2007

The ENERGY club: A diabetes prevention project for Monterey Elementary School

Peggy Ann Scoggin

THE ENERGY CLUB: A DIABETES PREVENTION PROJECT FOR MONTEREY ELEMENTARY SCHOOL

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

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in

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ABSTRACT

The incidence of type 2 diabetes (T2DM) in children has increased 30 - 50% over the last decade while risk factors have not been sufficiently addressed (NDEP, 2006). Research indicates that the adverse effects of being overweight, a primary risk factor of T2DM in children, can be addressed by reducing caloric intake of unhealthy foods and increasing energy output through increased play (Kirk, Scott, & Daniels, 2005).

The Monterey Community Diabetes Project was a two-year program, called the ENERGY Club, designed for schools to teach children to eat healthier foods and play more. Seventy-nine low income, Hispanic, fourth and fifth graders at risk for diabetes participated in the ENERGY Club. Play equipment provided an incentive. Students responded positively to the classes, which used a variety of visual, auditory, kinesthetic and tactile (VAKT) teaching methods. Eighty-eight of students participating were able to list five out of seven desired behavioral changes. Students consistently reported practicing the behaviors taught in class via self-report on returned homework sheets.

School based programs, such as the ENERGY Club, can successfully address student's learning needs to reduce

the risk of T2DM. Future program plans and an instructional manual are under development.

ACKNOWLEDGMENTS

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Last but not least, I appreciate all the support from the members of my family (and that includes two canine buddies, Wally and Asher) during the past three years.

DEDICATION

To the fourth and fifth graders at

Monterey Elementary School

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CHAPTER ONE

INTRODUCTION

Purpose of the Project

The Monterey School Diabetes Prevention Project's (MSDPP) ENERGY CLUB is a pilot project for a school-based health prevention curriculum targeting students with risk factors for diabetes. ENERGY is an acronym for Exercise 'N Eating Right is Good for You.

Children have incurred inescapable health risks stemming from the increase in obesity, one of them being increased risk of type 2 diabetes (NIH, 2002). An alert sent out from the Diabetes Coalition of California (DCC) and the California Diabetes Program (CDP) cautions that children are at risk for diabetes if they have:

- a family history of diabetes,
- are of certain ethnicities, one being Hispanic,
- have a Body Mass Index (BMI) equal to or greater than 85%,
- and have signs of insulin resistance such as acanthosis nigricans (DCC, CDP, 2005-06).

There are an estimated 1,468,100 people with diabetes in California, 82,200 of whom are in San Bernardino County (Center for Health Statistics, 2004). These Californians

with diabetes give one risk factor to their children, two risk factors if they are Hispanic. Any of their six to eleven year old children who are overweight (and there are 23.7% of Hispanic children in California in this cohort) have three risks (NHANES, 2002). The children with the high insulin marker of acanthosis nigricans accrue four. Monterey Elementary School in San Bernardino, California screened for risks of diabetes and identified 103 fourth and fifth grade students with at least two risk factors (Larenco, personal communication, September 2006).

MSDPP ENERGY Club was significant in its demonstration of a transferable, affordable curriculum model for elementary schools needing preventive education in behavioral changes for the students at risk for diabetes.

Background Information

The catalyst for the program idea at this particular school came from a group of Latino mothers who were concerned about their weight status and risk of diabetes as well as those same risks in their children at Monterey School. What began as a short presentation on diabetes evolved into a community assessment that brought forth rich data via group interaction, questionnaires, health

screening, windshield surveys, literature searches, interviews with community partners and internet data collection. The community cohesion among the Latinas, effective community partnerships with school personnel and Public Health officials, city funding, and in-kind resources available to screen the student body for risk of diabetes came together to provide the setting for an intervention program.

Author's Expertise

Twenty years of clinical practice in the specialty of diabetes afforded observation of the alarming rise in type 2 diabetes in youth. In the author's current site of clinical practice, 20% of the new onset children with diabetes are type 2 (H. Speer, personal communication, March 2007). The National Diabetes Education program reports that five per cent of children diagnosed with diabetes before 1994 had type 2 diabetes. In the following years it has risen to 30-50% (NDEP, 2006). The author's dual interest of investigating ways to screen youth for risk of diabetes prior to getting the diagnosis and developing educational interventions to proactively prevent the diagnosis goes back many years.

Earlier Research

In 2000, the author, as a co-investigator, researched whether youth identified at risk for type 2 diabetes by ADA criterion, showed the same metabolic abnormalities of insulin resistance as compared to youth not at risk. The quasi-experimental study determined whether a non-invasive screen alone could be used in schools to detect students who were at risk. The sample population of 277 students with parental consent were screened for risk of diabetes by non-invasive means. One hundred and nineteen were identified as at risk. The clinical arm of the study consisted of asking the 277 students to participate in lab testing for metabolic abnormalities. The results of the study clearly indicated that the non invasive screen used was highly predictive of the metabolic abnormalities associated with the risk of developing type 2 diabetes in youth (Clark, personal communication, March 2007) The American Diabetes Association (ADA) annual clinical updates now include criteria for screening youth to identify risk for type 2 diabetes (ADA Position Statement, 2007).

The at risk youth were invited to participate in an after school educational intervention teaching behavioral changes that decrease risk of diabetes. Of the 119

students who were eligible for the program, only 20 percent attended. The response of the students in middle school was less than enthusiastic, but it was the beginning of this researcher's motivation to identify children earlier and to create innovative ways to educate them on how to decrease their risk of developing early diabetes.

Five years of developing curriculum for family based weight programs for children at risk of diabetes increased the knowledge base and set the stage for the development of the current project in a school based setting. The opportunity to adapt the curriculum for Monterey Elementary School came in the fall of 2005.

Scope of the Project

A community assessment of the Monterey School neighborhood was conducted prior to the start of the project.

Community Assessment of the Monterey School Neighborhood

According to Ervin (2002), the community assessment process helps define and describe the specific population of interest and choose an applicable framework or model for guidance. Based on Bronfenbrenner's Ecological Systems Theory (EST) (Pacquette & Ryan, 2001), an Ecological Model

of Childhood Obesity as defined by Davison and Birch (2001) was adapted to include risk of diabetes and provided the framework for the community assessment. According to Davison & Birch (2001), ETS considers the child's "...ecological niche," which includes the child's family, school, community and larger surrounding society in order to understand certain behaviors (p. 159).

Methodology. Collection, analysis and synthesis of community data provides information to make accurate community diagnoses, from which interventions are designed (Erwin, 2002). Quantitative and qualitative data were collected. The researcher jogged throughout the Monterey Elementary School boundaries, stopping in stores, talking to people and learning about the environment of the neighborhood. Windshield surveys helped clock distances to local parks and places for exercise. Internet sources, textbooks and journal articles helped with the formulating of the assessment. Interviews and meetings with key informants at San Bernardino Public Health as well as meetings with the school principal and key teachers provided qualitative data.

Norwood (2003) defines community as "...complex and interdependent webs of people who share space and time, a history, a language, interests, a sense of purpose, a

sense of responsibility and patterns of interaction and communication" (p. 20). Community as a focus of practice, according to Ervin (2002) also contains the component of geographic boundaries, such as school campus and neighborhood boundaries as in this case (p. 49).

Monterey Elementary School displays the following exemplars of Norwood's (2003) definition.

- Before the bell rings for the beginning of school at Monterey Elementary there are groups of happy children and mothers with small babies and preschoolers in tow. Mothers seem to know each other well and there is evidence of camaraderie (space and time, along with history).
- The women speak to one another and their children in Spanish and the children chatter away using both English and Spanish (a language).
- Mothers are gathered together working on projects such as cutting out English word charts for their child's teacher as they discuss issues of the school (a sense of purpose, responsibility).

- This community appears friendly, cohesive and energetic (patterns of interaction and communication) (Norwood, 2003, p. 20).

Boundaries of the Monterey School Community. Monterey Elementary School is in the southeast section of San Bernardino, California in the First Ward of the city. Most of the surrounding neighborhood lies south of 5th Street, bordered by Waterman Avenue on the east and Alabama Street on the West. The residential area is characterized by older, closely spaced houses, lots of dogs in fenced yards, old cars and very few sidewalks. One mother interviewed reported that in some areas, troubled by gangs and "street racing," neighbors banned together to call police to get their safety issues addressed. There are a few small stores that sell convenience food and supplies, candy, chips, soda, and a few vegetables. The nearest Latino market is approximately one mile away. A park and playing field is located next to the school and Secombe Lake Park is a one-mile walk from the school. About two miles west of the school is the downtown section of San Bernardino and within five miles to the south is the expanding development of Hospitality East. The boundaries of the school encompass underdeveloped poverty and blight, with houses grouped together in close proximity (Google,

2005). After a jog around the area, it can be best described as a neighborhood pocket of poverty surrounded by blight, commercial development and urban sprawl.

Demographics of the Monterey School Community. The School Accountability Report Card (SARC) of 2005-2006 reported that Monterey Elementary has 852 students, 70.4% (or 599) of whom are Latino. The school has a 97.3% poverty level (The Education Trust-West, 2005). It is interesting to note that at a Site Council meeting of parents and faculty, the principal stated that less than 3% of the students were not eligible for free lunch; therefore, all the students would be given the free lunch so as not to discriminate against the 3% of students who were not in the poverty level (School Site Council meeting, 12/2005). According to the 2004 Census Bureau, students and their families predominantly live in Census Tract 65 which is 54.2% Hispanic, 6.7% higher than the 47.5% Latino population of the city of San Bernardino. Likewise, county, state and national statistics for the percentage of Latinos show that the community has a disproportionate percentage of Latinos comparatively. In San Bernardino County there are 44% Latino, 32.4% in California and 14.2% nationwide (U.S. Census Bureau, 2004).

The majority of the households are families (74.4%) although almost 20% are female households with children under 18. Most of the families rent their homes (68.3%) (U.S. Census Bureau, 2000). Information from First American Title Company (FATC, 2005) indicates that the houses in the Monterey School boundaries were built anywhere from 1918-1995, with the majority being built in the 1940s. Most of the houses are less than 1000 square feet.

School Performance. California Standards Tests (CST) show how well the students meet or exceed state standards. The school CST scores show that the students are struggling academically. Only 15% meet the English-Language Arts requirement and the Math (20%) and Science (5%) percentages are low also (SARC, 2005-2006). Only 19.9% of the fifth grade students passed the aerobic capacity standards of the California Fitness Test and 6.6% met all the fitness levels (California Physical Fitness Test Results, 2005-06).

Health Awareness. Latinas of the Monterey School Community have a history of initiating policy development for healthy food choices, according to Silberstein (2005) of the San Bernardino County Department of Public Health Nutrition Program. Several years ago a group of women were

involved in nutrition and gardening classes and were instrumental in halting the sale of candy for fund raisers, getting a salad bar in the lunch room for their children and holding the principal accountable for following through on the policies adopted. A Latina Public Health Nutritionist was key in motivating the women. However, when she left the department, enthusiasm fell and the community gardening drifted away. Although the women still gather together, they lack direction. Currently they meet every week and have a health based program on various topics of their choosing. They are guided by a Public Health employee (Silverstein, personal communication, November 2005).

Three Community Diagnoses. First, there is a community energy deficit among the Latino families due to lack of financial resources resulting in:

- A low median income
- A 97% poverty level in the student body
- A high percentage of families who do not own their own home
- A high percentage of families who rent very old homes on small lots

Second, there is potential for increased incidence of type 2 diabetes among the students related to:

- The high percentage of students screened at risk for diabetes
- The high percentage of Latinos attending the school
- The low performance on the California fitness Test

Lastly, the strength of the involvement of the school with the partners who interface with the children is related to:

- School personnel expressing interest in the health and well being of students by screening the student body for risk of diabetes
- Availability of school administration, Public Health professionals, California State University of San Bernardino (CSUSB) students and fiscal agents to discuss plans for interventions as demonstrated in:
  - The principal offering the space and class time needed to hold the classes for the children
  - San Bernardino Department of Public Health providing PH professionals for mentoring and advice

- The school being willing to support seeking a grant to fund the project, and (d) CSUSB providing student support.

In summary, the Monterey community data collection was followed by analysis and synthesis resulting in three specific community diagnoses. The intervention was designed using the framework of the diagnoses.

The Intervention Program

In August of 2006, the school conducted school wide screening for risk of diabetes. The at risk fourth and fifth graders with parental permission were the recipients of the pilot educational instruction. Parents of all at risk students were invited to attend as well.

Format Overview. Monterey Elementary School is a year round school with four tracks, named A, B, C, and D. Each track has one fourth and fifth grade class in session during the three month "on track" period. The participating at risk fourth and fifth grade students of each track were grouped together to form the ENERGY Club classes. Two of the tracks went through the ENERGY Club twice and the remaining tracks will go through the again in May and June of 2007. The educational sessions were conducted on four consecutive Tuesdays during the last 45 minutes of the school day, at which time the students were

excused to attend The ENERGY Club, an acronym which stands for Exercise 'N Eating Right 'R Good for You. The Multiuse (MU) room of the school was reserved for the sessions, which provided ample space for the 12-33 students who attended each session.

Teaching Strategies. The content of the curriculum introduced new concepts to the students who were predominantly Hispanic. Due to the short period of time for the classes a visual, auditory, kinesthetic, tactile (VAKT) model, was used in setting up the lessons (Hadfield, 2006). Visual art, taste testing, hand/body movements to represent behaviors, repetitive drilling associated with group participation, guessing games, measuring, rhythm and rhyming along with dancing are incorporated into the strategy. In 1988 Epstein developed the Stoplight Diet in his research on weight management for children (Epstein & Squires, 1988). The National Heart Lung and Blood Institute (2007) has initiated a campaign that categorizes food into Go, Slow and Whoa foods in terms of their health value. This categorization was used and adapted for teaching food groups to the students in the ENERGY Club, helping to simplify eating healthy foods (NHLBI, 2007). A fun, rewarding environment was created to

encourage consistent participation and freedom of expression of changes they tried at home.

Content Overview. The educational content covered age appropriate explanation of the pathophysiology of how diabetes develops in at risk individuals as well as what the risk factors are and what they mean to a person who has them. A visual art demonstration was used to show the effects of increased glucose in the blood stream with the increased insulin response from the pancreas. There was open discussion and time for questions about risk factors and how to decrease them.

Seven life style behavioral changes were emphasized and encouraged. They were as follows:

- Just say, "No" to sugar drinks
- Eat slower
- Eat more "Go" foods (vegetables and lean protein)
- Eat less (age appropriate portions) "Slow" foods (carbohydrates like breads, starchy vegetables, fruits)
- Eat small, small amounts of "Whoa" foods ("junk foods," high fat food, candy)
- No more than 2 hours of TV a day
- Play or exercise for at least one hour each day

The behavioral changes were broken down in increments over the course of the sessions with opportunities to practice and report on the new habits they attempted during the week that followed the class. Homework was given that helped track progress. The participants were actively involved in the learning process, including trying healthy snacks during class. Each class involved an action component that encouraged movement and play activities easily replicated at home. Students left the class with some type of play equipment to encourage increased physical activity at home during the week between the classes. The final class included a test that determined if they could remember the seven behavioral changes to prevent diabetes. The goal was that the students could write out five of the seven behavior changes that will decrease their risk of diabetes.

Significance of the Project

There have been many efforts to address the increasing threat of diabetes in youth. The National Diabetes Education Program (NDEP) reports that the increase in diabetes in children has sparked research to investigate ways to lower the risk of diabetes in high risk children. They offer, among other tools, a Tip Sheet

for Kids for information (NDEP, 2006). There have also been school-based intervention studies involving invasive tests and targeting certain ethnicities such as Native Americans (Macauley et al., 1997) and Latino middle schoolers (Rosenbaum et al., 2007). School based programs have been applauded as an obvious approach as students spend a good portion of there time in school (Zeitler, 2007). In 2004, The Keck Diabetes Prevention Initiative at Children's Hospital Los Angeles (CHLA) began an eight year project to identify and address the issues of obesity and related diabetes in the Los Angeles area (CHLA, 2007). In California, Governor Swartzenager has promoted efforts to screen children for risk of diabetes and has signed bills to improve nutritional standards and physical activity standards in the state (Governor's Summit Report, 2005; Center for Weight and Health ()).

All of the efforts are needed, but require grant funding to carry out the interventions. Not all schools can be the recipients of large grant funded programs. As of yet there is no state funding for local schools in San Bernardino to provide education for children at risk for diabetes, even though school nurses are individually screening students (Jones, personal communication, September 2006).

The Monterey Elementary Diabetes Prevention Project's significance lies in the fact that it offers a solution to those schools able to screen children for diabetes, but cannot afford the time or funding needed to provide follow-up interventions. It addresses the problem of how to offer evidence-based preventative education to children at risk for diabetes, offer the education in the school setting, during school hours, and fund the project with grants from the city. The incorporation of innovative ways to teach the concepts in a short period of time and the offering of incentives in the way of play equipment for these underprivileged children addresses a health issue for the school without the expense of buying expensive health curriculum or adding to the workload of existing teaching staff. Its significance also lies in the fact that it represents a grassroots collaborative effort between the schools, the city government and the Graduate Nursing Department of CSUSB which could set the stage for more collaborative ventures in the future. The curriculum is adaptable for the teachers of the school to incorporate into their own instruction of the students.

Program Design and Behavioral Objectives

The program content is designed to be informational and persuasive. Based on a framework by Burtney, Plaut,

Courtney and Chin (2002), the program incorporates the Ecological Model, Social Learning Theory, Theory of Planned Behavior and the Health Belief Model. See Appendix B for Framework. By engaging the students in hands-on, active learning techniques that stimulate all senses, the students will be educated in healthy behaviors that will be easy to remember. Seven behavioral changes will be introduced that will increase the knowledge base of what actions will decrease the risk of diabetes. They are: eliminate sugar based beverages from daily caloric intake; eat meals slower, taking at least 20 minutes to eat on most occasions; increase daily consumption of non-starchy vegetables and lean protein in meals and snacks; decrease excess portions of carbohydrates such as breads, starchy vegetables, fruits, and milk; rarely consume "junk foods" such as highly refined cakes, cookies, candy and high fat foods such as fries, chips, and high fat protein; keep screen time to two hours or less a day; and engage in active play or exercise at least an hour a day. Outcome data evaluated whether 90% of the students could name at least five out of the seven behavioral changes by the end of the four class sessions.

Limitations of the Project

The pilot project was a new, evolving experience for both the author and the elementary school; consequently, there were many limitations in resources, time, and in the numbers of students and parents who were able to benefit from the program. The screening for risk of diabetes identified at-risk students in all grades. The pilot project was an initial effort to investigate a feasible way to address the needs of these students.

Human Resource Limitations

During the community assessment of the school in 2005, the initial intent was to provide a school wide preventative educational program which would be held after school and involve both parents (mostly mothers) and at-risk children. There was also the thought of training some of the mothers to be peer leaders so they would be able to multiply the numbers of after school preventative sessions available to the students and mothers. In reality, the core group of mothers who were initially interested did not demonstrate an interest in wanting to become peer leaders and there were some competitive group dynamics that were not conducive to multiplying the program. A preliminary pilot of the ENERGY Club's four sessions was conducted after school with the mothers and

their children. Two mothers with three to four children out of the usual fifteen to twenty mothers in the group attended. That the author is Caucasian and not bilingual was possibly a limitation deficit in terms of promotion of the program. Even though there was a bilingual Public Health worker at every session, the mothers were very polite, but not consistently participatory.

With the limited participation of the mothers, and high interest of faculty and school administration, the focus was changed to the students with parents attending if they wished. With the permission of the principal, the sessions were able to be held during the last 45 minutes of the instructional day. It was decided that only the fourth and fifth graders would participate as there was the limitation of one instructor (the author) and one Spanish speaking peer leader, a colleague of the author who was funded by the grant and had no children at the school. Most of the at-risk students received permission to participate, but only three sets of parents participated during the entire duration of the project, in spite of letters in Spanish that were sent home with the students and bilingual posters all over the school announcing the sessions. The author surmises that if she were Hispanic and bilingual, the parent response might

have been different. But perhaps it was the time limitations.

Time Limitations

Due to job and school constraints, the author was limited in the amount of time spent on the school campus apart from the weekly sessions. Ideally, spending time mingling among the parents before and after school might have established more relationships and trust, thus fostering more parent participation. More grades could have been involved with more available time to teach the students; however, the principal may not have been able to free up the time for all the grades to participate. There are enough at-risk students at the school to warrant a part time educator to work with these students and their parents, but the author did not have the luxury of time needed to do so. Evaluating the student's long term retention of the behavioral changes and the health effects of applying these changes to their lives was not feasible, but could be a topic of future research.

Resource Limitations

The school has limited space to accommodate extra classes. The program was held in the Multi-use room, which is also used for the cafeteria, the school assemblies, testing, and any other large group gathering. Fortunately,

the MU room was reserved weekly for the classes, but occasionally, the class would be bumped into the library or outside on the picnic tables which limited the mobility of the classes.

The project funding was from a grant that extended over a twelve month period. The in-kind contributions by the author, the school, and school personnel were almost equal to the amount of the grant itself. Although there was no limits to the interest and appreciation expressed by the school, there were not enough resources to offer the classes to other grades. If enthusiasm could be converted to cash, this program would continue for a long time, but this, unfortunately is not the case.

Definition of Terms

For the purpose of this project, the following definitions apply with in the context of this paper:

Type 2 diabetes - The most common type of diabetes, characterized by the body's inability to produce enough insulin to control glucose levels in the blood. There is also evidence of the cell's resistance to the body's insulin, called insulin resistance. Type 2 is controlled by losing weight, changing food intake patterns, increasing exercise

and in some cases medication, including insulin (ADA, 2007).

Risk factors of diabetes in children - Overweight (a BMI > 95th percentile); family history of type 2 diabetes; ethnic background of African American, Mexican American, Native American, or Asian American; acanthosis nigricans signifying insulin resistance (ADA, 2007).

BMI for children - A figure calculated from a child's height and weight. The CDC has developed BMI-for-age growth charts for girls and boys which gives a percentile ranking showing the relative position of a child's BMI with children of the same age and sex. At risk of overweight is 85th to less that 95th percentile and overweight is equal to or greater than 95th percentile (CDC, 2007).

Overweight/Obesity - Both terms will relate to a BMI percentile equal to or greater than 95th percentile and in this paper have the same meaning.

Go Foods - Non-starchy vegetables and lean protein foods.

Slow Foods - Carbohydrates such as bread and grains, starchy vegetables, fruit and milk and milk products.

Whoa Foods – "Junk foods" such as candy, cookies, cakes, donuts, high fat chips, fries, and high refined sugar foods or high saturated fat foods.

VMOSA – A strategic planning framework, the acronym being Vision, Mission, Objectives, Strategies and Action Plans (Porshe, 2004).

ADA – American Diabetes Association

CDE – Certified Diabetes Educator

CDC – Center for Disease Control

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Risk of Type 2 Diabetes in Children

Statistics of how many children in the U.S. are at risk for type 2 diabetes do not exist, but over the years research has determined some of the risk factors specific to children. The mean body mass index of newly diagnosed children with diabetes is most often above 95th percentile by age (Ludwig & Ebbeling, 2001), making overweight and obesity a primary risk factor. Studies of Latino children with a family history of diabetes indicated high percentages of impaired glucose intolerance (IGT), especially if the mothers had gestational diabetes (Goran et al., 2004; NDEP, 2006). More recent research found that hyperinsulinemia and insulin resistance in children, which characterize IGT, are also risk factors for type 2 diabetes with studies supporting that these risks are more prevalent in children with a family history of diabetes (Rodrigues-Moran & Guerrero-Romero, 2006). Criteria for risk of diabetes have been established by the American Academy of Pediatrics and the American Diabetes Association (NDEP, 2005). Recent reports indicate that of those born in 2000, 32.8% of males and 38.5% of females

will develop diabetes with a preclinical phase of diabetes, called prediabetes, lasting up to 12 years prior to diagnosis (Colagiuri, Colagiuri, Yach, & Pramming, 2006). Criteria for risk of diabetes have been established by the American Academy of Pediatrics and the American Diabetes Association (NDEP, 2005).

Data Collection

The STOPP-T2D Prevention Study collected data on diabetes risk factors in 1,740 minority Hispanic, African American, and Native American eighth graders in four states, one being California. The three risk factors identified for risk of diabetes were a BMI equal or greater than 85th percentile (indicating overweight/obesity), fasting glucose equal to or greater than 100 mg./dl. (indicating prediabetes) and fasting insulin equal to or greater than 30 µU/ml. (indicating hyperinsulinemia). All three risk factors were found in 14.8% of the sample and 40.5% had prediabetes (Baranowski et al., 2006). The children participating in the Monterey Diabetes Prevention Program were all > 90th percentile and had one or two additional risks for diabetes, including ethnicity and acanthosis nigricans as a marker of hyperinsulinemia (Larenco, personal communication, September 2006).

Screening

Non invasive screening for risk of diabetes in schools is a potential tool for data collection of the numbers of at risk children, but currently screening in schools is not mandated and the CDC does not endorse screening for acanthosis nigicans (AN) as a predictor of type 2 diabetes (CDC, 2005) although they do concede that AN could be used to screen adolescents for high levels of insulin, a risk factor for diabetes. In California, the Governor has added obesity and diabetes prevention screens to the Child Health Disability Program (CHDP) which will generate statistics (Center for Weight and Health, 2006). In September 2006, AB 2226 was passed by the California legislature and established a three-year pilot program to screen for risk of diabetes in conjunction with scoliosis screening in middle schools (Health Policy Tracking Service, 2007). Even with the rise of type 2 diabetes in children, there has been little momentum in the efforts to collect data on the actual numbers of children of all ages who are risk. There is, however, much study in analyzing factors that contribute to some of the risk factors.

Parental Influences in Overweight

The rise in type 2 diabetes in minority children is said to parallel the increase in childhood obesity (Burnet, Plaut, Courtney, & Chin, 2002). With the primary risk of type 2 diabetes in children being obesity (Ludwig & Ebbeling, 2001) literature was reviewed that investigates parental influences on obesity. Pointing out that one in four children under the age of 18 are at risk for overweight, Patrick and Nicklas (2005) reviewed research on family determinants of children's eating patterns. Their findings support the idea that parents influence the development of a child's eating habits. Summarizing current research, they found that a child's preference for foods is related to: availability and accessibility in the home in age appropriate portions (e.g. apple wedges cut up by parents); parental modeling of preferences, beliefs, and attitudes toward different types of food, from healthy to spicy; and mealtime structure, such as eating together, eating while TV viewing, eating out, portion size of served meals (p.84-85). One of their suggestions is to develop interventions that target family feeding styles and mealtime structure.

How Parents View the Weight of their Child

Focusing on parents' perception of their children's weight, the American Obesity Association (AOA) conducted 1,025 telephone interviews with parents of children six to 17 years of age, randomly selected over the U.S. by a computer based process that assured equal probability. The completed interviews were weighted to ensure accuracy and reliability. Two major findings indicate that parents, as major influencers, underestimate the health risk of overweight in their children and the difficulty in changing lifestyles to correct it. Only 5.6% of parents chose being overweight as their children's greatest risk to health and longevity. Also 61% thought is would not be difficult to change their own eating habits and activity patterns if it would prevent obesity in their children (AOA, 2000). A study in the United Kingdom of 277 randomly recruited healthy children suggested similar findings in parents' inability to identify overweight in themselves and their children, especially their sons (Jeffery et al., 2005). These studies may indicate why children develop overweight without their parents' awareness or concern. It may also explain any lack of involvement in a school based program to decrease risk of diabetes which incorporates weight management.

Parenting Styles and Weight of Children

Stein and Epstein (2005) researched whether the influence of parenting styles at the start of a program and changes made after the program had an effect on pediatric weight control 12 months after a family-based pediatric obesity treatment. Using hierarchical regression, the study looked at whether parenting contributed to the 51 children's outcomes beyond the aspects of program adherence and other related behaviors. An interesting find was that in using ANOVA, there was significantly greater weight loss in the children whose fathers who increased their acceptance of their children vs. those that decreased acceptance at six and 12 months out.

From the premise that obese parents are more likely to have obese children, a study by Cutting, Fisher, Grimm-Thomas, and Birch (1999) suggested that a mother's disinhibition (overeating or eating triggered by emotional, social, and environmental influences) is a predictor of their daughter's excess weight-for-height. Using regression analysis, the study revealed a relationship between a mother's and daughter's overweight as well as one between maternal disinhibition and the

daughter's free food access intake, which also predicted overweight (p. 611).

Based on previous studies of middle class Caucasian families, Robinson, Kiernan, Matheson, and Haydel (2001) hypothesized that there would be a direct relationship between parental control of a child's intake and the child's degree of overweight, the thought being that parents who control what their children eat interfere with the child's ability to self-regulate, resulting in obesity. However, when they surveyed a generalized sample of 792 third graders with different ethnic and socioeconomic backgrounds, they found parental control over children's intake was inversely related to overweight in girls and had no relationship in weight of boys (p. 306). Hispanic girls in particular were found not to be affected by high parental control, which shows specific differences in the Latina population.

Latina Parental Influence

Several significant studies have looked specifically at Latinas and helped with designing a health promotion for Monterey Elementary School. Crawford et al. (2004) conducted qualitative research from data collected from 43 Latina mothers divided into eight focus groups. The

objective was to assess Latina's health beliefs and attitudes concerning early childhood weight issues. Rich insight into the Latina belief system and cultural framework was obtained. Of particular interest were the following themes of belief: moderate overweight was perceived as "best" or healthiest, whereas thinness was associated with poor health; a young child's weight or shape is mostly determined by genetics; young children who are overweight are likely to grow out of it; mothers are hesitant to identify their young children as overweight; and many parental concerns, such as neighborhood safety, household work load and lack of time compete with nutrition and feeding concerns (p. 390-391).

Sherry et al. (2004) did similar qualitative research in focus groups of low income Hispanic mothers as well as Afro American and Caucasian mothers. She explored attitudes, concerns, feeding practices, maternal perceptions and weight concerns. Pertinent findings specific to Latinas indicated that: the mothers prepared mostly Hispanic foods and focused on getting their children to eat; mothers who did not believe their children were "...full" pressured them to eat more; responses of children of "...not hungry" meant ill; they believed that good health and what their children ate was

more important than weight; and from a schematic drawing of children of various weights, 59% of the Latinas set the cut point for overweight at an obese child figure (p. 218-219).

Body Perception

Two studies over the last six years which explored Latina's body perception as well as their children's found potential unhealthy implications for weight control behavior. Fitzgibbon, Blackman, and Avellone (2000) studied 389 women, 95 of whom were Hispanic, examining at what body mass index (BMI) body image discrepancy was reported. The researchers first referred to a study showing that Latinas born in the US or emigrating before 17 were less satisfied with their body image than those who emigrated later in life and chose larger silhouettes as their ideal body weight (cited study by Lopez, Blix, & Blix, 1995). The Hispanic women in the Fitzgibbon study did not experience a discrepancy between their real body weight and their ideal body weight until they were overweight, which the researchers felt might make it harder to be motivated and/or successful at weight loss. Contento, Basch, and Zybert, (2003) investigated body image perceptions of 187 Latinas about themselves and

their children using a descriptive and co relational study. In picking out desirable body images, the Latinas in this study preferred thinner figures for themselves and larger figures for their children. The acculturation factor was not considered (from abstract).

Children's Perception of Weight

Even though the Latinas are accepting of their children's overweight, the stigmatization of obese children has not subsided as the obesity rates have gone higher, as shown in the research of Latner and Stunkard (2003). In their study, fifth and sixth graders (415 students, only 12% Hispanic)) were given six drawings depicting one child with no disabilities (healthy), four with various disabilities and the last figure depicting a child who was obese. They ranked the one they liked best to the least. The healthy child received the highest ranking and the obese child received the lowest. The researchers commented on a similar study done in 1961 which had similar results, but they felt that the most important finding in their study was that the children's bias against the obese child drawing was stronger in 2001 data collection than it had been in 1961. There were no studies investigating Hispanic children's bias, which

comprises the majority of students in the Monterey Project.

Components of Successful Weight Management Programs

The diabetes prevention program addresses weight management as a means to prevent diabetes, thus it was important to review what is successful when addressing weight issues in children. There are a variety of programs nation wide, but many of them do not have outcome studies available. Current research reported by the American Dietetic Association recommends four primary behavioral strategies for successful weight management interventions for children (Kirk, Scott, & Daniels, 2005) First, reduce energy intake while maintaining optimal nutrient intake to protect growth and development. Secondly, increase energy expenditure by promoting more physical movement and less sedentary activity. Thirdly, actively engage parents and primary caretakers in lifestyle changes. Lastly, facilitate a supportive family environment (p. S44). These strategies are also recommended by the Center for Weight and Health from University of California Berkley (2001), which published a lengthy review of literature regarding pediatric overweight. Some of the most significant long term studies on the effects of family-based treatment of

pediatric overweight were conducted in the 1980's by Leonard Epstein, who researched what family dynamics worked best. Families were randomly assigned to three treatment groups; parent and child together, child alone and a control group. The results showed that targeting both parents and children resulted in lower relative weight after five years than the child-only interventions (Epstein, Wing, Koeske, & Valoski, 1987). Epstein did further research in 2000 to see if adding behavioral problem solving to the family-based intervention would enhance weight loss in the children (Epstein, Paluch, Gordy, Saelens, & Ernst, 2000). Surprisingly, the problem solving training had no advantage for the child's weight control. Another interesting study done more recently by Epstein et al. (2001) involved 30 families, randomly divided into two groups. One group targeted behavior to increase fruit and vegetable intake and the other to decrease high-fat/high-sugar food intake. The parents who increased fruit and vegetable intake also decreased the high-fat/high-sugar foods, but the parents who decreased the high sugar foods did not increase the intake of fruits and vegetables. These studies give valuable information to consider when designing a program intervention.

Another approach in the literature is to target parents exclusively in the treatment of child overweight (Golan & Crow, 2004). In most family-based programs, the child is the focused point of change, with high parental involvement. In Golan & Crow's study, 50 children and their families were randomly recruited and followed for seven years. The children were in the parent-only group, which they did not attend, or the children-only group, which they attended without the parents. Even though the children-only group met longer, 35% of the children of the parent-only group were non-obese at the end of the intervention as compared to 14% of the children-only group. After seven years, both treatment groups had kept most of the weight off, but the reduction in the parent-only group was 29% compared to 20.2% of the children-only group (p. 8). Golan's study was of middle class Israeli school children, which must be considered when making application to the Monterey population. An interesting study that focused on Mexican American women showed a different twist (Cousins et al., 1992). A group of 168 obese Latinas were randomly assigned to three groups. One group received written material on nutrition and exercise, one group got the material and attended a class taught by a dietitian and the third group got the

material and also a family-based intervention that included their spouse and children. Weight loss was greatest in the family group, suggesting that family oriented, culturally sensitive weight programs work effectively in the Latino population regardless of the targeted participant. These findings support the need to concentrate on more parental involvement if the program expands.

Theories, Models and Targets of Diabetes Prevention Programs for Children

Self-directed change is possible because of a person's capacity for "...self-knowledge, self-regulation, decision making and creative problem solving (Pender, Murdaugh & Parsons, 2006, p. 37). Health prevention programs incorporate theory and models to direct the change. Four widely researched theory/models used in health prevention are the Health Belief Model(HBM) based on the work of Kurt Lewin, the theory of planned behavior (TPB) (Erwin, 2002), Bandura's social learning theory (SLT) (Huff & Kline, 1999) and the Ecological Model (EM), which was used in the community assessment of this project (Burnet, Plaut, Courtney, & Chin, 2002). The HBM assumes that individuals behave on the basis of their perceptions, that they are attracted to the positive values of health,

and will turn away from negative values of illness (Erwin, 2002). SLT emphasizes "...self-direction, self-regulation, and perceptions of self-efficacy" with "...environmental events, personal factors, and behavior" acting "...as determinants of each other" (Pender, Murdaugh, & Parsons, 2006, p. 41). Ajzen's TPB proposes that choosing a certain behavior is driven by a person's intentions, which are in turn affected by attitudes, subjective societal norms and perceived ability to carry out the behavior (Polit & Beck, 2004).

Burnet, Plaut, Courtney, and Chin (2002) proposed a model named the Theoretical Framework for Behavioral Change for preventing type 2 diabetes in minority youth which is based on the four behavioral theories described above. Their theoretical framework for behavioral change was the framework chosen for the MSDDP. The framework combines the strengths of several theories of behavioral change and builds on the strengths of each theory, incorporating "... environmental influences" and "...interpersonal determinants" (p. 783). They further identify seven targets for interventions in behavioral change which are knowledge, risk awareness, self-efficacy, role models, parental involvement, community partnership and reward/ reinforcement (p. 786). These targets are used

to evaluate existing school based programs for preventing diabetes.

School-based Diabetes Prevention Programs

This section of the literature review will focus on school-based programs in elementary schools that offer curriculum to address diabetes prevention and reduction of risk of diabetes. Programs in the literature often target the specific ethnicities of Native American and Latino children. Native Americans in the United States and Canada as well as Mexican Americans have a higher rate of type 2 diabetes developing in children (Gahagan & Silverstein, 2003) and as "...vulnerable populations that exhibit new disease trends may be seen as the 'canary in the coal mine,' warning of hazards present for the entire population" (p. e328).

Native American Projects

Three school based diabetes prevention projects targeting Native Americans in Canada and the United States will be discussed. These projects were part of tribal efforts to decrease diabetes in both adults and children.

Kahnawake Schools Diabetes Prevention Project. The Kahnawake Schools Diabetes Prevention Project (KSDPP) in a Canadian rural Mohawk community of 6,746 was a three year

quasi-experimental study in an elementary school which incorporated an education program for grades one through six in addition to programs for teachers, families and the community (Macaulay et al., 1997; Satterfield et al., 2003). The Social Learning Theory elements of self-efficacy, modeling and self-management were incorporated into traditional learning styles of Native children to encourage healthier eating and increased physical activity (p. 779). The curriculum covered diabetes, healthy lifestyles, eating habits, and benefits of exercise in ten 45-minute lessons per year for each grade (p. 781). There were some improvements in physical activity, fitness and decreased television watching for five years, but improvements were not sustained after that time. There was no change on the BMI and any benefits to decrease risk factors were not maintained over an eight year period (Paradis et al., 2005). It was suggested by Paradis et al. (2005) that "...secular forces of increasing obesity throughout North America are strong and may require more intense and comprehensive efforts than those contained in a single local health promotion program" (p. 337) and that intervening at the elementary school level may be too late.

Sandy Lake Project. In the Sandy Lake school-based diabetes prevention program for a Canadian rural Ojibwa-Cree community, both qualitative and quantitative data was collected, with one of the interventions being a health and nutrition curriculum taught to the 500 students (K-12) in the two local schools (Gittelson et al., 1995). The program successfully increased the students' "...knowledge, dietary self-efficacy, and dietary improvements," but one of the stated limitations was a weak emphasis on physical activity (p. 2397) which might explain why the mean BMI and percentage of body fat increased during the intervention. Other school based prevention programs in First Nations have been developed on the Sandy Lake Project as there is much interest in education children (Ho, Gittelsohn, Harris, & Ford, 2006).

Cherokee Choices. The third prevention program for Native Americans is Cherokee Choices in the Great Smokey Mountains of North Carolina, which included an elementary school program taught by mentors and teachers. Approximately 600 students were educated on awareness of diabetes as a health issue, the need to increase physical activity and the benefits of good nutrition (Bachar et al., 2006). One interesting aspect reported by Bachar (2006) was the perceived negative impact casino revenues

had on the families' income, making eating outside the home more affordable. The increased economy of the area boosted the number of fast food restaurants in a three mile radius. Adults were also targeted by church wellness programs and worksite wellness. There are no outcome data relating to decreased risk of diabetes, such as decreased BMI or improved physical fitness. Reported benefits of the program were increased physical activity and increased options of fruits and vegetables in the lunch menus as well as parent participation in the student activities. The unique aspect of the Native American population is that they live in communities set apart and thus the community as a whole targets their own people (Bacher).

Latino/Mexican American Projects

Hospital Based Project. In the late nineties, McKenzie, O'Connell, Smith, and Ottinger (1998) indicated the higher prevalence and incidence of type 2 diabetes in Mexican Americans, with the onset occurring at an earlier age and the rate of complications higher. They worked on a pilot educational program that was hospital based as opposed to school-based, but it represents an early effort to design prototype curriculum for this population. One of the significant findings was that although the program was designed for children with parents in attendance, it

affected the eating habits of the whole family (p. 186). There was an improved knowledge score in 70% of the children (Burnet, Plaut, Courtney, & Chin, 2002).

Bienestar. Using Social Cognitive theory, Bienestar was an eight month pilot program targeting 561 Mexican American fourth graders. The students were randomly assigned to either intervention or control groups in nine elementary schools in low-income neighborhoods of San Antonio Texas (Trevino et al., 2005). The program emphasized low fat foods and high dietary fiber and promoted more vigorous participation in physical activities (p. 123). Classroom activities on nutrition, self-esteem, weight management and exercise were combined with separate parent programs throughout the year (Ng, Anderson, McQuillen, & Yu, 2005). The project reported a positive effect on physical fitness scores when compared to the control groups (Trevino et al., p. 128) although the program had no effect on level of activity or percent body fat (Burnet, Plaut, Courtney, & Chin, 2002, p. 788). The program used Social Cognitive theory with emphasis on self-efficacy and parental involvement in fun activities such as salsa dancing, and hands-on craft projects (Trevino, p. 124).

Jump Into Action. Jump Into Action was a school based quasi-experimental project designed for Hispanic fifth graders and taught by teachers on 19 campuses on the Texas-Mexico border (Holcomb, 1998). The curriculum provided information about type 2 diabetes and emphasized low fat foods and increased physical activity with the goal of improving "...students' knowledge, self-efficacy and behaviors regarding type 2 diabetes prevention" (Ng, Anderson, McQuillen, & Yu, p. 216). Results from pre and post tests and reports by both Ng et al. (2005) and Burnet et al.(2002) indicate increased knowledge and self-efficacy in diet and exercise behavior that were sustained after four weeks. The uniqueness of this project was that it was teacher led using a teacher's guide with student workbooks. There was no significant difference in the outcomes from teachers who received pre-training and those who did not (Holcomb, 1998), indicating that the content was transferable and self-explanatory. There was not data collection on BMIs or level of fitness. The Jump Into Action Program was also tried in 300 school teams in Missouri which also speaks of it's transferability.

Programs Which Influenced the ENERGY Club

For several years the author was involved in the development of weight management programs for low socioeconomic children and their families which are still conducted in the San Bernardino area. The six, two hour long classes are held in an outpatient medical office and spread out over two months. Over the years many techniques and innovative teaching tools evolved, many of which were used in the Monterey project. The ENERGY acronym came from collaborative brainstorming with colleagues from the Health Educators Medical Group program. Much of the design and content that was developed during those years was adapted for the school based program presented in this paper. The outcome data of the program in 2005 showed that the average BMI of the 82 children in the program decreased from 32.3 to 30.9. In 2006, 46 children went through the program and BMIs went from an average of 33.2 to 32.4. All the children were above 97th percentile in BMI (Shankar, personal communication, April 2007).

An adaptation of this program is also being piloted in a community center in Costa Mesa, California which is successfully seeing behavioral changes in families. Results of pre/post tests and pre/post self report questionnaires show significant positive changes

($p = <0.001$) in both youth behavior and knowledge (Hawk, personal communication, April 2007).

Summary of the Review of the Literature

The literature shows that risk of diabetes in children is a serious problem that needs addressing (Nestle, 2005). Nestle (2005) states that possibly one third of all children born today-and even higher percentages of Hispanics-will develop type 2 diabetes during their lifetime and as a result will have a shorter life expectancy (p. 1497). The literature review establishes the risk factors of type 2 diabetes in children that can guide interventions to reduce the risks. Data collection of the extent of the problem is in process with the STOPP-T2D Prevention Study (Barnowski et al., 2006) but intervention cannot wait until all the data is collected. With the CDC's frowning on the benefits of non-invasive screening of risk of diabetes (CDC, 2005) there could be further delay in documenting the extent of the problem.

Parents as caregivers of their children are the primary sources of providing food and a healthy environment for their children, but the literature suggests that parental influences on weight issues and

feeding of their children have tipped the balance toward childhood overweight and obesity (Patrick & Nicklas, 2005), the primary risk factor for type 2 diabetes in children (Ludwig & Ebbeling, 2001).

Literature purports that parental participation is a key component in successful child weight management programs (Kirk, Scott, & Daniels, 2005). However, as in the case of Monterey Elementary School parents, Keitler (2007) suggests, "...adaptation of these approaches to a broader, less-motivated population remains of unproven efficacy" and "...intervening through the schools, where children spend a large part of their day, is an obvious approach" (p. 422).

Research of school-based diabetes intervention programs indicates success with targeting entire schools or entire grades, but there is not evidence of programs focusing on just those children who are at risk. Apart from Jump Into Action, there is not evidence of transferable curriculum that schools can use to teach at risk children. Models for effectively working with children to reduce risk of diabetes have been researched and give evidenced-based frameworks for developing programs and curriculum (Burnet, Plaut, Courtney, & Chin, 2002). There is a need for developing a transferable

curriculum based on effective models for students at risk for diabetes. Such curriculum will be an important component in the overall prevention program at Monterey School to decrease risk of diabetes.

CHAPTER THREE

METHODOLOGY

Program Plan

The program plan utilized the VMOSA planning framework, which is an acronym for Vision, Mission, Objectives, Strategies and Actions (Porshe, 2004, p. 178). The strategic plan was also based on Ervin's (2002) concepts of goals and objectives which relates objectives to goals and designates a time frame for completion.

Vision and Mission

The vision of the program proclaims: "Monterey Elementary School United in Preventing Diabetes." Stemming from the overall vision, the mission of the program was: "To provide the school with a school based, culturally competent program format to prevent early diabetes in at risk students."

Hypothesis

The long term program hypothesis is: If school based intervention education can be developed to teach students behavioral changes to decrease the risk of diabetes, then the early diagnosis of childhood type 2 diabetes can be reduced if the students choose to practice the behaviors. The pilot program addresses the need for developing

curriculum that teaches the students about the behavioral changes in a way that promotes knowledge retention.

Goals and Objectives

The program "achievement goal" was to increase the knowledge base of risk factors and prevention of type 2 diabetes in a cohort of students screened to be at risk for diabetes. The corresponding objective was that by the end of the program, 50% of the at risk students in the fourth and fifth grade would attend four sessions of the classes.

The "behavioral change knowledge" goal was to expose the participating students to behaviors that would increase their healthy food choices and physical activity and decrease their unhealthy food choices and inactivity levels. The corresponding objective was that at the conclusion of the four sessions, 90% of the students would be able to list five out of the seven behavioral changes taught in the classes.

Program Strategies

Several strategies were in operation simultaneously to implement the accomplishment of the goals and objectives.

Stakeholder Strategy

Gathering of key stakeholders to provide in kind assistance, support, direction, expert guidance and insight about the project was a continuous process. The list included the school principal and vice principal, the school nurse and health aide, Monterey support staff, the Director of School Nursing of San Bernardino City Unified School District, community health professors at CSUSB Department of Nursing, a bilingual CDE colleague, San Bernardino Department of Public Health staff, City of San Bernardino public officials and volunteers interested in the project. Individual and small group meetings with various stakeholders throughout the year helped co-ordinate efforts to move the project forward.

Funding Strategy

Funding for the project was a major priority. An application for a Community Development block Grant (CBBG) from the city of San Bernardino was submitted in November 2005 and funding for $10,000 was awarded starting June 2006. The fiscal agent for the grant was Arrowhead United Way of San Bernardino. The grant provided for the majority of the teaching tools and supplies, snacks for the students, the stipend for a bilingual educator, and incentives for the students. A wealth of in kind

contributions valuing approximately $18,300 were supplied in professional time and use of school. The school nurse for Monterey Elementary, in addition to spending many hours in planning and consulting with the author, applied for and was granted a $500.00 grant to help cover the expense of the food models used in the project. The collaborative efforts of many were invaluable to the success of the project.

Curriculum Strategy

Strategic, relevant curriculum that the author has used in other settings was adapted to the fourth and fifth graders. The adaptation needed to be condensed so that the content was covered in a shorter amount of time. The hands on projects and graphic design of the learning modules needed careful planning to move at a pace for good retention yet be effectively presented in the short time frame. The weekly review of the seven behavioral changes was strategically designed to reduce any boredom and be rewarded with an incentive prizes. A simple review test was designed to evaluate the learning and measure the outcomes of the goals and objectives.

Advertising and Promotion Strategy

Letters to the teachers and announcements in staff meetings about the project informed the teachers and staff

of the project. Before each track's ENERGY club, a letter was sent home with the at risk students announcing the project and inviting all parents and students to participate. A permission slip was included in the letter and all communication home was both in English and in Spanish. Word of mouth was probably the most effective promotion strategy for the students. After the first class, many of the at risk students who did not get permission slips promptly did so and throughout the sessions, participation was excellent from the students. There were many requests from all the students to join the "club". Reminder flyers were sent out to the students on the day of the second class, but after that no reminders were needed.

Several strategies were tried to get more parent participation. In addition to the letters home, flyers and posters in English and Spanish were posted in strategic places on the school campus where parents congregated. A personal phone call to invite the parents was tried during one session with very minimal success. The lesson content was sent home with the students in Spanish and English so parents could keep abreast of the content their children were receiving, but the parent participation remained low for the entire project.

Process Objectives/Action Plans

Ervin (2002) states that process objectives, "...spell out the actions of staff or others involved in the program" (p. 259). In the VMOSA framework, the action plans are very similar in that they describe, "...specific actions that will be done, by whom, when, and at what cost" (Porshe, 2004, p. 178). For this project, a chart was devised that listed various action steps, gave a designated responsible person for each step, gave a target date for completion, the resources requires and the collaborators involved. The Action Plan Chart is in Appendix C.

Evaluation Checkpoint Timeframes

The program will cover a 21-month period which started October 2005 and will extend through June 2007. Evaluation checkpoints were set up every three months starting at the third month. The dates of the eight checkpoints are:

- Month 03 - 12/31/05
- Month 06 - 03/31/06
- Month 09 - 06/30/06
- Month 12 - 09/30/06
- Month 15 - 12/31/06

- Month 18 - 03/31/07
- Month 21 - 06/30/07

A chart merged the evaluation checkpoints into the action plan. This merger guided the evaluation process and assured that all of the parts of the program were adequately functioning (Issel, 2004). The Evaluation Checkpoints of Action Plans graph is in Appendix D

Methods and Tools

Two charts were developed showing use of methods and tools. First, the program objective and behavioral knowledge objective were evaluated by charting the methods and tools used to achieve the desired program outcomes within the time frame. Second, an action/strategy chart mapped out the methods and tools to reach the desired strategy outcomes within the time frames. Personnel involved in the process was listed in both charts. Methods and tools were obtained from Issel (2004). The Program Objective Chart is in Appendix E followed by the Action/Strategy Chart in Appendix F.

Summary of Process Evaluation

Issel (2004) describes four purposes of the process evaluation; to "...have data about the delivery of the program so that the results of impact and outcome

evaluations can be interpreted within the context of the program delivery," to give guidelines for program replication, to satisfy funding agencies, to demonstrate that the program is being implemented on schedule, and to "...provide data upon which to make midcourse corrections in the delivery of the program" (p. 239). The process evaluation of the Diabetes Prevention Program for the Monterey School will provided researcher with the guidelines needed for program success.

Resource Allocations/Budget

The financial resources for the project are solely dependent on the block grant and a wealth of in kind contributions of time from professionals, volunteers, and students as well as rent free facilities and equipment. If interest in the project can be considered a resource in and of itself, then the project has deep resources of support from the community and the political environment. Many key stakeholders are willing to give their time to meet and add valuable insight and advice. The San Bernardino community via CSUSB offers a pool of eager RN and MSN students willing to get involved in community projects to fulfill clinical hours. All these individuals are vital to the success of the project. The monetary

value of the in kind contributions far surpasses the grant award. Appendix G is the chart of the financial allocations.

Teaching Curriculum

Based on literature review, the most relevant and achievable behavioral changes were selected to be taught in the allotted time frame. The content was spread out over four 45-minute sessions and incorporated instruction, demonstration activity, an exercise/moving activity and plenty of review and verbal quizzing. Homework was given out at the end of each class encouraging practice of behaviors taught in the class session. Time was allowed for an explanation in how to complete the homework sheets. An incentive prize was given out after each class and the prizes got better each week. Types of incentives included balloons, sidewalk chalk, Frisbees, playground balls, baseballs, softballs, jump ropes, basketballs, soccer balls, bats, footballs, horseshoe sets, and badminton sets. The content of the classes will follow, however; the actual teaching manual will be available in the Department of Nursing at California State University San Bernardino.

Class One

Objectives. By the end of the class the students will be able to:

- State what the ENERGY Club acronym means.
- Define "energy in / energy out".
- State what calories measure.
- State how many sugar packets are in one cup of a sugar containing beverage.
- Calculate how many calories and sugar are in various sizes of drinking cups.
- State four behavior changes they can do to prevent diabetes.
- Demonstrate the body movements that go with each of the behavior changes.

Getting Settled. As students come in they are welcomed to the ENERGY Club and instructed to put their backpacks in the designated area and proceed to make a name tag and take a seat in front of a folder, which they identify with their name. The folder has a magnet clip in it for using on their refrigerator to clip the homework or handouts from class.

Introduction to the ENERGY CLUB. The acronym of the club is explained as "Exercise N Eating Right is Good for

You". The concept of "ENERGY IN ENERGY OUT" is introduced by using a balloon pump and a balloon. The "energy in" is illustrated by air filling a balloon, and the "energy out" is illustrated by releasing a balloon filled with air so that it flies out into the room. The concept of "energy in" as food and drink and "energy out" as exercise is explained and the need for balance is emphasized. It is stated that they were invited to the ENERGY Club so that they would learn how to prevent them from getting diabetes. They are told that diabetes will be talked about more next week, but it is a condition where a person can't handle a lot of sugar in the blood stream. They get some time to talk about what they think causes diabetes and if they know someone with the condition.

Calories. The explanation of calories is introduced as how energy is measured; just as height is measured with inches and weight is measured with pounds, energy is measured with calories. If there are more calories put in the body with food and drink and fewer calories burned off with exercise then there is an imbalance that is not healthy. They are then told that they will learn seven things to do to keep balanced and healthy and therefore prevent diabetes. Four of the seven are mentioned in the

first class, with emphasis on elimination of sugar drinks and conversion to sugar free drinks, which includes water.

Just Say "No" to Liquid Sugar. This first behavioral change is introduced by having the students call out their favorite beverages and listing them on the white board. On the table are many bottles of regular soda, punch, Gatorade and other sugar loaded beverages, including juice and energy drinks.

Packets of sugar that have been taped together in several links are used to measure how much sugar is in each of their favorite drinks and the connection of excess "energy in" is made. Seven packets of sugar are used to approximate the sugar consumed in one cup of soda or sugar beverage. A cup that measures eight ounces is used to represent 100 calories and the students try to guess how many cups, and therefore calories of sugar, are in various size cups and glasses that they might use at home or purchase at fast food restaurants, convenient stores that sell beverages in super sized cups. Students are challenged to cut out "liquid sugar". For each of the seven behaviors, a body movement is taught to help them remember. For this particular concept, the students circle their arms up and cross their index fingers to make an X.

They bring their crossed finger Xs down as they say, "Just say 'No' to liquid sugar".

The students are then shown several examples of sugar free sodas and beverages, including a container of Crystal Light which each student will receive at the end of class to take home to try. They are told that next week they will get to take a taste test of different drinks, so they can experiment with alternatives to "liquid sugar".

Play or Exercise for at Least One Hour a Day. The students break for an exercise activity. A sponge throwing game is played for a short while, which assures a lot of moving and laughing. After the game the concept of building up to an hour of playing or exercise every day is talked about as a way to increase the energy out. A discussion follows about what types of play they might try to burn off energy. The body movement to remember this behavior change is to break out in jumping jacks.

Limit TV to an Hour or Less a Day. After a discussion of how much TV they actually watch, a guided discussion follows about how screen time takes the place of play and exercise time. It is emphasized that often watching TV only exercises their thumbs and can lead to a lot of snacking which is a lot of "energy in" and no "energy out". The connection of limiting TV time as a way to gain

more time for play and exercise is made. The body movement is the student's individual rendition of a "TV zombie" hunkered down and eating in front of TV.

Eat Slower. The students are asked to pantomime how they eat their meals and how long it takes them to eat a meal or snack. This usually leads to some acting out that indicates how they "wolf down" their meals. They are then taught that the brain needs about 20 minutes to register that the person eating is "full". When the students eat in five or ten minutes, they may eat more before the brain tells them they are full and thus they overeat which is too much "energy in". They are encouraged to take at least 20 minutes or longer to eat a meal. The body movement for this behavior is to pantomime eating very fast and then abruptly switching to eating very slow. If there is time for a snack, they practice eating it slowly.

Homework. The first week's homework is a weekly chart that gives the students a chance to record sugar free beverages, including water, that they try each day as well as checking the days they went without any "liquid sugar". They also check off if they tried to eat slower and can record the time if they choose. They are challenged to add 30 minutes to their current play time and record what they do for play/exercise each day. There is also a place to

chart how many hours of TV were watched each day. Returning homework at the next class guarantees an incentive prize to help with the extra play and exercise. First pick of prizes go to those who reflect good, descriptive charting of behaviors and not vague checks. Students leave with some incentive prize to encourage play.

Class Two

Objectives. By the end of the class students will be able to:

- Name the four behaviors they learned in Class One and demonstrate the body movements of each behavior.
- State that food turns to sugar and the sugar gets into the blood stream.
- State the importance of sugar from digested food as food/fuel for the cells and describe how the sugar gets into the cells by the hormone insulin.
- Define the problem of insulin resistance as needing too much insulin to get the blood sugar into the cells which can make the pancreas work too hard and lead to diabetes.

- Define acanthosis nigracans as a marker that their bodies are over producing insulin.
- Name some Go, Slow, and Whoa foods and state which types of food turn into the most sugar in the blood.
- State the reasons the Go, Slow, and Whoa foods are named as such.

Getting Settled/Started. Homework is collected as they file in the door. Backpacks are put in the designated spot and they put on their nametags. They go to the taste testing area and taste drink A, B, and C and mark down which one they like the best on preprinted response cards. As they are testing the instructor is commenting on the returned homework and individual praise and comments are freely given out for encouragement. After the students have finished the taste testing they go to their seats.

Review. The four behaviors from Class One are reviewed verbally and by group demonstration of the body movements that represent each behavior. Sugar free gum or Crystal Light tubes for water bottles are given out for those who give right answers to review. Homework that was turned in was praised with positive feedback or suggestions for improvement.

Pathophysiology Lesson. Pictures of different types of body cells are passed out for the students to observe. On the display board, there is a cut out of a stomach, a pancreas, a blood stream and a cell. White glitter glue spread from the stomach to the blood stream is used to represent the sugar that gets into the blood stream from the food that has changed to sugar. Blue glitter glue is spread from the pancreas into the blood stream in a matched amount to represent how the insulin gets into the blood stream. The insulin (blue glitter glue) then attaches to the outside of the cell and then the sugar (white glitter glue) is spread into the cell and the cell is "fed".

To illustrate what happens when a person is at risk for diabetes and is insulin resistant, excess amounts of insulin (blue glitter glue) is spread into the blood stream and it is explained that the pancreas has to put out too much insulin to get the sugar into the cells to "feed" them. This leads into an explanation of the acanthosis nigricans as a clue that the body has to put out too much insulin. When the pancreas has to work too hard to produce extra insulin, it gets so tired that it slows down and when it does, diabetes can develop. This development is illustrated when the blue glitter is wiped

away and the white glitter takes over and the blood sugar is overloaded in the blood stream. Questions that they may have are answered and there is time for discussion.

Exercise Activity. The students break for either a time of moving to music, led by the instructor and various students, or balloon volley ball.

Types of Food. This segment of the class is about the last three behavior changes that are covered. Food is explained to be divided into three types depending on how much of it turns into sugar in the blood stream. "Go" foods are non starchy vegetables and lean protein which do not turn into large amounts of sugar in the blood. "Slow" foods are starchy vegetables, types of breads and grains, fruit and milk which are carbohydrates and turn 100% into sugar in the blood stream after a few hours. It is emphasized that "Slow" foods are healthy foods and "slow" refers to eating only age appropriate portions and not overeating with large portions of carbohydrates. One portion is described as the amount of slow food which can fit into one of their cupped hands, or a portion the size of their hand. "Whoa" foods are "junk" foods and high fat foods. These foods should be eaten rarely and only in small amounts.

The body movement of "Go" foods is to bounce the knees and pump the arms as in running fast. For "Slow" foods they bounce the knees slow and pump the arms as if they were running in slow motion. For "Whoa" foods the arms are lifted up and crossed back and forth to form an X. They are taught that overeating or eating large portions of "Slow" food and "Whoa" food cause their pancreas to have to produce too much insulin and can increase their risk for diabetes. A rhyme is printed out and given to them which is said to body movements or as a cheer. It is, "If you go with the Go and cut down the Slow, then once and awhile, enjoy the Whoa. But... if you go with the Whoa and don't slow the Slow, your pancreas says, 'Oh No! Oh No!'"

Food models are used to illustrate the types of foods and a handout is given which lists various foods in each category. They use their handout for reference during a food drill when a food is held up and they identify it as a Go, Slow or Whoa food. Snacks are given that are Go foods.

Homework. The same chart as the previous week is given to them but the exercise time is increased to one hour. They are also given a sheet to write down the three types of food that they eat each day.

Incentives. All of the students get to pick out their incentive exercise prize form a variety of items, with the first picks going to those who completed the homework with evidence that they practiced the behavior.

Class Three

Objectives. By the end of the class session the students will be able to:

- Pick out a balanced meal from the Nasco food models and make an unbalanced meal healthier by exchanging food or changing portion size.
- Demonstrate with their hands the appropriate portion sizes of foods.
- State the unhealthy attributes of Whoa food in terms of fat and sugar.
- Visualize the volume difference in five pounds of fat versus five pounds of muscle.
- State the advantages of exercise in converting fat to muscle and how that effects body mass.
- Demonstrate the body movements associated with each behavioral change.

Getting Settled/Started. Students come in, hand in homework, put backpacks in the designated area and get

their nametags and sit down. Homework is reviewed and evidence of behaviors practiced is praised.

Review. Verbal response quizzing is used to review the seven behaviors with small incentives for right answers. All the body movements are demonstrated. This review is also a time when the students report about the exercise they have been doing and the hours of TV they have cut and other progress. They can report if they feel healthier or their clothes are fitting differently or any other reportable change.

Portion Sizes and Hidden Fat in Whoa Foods. Various sizes of bags of Flaming Hot Cheetos and Doritos are displayed before the group and a discussion is begun on the portion size of these Whoa foods. The contents of the Cheetos and Dorito bags have been prebagged into single serving sizes put back into the various sized bags. As the servings per each size bag are pulled out, the students count out loud the number of servings per each bag and compare with what their guess was.

A discussion of the amount of fat in the cheetos and chips follows with visuals of what a pound of fat looks like and a calculation of how many pounds a person would gain if he até a small bag of chips every day for a year, which is fifteen pounds. The instructor then removes a

five pound simulated fat strip that she has been wearing for the entire class, but hidden by clothes. The students visualize three times that amount of fat gain in one year by the extra daily consumption of one small bag of chips over a year. The simulated fat is compared with five pounds of simulated muscle and the students can see that the five pounds of fat takes up more volume that the five pounds of muscle. Much discussion is generated by this demonstration and there is time for hearing comments and answering questions.

Exercise Activity. The students jump rope to music and then to the rhyme they learned the previous class and they are challenged to jump through the entire rhyme. The entire class chants the rhyme while jumping. Water and Go snacks follow this vigorous activity.

Homework. The homework is the same as the previous week with one addition. All the students are given a ten dollar Stater Brothers coupon and are encouraged to go shopping with their parents and see what healthy go and Slow foods they can get with their shopping money. They are to bring the receipts back the next week.

Incentives. Students go home with incentives which get progressively better each week. The same procedure for first picks is repeated.

Class Four

Objectives. By the end of the class the students will be able to:

- Write out at least five of the seven behavioral objectives to prevent diabetes.
- Have the opportunity to express what they liked and did not like about the ENERGY Club.

Getting Settled/Started. After taking care of backpacks, turning in homework and getting name tags, the students go straight to their tables to have sugar free Jell-O sundaes with fat free whip cream and a bottle of water. An attempt is made for this final class to be celebratory.

Review. Homework is reviewed and there is discussion about what they bought with the coupon. There is time for feedback on the changes they have made during the past weeks. A final review of the seven behaviors is done with lots of demonstration of movements and prizes for correct answers and lively discussion of progress they have made.

Exercise Activity. The students get to choose what they want to play, either the sponge throw, jump roping or aerobics. There is time allotted to more activity in this session.

Final Exam. The students are given a paper on which is written a scenario of their best friend asking them what they learned in the ENERGY Club. They answer that they learned seven things to do that will keep them from getting diabetes. The test is to write down the seven things. There is also the option of writing down the things they liked or didn't like about the Club.

Final Challenge. The instructor challenges the students to continue the progress they have made in changing their behavior to prevent diabetes and become healthier. Encouragement and praise for successful changes is given.

Incentives. The students go home with incentives that are the best prizes of the session.

The curriculum as a teaching guide will be available in the Graduate Nursing Department of California State University San Bernardino.

CHAPTER FOUR

RESULTS

Goals and Objectives

The results of the ENERGY Club provided insightful information on the achievement of goals and the recommendations for the future. Tracks A and D went through the ENERGY Club once and Tracks B and C went through twice. The results will be presented in the categories of the two sets of goals and corresponding objectives set for program.

Program Achievement Goal and Objective

The program "achievement" goal was to increase the knowledge base of risk factors and prevention of type 2 diabetes of fourth and fifth graders screened to be at risk for type 2 diabetes. The corresponding objective was that by the end of the project, 50% of the students would attend four sessions of the ENERGY Club.

Track A. Twenty out of 24 at risk students attended the sessions, which is 83% attendance.

Track B. Twenty two out of 26 at risk students attended two full sessions, which is 85% attendance.

Track C. Thirteen out of 18 at risk students attended two full sessions, which is 72% attendance.

Track D. Twenty four out of 35 at risk students attended one full session, which is 69% attendance.

Summary. Out of 103 at risk fourth and fifth graders, a total of 79 or 77% attended the ENERGY Club for at least one full session. Thirty seven students attended the program twice. The program achievement goal of at least 50% participation was met.

Behavioral Change Knowledge Goal and Objective

The "behavioral change knowledge" goal was to expose the participating students to behaviors that would increase their healthy food choices and physical activity and decrease their unhealthy food choices and inactivity levels. The corresponding objective was that at the conclusion of the four sessions, 90% of the students would be able to list five out of the seven behavioral changes taught in the classes via a written response.

Track A. Only 80% of the 20 students who took the test were able to list five out of seven behavioral changes.

Track B. After the first session, 82% of the 22 students who took the test were able to list five out of seven changes, and after the second full session the percentage went up to 85%.

Track C. The students did not take the test after the first complete session. After the second session, 100% of the 11 students who took the test were able to name five out of the seven changes when they were asked to write them out.

Track D. Out of twenty who took the test, 90% were able to list five out of seven behavioral changes.

Summary. Overall, only 88% of the students who took the test were able to list five out of the seven behavioral changes taught in the ENERGY Club. The behavioral change knowledge goal was not met by a 2% margin. The smaller class tested the best, but after the second time through the session.

Homework Evaluation Results

The students were given homework after the first three classes, giving them a chance to self report on the behavioral changes made during the week. There were no goals and corresponding objectives set to evaluate homework completion. It is interesting to note that in reviewing the homework, much was learned about their progressive efforts to practice the behaviors discussed in class. The homework was either a graph they filled out to indicate changes they made, or a chart on which they recorded types of food they ate during the week. The

percentage of students who turned in the homework decreased each week, but the self report of practicing the behaviors taught in class increased each week.

Week One. Out of 77 homework sheets returned, 66% (51 students) indicated efforts in practicing behaviors taught in class one.

Week Two. There were two homework sheets given out after week 2 which added the listing of types of Go, Slow and Whoa food eaten each day. Fifty-five students returned the behavior graph, with 64% (35) completing it so as to indicate change. Forty-one completed the food chart, with 80% (33) reflecting good understanding of the different categories of food.

Week Three. Fewer homework sheets were returned, but a higher percentage of students indicated practice of behavior change. Thirty-nine students returned the behavior graph with 87% (34) indicating change. Forty-four returned the food chart with 86% (38) reflecting understanding of the types of foods.

Discussion and Conclusions

Discussion. Homework sheets were given out to all the students in the class. The students who returned the homework with written indication of changes made or foods eaten received "first pick" of the incentive items,

however, the incentives were of equal value and every student received one. Of the 590 sheets of homework handed out to the students, 256 sheets, or 46%, were collected. In reviewing all the returned homework, 75% of the homework sheets reflected practice of the behaviors taught in class. Types of behavior reflected in the completed homework were:

- Reducing and/or eliminating sugar containing beverages and an increase in drinking water
- Playing for one hour or more on a daily basis
- Decreasing television viewing to two hours on most days
- Eating slower during meals
- Eating more vegetables and lean protein
- Cutting out large portions of carbohydrates
- Decreasing high refined sugar and high fat foods

Handing out homework sheets was a systematic process at the end of each class. The collection of homework lacked consistency. The ENERGY Club typically began with a flurry of enthusiastic students coming into the room, scattering backpacks and either waving homework sheets to be collected or explaining why they didn't have homework to return. The enthusiasm took precedence over order, but

as a result, it is probable that many homework sheets were not accounted for at the beginning of class.

Conclusions. The homework was not used as a tool for data collection as the objectives in the pilot project focused on attendance and evidence of knowledge learned, rather than evidence of behavior change. However, the homework would be a useful tool to evaluate changes in behavior in any continuation of the project. Although the students self-reported changes, the method of evaluating evidence of change in this self reported tool needs to be refined to differentiate which of the seven behaviors were practiced and to what extent. The reading and writing skills of the students also needs to be considered in refining the homework sheets as a tool. It is possible that when graph boxes were not written in, but merely checked, the student was not able to write out the changes made; however, when homework was reviewed by the instructor the "checks only" in all graph boxes were counted as incompletes. In summary, the homework sheets completed by the students turned out to be a valuable source of data that needs to be included in further research of the project.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The Monterey School Diabetes Prevention Project demonstrates a transferable, affordable curriculum model called the ENERGY Club, designed for a school-based preventive program to decrease the risk of diabetes in their students via education in behavioral changes.

The purpose and scope of the project was based on data from a three-month community assessment. Community diagnoses guided the VMOSA program plan and evolving process objectives, action plans, timelines and program strategies. The curriculum of the ENERGY Club was designed for fourth and fifth graders who have risk factors for type 2 diabetes. A theoretical framework for behavioral change was used for curriculum development which incorporated the Health Belief Model, the Ecological Model, the Social Learning theory and the Theory of Planned Behavior as set forth by Burnet, Plaut, Courtney and Chin (2002). See Appendix B.

The project's significance in the field of study lies in the testing of a pilot curriculum that has been effective in the community and health care setting but was

adapted to a school-based setting. The transferable curriculum to teach behavioral changes that decrease risk of diabetes sets the stage for further research using empirical referents and data collection to determine if risk is decreased.

Conclusion

Monterey Elementary School had the unique opportunity of conducting a non-invasive screen of the student body for the risk of type 2 diabetes. Piloting the ENERGY Club curriculum proved successful in educating the at risk fourth and fifth grade students in behavioral changes they can choose practice to decrease their risk of diabetes. The content was presented over 45 minutes during the regular instructional day and the behavioral change knowledge goal was met by 88% of the students attending the program. There were no complaints from teachers about pulling students out of class to attend the program and there was no negative feedback from the students, apart from their disappointment that they could not attend every week. The incentives proved to be a useful in supplying this group of low-income students with play equipment that they can used to increase physical activity. Homework reported use of the equipment in their hour of play

encouraged each day. Aggregate data showed decreases in BMI in the students who attended the program (Larenco, personal communication, April 2007).

The project proved that a collaborative effort from local government, the school district and fiscal agents such as the United Way can work together in a grassroots effort to help children at risk of diabetes. It sets the stage for expansion and further research.

Recommendations

There are several recommendations based on some of the limitations of the project that were mentioned previously. One of the major disappointments was the lack of parental presence in the classes, even though the parents were encouraged to attend. The original plan was to involve parents and mentor them into being peer leaders. Parents did not respond in spite of personal phone calls, the availability of a bilingual teacher to conduct the sessions, posters all over the school and letters sent home with the students inviting the parents. It is recommended that more thought and effort be applied to different and more effective ways to get the parents involved. Future qualitative research via focus groups led

by bilingual researchers might tease out themes that are barriers to involvement.

The ENERGY Club curriculum is now ready for further data collection and evaluation of long-term rates of change in students' risk reduction. Pre/post tests, empirical referents to research self-efficacy and longitudinal studies of BMI changes would be beneficial and highly recommended. A tool for evaluating homework would be beneficial as well as establishing goals and objectives to determine actual practice of behaviors taught, with corresponding data collection on changes in levels of fitness. This project was a lesson in the planning and process of developing a pilot and was limited in the manpower hours needed to carry out more extensive data collection. A copy of the ENERGY Club manual will be made available to all the teachers and at the least it is recommended that they incorporate the various lessons in their classrooms.

Recommended Future Program

The recommendation is for Monterey Elementary School to continue to screen their student body for risk of diabetes at the beginning of each school year as they have done in 2006. The screening project could benefit from the

help of student nurses on the screening days to assuage the cost of nursing manpower for screening and data collection and evaluation. The school has the capability to store the data from the screening of height, weight and BMI of the students and can track changes in BMI for the students during the year. The ENERGY Club can be offered to either the fourth and fifth grades, which would be a repeat for the fifth graders who went through the curriculum in fourth grade, or it could be offered to lower grades. Existing tools or created tools for evaluating not only knowledge, but effectiveness of actual behavior changes should be used along with the changes in BMI to further the research. Grant funding will need to be secured to continue the incentives given to the students and funding for a primary investigator would be beneficial.

The pilot project for the developing and preliminary testing of the ENERGY Club curriculum is only the beginning of what might prove to be a successful on going school- based program in a local school with a high percentage of students at risk of diabetes. The setting is conducive to both qualitative and quantitative research to add to the knowledge gained from the pilot. Preventing diabetes in children is a major health concern for as

Nestle (2005) states, it "is not something you would wish on any child" (p. 1497). Efforts to help our children decrease their risk must continue.

APPENDIX A

APPROVAL LETTERS

Monterey
ELEMENTARY SCHOOL
OFFICE OF THE PRINCIPAL

794 E. Monterey Avenue
San Bernardino, California 92410
Telephone: (909) 388-6391

September 5, 2006

To Whom It May Concern:

The Monterey Mamas and Kids Diabetes Prevention Project has been fully endorsed by the San Bernardino Unified City School District. I have been informed of the components of the project and am in full agreement with the project occurring on the Monterey School campus.

I have met with Peggy Scoggin, the graduate student in the CSUSB School of Nursing and agree with her presence on my campus to direct the program.

Please contact me for further questions or concerns.

Ernestine Landeros

Principal of Monterey Elementary School

CALIFORNIA STATE UNIVERSITY
SAN BERNARDINO

5500 University Parkway, San Bernardino, CA 92407-2397

Institutional Review Board (IRB)
California State University, San Bernardino
Ph: (909) 537-5027 Fax: (909) 537-7028

December 15, 2006

CSUSB INSTITUTIONAL REVIEW BOARD
Exempt Review
IRB# 06029
Status
APPROVED

Ms. Peggy Scoggin
c/o: Professor Mary Molle
Department of Nursing
California State University
5500 University Parkway
San Bernardino, California 92407

Dear Ms. Scoggin:

Your application to use human subjects, titled, "Monterey Mamas' and Kids' Diabetes Prevention Program" has been reviewed and approved by the Chair of the Institutional Review Board (IRB) of California State University, San Bernardino and concurs that your application meets the requirements for exemption from IRB review Federal requirements under 45 CFR 46. As the researcher under the exempt category you do not have to follow the requirements under 45 CFR 46 which requires annual renewal and documentation of written informed consent which are not required for exempt review category. However, exempt status still requires you to attain consent from participants before conducting your research.

Although exempt from federal regulatory requirements under 45 CFR 46, the CSUSB Federal Wide Assurance does commit all research conducted by members of CSUSB to adhere to the Belmont Commission's ethical principles of respect, beneficence and justice. You must, therefore, still assure that a process of informed consent takes place, that the benefits of doing the research outweigh the risks, that risks are minimized, and that the burden, risks, and benefits of your research have been justly distributed.

You are required to 1) notify the IRB if any substantive changes are made in your research prospectus/protocol, 2) if any adverse events/serious adverse events (AE's/SAE's) are experienced by subjects during your research, and 3) when your project has ended. Failure to notify the IRB of the above, emphasizing items 1 and 2, may result in administrative disciplinary action. You are required to keep copies of the informed consent forms and data for at least three years.

If you have any questions regarding the IRB decision, please contact Michael Gillespie, IRB Secretary. Mr. Michael Gillespie can be reached by phone at (909) 537-5027, by fax at (909) 537-7028, or by email at mgillesp@csusb.edu. Please include your application identification number (above) in all correspondence.

Best of luck with your research.

Sincerely,

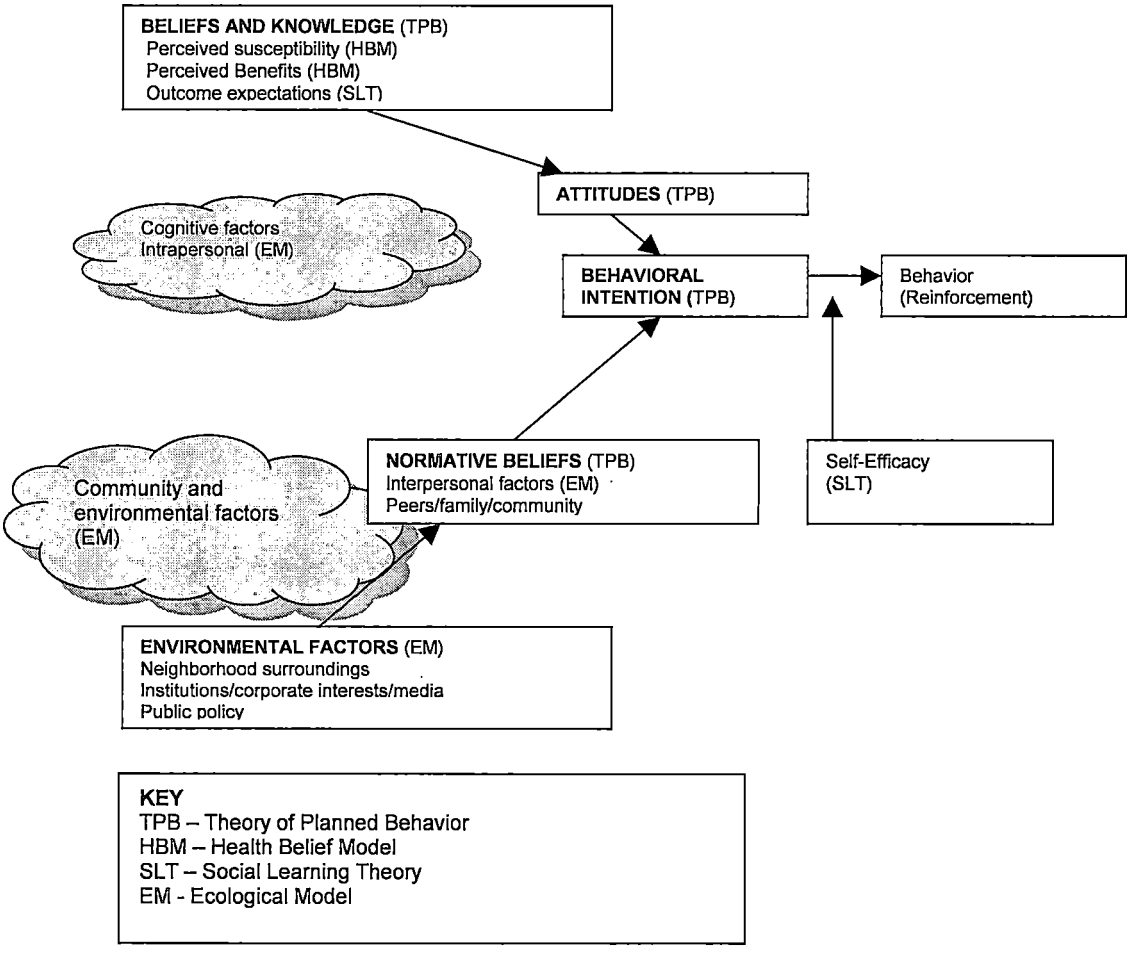
Samuel S. Kushner, Chair
Institutional Review Board

JL/mg

cc: Professor Mary Molle, Department of Nursing

APPENDIX B

TRANSTHEORETICAL FRAMEWORK FOR BEHAVIORAL CHANGE



Theoretical Framework for Behavioral Change
(Burnet, Plaut, Courtney and Chin, 2002, p. 783)
(used with permission of the author, May 2007)

APPENDIX C

ACTION PLAN CHART

Action Step	Person(s) Responsible	Target Date	Resources Required	Collaborators
Secure fiscal agent	Program director	October 2005 (met via AHUW)	5 hours research and meeting time-in-kind resource (INKR)	SB Public Health
Apply for CDBG and submit	Program director	Nov. 17, 2005	8 hours prep time (INKR)	Susan Longville, council member
All key stakeholders on board and contacted individually, in small groups or email. Input and advice received	Program Director	Majority of input by mid April, 2006 Continues throughout project	Estimated 20+ hours in communication time Computer/email (in kind resource) (INKR)	Preceptors and Dr. Molle
Project presentation to CBDG committee	Program Director	Feb. 23, 2006	2 hours prep and presentation time (INKR)	Susan Longville, council member
Dates secured on the school calendar for classes and training sessions for the staff	Program Director	End of April	2+ meeting time (INKR)	School principal, key mothers, PH translators, Pat Hawk, CDE (all key stakeholders)
Train the trainer curriculum development Selection of teaching staff	Pat Hawk, CDE Program Director	End of April	5 hours research and meeting time (INKR)	PH translator HEMG staff
Training of teaching staff	Pat Hawk, CDE	Training complete by June 1, 2006	Pat's salary secured by in-kind contribution	Program Director PH translator
Advertising for the health classes , campaign development and implementation	Key Monterey mothers Program Director	Start by April Continue through February 2007	2-5 hours, volunteer time Printing costs Flyer design Copying costs (INKR)	Monterey School Staff
Development of evaluation tools	Program Director	End of May	10+ hours research and development time (INKR)	Pat Hawk, CDE Dr. Mary Molle preceptor
Data Collection and Evaluation	Program director	Feb. 2007	10+ hours (INKR)	Dr. Mary Molle Project/thesis committee

APPENDIX D

EVALUATION CHECK POINTS OF ACTION PLANS

Evaluation Checkpoints	Action Step	Person(s) Responsible	Target Date	Resources Required	Collaborators
Month 3 12/31/05 (X)	Secure fiscal agent	Program director	October 2005	5 hours research and meeting time as in-kind resource (INKR)	SB Public Health
Month 3 12/31/05 (X)	Apply for CDBG and submit	Program director	Nov. 17, 2005	8 hours prep time (INKR)	Susan Longville, council member
Month 9 6/30/06 (x) Month 15 12/31/06 ( ) Month 21 6/30/06( )	All key stakeholders on board and contacted individually, in small groups or email Input and advice received	Program director	Majority of input by mid April, 2006 Continues until 6/07	Estimated 50+ hours Computer/email (INKR)	Preceptors and Dr. Molle
Month 6 3/31/06 (X)	Project presentation to CDBG committee	Program director	Feb. 23, 2006	2 hours prep and presentation time (INKR)	Susan Longville, council member
Month 9 6/30/06 ( ) Month 15 12/31/06( )	Dates secured on the school calendar for health screens, parent child classes and training sessions	Program director	End of April	10 hours meeting time (INKR)	School principal, school RN, key mothers, PH translators, Pat Hawk, CDE (all key stakeholders)
Month 9 6/30/06 ( ) Month 12 9/30/06 ( ) Month 18 03/31/07( )	Train the trainer curriculum development Selection of staff	Pat Hawk, Program director	End of April	20 hours research and meeting time (INKR)	PH translator HEMG staff Possibly CSUSB Nursing
Month 12 9/30/06 ( )	Training of bilingual educator	Pat Hawk, CDE	Training complete by end of August 2006	Pat's salary secured (INKR) kind 5-10 hours Trainees time-volunteer time with incentives given- 5 hours (INKR)	Program Director PH translator
Month 9 6/30/06 ( ) Month 15 12/31/06 ( ) Month 21 6/30/07 ( )	Advertising plan for the classes Advertising campaign	Key Monterey mothers Program director	Start by April Continue through June 2007	2-5 hours, volunteer time Printing costs Flyer design Copying costs (INKR)	Monterey School staff and key teachers
Month 18 3/31/07 ( )	Data Collection and Evaluation	Program director	May 2007	20+ hours (INKR)	Pat Hawk, CDE Dr. Mary Molle Project/thesis committee

APPENDIX E

PROGRAM OBJECTIVE CHART

Program Objective	Method(s)	Tool(s)	Personnel	Time Frame	Desired Outcome
At-risk students and their mothers to attend intervention program to learn how to prevent or offset the dx. of DM2	• Four-session intervention program held on school campus	• Self-designed curriculum for DM2 prevention • List of students to attend	• Peer trainers • Program director (PD)	• All tools ready by 8/06 Total of 8 sessions • 2 in 9/06 • 2 in 10/06 • 4 before 5/07	• Exact dates of class sessions on the school calendar by mid-April • 30% of identified at risk students to have attended a four session intervention program
Behavioral Knowledge Objective Students will list seven behavioral changes to prevent diabetes	• Tests • Verbal Review at each session	• Self-designed tests, and homework • Incentives for returned homework sheets	• Peer leader • PD	• Tools designed by 6/30/06 • Homework eval after each class	• At end of each session, 80% of students will list 5 out of 7 behaviors

APPENDIX F

ACTION STRATEGY CHART

Action Strategy	Method(s)	Tool(s)	Personnel	Time Frame	Desired Outcome
Funding	• CDBG appl.on process • Interview	• CDBG application • Collaboration sessions with CHOC, CSUSB, SB Public Health, and SBUCSD for in-kind and volunteer staff and space	• PD	• Secure fiscal agent by 10/05 • CDBG appl. submitted by 11/17/05 • Project presented to CDBG committee on 2/23/06 • In-kind facilities secured by 6/06	• IEUW agrees to be fiscal agent • Grant awarded for full $10,000 • Funding secured by mo. 9 checkpoint • Free facilities
Securing strong stake-hold er base	• Network • Collaborative meetings • Consulta-tion	• Notes during meetings	• PD	• Contact with all key stakeholders individually or in groups by mid-April • Contact throughout program	• Stakeholder support
Securing dates and sites on calendar for classes, and training sessions for the teaching staff	• Organiza-tional record • Verbal survey • Interview	• School calendar • CSUSB PH class schedule • Pat's schedule	• School Rn • CHOC CDE • CSUSB prof • PD	• Dates and sites secured by mid April	• VP schedules in all class dates on calendar • Classes can be held in MU room during school hours • Training sites are established • "Workability" of dates and sites evaluated at month 9 and again at month 15 checkpoints
Adver-tising Strategy	• Advertising committee • Media coverage at AUW • Adver-tising on campus	• Flyers • Letters sent home with students • Teacher flyers • School bulletins	• Key mothers. • Key school staff • Prin. Of School • PD	• Plan complete by June '06 • Flyers designed by mid-May	• 90% of risk students attending class screening • News paper article in the Sun newspaper

Action Strategy	Method(s)	Tool(s)	Personnel	Time Frame	Desired Outcome
IRB approval	• On-line appl.	• Consent forms • IRB required documents	• CSUSB IRB • PD	• IRB process complete by end of April • All required forms signed and returned by end of April	• IRB Approval or exemption • All requirements completed by month 9 checkpoint

APPENDIX G

BUDGET

Budget Categories	CDBG Via Arrowhead United Way	In Kind Funds	Contributed by:
Mileage Costs		300	All personnel
Meeting Facility		2500	SBCUSD
Utilities/Insurance		Unknown amount	SBCUSD
Incentives for students	5250		
Teaching supplies and	250	500	CASA grant
Project Director salary		15,000	MSN student clinical time
Bilingual peer leader	2000		
Consumable Supplies	2500		
Total	$10,000.00	$18,300.00	

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