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Evaluation of a Gender-Relevant Physical Activity After-School Program

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EVALUATION OF A GENDER-RELEVANT PHYSICAL ACTIVITY AFTER-
SCHOOL PROGRAM

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Master's Program in Public Health

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Dedication

To my parents, who always encouraged me to see the glass half full. You always knew that I was capable of handling anything and reminded me that there is a solution to every problem. Thank you for handling my stress and grouchiness.

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SCHOOL PROGRAM

by

VIANAY LOPEZ, BS

THESIS

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I'd like to give thanks to my family. My parents have been my emotional support and have always encouraged me to be successful. I've never felt anything less than loved and supported by the two of them. My dad who is my advisor has always guided me to a life of success and ambition. He never fails to remind me that I can be whoever I want with hard work and dedication. My mom who is my best friend has always been my rock and shoulder to cry on. She always knew when I needed a cup of coffee. To my two brothers who put up with my constant lap top use during Sunday Family days.

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Abstract

Background: Physical activity rates have decreased in the past 30 years. Physical activity rates decline further among girls as they reach adolescence, yet studies suggest girls are more inclined to participate in moderate-to-vigorous physical activity (MVPA) while among peers. When in close social networks, girls who have more physically active friends report being more active themselves. Several mentor-based programs throughout the United States have increased physical activity among preadolescent girls, indicating that gender-relevant physical activity programs may reverse their declining rates of physical activity.

Purpose: To evaluate if participation in a gender-relevant physical activity after-school program influenced participants' aerobic fitness, body composition, and physical activity self-efficacy.

Methods: Data were collected at baseline (T1) and mid-program (3 months, T2) for each variable (estimated $\text{VO}_{2\text{max}}$, body fat mass, lean body mass, and physical activity self-efficacy) within the control and intervention groups. Two-way ANOVA was conducted to examine the effect of the program intervention and time on each outcome variable.

Results: There were no significant differences for estimated $\text{VO}_{2\text{max}}$ or physical activity self-efficacy. There was a statistically significant effect on body fat mass by group, by time, and for the interaction (group x time): control ($14.69 \pm 7.09\text{kg}$ at T1 and $16.05 \pm 7.27\text{kg}$ at T2) and Aggie Play ($10.49 \pm 7.96\text{kg}$ at T1 and $10.61 \pm 7.91\text{kg}$ at T2); group $F(df\ 1)=3.87$, $p<0.01$; time $F(df\ 1)=22.9$, $p<0.01$; and group x time $F(df\ 1)=16.03$, $p<0.01$. There was a statistically significant effect on lean body mass by time and interaction (group x time), but not for the group effect: control ($28.82 \pm 6.56\text{kg}$ at T1 and $29.05 \pm 6.63\text{kg}$ at T2) and Aggie Play ($26.12 \pm 5.47\text{kg}$ at T1 and $26.98 \pm 5.70\text{kg}$ at T2); group $F(df\ 1)=1.69$, $p=0.02$; time $F(df\ 1)=15.7$, $p<0.01$; and group x time $F(df\ 1)=5.09$, $p<0.01$.

Conclusion: The results of this study indicate that after a three-month midpoint analysis a mentor-based after-school physical activity program can be beneficial. A major finding of the effectiveness of the program was the improvement in body composition.

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Chapter 1: Background and significance

1.1 OBESITY

The rate of obesity is increasing at an alarming rate with an estimation of more than 300 million people with obesity world-wide (Ahmad et al., 2010). There are multiple factors that contribute to obesity among children including low socioeconomic status, race, social networks, and inadequate physical activity among others. Obesity rates have more than quadrupled in adolescents in the last 30 years; about 40% of overweight children will continue to have increased weight during adolescence and they have a 75-80% chance of becoming overweight or obese into adulthood (Lifshitz, 2008). More than one-third of adults and 17% of youth in the United States are obese with stable rates observed between 2003-2004 and 2009-2010 (Ogden et al. 2014). Among adults, obesity is defined as having a body mass index (BMI) greater than or equal to 30 while among children obesity is defined as a BMI greater than or equal to the 95th percentile of the age and sex growth charts provided by the Centers for Disease and Control CDC; (Ogden et al. 2015).

1.1a Prevalence of obesity in children

The prevalence of overweight and obesity among children has increased in the U.S. from 1999 to 2014 (Sisson et al., 2009). From 2011 to 2014 it was estimated that almost 17 percent of youth ages 2 to 19 were obese; the rates were lowest among preschool aged children (8.9%, 2-5 years of age) compared to school aged children (17.5%, 6-11 years of age) and adolescents (20.5%, 12-19 years of age) (Ogden et al. 2015). Contributing factors include race, gender, and socioeconomic status (Levi et al., 2015). Childhood overweight is the most commonly seen nutritional disorder of US children and adolescents (Barlow & Dietz, 1998). Former Surgeon General Richard Carmona summarized the severity of childhood obesity (Carmona, 2014):

“Because of the increasing rates of obesity, unhealthy eating habits and physical inactivity, we may see the first generation that will be less healthy and have a shorter life expectancy than their parents.”

1.1b Childhood obesity rates by race

The burden of obesity has steadily increased over the last three decades with a greater burden among non-Hispanic blacks and Mexican American women (Kershaw et al., 2013). Childhood obesity also disproportionately affects minority groups. These groups tend to live in environments of high environmental stress, and studies link stress to obesity (Suglia et al., 2013). In a representative prospective cohort study, the prevalence of obesity increased by 120% among non-Hispanic black children, 65% among non-Hispanic white children, 50% among Hispanic children, and 40% among children from other races (Asian, Pacific Islander, Native American and multiracial children) (Cunningham et al., 2014). In another study, children with higher SES had lower odds of being overweight or obese. Specifically, in Hispanic children, by the age of 3 years, children in the highest SES quintile had about one-third the risk of children in the lowest SES quintile (Jones-Smith et al., 2014).

Researchers report early childhood risk factors are associated with obesity and are more prevalent among blacks and Hispanics than among non-Hispanic whites with the exception of excessive gestational weight gain (Brotman et al., 2012). In a study, participants’ early life risk factors for childhood obesity were measured including prenatal exposure to smoking, antenatal depression, introduction to solid foods at an early age, fast food intake at 3 years of age, and any sugar sweetened beverage intake at 2 years of age. Participants with these risk factors were more likely to have a BMI \geq 95TH percentile. This risks were greater among African American

(27.3%) and Hispanic (25.4%) children compared to non-Hispanic whites (7.2%) ($p<0.0001$) (Taveras et al., 2013).

1.2 PHYSICAL ACTIVITY

Metabolic equivalent is the ratio of rate of energy expended during an activity to the rate of energy expended at rest. One MET is equal to 1 kcal/kilogram/hour of energy expenditure, for example, sitting quietly. Light physical activity includes activities such as gardening or light house work where metabolic equivalents (METs) range from 1.0 to 3.0 (Pate et al. 2008). Moderate activity is defined as activity resulting in 3.0 to 6.0 METs such as walking fast and water aerobics (CDC, 2016). Vigorous activity is defined as METs greater than 6.0 resulting from activities such as jumping rope, running, or aerobic dancing. Rates of moderate-to-vigorous physical activity (MVPA) decline more rapidly among children 9 to 15 years of age with the cross over from pre-pubertal to post-pubertal status (Bradley et al., 2011). Fewer children achieve adequate levels of physical activity as they transition from childhood to adolescence (Maitland et al., 2014).

Recent studies suggest children are not meeting the recommended physical activity as they age (Marks et al., 2015). Children are achieving fewer minutes of MVPA during school time compared to weekday out of school hours and more so among females. In addition, minutes of light physical activity are declining with increasing grade level in school-aged children (Hubbard et al., 2016). Adolescents not meeting the recommended levels of physical activity and screen time limitations are more likely to be overweight than those complying with both recommendations (Laurson et al., 2008). Physical activity during childhood is associated with multiple health benefits including obesity prevention as well as improvements in cardiovascular fitness, bone mineral density, self-worth, and social engagement (Hubbard et al., 2016).

Excessive sedentary time and decreased physical activity are risk factors for obesity and are associated with health risks in childhood (Marks et al., 2015). In addition, physical inactivity is associated with morbidity and chronic diseases among youth (Nader et al., 2008).

1.2.1 Factors that influence physical activity: gender

1.2.1a Physical activity difference between girls and boys

Associations of MVPA and risk of overweight among adolescents who watch more than 4 hours of television per day are stronger in females compared to males, and there is a decrease in physical activity in females during adolescence (Eisenmann et al., 2008). Physical activity levels decline dramatically between the ages of 15 and 18 years of age, especially among females. Male adolescents report more hours per week of MVPA than female adolescents (Sirard et al., 2013). Studies using objective measures of total physical activity among school children have suggested girls are less active than boys during school time and are less likely to meet the total daily recommended physical activity time of at least 60 minutes of total daily activity (8.0% of girls meeting recommendation vs. 25.7% of boys meeting recommendation; $p < 0.0001$; Hubbard et al. 2016).

1.2.1b Why girls are less physically active than boys

Despite the evidence that adolescent girls have been observed to participate less in physical activity than boys, few studies have investigated the reasons for this difference. One study found non-Hispanic white girls who mature earlier (average age of start of menstruation of 11 years) report participating less in physical activity when compared to girls who mature at a later age (average age of 13) (Baker et al., 2007). Researchers attributed this to body insecurities among girls who mature early. Additional research has suggested that eating problems and body

image concerns in adolescent girls are transmitted by their peers though additional research is needed to confirm this finding (Brechtwald et al., 2011).

Participation in MVPA is influenced more by social support among female adolescents than among males. Physical activity among females is strongly influenced by friends as girls rate social aspects as some of the strongest appeals for their sports participation. Girls who have more physically active friends report being more active themselves, engaging in organized physical activity a similar amount of time when in a close social network (Macdonald-Wallis et al., 2011).

1.2.2 Factors that influence physical activity: socioeconomic status

Low socioeconomic status is associated with decreased physical activity (Burdette et al., 2006). Poor neighborhood characteristics, high crime rate, and neighborhood distrust are associated with decreased physical activity and increased sedentary behavior (Burdette et al., 2006). Neighborhoods influence opportunities for physical activity, and children living in areas of low socioeconomic status have limited access to parks, recreational centers, paved sidewalks, and adequate outdoor lighting (Frederick et al., 2014). Food insecurity may also be another reason for the link between low socioeconomic status and lower levels of physical activity. One study suggested children who experience food insecurity were emotionally exhausted and felt too tired or hungry to participate in physical activity (Fram et al., 2015).

1.2.3 Factors that influence physical activity: race

Levels of physical activity among Hispanics are significantly lower than whites and Blacks (Lee & Ferraro, 2007). Studies suggest decreased rates of physical activity are due to not having access to fitness centers, parks, and paved sidewalks, common in neighborhoods with a large Hispanic population. For instance, in a cross-sectional observational study of Latino

families, researchers concluded that lack of knowledge, information, and access to recreational facilities contributed to decreased physical activity among Latino children (Po'e et al., 2012).

1.2.4 Factors that influence physical activity: social networks

Studies suggest social influence is a contributing factor to increased physical activity and better health. Social influence theories propose that health-related behavior is influenced by a person's social context through various mechanisms such as peer modeling, imitation, and social learning (Marks et al., 2015). Peer influence is defined as a phenomenon characterized by the presence of both selection and socialization which may vary with age-related developmental milestones (Brechwald et al., 2011).

1.2.4a How family networks influence physical activity

Stability in the home environment attributes to obesity prevention specifically when having a consistent bedtime routine, reducing chaos and disorganization at home, and monitoring screen time (Appelhans et al., 2014). Stressful home environments and unavailability of parental emotional support are associated with behavioral problems and obesity as children are more inclined to use TV and eat poorly (Suglia et al., 2013). Studies suggest ineffective parenting increases the risk of behavior problems and obesity with lower rates of obesity found among families where there is a strong relationship between child and parent (Brotman et al., 2012).

Programs that target the entire family have been shown to have positive impacts on weight outcomes. For example, when incorporating the entire family in a program that promoted healthy eating and physical activity, improvements in weight and body fat were observed (Parra-Medina et al., 2015). In another study, families who enrolled in a family-based weight gain prevention program and worked together to increase and record their steps per day through fun, creative, family-oriented ways were more successful at preventing weight gain compared to

enrolled families that did not work together to increase and record their steps per day (Rodearmel et al., 2006).

Parents play an important role in influencing children's sedentary behaviors and physical activity (Maitland et al., 2014). Parents' encouragement and each parent's own level of physical activity is important for gender specific association with MVPA levels among children and the linear rate of decline in MVPA as detected in a longitudinal analysis of 801 participants (children 9-15 years of age and their parents) in 10 cities throughout the United States (Bradley et al. 2011).

1.2.4b How peer networks influence physical activity

Social support for physical activity is positively associated with higher physical activity in adolescents because individuals rely on behavioral cues from friends during adolescence, contributing to health-related behavior. There is a clear association between friendship network characteristics and physical activity and sedentary/screen time, particularly in the last years of childhood/early adolescence (Marks et al., 2015). Social influence among friends gives rise to similar behavior among peers due to the fact that youth befriend others who are already similar to themselves (Marks et al., 2015). As indicated in a study conducted in the Midwest, there was a social influence and a tendency for individuals to hang out with others of "the same kind" of weight class (Shoham et al., 2012).

According to social psychological research, what is considered to be social normality is likely to influence the initiation and maintenance of behaviors. Peers and friends are important models of physical activity during childhood and adolescence and are observed to engage more in physical activity when in the company of peers (Salvy et al., 2012). A study of more than 3000 adolescents and peers followed over 13 years in the United States found significant peer

effects for pursuing an active sport, regular exercise, and the frequency of eating in fast food restaurants (Ali et al., 2011).

Amounts of higher intensity physical activity are more likely influenced by social networks than overall physical activity levels (Macdonald-Wallis et al., 2011). During a cross sectional study, increased MVPA was associated with social influence in school and outside of school among both gender groups. The researchers suggested girls should be encouraged to engage in physical activity with their best friend as it was found that girls who partake in physical activity with their best friend obtain a higher level of physical activity than girls who partake in physical activity alone (Jago et al., 2011). In addition, a study conducted in Minneapolis measuring sedentary behavior and gender differences found that female adolescents had more social support for MVPA than male adolescents (Sirard et al., 2013).

Active close friends were associated with MVPA while lacking a friendship network was associated with sedentary behavior. Girls who reported higher perceived social support from friends and who were members of a clique were less likely to be highly sedentary (Sawka et al., 2014). Having a close group of friends influences peer routine activity level after school as was seen in a study of 81 school-aged children 5-12 years of age (Gesell et al., 2012).

1.3 FACTORS THAT INFLUENCE SEDENTARY BEHAVIOR: SCREEN TIME

Sedentary behavior refers to activities that do not increase energy expenditure above the resting level such as sitting, laying down, and watching television (Pate et al., 2008). With the development of new electronic multifunctional devices and interactive video games, sedentary behavior has increased significantly. In recent years, physical activity has decreased due to time spent watching television, contributing to detrimental health effects including overweight and obesity, reduced fitness, and poor social and cognitive skills (Maitland et al., 2014). In a cross

sectional study, increased sedentary behavior was positively associated with media equipment within the home (Maitland et al., 2014). One study surveyed households finding an association with more electronic devices in homes of low socioeconomic status, including in the rooms of children, than compared to homes with higher socioeconomic (Tandon et al., 2012).

1.4 PHYSICAL ACTIVITY PROGRAMS

Increasing all children's physical activity levels has become a national priority as children and adolescents are not meeting the recommended 60 minutes a day of physical activity (Pate et al., 2006). In an effort to address child and adolescent inactivity, the U.S. Department of Health and Human Services created evidence based physical activity guidelines to be implemented by programs (Strong et al., 2005). After-school programs continue to grow in sophistication, increase their offerings, and improve in quality (Weiss, 2013). There is a particular need for gender-relevant physical activity programs that address the lack of daily MVPA among girls (Beets et al., 2012, Huberty et al., 2014, Kumanyika et al., 2003).

A number of gender-specific after-school physical activity programs have been implemented in the U.S. to address the issue of decreased physical activity levels in girls. Many of these programs employ aspects of social cognitive theory, specifically demonstration of desired behavior using mentors or role models (Schunk, 1987). Reviewed here are programs that use a mentor based approach similar to the study described in this paper.

Annesi and colleagues implemented a program in the south targeting girls 9 to 12 years of age who were registered in a 12-week after-school care program (n=165, 64% female). The aim of the study was to test self-concept of physical activity and self-efficacy and assess voluntary physical activity. The children, 70% African American, 19% White, and 11% other ethnic group, were randomly assigned to one of two conditions: physical activity instruction

from an adult mentor for 45 minutes 3 times per week (2003 & 2005 Youth Fit For Life group) or uninstructed physical activity for 45 minutes 3 times per week. The children who received instruction reported increased voluntary physical activity (number of days participant reported completing MVPA session in the previous week [excluding PE class]) compared to the control group ($p < 0.001$). Using paired t tests, the authors reported children enrolled in the intervention group (2003 Youth Fit For Life, $n=41$) increased voluntary physical activity frequency/week from week 1 (2.39 ± 1.24 days of MVPA session/week) to week 12 (3.24 ± 1.26 days, $t(df\ 40)=4.93$, $p < 0.001$, $d=0.69$) compared to the control group ($n=40$) (2.25 ± 2.21 to 2.46 ± 2.18 days/week; $t(df\ 39)=1.07$, $p=0.29$, $d=0.10$). When compared to a second group of new participants in 2005, two years after the initial study, the intervention group ($n=84$) again had an increased voluntary physical activity frequency/week from week 1 (2.18 ± 2.03 days/week) to week 12 (3.42 ± 2.05 days/week; $t(df\ 83)=5.62$, $p < 0.001$, $d=0.61$). Contrasting the change in physical activity in the intervention groups from 2003 ($M_{\text{change}} = 0.85 \pm 1.01$) compared to 2005 ($M_{\text{change}} = 1.25 \pm 1.14$), the 2005 group had a significantly larger increase: $t(df\ 123)=2.00$, $p = 0.048$, $d = 0.36$) (Annesi, 2006).

Gabriel and colleagues used a quasi-experimental longitudinal study design to assess Girls on the Run, a program aimed at helping young girls to understand who they are and what is important to them by developing teams and healthy relationships through an adult and peer mentorship. Girls on the Run is designed to teach life and sport skills as a mechanism to build physical, psychological and social developments assets. The program encourages girls to develop life-long skills and motivates them to “celebrate the joy of movement” (Gabriel et al., 2011). Participants were 45.3% White, 20.8% African American, 12.6% Hispanic, 7.0% Asian/Native American, and 14.3% other racial groups. The program met twice a week in small teams for 12

weeks. A season-long assessment was conducted of girls 7-13 years old (n=877). Participants included girls who Never participated (did not participate in *Girls on the Run* before the pre-intervention evaluation or during the study period) (n=590), Newly participated (participated in *Girls on the Run* for the first time in the fall of 2008) (n=131), and Previously participated (participated in *Girls on the Run* in the past and during fall of 2008) (n=156). ANOVA and repeated measures of covariance analysis were used to compare pre and post outcomes. Girls who previously participated had higher physical activity commitment and physical activity compared to the never exposed group (see Table 1 for details) (Gabriel et al., 2011).

Table 1. Changes in self-esteem, physical activity commitment, and physical activity in girls Previously Exposed, Newly Exposed, or Never Exposed to Girls on the Run.

	Previously Participated* (n=156)	Newly Participated (n=131)	Never Participated (n=590)	<i>p</i> for Never Exposed vs Previously Exposed	<i>df</i>	<i>f</i>
Self-esteem	22.8±4.0	22.8±4.0	22.0±4.0	0.04	^NA	^NA
Physical activity commitment	25.6±4.8	25.2±4.8	24.3±4.8	0.006**	^NA	^NA
Physical activity	3.25±0.65	3.08±0.65	3.09±0.65	0.047*	^NA	^NA

* change in means from pre intervention to post intervention ± standard deviation. **p* <0.05; **

p <0.01. ^NA= not available

In another study, Barbeau and colleagues, evaluated a 10-month after-school physical activity program for 8-12-year-old African American girls. The aim of the program was to improve body composition and cardiovascular fitness. The girls in the intervention group were enrolled in 30 minutes of healthy snack time and 80-minutes of physical activity per day which included mentor-led 25-minute skill instruction, 35-minute aerobic physical activity, and 20-

minutes of strengthening/stretching every day after school for the duration of the program. The girls randomly assigned to the control group did not receive any intervention. Pearson and Spearman correlations were used to analyze the data. Percent body fat decreased after the program in the intervention group compared to the control group (intervention pre/post: $30.2 \pm 11.9 / 29.1 \pm 11.8$, control pre/post: $30.7 \pm 12.7 / 31.0 \pm 12.2$; [95% CI]: -2.01(-2.98, -1.04) $p < 0.0001$). Participation in moderate physical activity (hours/day) improved in the intervention group compared to the control group (intervention pre/post: $0.31 \pm 0.33 / 0.57 \pm 0.52$, control pre/post: $0.32 \pm 0.38 / 0.37 \pm 0.40$; [95% CI]: 0.21 (0.07, 0.34), $p = 0.004$) (Barbeau et al., 2007).

In another program, Scouting Nutrition & Activity Program (SNAP), Rosenkranz and colleagues studied a 5-month intervention to promote physical activity and healthy eating opportunities to girl scouts. The study analyzed the effectiveness of delivered intervention, healthful troop meeting environments and increase obesity prevention, delivered by trained Girl Scout Junior Troops. Girls 9 to 13 years old, non-Hispanic Caucasian (79.4% in the intervention group and 75.0% in the control group) and minority (20.6% in the intervention group and 25.0% in the control group), who were already registered in a Girl Scout Junior troop in Midwestern towns, were randomized into intervention ($n=34$) groups and control groups ($n=42$). The intervention groups were led by trained troop leaders that implemented policies promoting physical activity and healthful eating opportunities during bi-weekly group meetings. The intervention consisted of educational curriculum delivered by troop leaders, troop meeting policies, and badge assignments to be completed at home by Girl Scouts with parental assistance. The control group continued with regular activities, were not encouraged to engage in physical activity, and were offered unhealthy snacks during meeting times. A general linear model was used to determine the difference in both individual-level intervention (time 1 vs. time 2

comparisons) and monitored physical activity levels based on group conditions (intervention vs. control). Participants who were led by a trained troop leader, compared to a control troop leader, were exposed to more promotion of and knowledge content about physical activity and healthy eating: % exposure at meetings for intervention vs. control troops for physical activity knowledge content (6.0 vs. 0.3%, X^2 6.38, $p = 0.012$), healthy eating knowledge content (11.7 vs. 0.4%, X^2 13.64, $p < 0.001$), any PA promotion (16.6 vs. 1.5%, X^2 23.46, $p < 0.001$), any healthy eating promotion (18.9 vs. 0.4%, X^2 18.14, $p < 0.001$), and no PA or healthy eating promotion (64.5 vs. 99.1%, X^2 1167.7, $p < 0.001$) (Rosenkranz et al., 2010).

Through the Trial of Activity for Adolescent Girls (TAAG), Webber and colleagues incorporated the operant learning theory, social cognitive theory, organizational change theory, and the diffusion of innovation model in a social-ecological framework. The program was implemented to create environmental and organizational changes supportive of physical activity and establish more opportunities; improve social support and norms; and increase self-efficacy, outcome expectations, and behavioral skills to foster greater MVPA (Webber et al., 2008). The primary aim of TAAG was to reduce the age-related decline in MVPA among girls in middle school. The goal of the intervention was to determine if exposure to environmental factors and community based programs focused on increasing physical activity would result in increased MVPA. TAAG intervention included girls who were non-Hispanic White (19%), African American (21%), Hispanic (20%), and “other” (14%) ethnicity/race living in Arizona, California, Louisiana, Maryland, Minnesota, and South Carolina during 3 study years (2003, 2005, and 2006). The program linked school and community agencies to develop and promote physical activity programs for girls. YMCA or YWCA, local health clubs, and community recreation centers held activities including lunch-time Dance Dance revolution, after-school step aerobics

class, before-school open gym, basketball camp, touch football, and weekend canoe programs (Webber et al., 2008). Girls were randomized into intervention or control groups. The intervention group participated in 6 lessons focused on behavioral skills known to influence physical activity participation. The control group participated in regular PE classes. To promote awareness and participation of physical activity, TAAG used a social marketing approach. The difference in the mean percent of time spent in MVPA and VPA during PE class was significantly higher for intervention group from Spring 2006 (difference in mean % of time [95% CI]: 4.1 [0.5, 7.7]) but was not significantly different for Spring 2005 (3.9, [-1.6, 9.4]) or Spring 2003 (-0.1, [-4.9, 4.8]). Change in mean % body fat was not significantly different when comparing the control group to any of the intervention groups: Spring 2006 (difference in mean % body fat [95% CI]) 0.2 [-0.6, 1.1]; Spring 2005 (-0.3, [-1.2, 0.6]); Spring 2003 (-0.3, [-1.7, 1.2]) time points. Environmental influences to promote awareness and participation of physical activity had modest effects and were not consistent among the three intervention groups (Webber et al., 2008).

One effective program used a school-based intervention to increase PA among girls (5-18 years of age). Jones and colleagues developed interventions using enjoyable physical education (PE) strategies and addressing multiple levels of influence on behavior. Positive peer relationships and social support of friendship groups in a physical activity setting appear more promising than family support strategies which were reviewed as ineffective (Camacho-Miñano et al., 2011). Specifically reviewed here is a program that uses a school-based approach that incorporated role model success stories and social support. IMPACT, based in Houston, Texas, randomly assigned girls to a control or intervention group (control: n=606, intervention: n=718), 72% Non-Hispanic White, 12% Hispanic, 5% African American, 11% other ethnicity, from 12

schools (6th and 7th grade). The program used the Social Cognitive Theory and Trans-Theoretical Model to determine behavior change with the goal to improve bone health by increasing overall levels of physical activity. The objective of the study was to determine the intervention effects of IMPACT through the analysis of physical and sedentary activity endpoints. The program consisted of classroom lessons, a physical educational program, and a school food service component provided to the intervention group. IMPACT was implemented in 16 sessions during physical education classes (3 times/week). The program assessed the duration of weight-bearing physical activity (WBPA) and overall levels of vigorous activity. Using ANOVA, students in the intervention group compared to the control group had no difference in minutes/day WBPA (mean \pm standard error) intervention: 92.17 ± 3.64 , control: 87.05 ± 3.74 ; [95% CI]: (4.82,5.42), $p=0.33$), but had an increase in minutes/day of vigorous activity (intervention: 20.35 ± 2.18 , control: 14.35 ± 2.24 ; [95% CI]: (5.82,6.18), $p=0.05$ (Jones et al., 2008).

Chapter 2: An after-school program targeting physical fitness in adolescent girls

2.1 PROGRAM BACKGROUND AND DESCRIPTION OF ACTIVITIES

Given the research, gender-relevant physical activity programming may address the gap in daily MVPA rates and perceptions of physical activity by girls (Beets et al., 2012; Huberty et al., 2003). The Bay Area Women's Sports Initiative (BAWSI) was developed in San Francisco, CA using volunteer college female athletes as role models for young girls. BAWSI serves young girls in the San Francisco region by providing opportunities for and exposure to organized sports and physical education classes, with a focus on reaching communities where obesity and diabetes are prevalent. Patterned after the BAWSI program, Aggie Play, now being implemented in Las Cruces, NM, uses the influence of positive female role models to motivate young girls, ages 8-11, to engage in high-energy physical activity for 60 minutes during after-school time. Aggie Play volunteers educate female youth about the positive aspects of physical activity. Aggie Play outcomes are being assessed at three time points during the school year to examine how a gender relevant physical activity after-school program affects elementary school girls' body composition, fitness, and physical activity rates, as well as their perceptions of physical activity. The program is integrated into a local nonprofit afterschool program called Enrich the Kids in Doña Ana county, NM. Enrich the Kids provides afterschool programming for five elementary schools through childcare services at the school site and enriching activities for children, though it does not offer physical activity programming. With funding from the Paso del Norte Health Foundation, Aggie Play will be integrated into Enrich the Kids to provide girls with gender-relevant physical activity programming throughout the year (Post & Palacios, 2016). NMSU female athletes and kinesiology undergraduate students are volunteering as role models and coaches to engage the girls in fun physical activity games.

Patterned after BAWSI, Aggie Play uses similar activities to engage participants in fun physical activity. Activities are group-based with a role model (college athlete or student) who participates along side the young girls. The participants are encouraged to assist in leading the routine while other activities require alternating leaders. The girls are encouraged to motivate each other through challenges such as racing between groups to see which group untangles themselves the quickest after reaching the end of a line in a three leg race. Girls are encouraged to lead the groups in poses during yoga, challenging each other to hold their yoga positions. The variation in group activities allows the girls to stay motivated to participate in physical activity while having fun with their peers. Activities used by Aggie Play incorporate challenging, but fun, physical activity while encouraging the girls to develop leadership abilities. The use of mentoring has been incorporated to motivate young girls to participate in physical activity. The influence of teen and young adults has been demonstrated to be effective among elementary school-age children (Karcher, 2005; Starkey et al., 2009). Female college students mentor elementary school girls participating in Aggie Play as opposed to the use of parents as traditional models of mentoring.

2.2 AGGIE PLAY: A THEORY BASED PROGRAM

Aggie Play is based on multiple behavioral theories. Environmental, personal, and behavioral factors influence human behavior. Aggie Play capitalizes on the theory that role models are imitated most frequently when observers perceive that the role models are similar to themselves, making peer modeling a well-recognized method for influencing behavior (Schunk, 1987). In addition, children of the same age are more likely to imitate their peers and those older than they are (Brody et al., 1981).

Social Cognitive theory has been effectively applied for personal and social change. It integrates self-efficacy, confidence in one's ability to take action (by providing training and guidance in performing recommended actions), use of progressive goal setting, provision of verbal reinforcement, and demonstration of desired behavior. BAWSI, and by extension, Aggie Play, encourages physical activity self-efficacy by engaging young girls to build knowledge and skills related to physical activity and overall fitness so they may independently pursue similar activities outside of the program in the future. In addition to increasing the amount and type of physical activity among young girls, BAWSI has been shown to increase girls' self-efficacy to engage in physical activity while also enhancing positive body image (Post et al., 2016).

2.3 PROGRAM OBJECTIVE: AGGIE PLAY WILL ADDRESS THE HEAL STRATEGIC PLAN GOAL OF INCREASING PHYSICAL ACTIVITY AND DECREASING SEDENTARY BEHAVIOR

Program Aim 1: Integrate Aggie Play into the Enrich the Kids program at one of its five school sites. All girls in grades 3-5 who are students at the school site will be eligible to participate in Aggie Play twice a week throughout the school year. Aggie Play will use gender-relevant physical activity curriculum developed by BAWSI Girls. Volunteer female athletes and kinesiology undergraduate students at NMSU will serve as coaches to engage the girls (8-11 years old) in fun physical activity games created by BAWSI.

Program Aim 2: Test the effectiveness of bi-weekly gender-relevant physical activity programming on enhancing: 1) MVPA, 2) Fitness, 3) Self-efficacy to engage in physical activity, 4) Body composition, and 5) Anthropometric measurements: weight, height, and waist circumference.

Chapter 3: Hypotheses

The hypotheses that will be tested for this thesis project include:

H1a Participants in Aggie Play will increase calculated VO_{2max} compared to baseline

H1b Participants in Aggie Play will increase calculated VO_{2max} compared to control group

H2a Participants in Aggie Play will decrease body fat mass and increase lean body mass compared to baseline

H2b Participants in Aggie Play will decrease body fat mass and increase lean body mass compared to control

H3a Participants in Aggie Play will increase Physical Activity Self-Efficacy Scale (PASES) scores compared to baseline

H3b Participants in Aggie Play will increase Physical Activity Self-Efficacy Scale (PASES) scores compared to control

Chapter 4: Methods

Study population

Recruitment took place at two elementary schools in Las Cruces, New Mexico. Children enrolled in Enrich the Kids were invited to participate in Aggie Play at no additional charge. Enrich the kids is a non-profit after-school program offered at five Las Cruces elementary schools. The program provides basic childcare services at the school site and activities such as arts and crafts, tutoring, and dance classes. However, the program does not offer a structured physical activity regiment. All of the methods described were fully approved by the University of Texas at El Paso Institutional Review Board, by the New Mexico State University Institutional Review Board, and the Las Cruces Public Schools analysis and research department.

Study participants

Participants were recruited through promotional flyers (English and Spanish) sent to parents of girls who attend the selected school sites during the 2016-2017 school year. Student athletes and NMSU kinesiology students were recruited as role models for the program.

Inclusion criteria for participation included girls 8-11 years of age of any ethnic background enrolled at two elementary schools in Las Cruces, New Mexico.

Participation was voluntary. The details of the program were explained to the children's parents through a flyer. Children's parents completed a consent form prior to program participation. Child assent forms were provided to the girls eligible for participation prior to participation in the program. All flyers and consent/assent forms were available in English and Spanish.

Participants received an Aggie Play t-shirt and a \$5 gift card for each of the assessment days throughout the school year. Girls who completed the majority of Aggie Play sessions and all assessment days were entered into a drawing to win an iPad.

Data were collected by NMSU researchers and the Paso del Norte Institute for Healthy Living during the 2016-2017 Las Cruces school year. Data collection was done during the scheduled Aggie Play program period. Data collection days included a pre-assessment prior to the start of the program in August (Time 1, T1) and three months after the start of the program (Time 2, T2).

Outcome Measures

During the two data collection periods, the following measurements were taken from the girls:

1. Aerobic fitness was assessed with an estimate of VO_{2max} calculated from the Progressive Aerobic Capacity Endurance Run (PACER) test (Boiarskaia, et al., 2011) using the following equation: $VO_{2max} = 41.77 + (\text{pacerlaps} * 0.49) - 0.0029 * (\text{pacerlaps}^2) - (0.62 * \text{bmi}) + 0.35 * (\text{age} * \text{gender})$
2. Body composition was measured by bioelectrical impedance analysis (BIA) using the InBody 230 Body Composition Analyzer (Lee et al., 2017). Specifically, this device uses 8-point tactile electrode system and direct segmental multi-frequency bioelectrical impedance analysis (DSM-BIA; Anderson et al., 2012). Outputs used for this study were lean body mass (LBM; kg) and body fat mass (BFM; kg).
3. Physical activity self-efficacy was measured using the Physical Activity Self-Efficacy Scale (PASES) (Appendix 2) (Bartholomew, 2006). The self-report survey was available to the girls in both English and Spanish. Study personnel explained how to fill out the instrument and answer any questions.

Statistical Analysis

All data were collected and cleaned using Microsoft Excel and Google Sheets. Data were sorted, merged, and analyzed using SPSS version 23. Continuous variables in this study included age, LBM, BFM, and estimated VO_{2max} . The 8-question survey from the self-reported Physical Activity Self-Efficacy scale (PASES) was treated as a continuous variable as the number of questions indicated the data were continuous and not categorical based on a Likert Scale. Please refer to Appendix 2 for specific questions.

To determine the appropriate statistical analysis, the data were checked for normality. Two-way ANOVAs were used to determine the difference in means from T1 and T2 within each variable (estimated VO_{2max} , BFM, LBM, and self-efficacy scores) between the control and the Aggie Play groups.

Chapter 5: Results

Description of Study Participants

Study participant demographics are described in Table 2 by outcome measure. Number of participants varied by outcome due to absences on different days of data collection.

Table 2: Demographics for Control (a, b, and c) and Aggie Play (d, e, and f) by outcome (a and d: VO_{2max}; b and c: BIA; c and f: self-efficacy).

a.

Control: VO _{2max} Demographics	
Age (mean±SD)	9.06±0.94
Total n	34
Hispanic	24
Non-Hispanic	5
Not Answered	5

b.

Control: BIA Demographics	
Age (mean±SD)	9.23±0.89
Total n	13
Hispanic	8
Non-Hispanic	2
Not Answered	3

c.

Control: Self-Efficacy Demographics	
Age (mean±SD)	9.09±0.93
Total n	33
Hispanic	24
Non-Hispanic	5
Not Answered	4

d.

Aggie Play: VO _{2max} Demographics	
Age (mean±SD)	8.95±0.94
Total n	41
Hispanic	19
Non-Hispanic	22
Not Answered	0

e.

Aggie Play: BIA Demographics	
Age (mean±SD)	8.91±0.95
Total n	44
Hispanic	20
Non-Hispanic	24
Not Answered	0

f.

Aggie Play: Self-Efficacy Demographics	
Age (mean±SD)	9.13±0.87
Total n	36
Hispanic	14
Non-Hispanic	21
Not Answered	1

VO_{2max} Score

There was not a significant change in VO_{2max} scores in the control group from T1 (mean \pm SD: 35.25 \pm 4.6 ml/min/kg) to T2 (35.02 \pm 5.91 ml/min/kg) or Aggie Play group from T1 (36.32 \pm 4.71 ml/min/kg) to T2 (36.83 \pm 5.73 units ml/min/kg; between group (F(df 1)=1.55, p =0.22), time (F(df 1)=0.3, p =0.58), or group x time (F(df 1)=2.33, p =0.13); Table 3).

Body Fat Mass and Lean Body Mass

There was a statistically significant interaction between the effects of group, time, and group x time on BFM. The control group BFM mean and SD at T1 and T2, respectively, 14.69 \pm 7.09 kg and 16.05 \pm 7.27 kg (Table 3). The Aggie Play group BFM mean and SD at T1 and T2, respectively 10.49 \pm 7.96 kg and 10.61 \pm 7.91 kg; between group (F(df 1)=3.87, p <0.01), time (F(df 1)=22.9, p <0.01), and group x time (F(df 1)=16.03, p <0.01); Table 3).

There was a statistically significant interaction between the effects of time and group x time on LBM. The control group LBM mean and SD at T1 and T2, respectively, 28.82 \pm 6.56 kg and 29.05 \pm 6.63 kg. The Aggie Play group LBM mean and SD at T1 and T2, respectively 26.12 \pm 5.47 kg and 26.98 \pm 5.7 kg; between group (F(df 1)=1.69, p =0.2), time (F(df 1)=15.7, p <0.01), and group x time (F(df 1)=5.09, p <0.01); Table 3).

Self-Efficacy

Initially the self-efficacy scale did not meet requirements for reliability (Cronbach's alpha = 0.5). Self-efficacy item 3 did not correlate well with other items in the scale. Removing item 3 improved the reliability of the scale to an acceptable level (Cronbach's alpha = 0.7). Cronbach's alpha at T2 responses was low even without item 3. The control group self-efficacy survey mean and SD at T1 and T2, respectively 2.67 \pm 0.36 score and 2.63 \pm 0.31 score (Table 3). The Aggie Play group self-efficacy survey mean and SD at T1 and T2, respectively 2.73 \pm 0.27 score and

2.72 \pm 0.27score; between the group (F(df 1)=1.29, p =0.26), time (F(df 1)=0.46, p =0.50), or group x time (F(df 1)=0.18, p =0.67; Table 3).

Table 3: Outcome data for control and Aggie Play groups at T1 and T2

		T1		T2		Group			Time			Group x Time			Total df
		Mean	SD	Mean	SD	df	F	p	df	F	p	df	F	p	
VO ₂ max (ml/min/kg)	Control (n=34)	35.25	4.60	35.02	5.91	1	1.55	0.22	1	0.3	0.58	1	2.33	0.13	73
	Aggie Play (n=41)	36.32	4.71	36.83	5.73										
Body Fat Mass (kg)	Control (n=13)	14.69	7.09	16.05	7.27	1	3.87	$p<0.01$	1	22.9	$p<0.01$	1	16.03	$p<0.01$	55
	Aggie Play (n=44)	10.49	7.96	10.61	7.91										
Lean Body Mass (kg)	Control (n=13)	28.82	6.56	29.05	6.63	1	1.69	0.2	1	15.7	$p<0.01$	1	5.09	$p<0.01$	55
	Aggie Play (n=44)	26.12	5.47	26.98	5.70										
Self- Efficacy (score)	Control (n=33)	2.67	0.36	2.63	0.31	1	1.29	0.26	1	0.46	0.5	1	0.18	0.67	67
	Aggie Play (n=36)	2.73	0.27	2.72	0.27										

Chapter 6: Discussion

The results of this study indicate that after a three-month midpoint analysis a mentor-based after-school physical activity program can be beneficial. Our hypotheses related to body composition were supported. However, our hypotheses related to estimated VO_{2max} and physical activity self-efficacy were not supported.

Most studies looking at after school mentor-based physical activity programs targeting girls did not report BMI or physical activity. Two studies reported BMI, but neither found an impact on BMI (Fairclough et al., 2005; Rosenkranz et al., 2010). Two studies assessed changes in body composition. One study found the intervention group lost fat mass while the control group gained fat mass (Barbeau et al., 2007). Another study found no significant differences between intervention and control groups (Webber et al., 2008).

There were no significant changes in either group for estimated VO_{2max} . VO_{2max} is used as an indicator of aerobic fitness. The lack of impact on this outcome may be due to the duration of the assessment period (3 months) and the level of intensity of the intervention. This study only analyzed the first 3 months of the program, but the program is designed to span the entire school year (9 months). It is more likely that an impact could be achieved after 9 months. In addition, this program was only offered twice a week for 60 minutes. That amount of physical activity alone may not increase aerobic fitness. However, one goal of Aggie Play is to increase girls' enjoyment of physical activity so that they will be more physically active outside of program time as well.

There were no changes in self-efficacy in either group. However, the reliability of the self-efficacy assessment tool was questionable. In this study, the 8-item PASES survey was located at the end of a total of 24 survey questions (3 validated survey tools used consecutively)

which may have resulted in survey fatigue. Another study found the 17-item, 3-factor version of PASES resulted in poor reliability, but the 8-item version of the survey resulted in improved reliability (Bartholomew et al., 2006). For future evaluations, one strategy to address this potential for survey fatigue would be to separate the 3 survey tools, administering them at different time points during the overall evaluation period. For example, participants could complete one survey followed by fitness testing, followed by another surveyed.

Strengths and Limitations

A major strength of the study is the inclusion of fitness measures that are objective rather than relying on self-report of physical activity which has not been done in most studies of this kind (Annesi et al., 2006; Barbeau et al., 2007; Gabriel et al., 2011; Jones et al., 2008; Rosenkranz et al., 2010). VO_{2max} is considered a criterion measure of aerobic fitness (Boiarskaia, et al., 2011). Measuring VO_{2max} directly requires specialized equipment that cannot be used in a field setting such as the school playground. Therefore, the PACER test was developed for measurements of aerobic fitness in field settings such as schools (Leger et al., 1988).

Another strength of the study is the use of objective measures of body composition rather than reliance on changes in measured or self-reported BMI. Multiple methods can be used for assessing body composition in children, all with various advantages and disadvantages (Wells and Fewtrell, 2006). This protocol required a method that is portable, ruling out methods that require a clinical or laboratory environment (e.g. dual x-ray absorptiometry, air-displacement plethysmography, underwater weighing, etc.). Therefore, for this study, the InBody 230 BIA was used. Not only is this device portable, it also integrates many BIA innovations that improve accuracy. This device uses electrodes that contact the skin in both hands and both feet, with two electrodes at each point. By measuring impedance across the entire body (rather than foot-to-foot

or hand-to-hand as in some devices), no empirical equations are used to predict body composition. Multiple frequencies are used to ensure measurement of both extracellular (low frequency) and intracellular (high frequency) body water, making the total body water measurement (and therefore, the lean body mass measurement) more accurate. The use of direct segmental analysis allows for separate measures of impedance in the arms, legs, and trunk, leading to a more accurate overall assessment of body composition compared to methods that use a whole-body impedance assessment, which has been confirmed in children (Fuller et al. 2002). The InBody 230 has been validated in children (Lee et al., 2017) but the reference method used was dual x-ray absorptiometry which has its own limitations in assessing body composition in children when compared to the four-compartment model (Wells et al., 2010). However, using BIA in children longitudinally to assess changes in body composition has been shown to be reliable (Haroun et al., 2009).

One weakness of the study was the high attrition rates and inability to randomize participants. High attrition rates are common in community settings. In this study, many girls had conflicting activities at T2. Future work will include focus groups with participants to help researchers better understand ways to maintain participation rates. An additional weakness of the study was the inability to randomize participants. Randomization within a school site was not feasible (after school program leadership wanted all girls to have the option to participate). In addition, many participants were unable to report date of birth and ethnicity. This issue could be remedied in future studies if researchers can retrieve data from school records or have parents provide demographic data.

Future development

It is evident that mentor-based physical activity programs are successful in motivating young girls to be physically active (Annesi et al., 2006; Barbeau et al., 2007; Gabriel et al., 2011; Jones et al., 2008; Rosenkranz et al., 2010). Aggie Play, patterned after BAWSI, uses a similar list of physical activities to keep the girls motivated to be physically active and have fun while doing so. Requirement for BAWSI athlete leadership team members includes the involvement in curriculum development and participation in weekly discussions and assignments focused on topics such as leadership principles and practices. Developers of Aggie Play have recognized that additional leadership development provided to student athlete mentors will strengthen the program. Future plans include such development for mentors and evaluation of student athlete satisfaction. In addition, efforts are in place to develop sustainability strategies for Aggie Play. Incorporating community resources and stakeholders as support for Aggie Play may increase the likelihood of continued success of the program. For example, BAWSI uses a team approach that includes a chief executive officer, project coordinator, and support of multiple schools to ensure the success of the program.

Chapter 7: Conclusion

Given the well-documented decline in physical activity in preadolescent females there is a need for evidence-based programming that will mitigate that decline. In a preliminary assessment of data collected midway through the intervention, this mentor-based program shows promising impact on body composition. Longer duration of the program may lead to impacts on aerobic fitness and physical activity self-efficacy. Additional training for mentors may enhance the program and future consideration should be given to mentor development and satisfaction.

Chapter 8: MPH Core Competencies

The curriculum and student learning activities of the Masters of Public Health (MPH) program at the University of Texas at El Paso (UTEP) are shaped by 6 core competencies. This study addressed 5 core competencies that helped shape the research methodology and practices.

8.1 Biostatistics

Biostatistics is the statistical application of reasoning, analyzing, and solving problems in areas of public health. To determine the effectiveness of Aggie Play, statistical analysis were necessary. Techniques and interpretation of vital statistics were an important aspect in the evaluation of the program mentioned in this study.

8.2 Environmental Health Sciences Core Competencies

Environmental factors affect the health of a community; physical barriers are considered a factor. Research for this project included the effect of socioeconomic status on the rates of physical fitness. Low socioeconomic status has been associated with decreased physical activity.

8.3 Epidemiology

Epidemiology is the study of patterns of disease in human populations in an effort to control health problems. The program in this study analyzed the prevalence of obesity, a public health concern, and implemented a program to address one factor associated with obesity rates.

8.4 Social and Behavioral Sciences

In public health, social and behavioral sciences address the behavioral, social, and cultural factors related to individual and population health and health disparities over the life course. The program in this study address the social cognitive theory of social and behavioral change. Aggie Play uses the influence of mentors to engage young girls to be physically active because girls tend to be more active in social circles.

8.5 Hispanic & Border Health Concentration Competencies

Hispanic & Border Health is specific to the UTEP MPH program. Living along the border region, there is a unique exposure to health practices between three different populations. The location of the program addressed in this study was in the city of Las Cruces. It was an advantage to compare programs practicing the HEAL initiative in Juarez, MX, Las Cruces, NM, and in El Paso, TX.

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Appendix 1

Paso del Norte Institute for Healthy Living
FitnessGram Score Sheet

Program Name: _____
Data Collector Name: _____
Location: _____
Date: _____
Total pages: _____ Entered online ☐

FitnessGram Ethnic Codes	
000- Unknown	400- Filipino
100- Am. Indian/Alaska Na	500- Hispanic/Latino
200- Asian	600- African Am./Black
300- Native Am./Pac. Islan	700- Caucasian/White
	800- Other

[illegible]

Pg. ____ of ____

Appendix 2

Physical Activity Self-Efficacy Scale (PASES) – validated with Hispanic & Caucasian Children

1. I can be physically active most days after school
2. I can ask my parent/other adult to do physically active things with me
3. I can be physically active even if I could watch TV/play video games
4. I can be physically active even if it is very hot or cold outside
5. I can be physically active even if I have to stay at home
6. I have the skills I need to be physically active
7. I can be physically active no matter how busy my day is
8. I can ask my best friend to be physically active with me

!

!

Response on a 3-pt Likert-type scale!!

No!(0), Not sure!(1), Yes!(2)!

!

Vita

Vianay Lopez has an educational background in biology with a concentration in biomedical sciences from the University of Texas at El Paso (UTEP). Vianay has exposure to healthcare in the clinical setting and now has experience with preventive health in the community setting. It was her exposure in the clinical setting which sparked her interest in the prevention of childhood obesity. Now pursuing a Master's degree in Public Health (MPH), she has focused on research in healthy eating and active living among the Hispanic community along the border region. She is currently working as a Graduate Research Assistant under the direction and mentorship of Executive Director, Dr. Leah Whigham at the Institute for Healthy Living (IHL). The Institute is an organization that provides leadership and innovative approaches to support regional community efforts that promote nutrition, healthy eating behaviors, and physical activity. Vianay is an active member and current President of Students for Public Health (SPH), a graduate organization in the MPH program.

Upon completion of her MPH, Vianay will continue her work at the IHL where she will use her education and experience to analyze data collected by the institute from programs funded by the Paso del Norte Health Foundation and implemented in the cities of El Paso, Las Cruces, and Cd. Juarez. Vianay hopes to further her education and return to the clinical setting.

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This thesis was typed by Vianay Lopez