health and health promotion.”<sup>38</sup> This study

divided 1,396 NA youth (mean age = 10.28 years) from 10 reservations into three arms: skills intervention, skills + community intervention, or the control group which received no intervention.<sup>38</sup> The intervention, lasting six months, included story-telling, homework assignments, and skills practice through role-playing including how to deal with peer-pressure situations. Change in substance use through batteries given at baseline, after the intervention, and every 12 months after the intervention for a total of 3.5 years was assessed. Results showed a significant decrease in smokeless tobacco, alcohol, and marijuana use in the skills intervention arm compared to the control arm ( $p < .01$ ). The skills + community arm was neither significantly higher than the skills arm nor significantly lower than the control arm. This study demonstrates culturally sensitive interventions can result in a positive effect.<sup>38</sup>

### Holistic Learning

Assessments conducted on NAs cognitive style indicated the preferred teaching methods use a visual, holistic approach, which “develops an understanding of the whole context” before learning the components that bring the concept together.<sup>39</sup> The curriculum should incorporate observations, use metaphors, and NA games, music, and crafts so what the students learn is “relevant to [their] knowledge base and culture.”<sup>40</sup> Using this culturally relevant teaching method within health promotion programs will show students a practical application of how to connect what they have learned and essential tools needed to establish healthful behaviors in their everyday lives.

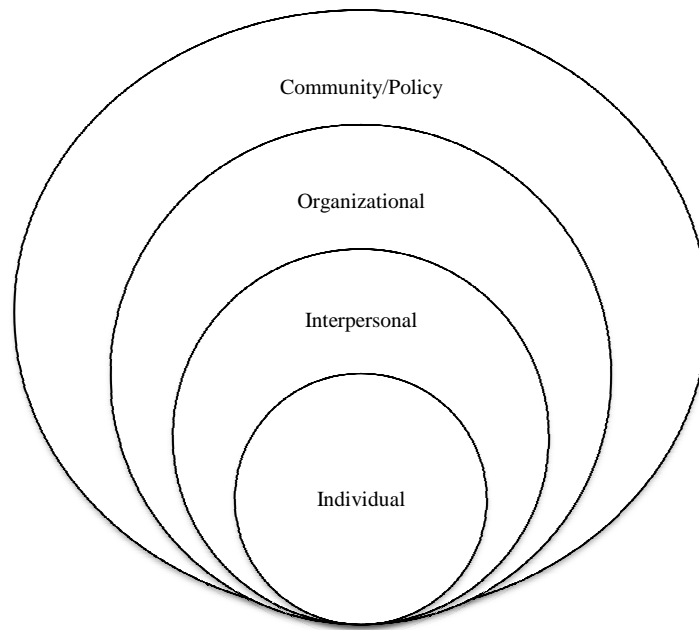
### **Theoretical Underpinnings**

Theory in nutrition education, derived from evidence, is a mental map that “helps us understand how potential constructs are related to food- and nutrition-related behavior change.”<sup>8</sup> Converging theory with research and practice creates

a tailored intervention to the behavior of interest, provides direction, structure, and incisive evaluation of the impact made due to the intervention.<sup>8,41</sup> Theory provides the basis and structure for interventions as it allows programs to “help individuals gain clarity and insight into the reasons and values underlying their behavior”<sup>8</sup> in order to “transform that knowledge into useful strategies for health enhancement”.<sup>41</sup> A theory is generated through quantitative and qualitative research such as questionnaires and focus groups.<sup>8</sup> Based on the literature review, certain theory designs are better to use in program design than others. Descriptions of two widely used theories in nutrition education that are central to the EA program follow.

#### Socioecological Model

The socioecological model (SEM) is a multi-theory framework for describing the interrelations among both environmental factors and personal attributes and their influences on health behavior and health outcomes.<sup>42,43</sup> In this model, four levels of influence are regarded as impacting health and nutrition behaviors: individual (micro-), interpersonal (meso-), organizational (exo-), and community/policy (macrosystem) (Figure 1).<sup>44</sup> Thus, this approach to designing health promotion emphasizes both the interrelatedness of conditions within single settings and the links between multiple settings and life domains within the broader community in order to create a more effective prevention program for well-being.<sup>42</sup>



**Figure 1** Levels of influence in the socioecological model.

The individual level (microsystem) includes internal determinants of behavior such as knowledge, attitudes, beliefs and self-concept skills of the individual.<sup>43,45</sup> An example of the individual level may be building a foundation of knowledge through education in school. Many single-domain theories assume a person's behavior or mechanisms for behavioral change is due to the individual's characteristics including knowledge, attitudes, skills, or intentions to comply with behavioral norms, but does not consider social environmental influences.<sup>42,43</sup> However, the SEM incorporates these intervention strategies along with shaping the social environment around them.<sup>42</sup>

The interpersonal level (mesosystem) includes family, friends, and peers that provide social identity, support, and role definition.<sup>8,43,45</sup> Norms are developed in individuals based on social interactions, support, and networks. Health promotion interventions that acknowledge interpersonal levels of influence usually focus on changing individuals by modifying "social influences rather than on changing the norms or social groups to which individuals belong."<sup>43</sup> For

example, a support group may be formed of individuals that support consumption of fruits and vegetables.

The organizational level (exosystem) focuses on rules and policies within social networks and social support systems, such as those in the workplace, schools, and religious organizations individuals are associated with.<sup>8,43</sup> Because people spend a large part of their day in these organizational settings, organizations have the “opportunity to build social support” in order to influence positive health behavior adoption in them.<sup>43</sup> Thus, a better health outcome is possible if organizations are supportive and help ease implementation of certain health behaviors. An example of helping people increase their F/V consumption may be strategic placement of where the fruits and vegetables are placed in the cafeteria.

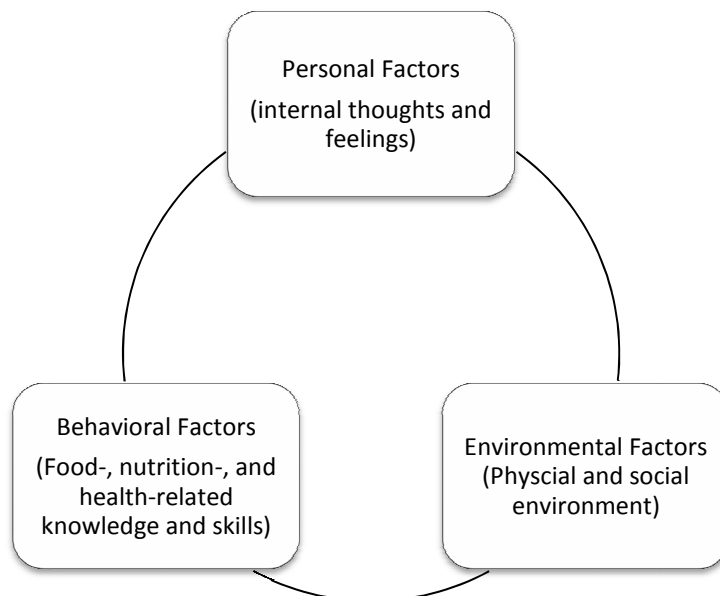
Lastly, the community/policy level (macrosystem) focuses on social networks, norms, and standards that exist among individuals, groups, and organizations, and also local, state, and federal policies that regulate health actions.<sup>8,45</sup> Community has multiple definitions such as one that is similar to Brofenbrenner’s description; mediating structure individuals belong to such as family, friends, and neighborhoods. The role the community level is implemented in a health intervention depends on the definition used.<sup>43</sup>

The varying relational roles a community may be defined as “the use of regulatory policies, procedures, and laws.”<sup>43</sup> Laws and regulations such as water fortification, banned public smoking, and food quality has decreased mortality and addressed health risks that may have led to chronic diseases.<sup>43</sup> Communities may coordinate with local health agencies and the government to initiate and implement programs to create awareness about certain health issues which may be prevalent within the community. Coordination of different environmental levels

will generate a more cohesive and supportive environment necessary for health behavior changes.

### Social Cognitive Theory

The social cognitive theory (SCT), previously known as the social learning theory, is “the most widely used theory for designing nutrition education and health promotion programs.”<sup>8</sup> It provides recognition of the determinants of behavior based on reciprocal determinism in which personal, environmental, and behavioral factors become a continuous interaction affecting behavior. Reciprocal determinism assumes a triadic reciprocal relationship in that behaviors are not a result of interactions between the person and the behavior or the person and the environment, but rather from an interaction of all three (Figure 2). This relational structure of behavior is able to create the basis for intervention strategies in assisting and enhancing the motivation in people to make positive behavior changes.



**Figure 2** Schematization of triadic reciprocal determinism in the causal model of social cognitive theory.<sup>46</sup>

With reciprocal determinism at the core of SCT, several key constructs are important in its application for use in designing nutrition and health education programs. A description of key constructs and concepts valuable in the promotion of health related behavior change follows.

#### Key Constructs and Concepts of the SCT

**Self-efficacy.** “Self-efficacy beliefs regulate human functioning through cognitive, motivational, affective, and decisional processes.”<sup>47</sup> It is the person’s confidence in performing a particular behavior. Programs incorporating self-efficacy may help increase the person’s confidence by encouraging them to try performing the behavior of interest.

**Behavioral Capability.** Key traits of behavioral capability include both the knowledge of the behavior and the skills necessary to perform that behavior.<sup>41</sup> Behavioral capability gives the reason why the behavior should be performed, as well as how to perform the behavior. A program including behavioral capability should provide information on the behavior of interest, and train the participants how to perform that behavior.

**Outcome Expectations.** Social cognitive theory hypothesizes that part of behavior is regulated by outcome expectations.<sup>8</sup> This construct addresses anticipatory outcomes of a behavior.<sup>8,41</sup> Programs addressing outcomes expectations may incorporate modeling positive outcomes of the health behavior of interest.

**Observational Learning.** Observational learning is the efficient process of learning a behavior by observing others performing the behavior and the reinforcements received that follow.<sup>41</sup> Through observation, the rules of performing a behavior successfully are quickly learned. Programs addressing

observational learning should include role models that engage in the targeted behavior.

**Positive Reinforcement.** Reinforcements may either increase or decrease the person's likelihood to perform the behavior of interest.<sup>8</sup> People are more likely to perform behaviors that result in positive reinforcements. It may be either an external reinforcement such as an award for completing a health program, or an internal reinforcement in which the behavior has a perceived value to the person.<sup>41</sup> Programs incorporating positive reinforcement include rewards and incentives for the participants engaging in the behavior of interest.

**Physical Environment.** Physical environments are imposed environments, which people have no control over except "how they react to them, act within them, or work to change them."<sup>8</sup> Physical environments include homes, schools, worksites, and so forth. Programs addressing physical environmental attributes should provide necessary resources required for the behavior of interest to be performed.

**Social Environment.** The social environment represents interactions between families, peers, and other social networks that have an influence on the behavior of interest. For example, a person's F/V intake may be influenced by their parental and or peers' perceptions of F/V. Programs addressing social environmental influences should enhance the environment and/or utilize resources available to support the behavior of interest.

### **Centers for Disease Control and Prevention's Recommended Approach to**

#### **Reduce Risk Factors Associated with Type 2 Diabetes**

Centers for Disease Control and Prevention Eagle Books and Behavioral Focus to Reduce Type 2 Diabetes



Through collaboration with many partners, CDC's division of Diabetes Translation established the Native Diabetes Wellness Program designed to improve the health status of NA/AN. The program's vision is to see "Indian Country free of the devastation of diabetes."<sup>48</sup> The goal of this program is to "support advancement toward the vision including supporting sustainable and ecological approaches to promote the use of traditional foods, PA, social support, and health policy change in communities."<sup>48</sup> In addition, the CDC ascribes it is important to "share messages about survival and traditional ways of health that are remembered", and asserts it is not only important to "share and evaluate Native and Western programs such as diabetes education in schools with Native students", but also to "support meaningful tribal consultation at the state and federal levels."<sup>48</sup>

The CDC recommends primary prevention of diabetes due to the capability to prevent or delay the onset of type 2 diabetes.<sup>49</sup> They advise healthy eating and regular PA in established safe and supportive environments including schools and families.<sup>50</sup> Overall, according to the CDC schools should:

- "Implement a planned and sequential curriculum that is culturally and developmentally appropriate."<sup>50</sup>
- "Implement a curriculum that addresses a clear set of behavioral outcomes that promote healthy eating and PA"<sup>50</sup>
- "Implement health education curricula that are consistent with the National Health Education Standards."<sup>50</sup>

**Review of Primary Intervention Strategies in Grade School Children That Address Improved Fruit and Vegetable Consumption and or Physical Activity Levels**

An increasing demand for primary prevention of type 2 diabetes has led to recent development of culturally appropriate interventions specifically for Native Americans. A primary prevention program for type 2 diabetes should begin during the earlier stage of life. This is the time children begin to adopt lifestyle behaviors from their parents and peers. The school environment is an ideal place to base a PPP because the majority of children may be reached there.

Unfortunately, as of this date, there are few examples of available reports and literature on PPP developed for Native American youth with the objectives to increase PA and establish healthful eating behaviors. The following is a discussion of two PPP, which are the only school-based, culturally appropriate programs which have been published in their entirety.

#### Pathways Study

An increase in obesity prevalence in 1993 created concern for the United States' overall health as obesity is a risk factor for many chronic diseases. The Pathways study focused on Native Americans. Pathways created the intervention for children in order "to prevent deleterious effects on their future health status."<sup>51</sup> Thus, Pathway's objective was "to prevent obesity in NA children through a culturally appropriate elementary school- and family-based intervention that promote healthful eating behavior and increased PA."<sup>52</sup>

The Pathways study was implemented in the U.S. and began with a multi-site, holistic formative assessment, which included parents, children in grades 3-5, teachers, six NA nations, and five universities.<sup>53</sup> The first part of the feasibility phase was conducted in order to develop an "effective, multi-culturally appropriate school intervention program to prevent obesity in six different NA

communities.”<sup>53</sup> The formative assessment also helped build the program’s sense of purpose and acceptance among the communities involved.

This phase of the study consisted of collecting both qualitative and quantitative data. The protocol was developed based on collaborative programmatic questions on planning effective, culturally appropriate interventions involving classroom curriculum, physical education and activity, school food service, family/home, and food sellers. The formative assessment protocol used in-depth interviews, semi-structured interviews, focus groups, and direct observation to gather information on nine different units that were directly purposed around the programmatic questions. It is noteworthy that at least one of the two trained representatives from each site trained to conduct the formative assessment was a Native American, which “helped to increase participation rates and improve rapport.”<sup>53</sup>

Each unit had a defined purpose and identified how to collect and analyze the data. The school-focused units were conducted during spring of 1994, with the community/home-focused units following. Last, the assessment of obesity risk behaviors units, an expansion of the spring and summer units, were conducted to focus on “identifying specific behaviors that appeared to be contributors to childhood obesity.”<sup>53</sup> The collected information was compared across sites and across schools within sites to find common themes of risk behaviors. This was done in order to “develop an intervention that would work within the resources” available at each of the sites.<sup>53</sup>

Each risk behavior was assigned a level as to whether or not the behavior existed in the community. Through the multi-site comparison, each risk behavior was assigned a priority level. Low priority meant the behavior was not commonly found at all sites, and high priority meant the behavior was commonly found at all

sites. The high priority behaviors would be focused on within the intervention. The information and experiences gained during the formative assessment were applied to the full-scale randomized trial that began October 1996.

The primary aim of the Pathways program was “to develop, implement, and evaluate a culturally appropriate, school-based intervention to promote healthful eating behaviors and increased PA to prevent obesity in NA children.”<sup>54</sup> Pathways further aimed to 1) “determine whether the intervention will increase the level of PA, decrease dietary fat intake, and change knowledge, attitudes, and behaviors (KAB) related to food choices and PA”, 2) to “document the degree to which the intervention was implemented in each intervention school”, and 3) to “evaluate the safety of the intervention.”<sup>54</sup> The primary outcome expected from implementing the intervention was a “mean difference between intervention and control schools in percentage body fat (PBF) at the end of the fifth grade.”<sup>54</sup>

The objective and aims of Pathways were addressed by using the social learning theory (SLT). The SLT gave structure to the components involved in the intervention. The researchers identified specific constructs to be used for each factor of reciprocal determinism: personal factors, behavior, and environment. The Pathways curriculum aimed to enhance children’s knowledge, values, and sense of personal control regarding PA and nutrition.<sup>51,55</sup> Behavior change on the part of children was anticipated as a result of goal setting, developing skills in food selection and preparation, and having increased opportunities to be physically active.<sup>51,55</sup> Lastly, environmental factors such as positive role models, decreasing barriers to exercise and healthful eating, and involving the family and peer support created a supportive environment to initiate changes.<sup>51,55</sup>

Every construct used within the SLT incorporated NA beliefs and values. This included cultural stories, games, and music.<sup>55</sup> Pathways' instructors also taught the classroom curriculum through preferred learning modes such as learning through observation, practice, and metaphorically.<sup>51</sup> The intervention utilized these concepts with the aim to "reinforce the students' cultural identity and the knowledge and skills they learned."<sup>55</sup>

The full-scale version of the Pathways study ran from 1996 to 2000, and included a "cohort of 1704 third-grade students in 41 schools (21 implemented the intervention and 20 were controls) in 7 NA communities."<sup>54</sup> Part of the inclusion criteria for schools was that  $\geq 90\%$  of the students in 3<sup>rd</sup> grade had to be NA.<sup>54</sup> Pathways involved four components to address the prevention of obesity: classroom curriculum, physical education, family involvement, and school food service.

In order to change the priority behaviors, as identified in the formative assessment, Pathways used constructs within the SLT for the classroom curriculum. These constructs were carried out through a series of stories and activities led by two fictional NA children that promoted a healthy and balanced life through healthful eating behaviors and increased PA.<sup>51,55</sup> Students were involved in many activities such as being offered to taste new foods, practice snack preparation, and participate in cultural games.<sup>51,55</sup> Grades three and four participated in two 45-minute sessions per week for 12 weeks, and grade five participated in two 45-minute sessions per week for 8 weeks to ensure time to collect follow-up measures.<sup>55,56</sup>

The researchers developed a physical education (PE) program based on the SPARK program (Sports, Play and Active Recreation for Kids) and integrating NA traditional games modified to increase energy expenditure.<sup>51</sup> The

PE program focused on “Increasing children’s activity and energy expenditure in school by increasing the frequency and quality of PE classes and activity breaks” as well as developing the children’s motor skills and promoting positive attitudes towards PA.<sup>51</sup>

The revised PE program was taught  $\geq 3$  times per week for 30 minutes.<sup>51</sup> Each lesson began with a warm up, a lesson from both type one and type two units, and a cool down. Type one units were health-related fitness units that helped develop muscular strength and endurance, cardiovascular endurance, flexibility, and motor skills.<sup>51</sup> Type two units were sports-related fitness units that helped develop manipulative and sports-related skills.<sup>51</sup> Additionally, the PE program included exercise breaks lasting 2-10 minutes in the classroom or during recess.<sup>56</sup>

Pathways included a family-involvement component to try to induce a healthy, supportive home environment so the students could continue implementation of the knowledge and behaviors of the Pathways curriculum and PE program.<sup>51,55,56</sup> The family was first reached by the student bringing home the “family pack”. The family packs were either 1) action packs, which focused on information that reinforced classroom curriculum lessons and suggested healthful activities the family can do together, or 2) snack packs, which contained healthful nutrition tips and recipes.<sup>51</sup>

The other way families were reached was through family events held at the intervention schools. The family events all promoted key Pathways educational and behavioral messages in order to reinforce health behaviors and encourage families to implement such behaviors at home.<sup>51,55</sup> The events included interactive booths, workshops on integrating PA into everyday life,

hands-on cooking demonstrations, and also rewards for students completing the Pathways program.<sup>55</sup>

The last component of Pathways was the school food service. Pathways program developed and implemented nutritional guidelines, behavioral guidelines, and training for food service workers, which included skill building techniques.<sup>51</sup> The goal of the school food service component was to lower the amount of fat in the breakfast and lunch school meals, while following the U.S. Department of Agriculture school meal regulations, where meals must contain 30% of energy from fat over 5 consecutive days.<sup>51,56</sup> Trained Pathways staff visited each school kitchen at least once a month to help the workers implement behavioral guidelines.<sup>51</sup>

The effectiveness of the Pathways study was measured by comparing baseline data to data collected upon completion of the intervention using four methods including body composition, PA, diet, and a KAB questionnaire. Body composition was determined using a formula created to estimate body fat percentage. The formula used the child's height, weight, triceps and subscapular skinfold thicknesses, and bioelectric impedance measurements.<sup>57</sup> The PA measurement was based on a physical activity questionnaire (PAQ) and a tritrac accelerometer which obtained a more objective estimate of total activity at baseline and after the intervention.<sup>58</sup> The PAQ was used to assess the child's PA from the preceding 24 hours by using a checklist format. The PAQ divided the day into before school, during school, and after school time-frames with activity lists tailored to the time of day. The children were instructed to check the activity as to whether they engaged in the activity "none", "a little", or "a lot".<sup>58</sup>

The children's diet was evaluated using multiple measurements. First, the researchers analyzed the breakfast and lunch menus during a 5-day period for

meal composition.<sup>56</sup> Two trained Pathways staff also measured food intake of groups of children during school lunch through direct, nonintrusive observation.<sup>56</sup> The amount of food left on the tray was measured based on what the staff should have served them initially to obtain the dietary intake. Lastly, Pathways staff conducted 24-hour dietary recalls only for the 5<sup>th</sup> grade students due to cost and unreliable answers about food intake from the younger children.<sup>51,56</sup>

The final evaluation method for the Pathways study was the knowledge, attitudes, and behavior questionnaire. This questionnaire was distributed in the classrooms with trained Pathways staff reading questions aloud as children followed along marking their answers correspondingly.<sup>56</sup> The questionnaire was culturally and developmentally appropriate for the participating 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> graders.<sup>52</sup> The questionnaire measured KAB related to PA, diet, weight related attitudes and behavior, and cultural identity.<sup>52</sup> The results of the children's answers helped to assess "knowledge of concepts taught in the Pathways curriculum in each grade."<sup>56</sup>

Although the Pathways study did not reach their primary aim of reducing body fat gain, the intervention was successful at changing the macronutrient distribution to more acceptable intake ranges compared to the control group.<sup>56</sup> Based on the randomized selection for the 24-hour dietary recalls, there were statistically significant reductions ( $p \leq 0.05$ ) in grams of protein (-9.5), total fat (-15.1), saturated fat (-6.0), polyunsaturated fat (-2.3), and overall total energy intake (-263 kcal).<sup>59</sup> Accordingly, there was a statistically significant decrease ( $p \leq 0.05$ ) in percentage of calories from total fat (-2.5) and saturated fat (-1.1).<sup>59</sup>

Most likely as a result from the decrease in fat consumption, the percent of calories from carbohydrates the children consumed significantly increased (2.5).<sup>59</sup> For example, children may have chosen healthier options such as F/V to



replace high fat food options as the food service component of the study reduced the fat content of school meals and increased the availability of less energy dense foods such as F/V.<sup>60</sup> This was further confirmed due to the sucrose levels not increasing significantly based on the dietary recalls, which shows high sugar foods did not replace the high fat foods.<sup>59</sup>

The KAB evaluation results indicated a significant increase in knowledge for all grades with the 3<sup>rd</sup> grade intervention group (0.77) having the most significant increase compared to the control group (0.65).<sup>56</sup> There was a slight decrease, yet still significant, in subsequent years, with the 4th grade intervention group (0.70; control = 0.67) being more significant than 5<sup>th</sup> grade's intervention group (0.55; control = 0.48).<sup>56</sup>

The study showed a positive trend in improved self-efficacy to be PA, but not result in a significant increase in PA based on the results of the tritrac accelerometer. Although the results of the PAQ were significantly higher (0.27) compared to the control group (0.24), the tritrac accelerometer only had a positive, yet not significant, trend (267.22) towards being more PA versus the control group (246.79).<sup>56</sup> Lastly, no significant measure in self-efficacy for choosing healthful foods was observed (0.66), however, there was a significant increase for intention to choose healthful foods compared to the control group (0.53).<sup>56</sup>

#### Kahnawake Schools Diabetes Prevention Project

Researchers found the prevalence of diabetes in a Mohawk community located in Kahnawake, Quebec to be twice that of the general population. Also, those with diabetes suffered from the highest level of macrovascular complications reported at that time in a Native community.<sup>61</sup> The researchers shared the prevalence and associated complications of type 2 diabetes with the

community, which raised awareness of diabetes along with concerns about continuing the Mohawk tradition of caring for their future generations.<sup>61,62</sup>

Because the average body mass indexes (BMI), in men and women, were still within the healthy range around the age of 18, the researchers and community both agreed it would be beneficial to create a primary prevention program aimed towards children in the community.<sup>63</sup>

The Kahnawake Schools Diabetes Prevention Program's (KSDPP) objectives were "aimed at promoting active living, eating in balance, and raising diabetes awareness."<sup>64</sup> KSDPP's overall goal was to embody the concept of living in balance.<sup>64</sup> The structure of the program was built by incorporating the Social Learning Theory, the Precede-Proceed Model, and the Ottawa Charter for Health Promotion 1986, all which "incorporate traditional learning styles of Native Children."<sup>62</sup> In order to meet the overall goal and vision of KSDPP, concrete goals were created which were specific towards diabetes prevention. The long-term goal of KSDPP was "to decrease the future occurrence of type 2 diabetes", while the short-term goal was to "to reduce the prevalence of obesity, high-calorie and high-fat diets, and physical inactivity among Kahnawake children aged 6 to 12 years."<sup>62</sup> In order to reach these goals, researchers employed a holistic approach involving numerous activities that reached the school, community, and home environments.

KSDPP focused on self-efficacy, modeling, and self-management constructs of the Social Learning theory. Specifically, self-efficacy was achievable through small, easily achievable goals. Adults and community elders modeled healthy lifestyles during community activities. Lastly, self-management was assessed by children being exposed to a structured school health education program aimed to increase their desire to gain healthy lifestyle benefits.<sup>62</sup>

The researchers used the Precede-Proceed Model to apply the social learning theory in order to strategically impact the identified risk health behaviors of the children. This included predisposing factors such as the “children’s knowledge and skills, reinforcing factors through the support of teachers and family, and enabling factors like the availability of healthy foods and opportunities for PA.”<sup>62</sup> The final component of the vision’s foundation was the Ottawa Charter for Health Promotion, which helped incorporate fundamentals into the intervention including “developing personal skills, strengthening community action, and creating supportive environments” met through the 63 reinforcing activities of the health education program introduced to the students at school.<sup>62</sup> Every activity within KSDPP incorporated traditional learning styles of Native children. Thus, the activities incorporated were visual, spatial, and perceivable.<sup>62</sup>

After completion of the feasibility phase of KSDPP, the program went into full effect in 1994 and ran for three years. Ninety percent (n = 458) of the elementary students, grades 1-6, were enrolled in community elementary schools where KSDPP was implemented.<sup>62</sup> The health education program, which was the main focus of the intervention, involved the children, teachers, families, and community.<sup>62</sup> The activities were based on the fundamentals of the Ottawa Charter for Health Promotion. Children had ten 45-minute intervention lessons per year. The lessons incorporated traditional learning styles, practical experiences, and interactive learning techniques such as storytelling, games, food tasting, crafts, and puppet shows.<sup>62</sup> The topics discussed were nutrition, fitness, diabetes, understanding the human body, and healthy lifestyles.

The nutrition portion of the curriculum discussed various health topics such as balanced eating, healthy snacks, avoidance of high-fat foods, and factors that influence eating habits.<sup>62</sup> The nutrition education was reinforced

through KSDPP initiating an active enforcement of the school nutrition policy.

Children were only allowed to bring healthy lunches and snacks, and cafeterias only offered low-fat, low-simple sugar, high-fiber foods.<sup>62</sup>

The fitness portion of the curriculum involved understanding the benefits and enjoyment of daily PA, along with ways to incorporate PA into daily routines.<sup>62</sup> Teachers were encouraged to integrate extra physical activities into the classrooms.<sup>62</sup> Lastly, the diabetes section of the curriculum taught about type 2 diabetes, its consequences, and how it may be prevented.<sup>62</sup>

A supportive community environment had to be established in order to reinforce the lessons learned from the health education program. KSDPP strived to achieve this strengthened community action through utilizing local media, supporting local events and groups such as the recreational center, and encouraging the Community Advisory Board members to become active role models within KSDPP.<sup>62</sup> The supportive environment theme was continued in the community by building a walking and bicycling path, physically active contests and races at the schools and creating clubs promoting PA in order to increase parent and elder role models.<sup>62</sup>

KSDPP was a mixed longitudinal and cross-sectional study that compared results to a nearby community which had 199 children in grades 1-6.<sup>62</sup> Researchers obtained baseline data in 1994 from the children in grades 1-6 from both the experimental and comparison schools. Each year thereafter, researchers followed the children from grades 1 and 2 at baseline in each community. Also, in 1996 children in grades 1-6 were reassessed. The evaluation included both outcomes and proximal impact of the intervention.

The outcomes evaluation “examined the relationship between exposure to the program and obesity, fitness, healthy eating, and patterns of PA of the

children.”<sup>62</sup> The fitness level was measured by having students complete a 1-mile run/walk test (0.5 miles for children in grades 1-3) twice in one session. <sup>62</sup> They were instructed to run as fast as possible with the best time recorded. Body composition was assessed through anthropometric measurements including height, weight, waist and hip circumferences, and triceps and subscapular skinfold thicknesses. <sup>62</sup>

The final measure of the outcomes evaluation was a behavioral assessment for both dietary habits and PA patterns. Food consumption of the children for the past seven days was assessed by a 51-item self-reported food frequency questionnaire, which also included foods frequently consumed by the community. <sup>62</sup> A separate questionnaire assessed PA patterns by asking if the students did any of the listed 27 PAs, participation in organized sports, television watching, and/or use of video games within the past seven days. <sup>62</sup> Children in grades 1-3 completed the questionnaire at home with the help of their caretakers while children in grades 4-6 completed the questionnaire in class.

The proximal impact evaluation “assessed the intermediate variables of students’ self-efficacy and the perceived parental support for healthy eating habits and PA.” <sup>62</sup> Self-efficacy and perceived parental support were assessed with a self-administered questionnaire completed in the classroom with a trained monitor present. The perceived parental support included six statements such as my family never, rarely, a few times, or often encouraged me to eat healthy foods. <sup>62</sup> Self-efficacy included 11 items asking how sure the student was they could try to do specific activities such as I know I cannot, maybe I can, or I know I can eat fruit instead of cookies or candies for dessert or snack. <sup>62</sup>

The Kawnawake project did not meet their aim in regards to reducing obesity in children as both BMI and skinfold thickness measures actually

increased each successive year.<sup>65,66</sup> However, KSDPP significantly increased the proportion of students being PA  $\geq 30$  minutes per day compared to the baseline data (1994 = 36%; 1998 = 94%).<sup>66</sup> The aim of improving PA was only temporarily met as the level of PA was reduced back to the baseline level when the 8-year impact of KSDPP was analyzed.<sup>65</sup>

There was not a significant improvement in students' overall quality of diet shown during the time the intervention was being implemented.<sup>66</sup> However, the aim of improving the students' diet was partially met by significant reductions of key high-sugar and high fat foods consumed each successive year.<sup>65</sup> Unfortunately, the reduction of high-sugar and high fat items were not replaced with nutrient dense F/V as the consumption of these food items continued to successively decrease each year as well.<sup>65</sup>

Both Pathways and KSDPP addressed increasing PA and healthful eating behaviors. The Pathways study 1) revised the PE program in order to increase energy expenditure, 2) improved the school food service's nutritional guidelines by lowering the amount of fat in meals served, and 3) gave practical advice and taught the children about diet and PA within the classroom curriculum. KSDPP 1) taught children about balanced eating, diabetes, and the importance of being physically active within the classroom curriculum, 2) enforced a healthful school nutrition policy, and 3) engaged the community environment, which included building a walking and bicycling path. Both programs were also culturally competent by using a participatory approach when developing the intervention, while also integrating Native language and learning modes.

Although both programs did not meet their expected outcomes, they did see success in other areas. Pathways resulted in a more appropriate macronutrient distribution of dietary intake and a significant increase in

knowledge of healthful diets and PA, intent to choose more healthful foods, and self-reported PA. KSDPP resulted in a significant increase in PA and decreased intake of high-fat and high-sugar foods. These findings indicate PPPs can make an impact at reducing the risk of type 2 diabetes; however, more time may be needed to reach their ultimate goal.

### **Summary of Literature Review**

In summary, the increasing prevalence of type 2 diabetes in NA youth calls for implementation of PPPs that are culturally relevant and address behavior modification through multiple levels of influence. It is also important to understand barriers within the targeted community's access, availability, and affordability to implementing the targeted health behaviors in order for the intervention to be effective.

## CHAPTER III

### Methodology

#### **Participant Description**

The Get Fresh! Eagle Adventure (EA) program used a purposive sample technique which drew samples to include particular areas or groups found in a population.<sup>67</sup> The criteria for the sample included schools where  $\geq 50\%$  of the students are eligible to receive free or reduced priced lunches and where the proportion of NA students enrolled was greater than Oklahoma's state average ( $\geq 19\%$ ). Further, two schools in Pontotoc County, the location of Chickasaw Headquarters, were the focus of this study. All students in grades 1-2 participated in the program and evaluation procedures if their school opted to participate.

#### **Study Design**

To measure change in knowledge and intent, EA used a single group experiment, observational study design, which measured the outcomes by analyzing the differences in pre- and post-test given to the students. This design was chosen because it was considered a long-term evaluation procedure which could be easily replicated by SNAP-Ed programs and Tribal organizations that chose to implement the program. Pre-tests were administered in class approximately one week pre-intervention and post-tests were administered approximately one week post-intervention. To measure student acceptance and



utilization of the EA program materials, descriptive questions were added to the post test. This study was approved by both Oklahoma State University and the Chickasaw Nation Institutional Review Boards.

### **Description of Intervention**

The Get Fresh! EA is a primary intervention program which targets children in grades 1-3. The long term goal of EA is to prevent type 2 diabetes among grade school children by helping students develop a desire to eat more F/V and be more PA. The EA school-based program is theoretically based utilizing the SEM as the framework for program development to reach multiple levels of influence. Constructs from the SCT to address behavior change related to F/V and PA were incorporated in the lesson design including self-efficacy, behavioral capability, and social expectations (Table 1).

**Table 1. Social Cognitive Theory Constructs Integrated in Eagle Adventure**

<b>Construct/Concept of SCT</b>	<b>How it was addressed in EA</b>
Self-efficacy	<ul style="list-style-type: none"> <li>• Provided F/V for the children</li> <li>• PA movement incorporated into each lesson</li> <li>• 2-bite club</li> <li>• Educators acting as role models displaying positive attitudes</li> </ul>
Behavioral capability	<ul style="list-style-type: none"> <li>• Hands-on lessons</li> <li>• Health homework</li> </ul>
Outcome expectations	<ul style="list-style-type: none"> <li>• Role modeling of how F/V and PA helps build strong, healthy bodies</li> </ul>
Observational learning	<ul style="list-style-type: none"> <li>• EA play</li> <li>• Educators' display of enthusiasm</li> <li>• EA books</li> </ul>
Positive Reinforcement	<ul style="list-style-type: none"> <li>• Medal given to all students upon completion of the program</li> <li>• Stickers given as an incentive for returning folders</li> </ul>
Physical environment	<ul style="list-style-type: none"> <li>• Frisbees</li> <li>• EA announcements</li> <li>• Posters</li> </ul>
Social environment	<ul style="list-style-type: none"> <li>• 2-bite club</li> <li>• Educators acting as role models displaying positive attitudes</li> <li>• Sending recipes, EA moving activities, and parent tip sheets home to students' families</li> </ul>

The EA incorporated five educational contacts in the school environment to address the individual level of influence. Students were introduced to the program by an interactive play which was based on four Eagle books that embrace NA traditions of storytelling to pass on important information to younger generations. Four in-class lessons followed the EA play. Each lesson was designed to engage children in a discussion about their own health and nutrition habits. Students participated in hands-on activities and food experiences in class to help them develop an enthusiasm for eating more F/V and moving their bodies more often. Educators served as role models for health and exhibited enthusiasm for the targeted behaviors as a means of social persuasion and observational learning.

Along with the in-class lessons, children took home a folder that included messages to share with their parents and family members (interpersonal level of influence) including nestwork (health homework), simple recipes, and fun moving activities in which the whole family could participate. The take home activities were designed to address familial behavioral capability.

The EA program was also integrated throughout the school environment using posters displaying simple health and nutrition messages and school announcements over the intercom system. The collateral materials displayed in the school environment addressed vicarious learning and social persuasion concepts. Upon completion of the lessons, students took a post-test and were rewarded for their efforts and participation with an EA medal which serves as a reminder to continue improvements in F/V intake and PA behaviors beyond the intervention time frame.

### **Description of Pre- and Post-Survey**

Surveys were administered to children in each intervention classroom approximately one week prior to the first educational contact (pre) and following the completion of all intervention components (post). Surveys were administered by an educator who was trained in survey procedures by the research team. A trained assistant was also present to answer questions. The survey included a script developed by the researchers to ensure consistency in administration across classrooms. The Perry, et al. (2002) questionnaire for children in 1-3 grades was adapted to measure food intent and knowledge.<sup>68</sup> Questions from Jackson (2004) were adapted to measure PA intent and knowledge behaviors.<sup>69</sup> Intervention outcomes were measured by comparing pre- and post-mean scores calculated for each scale. Most question items were depicted by clip-art to address student readability.<sup>70</sup>

The main focus of the intervention was balancing calorie intake with expenditure by addressing F/V intake and increased PA. Outcomes were measured through pre – and post- significant improvements in scores on the following scales:

- *Food Choice*. Intent to choose healthful food options was measured by response to four questions which asked students to circle which food they would pick when given a choice between a more healthful or less healthful choice.
- *Food Knowledge*. This was measured by response to four questions which asked students to identify from a pair which food was better for their body.
- *Physical Activity Choice*. Intent to choose moving activities was measured by response to four questions which asked students to circle which

activity they would pick when given a choice of a moving or sedentary activity.

- *Physical Activity Knowledge*. This was measured by response to four questions which asked students to identify from a pair which activity was better for their body.
- *Food Preference* Preference for consuming more healthful foods was measured by response to eight questions (four relating to fruits and four to vegetables) which asked students to circle which food they prefer when given a choice between a more healthful or less healthful choice and questions which asked whether they would like to consume more F/V.
- *Physical Activity Preference* Preference for being physically active was measured by response to five questions which asked students to circle which activity they prefer to do when given a choice between a physically active activity or a sedentary activity and a question which asked whether they would like to play outside more.

Surveys were matched by initials, birth day and month, and gender.

Because EA was a newly designed program, an important process outcome of the intervention was student response to the EA play and participation in take home activities. Response to the program and activities was measured by questions on the post-test surveys which asked students to identify whether they liked the play and completed activities like the nestwork, eagle recipes, and moving activities at home.

### **Statistical Analysis**

Data gathered from the study was entered into the Statistical Package for the Social Sciences (SPSS) 19.0 for Windows. Descriptive statistics were used to determine and compare both school's community characteristics, gender and

percentage of students enrolled within each grade, and students eligible for the school lunch program of free or reduced priced meals. Descriptive statistics were also used to determine student acceptance of the EA program and whether students engaged in the EA take-home components.

Internal consistency was determined using cronbach's alpha analysis. Cronbach's alpha computes the extent of how closely the scale items are intercorrelated, conveying reliability of the survey. Paired t-tests were used to determine mean differences in food choice, PA choice, food knowledge, PA knowledge, food preference, and PA preference scores pre-and post-intervention. The paired t-test compared the means of two variables and determined whether the mean differed from zero. Differences were considered significant when  $p \leq 0.05$  and approached significance when  $p \leq 0.10$  as identified by Perry, et al (2002).<sup>68</sup>

The McNemar test was used to examine outcomes related to desirability with respect to eating more F/V and playing outside more. The McNemar test was used to determine whether the proportion of students who desired to eat fruits, vegetables, and be active at pre-intervention was significantly different than the proportion of students who wanted to engage in these behaviors post-intervention.

## CHAPTER IV

### RESULTS

For this study, the targeted population was located within Pontotoc county in the state of Oklahoma. **Table 2** details Pontotoc's socioeconomic, U.S. census, and preparation, motivation, and parental support data. NAs comprise the second highest percentage of ethnicity enrolled within our participating schools, and twice the state average percentage.<sup>71</sup> Compared to the Oklahoma's average household income of over \$56,000, the districts of the participating schools were of higher poverty levels where the average household income was around \$43,000.<sup>71</sup> Although the percentage of single-parent families was slightly higher than the state's average, the parent's participation in parent/teacher conferences were above average.<sup>71</sup> It is also noteworthy that the percentage of students in grades 1-3 receiving reading remediation was much lower than the state average.

**Table 2. Pontotoc County Community Characteristics of School 1 and 2\***

	School 1	School 2	District 1	District 2	State Average
<b>Socioeconomic Data</b>					
<i>Ethnic Makeup Based upon Fall Enrollment:</i>					
Caucasian	57%	48%	55%	51%	56%
Black	3%	5%	2%	5%	11%
Asian	0%	1%	1%	1%	2%
Hispanic	1%	6%	1%	5%	11%
American Indian	39%	40%	40%	37%	19%
<i>Students Eligible for Free or Reduced Lunch</i>	87.3%	69.6%	83.7%	58.4%	59%
<b>U.S. Census Data (American Community Survey 2005-2009 5-Year Estimates)</b>					
District Population (Census 2010)			3,209	15,376	7,051
Poverty Rate			17%	29%	16%
Unemployment Rate			3%	7%	6%
Average Household Income			\$43,473	\$43,675	\$56, 492
Single-Parent Families			39%	47%	33%

**Table 2. Community Characteristics of School 1 and 2, continued.\***

	School 1	School 2	District 1	District 2	State Average
<b>U.S. Census Data (American Community Survey 2005-2009 5-Year Estimates)</b>					
<i>Highest Educational Level for Adults Aged 25+:</i>					
College Degree			16%	28%	22%
H.S. Diploma w/o College Degree			69%	55%	62%
Less than 12 <sup>th</sup> Grade Education			15%	17%	15%
<b>Preparation, Motivation &amp; Parental Support</b>					
1-3 <sup>rd</sup> graders receiving reading remediation	7.6%	20.1%	7.6%	26.7%	34%
Average number of days absent per student	9.3	11.0	9.2	9.1	10.2
Parents attending parent/teacher conferences	73.0%	85.0%	52.9%	61.5%	72%

\*2010 Oklahoma School Report Card. Education Oversight Board: Office of Accountability.<sup>71</sup>



Additional characteristics of participating schools are presented in **Table 3**. Of the 509 students eligible for free and reduced school meals, more students (67.9%) were eligible for free meals compared to reduced meals (9.77%). The percentage of students eligible for free or reduced school meals met the study's inclusion criteria where 50% or more students had to be eligible for free or reduced-priced meals.

**Table 3. Free and Reduced-Price Meal Eligibility for the 2010-2011 School Year**

School	Free Meals	% Free Meals	Reduced Meals	%Reduced Meals	Free & Reduced	Enrollment	% Low Income
1	176	76.86%	28	12.23%	204	229	89.08%
2	269	63.15%	36	8.45%	305	426	71.60%

2010-2011 Low-Income Report. Oklahoma State Department of Education: Child Nutrition Programs.<sup>72</sup>

Of the 501 students within grades 1 and 2 of participating schools, 370 completed usable pre- and post-surveys for statistical analysis as depicted in **Table 4**. The response rate was approximately 74%. **Table 5** shows the female/male participation was similar, with 51.4% of students being female and 48.6% male. The grades as well were similarly distributed, with grade 1 consisting of 48.9% of participants and grade 2, 51.1% of participation.

**Table 4. Pre- and Post-Survey Response Rate**

	Total number planned	Total number received	Number received that could not be matched with post- survey	Number eliminated due to item nonresponse <sup>a</sup>	Number of usable surveys	Usable response rate <sup>b</sup> %
<b>Pre- survey</b>	501	452	43	20	389	77.64%
		<b>Total number received</b>	<b>Number received that could not be matched with pre- survey</b>	<b>Number eliminated due to item nonresponse</b>	<b>Number of usable surveys<sup>c</sup></b>	<b>Usable response rate %</b>
<b>Post- survey</b>	501	453	44	19	390	77.84%
<b>Paired data set</b>	501	453	44	39	370	73.85%

<sup>a</sup> All pre-test surveys with any incomplete item responses necessary for outcome scale calculations.

<sup>b</sup> Corrected rate calculated after removing unusable surveys.

<sup>c</sup> Number of usable posttest surveys calculated as number of usable pre-test surveys minus number of posttest surveys that could not be matched with pre-test surveys minus the number of posttest surveys missing responses

**Table 5. Demographic Characteristics of the Final Analysis Group**

<b>Characteristic</b>	<b>Intervention (n = 370)</b>
Gender n (%)	
Female	190 (51.4%)
Male	180 (48.6%)
Grade n (%)	
1	181 (48.9%)
2	189 (51.1%)

**Table 6** reports the internal consistency of each outcome measure using Cronbach's alpha. The internal consistency of each outcome ranged from 0.55 (PA preference scale) to 0.85 (PA knowledge scale). The PA knowledge scale and food preference scale were not acceptable (Cronbach's alpha <0.60), and the other outcome measures were classified as acceptable (Cronbach's alpha ≥0.60).<sup>73</sup>

**Table 6. Outcome Measures**

<b>Impact</b>	<b>Measure/Indicator</b>	<b>Scale or Single Item Measure</b>	<b>Internal Consistency Cronbach's Alpha n=578<sup>a</sup></b>
Intent to choose fruits, vegetables, or water over less healthful options	Food Choice Scale	This scale is the sum of Q1, Q2, Q3, & Q4. The minimum score possible is 4 and maximum is 8. A low score indicates poorer quality choice while a higher score indicates better choices	.70
Knowledge related to health benefits of fruit, vegetables, and water	Food Knowledge Scale	This scale is the sum of Q9, Q10, Q11, & Q12. The minimum score possible is 4 and maximum score possible is 8. A low score indicates lower food knowledge while a higher score indicates good food knowledge.	.84
Intent to choose physical activities over sedentary activities	Physical Activity Choice Scale	This scale is the sum of Q5, Q6, Q7, & Q8. The minimum score possible is 4 and maximum score possible is 8. Lower scores indicate preference for more sedentary activities while higher scores indicate preference for moving activities.	.71
Knowledge related to health benefits of PA	Physical Activity Knowledge Scale	This scale is the sum of Q13, Q14, Q15, & Q16. The minimum score possible is 4 while the maximum score possible is 8. Lower scores indicate less knowledge of PA.	.85
Preference of physical activities over sedentary activities.	Physical Activity Preference Scale	This scale is the sum of Q23, Q24, Q25, Q26, & Q30. The lowest score possible is 5 and the highest score 10. Lower scores indicate preference for sedentary behaviors.	.55
Preference of choosing vegetables over less healthful options.	Vegetable Preference Scale	This scale is the sum of Q17, Q20, Q22, & Q29. The lowest possible score is 4 and the highest score 8. Lower scores indicate less preference towards vegetables.	.76
Preference of choosing fruits over less healthful options.	Fruit Preference Scale	This scale is the sum of Q18, Q19, Q21, & Q28. The lowest possible score is 4 and the highest score 8. Lower scores indicate less preference for fruits.	.57

<sup>a</sup>Calculated based on the number of completed pretest surveys received.

**Table 7** presents the results of the paired t-test. Caution must be observed when interpreting the results of the PAP and FPS score differences as the internal consistency for the items included in each of these scales were not acceptable. Neither FKS nor FPS scores resulted in a significant difference ( $<0.05$ ) as shown in **Table 6**. The most significant differences at post-intervention included both the students' intent to choose PA over sedentary behavior ( $p < 0.001$ ) based on the PAC scale and preference of being more PA versus sedentary ( $p < 0.001$ ). The remaining scales increased at post-intervention resulting in a significant difference as well, which included the PAK ( $p = 0.019$ ), VPS ( $p = 0.001$ ), and the FCS ( $p = 0.002$ ).

**Table 7. Differences Between Pre- and Post-Survey Scores (n=370)**

	Pre	Intervention			
		Post	Mean difference	<i>t</i>	<i>p</i>
<b>Food Choice Scale (FCS)</b>					
Mean (SE)	6.93 (0.07)	7.15 (0.06)	.22 (0.07)	3.14	0.002
<b>Food Knowledge Scale (FKS)</b>					
Mean (SE)	7.88 (0.03)	7.86 (0.03)	-.02 (0.02)	-0.65	0.513
<b>Fruit Preference Scale (FPS)</b>					
Mean (SE)	7.70 (0.04)	7.73 (0.04)	.03 (0.03)	0.97	0.333
<b>Vegetable Preference Scale (VPS)</b>					
Mean (SE)	6.35 (0.08)	6.56 (0.07)	.21 (0.06)	3.33	0.001
<b>Physical Activity Choice Scale (PAC)</b>					
Mean (SE)	6.52 (0.07)	7.11 (0.06)	.59 (0.07)	8.21	<0.001
<b>Physical Activity Knowledge Scale (PAK)</b>					
Mean (SE)	7.72 (0.04)	7.81 (0.04)	.09 (0.04)	2.36	0.019
<b>Physical Activity Preference Scale (PAP)</b>					
Mean (SE)	8.95 (0.06)	9.21 (0.06)	.26 (0.06)	4.03	<0.001

FCS scores could range from 4-8; FKS scores could range from 4-8; FPS scores could range from 4-8; VPS scores could range from 4-8; PAC scores could range from 4-8; PAK scores could range from 4-8; PAP scores could range from 5-10.

The McNemar test was conducted post hoc to examine outcomes related to the effectiveness of the EA on desirability with respect to eating more fruits, vegetables, and playing outside more as displayed in **Table 8**. The percentage of students who desired to engage in eating more vegetables and playing outside was significantly higher at post intervention ( $p < 0.05$ ).

**Table 8. Comparison of Student Desire to Engage in More Healthful Behaviors (N = 370).**

	Pre		Post		p-value <sup>a</sup>
	Number	%	Number	%	
Do you want to eat more fruits?	94.3%		96.2%		0.189
Do you want to eat more vegetables?	70.0%		75.4%		0.029
Do you want to play outside more?	88.1%		93.8%		0.006

<sup>a</sup>McNemar's test.

Descriptive statistics were used to determine both the students' acceptance of the EA program and their engagement level of the EA take-home components with the results displayed in **Table 9**. Over 90% of the students attended the EA play which initiated the program. Over 95% of those students indicated they liked the play. Over half the students continued the EA into their home environment by specifying they completed the Nestwork (66.1%), read the Eagle books (78.3%), and did the Eagle song and dance (62.1%). The students also indicated they participated in healthful behaviors at home including asking their care provider to buy more FVs (64.5%), trying the Eagle recipes (51.4%), and playing an Eagle game (69.3%). Lastly, **Table 9** indicates most of the students were able to correctly classify which food was a sometimes snack (94.8%) and which food was an everyday snack (95.9%).

**Table 9. Student Acceptance of the Play, Participation in Take-home Activities and Comprehension of Everyday and Sometimes Food Concepts (n = 370)**

	<b>Yes n (%)</b>	<b>No n (%)</b>
Did you see the Eagle Play?	336 (90.8%)	34 (9.2%)
Did you like the Eagle Play? <sup>a</sup>	324 (95.6%)	15 (4.4%)
At home, did you or anyone in the family read the Eagle Books?	288 (78.3%)	80 (21.7%)
At home, did you ask a parent or adult to buy more fruits and vegetables?	238 (64.5%)	131 (35.5%)
At home, did you do the Eagle song and dance?	229 (62.1%)	140 (37.9%)
At home, did you make an Eagle recipe?	190 (51.4%)	180 (48.6%)
At home, did you play an Eagle Game?	255 (69.3%)	113 (30.7%)
At home, did you do the Nestwork?	242 (66.1%)	124 (33.9%)
	<b>Chips</b>	<b>Apple</b>
Which food is a sometimes snack?	348 (94.8%)	19 (5.2%)
	<b>Cookie</b>	<b>Carrot</b>
Which food is an everyday snack?	352 (95.9%)	15 (4.1%)

<sup>a</sup> Percents based on the number of students who saw the Eagle Play.

## CHAPTER V

### Conclusion

#### **Summary**

The goal of EA was to prevent type 2 diabetes among grade school children by helping them develop a desire to eat more F/V and be more physically active. Because this program was relatively new, it was also important to measure students' acceptance and utilization of EA program materials. The EA program used the SEM and SCT to guide and support EA for better outcomes related to food and PA knowledge, choices, and preferences

Though several programs have been created with similar goals as EA, only two PPPs have published outcomes: the Pathways study and KSDPP. Both studies showed significant behavioral improvements associated with decreasing the risk of type 2 diabetes. Pathways had a significant increase in knowledge of healthful diets and PA, intent to choose more healthful foods, and self-reported PA. KSDPP resulted in a significant increase in PA. These studies have demonstrated PPPs can have significant impact on health behaviors.

By study design, the sample of participant schools met the EA's inclusion criteria of  $\geq 50\%$  of students eligible to receive free or reduced priced lunches and the proportion of NA students enrolled were greater than Oklahoma's state average of 19%.



## **Hypotheses**

The main research question of whether or not children in grades 1-2 change nutrition and PA behaviors following participation in the EA program was answered by the following hypotheses.

### **Hypothesis 1**

HO1: There will be no significant difference in mean pre and post scores for intent to choose F/V.

Results indicated there was a statistically significant difference between the students' pre and post survey scores for intent to choose F/V ( $p=0.002$ ). Therefore, the researchers reject Null hypothesis 1.

### **Hypothesis 2**

HO: There will be no significant difference in mean pre and post scores for preference to choose fruits.

Results indicated there was not a statistically significant difference between the students' pre and post survey scores for preference to choose fruits ( $p=0.333$ ). Therefore, the researchers failed to reject Null hypothesis 2. However, caution must be observed when interpreting these results as the internal consistency for the items included in the scale was not acceptable (0.57).

### **Hypothesis 3**

HO: There will be no significant difference in mean pre and post scores for preference to choose vegetables

Results indicated there was a statistically significant difference between the students' pre and post survey scores for preference to choose vegetables ( $p=0.001$ ). Therefore, the researchers reject Null hypothesis 3.

### **Hypothesis 4**

HO: There will be no significant difference in mean pre and post scores for knowledge of healthful snacks and beverages.

Results indicated there was not a statistically significant difference between the students' pre and post survey scores for knowledge related to healthful food and beverage choices ( $p=0.513$ ). Therefore, the researchers failed to reject Null hypothesis 4.

#### Hypothesis 5

HO: There will be no significant difference in mean pre and post scores for intent to choose PA.

Results indicated there was a statistically significant difference between the students' pre and post survey scores for intent to choose PA ( $p<0.001$ ). Therefore, the researchers reject Null hypothesis 5.

#### Hypothesis 6

HO: There will be no significant difference in mean pre and post scores for knowledge of PA choices.

Results indicated there was a statistically significant difference between the students' pre and post survey scores for knowledge related to healthful PA choices ( $p=0.019$ ). Therefore, the researchers reject Null hypothesis 6.

#### Hypothesis 7

HO: There will be no significant difference in mean pre and post scores for preference to be PA.

Results indicated there was a statistically significant difference between the students' pre and post survey scores for preference to be PA ( $p<0.001$ ). Therefore, the researchers reject Null hypothesis 7. However, caution must be observed when interpreting these results as the internal consistency for the items included in the scale was not acceptable (0.55).

## **Conclusion**

In recent years, diabetes has become significantly more prevalent in NA youth.<sup>3,4</sup> Diabetes-related health complications multiply and become more severe the younger one is at the onset of diabetes, which has raised much concern for NAs' future health. In order to address this health disparity, EA was developed to prevent type 2 diabetes through behavioral modifications. The goal of EA was to prevent type 2 diabetes among grade school children by helping them develop a desire to eat more F/V and be more PA. The EA program resulted in statistically significant positive changes.

The main research question of whether children in grades 1-2 would change nutrition and PA behaviors following participation in the EA program was explored through examination of changes in intent to choose F/V over less healthful choices, intent to be more physically active over doing sedentary activities, preference of choosing more vegetables and PAs, and having increased knowledge of PA choices as seen in **Table 7**.

Our findings correspond with the Pathways' results of their knowledge, attitudes, and behaviors questionnaire assessment. Pathways significantly affected the children's knowledge and intentions related to diet and PA.<sup>56,74</sup> Another program with the objective to increase PA and improve children's diets, the Child and Adolescent Trial for Cardiovascular Health (CATCH), used a questionnaire to measure diet and physical activity-related behaviors and choices. This study focused on multiple ethnic groups of children grades 3-5 similar to EAs sample population, CATCH's program also resulted in significant improvements of students' dietary intentions, food choices, and food knowledge.<sup>75</sup>

Unlike Pathways, which resulted in a statistically significant positive change in food knowledge, EA had no significant effect in regards to students' knowledge related to healthful food and beverage choices and preference to choose more fruits.<sup>74</sup> However, it is important to highlight students at pre-survey were more likely to report healthful preferences related to fruit behaviors (94.3%) than vegetable behaviors (70.0%) as seen in **Table 8**. This high preference for fruit left little room for behavioral improvements associated with fruit consumption. Pre-survey results were also high (7.88) for the food knowledge scores, which also left little room for improvement as the maximum score for the scale was 8 (**Table 7**).

Because the program was relatively new, additional objectives were set forth to address the EA program implementation process. The aim was to determine student acceptance and utilization of EA program materials by means of a post-survey. Over 50% of the students participated in the take-home activities, which included recipes, nestwork and Eagle games. The highest take-home component students' utilized were the Eagle books. Over 90% of the students attended the Eagle play with over 95% liking the play. Overall, EA was indicated as acceptable to the students with many of the materials given to the students to take home being utilized.

### **Implications**

The EA program successfully altered most of the targeted nutrition and PA behaviors, which indicates students learned basic concepts and practical application of healthful eating and PA. At this time, there are few diabetes PPP available that are culturally relevant to NA youth. Most curriculum materials children learn from are developed from a dominant cultural perspective. When education is presented from a multi-cultural perspective, students are able to

connect with lessons and it also helps develop multi-cultural cohesion in everyday social experiences. EA helps fill the void of available diabetes PPP, and utilizes culturally relevant curriculum with the inclusion of the Eagle books developed and recommended by the CDC.

Unlike other available programs, EA was developed to include only four lessons. With the understanding that behaviors are learned and adopted based on multiple levels of influence, EA used the SEM and integrated the SCT to provide a better focus for the messages given in each lesson. In addition, each lesson sequentially builds from the previous lesson. This gives a holistic understanding and approach of incorporating targeted behaviors into lifestyles, which is relevant to NA's preferred method of learning.

Lastly, EA was unique in that it addressed the barriers of access, availability, and affordability for being physically active and having a healthful diet. In each take-home folder, students were given practical PA suggestions they could do at home. The activities required no equipment except for those which required a flying disc, which was provided to the students. EA also provided practical snack recipes using 5 ingredients or less, which were affordable and commonly found in stores, and took 5 minutes or less to prepare. These take-home activities and recipes also encouraged family members to participate in EA. Family participation can help develop home environments that are supportive of key health concepts. This program would provide an operative diabetes primary prevention intervention model and strategy and would be effective when expanded to other Native communities as EA is tailored towards Native American youth populations.

### **Future Research**

The EA program had limitations. Due to restriction of time, cost, and low prevalence of NA in some areas, this study utilized purposive sampling. This technique limits the ability to generalize the sample's results to the population, causing the results to be less reliable and causal inferences more difficult. Another limitation of this study was using children as the sample. Social desirability response bias and readability can be issues with children when completing surveys. To attend to these issues, survey administrators were trained appropriately. The questions were represented through both pictures and text and the survey administrator also read aloud the questions to students. Lastly, the students' dietary intake pre- and post-intervention were not measured due to restriction of time, cost, and low reporting reliability of our samples age group.

Due to the aforementioned limitations of measuring students' dietary intake, future programs recommendations are to consider using parent-reporting methods to analyze the relationship between actual behaviors post intervention and impact on knowledge, intent, and preferences related to PA and diet. This comes with limitations as well, though. Because our sample population was of lower socioeconomic status, over half the children are available for free or reduced-priced meals. Therefore, since the children would be eating lunch and possibly breakfast at school, parents will only observe what their children eat for dinner most days out of the week. Also, dietary recalls are subject to under- or over-reporting which may alter results and conclusions.

Plate-waste observation is also recommended during school meal times for shorter-term studies. Plate-waste observations could give more accurate results of the students' dietary intake, especially if combined with parent-reporting methods. Food production records, which look at how much food was

prepared for service and how much was left, can also be compared to plate-waste observations as a reliability measure. This study did not use plate-waste analysis as EA was a long-term and we strived to create a program that could be easily replicated by SNAP-Ed programs and organizations which choose to implement the program. Finally, since the EA is still fairly new, further integration of the program into the interpersonal level of influence is recommended. For example, characters from the play would be present during school drop-off and pick-up times. This social influence will engage parents in EA, which may result in a supportive home environment for children to adopt more healthful behaviors.

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## APPENDICES

## Appendix A

### Oklahoma State University Institutional Review Board

Date: Wednesday, June 01, 2011 Protocol Expires: 9/19/2011  
IRB Application No: HE0952  
Proposal Title: Eagle Adventure School Based Nutrition and Health Program

Reviewed and Exempt  
Processed as: **Modification**

Status Recommended by Reviewer(s) **Approved**

Principal  
Investigator(s):

Stephany Parker  
301 HES  
Stillwater, OK 74078

Angelina Stovall  
1200 N. Perkins Rd, Apt V7  
Stillwater, OK 74075

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The requested modification to this IRB protocol has been approved. Please note that the original expiration date of the protocol has not changed. The IRB office **MUST** be notified in writing when a project is complete. All approved projects are subject to monitoring by the IRB.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

The reviewer(s) had these comments:

The modification request to include the Otoe-Missouri tribe data as part of the data analysis and storage for the program is approved. A. Stovall added as a co-PI.

Signature :








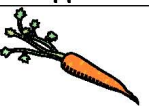


Shelia Kennison, Chair, Institutional Review Board

Wednesday, June 01, 2011  
Date









## Appendix B

Post

### Part 1: Which one would you pick?

1.	 Water	Or	 Soda
2.	 Chips	Or	 Apple
3.	 Cookie	Or	 Carrot
4.	 Banana	Or	 Candy Bar








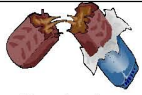








### Part 2: Which would you do?

5.	 Play video games	Or	 Play Frisbee
6.	 Play outside	Or	 Watch TV
7.	 Go on a walk	Or	 Play on the computer
8.	 Jump rope	Or	 Play video games







1








**Part 3. Which one is better for your body?**

9.	 Water	Or	 Soda
10.	 Chips	Or	 Apple
11.	 Cookie	Or	 Carrot
12.	 Banana	Or	 Candy Bar
13.	 Playing video games	Or	 Playing Frisbee
14.	 Playing outside	Or	 Watching TV
15.	 Walking	Or	 Playing on the computer
16.	 Jumping rope	Or	 Playing video games




**Part 4: Do you want to eat this food?**

17.	 Carrot	Yes	Or	No
18.	 Apple	Yes	Or	No
19.	 Grapes	Yes	Or	No
20.	 Broccoli	Yes	Or	No
21.	 Banana	Yes	Or	No
22.	 Celery	Yes	Or	No


**Part 5: Do you want to do this activity?**

23.	 Dance	Yes	Or	No
24.	 Play outside	Yes	Or	No
25.	 Play Frisbee	Yes	Or	No
26.	 Go on a walk	Yes	Or	No
27.	 Jump rope	Yes	Or	No

**Part 6: Do you want to...**

28.  eat more fruits?	Yes	Or	No
29.  eat more vegetables?	Yes	Or	No
30.  play outside more?	Yes	Or	No

**Part 7: This part is about the Eagle Adventure Program.**

31. Did you see the Eagle play at school?	Yes	Or	No
32. Did you like the Eagle play?	Yes	Or	No
33. At home, did you or anyone in the family read the Eagle Books?	Yes	Or	No
34. At home, did you ask a parent or adult to buy more fruits and vegetables?	Yes	Or	No
35. At home, did you do the Eagle song and dance?	Yes	Or	No
36. At home, did you make an Eagle recipe?	Yes	Or	No
37. At home, did you play an Eagle Game?	Yes	Or	No
38. At home, did you do the Nestwork?	Yes	Or	No
39. Which food is a <b>sometimes</b> snack?		Or	 Apple
40. Which food is an <b>everyday</b> snack?	 Cookie	Or	 Carrot

**Part 8: Tell me more about you.**

41. My first name starts with a: \_\_\_\_\_

42. My last name starts with a: \_\_\_\_\_

43. I was born in this month. Please circle:

January	February	March	April
May	June	July	August
September	October	November	December

44. I was born this day: \_\_\_\_\_ put in the number

45. I am a:



**Boy**

Or



**Girl**

VITA

Angelina Stovall

Candidate for the Degree of

Master of Science

Thesis: OUTCOMES EVALUATION OF THE EAGLE ADVENTURE PROGRAM

Major Field: Nutritional Sciences

Biographical:

Education: Accepted into the dietetic internship at Oklahoma State University August 2010, with requirements to be completed; completed the requirements for the Master of Science with a major in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in May 2011; received Bachelor of Science Degree in Dietetics from the University of Nebraska, Lincoln, Nebraska in May 2010.

Experience: Employed by Oklahoma State University, Nutritional Sciences Department and Chickasaw Nation as a research assistant, November 2010-May 2012.

Professional Memberships: Academy of Nutrition and Dietetics

Name: Angelinagrayce Tamera Stovall

Date of Degree: May, 2012

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: OUTCOMES EVALUATION OF THE EAGLE ADVENTURE PROGRAM

Pages in Study: 70

Candidate for the Degree of Master of Science

Major Field: Nutritional Sciences

Scope and Method of Study: There is an increasing prevalence of Native American children diagnosed with type 2 diabetes, a chronic condition that is usually adult-onset. Get Fresh! Eagle Adventure program is a theoretically-based, diabetes primary prevention program that is culturally appropriate for Native American children in grades 1-3. Students were introduced to the program through a live production of the Eagle Adventure play, which was followed by four in-class lessons on health and nutrition. The primary objective of the program is to increase students' knowledge, intent, and preference related to choosing fruits, vegetables, and being more physically active. A pre- and post-survey was administered by trained staff. The outcomes of the program were measured by conducting paired t-tests using IBM SPSS Statistics 19.

Findings and Conclusions: The program resulted in a statistically significant increase in the children's (n=370) intent to choose physical activities over sedentary activities (pre=6.52, post=7.11;  $p<0.001$ ), knowledge of physical activities (pre=7.72, post=7.81;  $p=0.019$ ), preference of consuming vegetables (pre=6.35, post=6.56;  $p=0.001$ ), and preference of being physically active (pre=8.95, post=9.21;  $p<0.001$ ).

The Eagle Adventure program is an innovative program designed to be culturally relevant for schools in Oklahoma with a high proportion of Native American students. Further, the program was effective in meeting most of the intended outcomes and has the potential to positively impact the health of students. Therefore, we recommend the Eagle Adventure program reach a broader audience by expanding to additional schools that have a high proportion of enrolled Native American students. Additional research is recommended to determine whether the program had an effect on fruit and vegetable intake of family members.

ADVISER'S APPROVAL: Dr. Stephany Parker

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