REFLECTING ON GRATITUDE: PROMOTING HEALTHY LIFESTYLES IN ADULTS

by

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STATEMENT OF DISSERTATION APPROVAL

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ABSTRACT

The main aim of this study was to examine the effectiveness of an innovative health prevention program, the Healthy and Fit Adults Program (HFAP). The HFAP consists of five sessions designed after an effective evidence-based family skills training intervention, the Strengthening Families Program, which uses Bandura's (1986) Social Cognitive Theory in order to increase protective factors against health risk behaviors. The HFAP intervention included two elements (reflecting on gratitude and expressive writing as the vehicle to reflect on gratitude) as means to improve healthy behaviors. It was hypothesized that those participating in the HFAP would increase health protective factors against obesity (physical activity) and decrease health risk factors for obesity (excessive weight and depression).

This study employed a quasi-experimental design (no treatment comparison and treatment groups) in order to assess the impact of the HFAP on the health behaviors of 48 voluntary participants ages 31 to 45. Standardized measures included self-reported scales to measure physical activity (IPAQ), gratitude (GQ-6), and depression (CES-D) as well as objective measures (pedometer and BMI). Data were collected and analyzed using parametric and nonparametric tests (RM-ANOVAS, ANCOVA, Paired Samples *t* test, Wilcoxon Signed Ranks Tests, Spearman Correlation Coefficient).

Results showed statistically significant increases in self-reported gratitude as well as a significant decrease in depression scores within the experimental group from pretest to posttest. Self-reported physical activity measured in METs also increased significantly within the experimental group from pretest to posttest. These results were only statistically significant when baseline differences between groups were not accounted for. When baseline differences were considered (ANCOVA), the differences in main outcomes (physical activity in METs and steps, gratitude, BMI, and depression) between comparison and treatment groups from pretest to posttest were not statistically significant. There was, however, a statistically significant moderate negative correlation between levels of gratitude and depression among participants.

In this study, reflecting and practicing gratitude seemed to contribute to healthier psychological self-perceptions of participants (i.e., improved gratitude and decreased depression). Findings are discussed and suggestions for future research and interventions aiming to prevent obesity among adults are provided.

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ACKNOWLEDGEMENTS

After years searching for the true purpose of life, I became member of the Church of Jesus Christ of Latter-Day Saints. Such event took place in my hometown, Gandía (Valencia, Spain) on August 29th 1998. A few years later, the missionary who baptized me, Elder David Boyle, invited me to come to USA in order to learn English. I accepted, and I also considered his challenge to pursue a doctoral degree. I did not feel very motivated to stretch myself to the point of going through grad school in a foreign country away from home and family. I prayed about it and I received the following answer: "if you get a PhD, your family and descendants will be greatly blessed." My heart was filled with peace and joy. I took courage and I made up my mind that I would go for it. The advice of a living prophet, President Hinckley, regarding pursuing as much education as possible, also resonated in my heart and helped during times of discouragement.

Now, about four years later, as I recall the reasons for which I pursued my degree, I feel gratitude in my heart and I know that such promises regarding my family will be fulfilled as I keep working hard. I thank God, my loving Father in Heaven, for His constant guidance, love, and tender mercies.

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(who will be born in May 2012). I am also very grateful for my grandparents, aunts, uncles, cousins, and Pretty (my cure dog).

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I am now committed to live by example as I am well aware that I cannot teach any principle relating to healthy living unless I am living such principles myself.

I have the great privilege to keep learning and work hard and use any valuable knowledge I may obtain for the benefit of all my wonderful brothers and sisters (humankind).

Ultimately and first of all, I am so grateful for a loving Father and His Son, Christ the Lord, my friend and Savior. I ask God, in this special occasion, for His continuous guidance and blessings, not just for me, but for all of us, His children. Love, Quino.

RECONOCIMIENTOS

Pasé muchos años buscando el verdadero propósito de la vida, y lo encontré en las enseñanzas de la Iglesia de Jesucristo de los Santos de los Últimos Días. Esto aconteció en mi ciudad natal, Gandía (Valencia, España) el 29 de agosto de 1998. Pocos años después, el misionero que me bautizó, el Elder David Boyle, me invitó a venir a los EEUU para aprender inglés. Acepté y también consideré su reto de sacarme un doctorado. No estaba suficientemente motivado para embarcarme en tal aventura (escuela de postgrado en un país extranjero) lejos de mi familia. Oré al respecto y recibí la siguiente respuesta: "si te sacas un doctorado (PhD), tu familia y descendientes serán muy bendecidos". Mi corazón se lleno de paz y gozo. Me animé y me convencí a mi mismo de que me lo sacaría. El consejo de un profeta viviente, el Presidente Hinckley, en cuanto a la importancia de sacarse la máxima educación posible también resonó en mi corazón y me ayudó a seguir adelante en los muchos momentos de desánimo.

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CHAPTER 1

INTRODUCTION

This chapter describes the problem of obesity and the current levels of physical activity among adults in Utah. The chapter further describes the value of elements such as gratitude and expressive writing in promoting healthy behaviors.

Background

Obesity has become a worldwide public health concern of epidemic proportions, both in developed and developing countries (CDC 2010a; De Onis, Blössner,& Borghi, 2010; WHO 2011a). The World Health Organization (WHO) estimates that by 2015 the number of overweight adults worldwide will reach 2.3 billion. There have been a remarkable number of studies focused on the causes of obesity and interventions, or public policies to turn around this problem (IOM 2007; Low, Chin, & Deurenberg Yap 2009; NSCH, 2010; Rodearmel et al., 2007; Smith et al., 2010; WHO 2000; Zenzen & Kridli 2008). Researchers worldwide are conducting studies to gain new knowledge about major causal factors and effective interventions that can be used to reverse this trend of increasing obesity rates. Without developing and widely disseminating evidence based obesity prevention programs, obesity is likely to continue to increase with its

concomitant health problems and costs (Flynn et al., 2006; RWJF 2011).

According to recent data from the WHO (2010a), the United States of America ranks number eight in the list of fattest countries in the world, with 63.1 % of adults being overweight, and 26.6% obese (UDOH, 2011). Both overweight and obesity are related to high rates of morbidity and mortality; both are "major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases, and cancer" (WHO, 2011a).

Obesity affects individuals regardless of their age, gender, ethnicity, environment or geographical location (CDC, 2010a). Adults residing in Utah are also among those who struggle with this epidemic. Alarmingly, the 2008 BRFSS (Behavioral Risk Factor Surveillance System) data report indicates that 60.1% of Utah adults are overweight (37%) or obese (23%) (UDOH, 2011). Utah is home to more than 2,763,885 people, of which approximately 62% are adults (U.S. Census Bureau, 2011). Among these adults, men were significantly more overweight or obese (67.5%), than women (52.4%) (UDOH, 2011).

Health practitioners and authorities are aware of obesity's serious health risks, therefore, an increasing number of evidence based and creative interventions are being developed by health researchers. A myriad of approaches are implemented in different settings and populations: school, community, educational, policy, environmental, children, adults, elderly, and family based interventions (Stice, Shaw, & Marti, 2006; RWJF, 2011).

A meta-analysis conducted by Stice, Shaw, and Marti (2006) examined the effectiveness of 64 obesity prevention programs. Only 21% of those prevention programs

seemed to have a statistically significant effect in preventing weight gain and reducing weight from pre to posttest. Thirteen programs were evaluated and the mean effect size was small (r = .04); however, it was statistically significant ($p <$ .01). Effect sizes ranged from -0.24 to 0.50. An investigation on the potential factors moderating the effect size of these interventions revealed that prevention programs seemed to be more effective in those trials in which female participants (r = .13, $p <$ .01) were enrolled. The authors also indicated that programs of shorter duration (16 weeks or less) (r = .06, $p <$ .01) and those programs focusing exclusively in weight change (r = .09, $p <$ .001) seemed to be more effective. Studies that allowed for self-selecting recruitment also showed larger effect sizes (r = .14, $p <$ .001) than those for population based studies (Stice, Shaw, & Marti, 2006). In conclusion, these authors pointed out that most weight prevention interventions were not effective in reaching the expected weight reduction or prevention effects; overall the effect of the interventions was typically small.

Two recent qualitative studies on obesity prevention contribute to the body of knowledge of what makes obesity interventions more effective. Thomas, Hyde, Karunaratne, Kausman, and Komesaroff (2008) concluded that those "individuals with obesity receive numerous instructions about what to do to address their weight, but very few are given appropriate long-term guidance or support with which to follow through those instructions" (in press). Thomas and associates, (2008) suggest that understanding the importance of social support (even social networks) as part of obesity interventions is useful for creating more effective obesity interventions.

In another qualitative study, Thomas and associates, (2010) further examined other factors that make obesity interventions more effective. A total of 142 obese adults

(ages 19 to 75 years) were interviewed. Results indicated that non-commercial interventions that focus on "encouraging individuals to make healthy lifestyle changes (regulation, physical activity programs, and public health initiatives)" (Thomas, Lewis, Hyde, Castle, & Komesaroff, 2010, p. 420) had stronger support by those struggling with obesity. On the other hand, "interventions perceived to be invasive or high risk (gastric band surgery), stigmatising (media campaigns), or commercially motivated and promoting weight loss techniques (commercial diets and gastric banding surgery)" had lower support (Thomas, et al., 2010, p. 420).

Despite the immediate and larger effect sizes of some obesity interventions, the challenge remains to increase and maintain physical activity levels, and in maintaining the improvements achieved during the implementation of the weight prevention interventions (Stice, Shaw, & Marti, 2006). It seems that achieving maintenance in health behavior changes, in order to prevent excess of weight, is one of the greatest challenges for health practitioners (Stice, Shaw, & Marti, 2006). It is reasonable to think that some of the elements present in interventions may have an effect in the outcomes sought. As prescribed by health authorities (USDHHS, 2000; CDC, 2011c), the most common prevention programs are focused on increasing levels of physical activity and improving and managing dietary habits.

Stice, Shaw, and Marti (2006) identified the two major types of obesity interventions seeking to prevent weight gain: cardiovascular disease prevention programs with several focuses (targeting obesity along with other risk factors for cardiovascular problems), and prevention programs focused on preventing weight gain or obesity. It is common to find programs that focus disease prevention by focusing on the element of

weight reduction; however, there are other elements that could be included in those programs. Elements such as gratitude, expressive writing, forgiveness, and meditation (among others) have been proven to be effective in health interventions aiming to improve physical, mental, and emotional health (Dunnack & Park 2009; Emmons & Shelton, 2005; Ke-Ping, Whei-Ming, & Chen-Kuan, 2009; Lawler, Younger, & Piferi, 2003; Sloana, Feinsteina, & Marxa, 2009). The following paragraphs will explain more about these elements and their value as part of existing or new obesity prevention programs.

Gratitude as Obesity Prevention Component

A plethora of studies supports that adults who reflect and practice gratitude may experience positive health outcomes (Bono, & McCullough, 2004; Emmons & McCullough, 2003; Emmons & Shelton, 2005; Fredrickson & Joiner 2002). Increasing evidence links gratitude to higher scores of psychological and physical well being (Emmons & McCullough, 2004). Gratitude has been reported to be negatively correlated to depression, social anxiety, and even envy (Kashdan & Breen, 2007; Lyubomirsky et al., 2005; McCullough, Emmons, & Tsang, 2002; Seligman et al., 2005).

Written, personal disclosure of feelings can also have numerous health benefits. Several studies have indicated that simple ways of journaling (expressive writing) can result in improvements to mood, relationships, subjective and objective health, and overall wellbeing (Banburey, 2003; Smyth, Stone, Hurewitz, & Kaell, 1999). Current and classic studies have proven that there is great health value in personal disclosure (Dunnack & Park 2009; Sloana, Feinsteina, & Marxa, 2009).

In this study, the researcher combined two evidence based elements that have been proven effective in improving health protective factors. These are reflection and practice of gratitude, and expressive writing. Among those approaches aiming to reduce obesity among adults in Utah, the author of this study has not found interventions that combine gratitude and expressive writing as a means to increase healthy behaviors (physical activity) in order to fight the obesity epidemic among adults.

Problem Statement

Rates of physical activity among adults residing in Utah are considerably below the recommendations given by the U.S. health authorities (CDC, 2011c). A major consequence of the lack of physical activity is overweight and obesity (CDC, 2011c). There is a call for innovative and effective evidence based programs that will help in increasing protective factors for obesity (Stice, Shaw, & Marti, 2006; Thomas et al., 2010; RWJF, 2011). Most obesity prevention programs include physical activity and nutrition as main components in the curriculum. Few obesity prevention programs integrate the elements of reflection and practice of gratitude (Bono, & McCullough, 2004; Emmons & McCullough, 2003; Emmons & Shelton, 2005; Fredrickson & Joiner 2002) and expressive writing (Mackenzie, Wiprzycka, Hasher, & Goldstein, 2008; Mosher, & Danoff–burg, 2006 ; Pennabaker, 1997; Sloana, Feinsteina, & Marxa, 2009; Wright, 2009) as a way to promote protective factors for obesity. This investigation explores an innovative way to promote protective factors for obesity and contributes to the research literature on health prevention programs.

Purpose of the Study

There is a call for innovative evidence based obesity prevention programs (RWJF, 2011). A review of current research on obesity, depression, expressive writing, and gratitude suggests that a possible way to increase obesity protective factors is to gain appreciation for the body, health, and life. A comprehensive review of the literature found no studies that combine gratitude and expressive writing in an effort to increase health protective factors against obesity (i.e., increasing physical activity levels) among adults. The purpose of this study was to test the effectiveness of the Healthy and Fit Adults Program in adults. This program includes expressive writing and reflection, and practice of gratitude as a way to improve protective factors (increase levels of physical activity and decrease depression) for obesity in adults residing in Utah.

Research Questions and Hypotheses

The primary research aim of this study was to examine the impact of the Healthy and Fit Adult Program on adults, by conducting survey research and comparing self-reported and objective data of 48 participants. Outcomes include the following: (a) physical activity levels and gratitude as obesity protective factors; and (b) excessive body weight (BMI) and depression as obesity risk factors. Research questions and hypotheses in the form of null or alternative hypotheses are presented below.

Research Question 1

Does the 5-week Healthy and Fit Adults Program intervention significantly increase physical activity levels (self-reported and objective) among participants in the

intervention group?

Hypothesis 1.1

For those participants taking part in the intervention group, there will be a statistically significant increase in self-reported physical activity levels (METs) from pretest to posttest.

Hypothesis 1.2

For those participants taking part in the intervention group, there will be a statistically significant increase in objective physical activity levels (steps measured by pedometers) from pretest to posttest.

Research Question 2

After the 5-week intervention, will there be significant differences in physical activity levels (self-reported and objective) between the intervention and comparison groups?

Hypothesis 2.1

After the 5-week intervention, there will be no difference in self-reported physical activity levels (METs) between the intervention and comparison groups.

Hypothesis 2.2

There will be no difference in total steps (pedometer) between the intervention and comparison groups from pretest to posttest.

Research Question 3

Do self-reported gratitude scores as measured by the G6-Q scale, significantly improve in those who participated in the 5-week HFAP as intervention group?

Hypothesis 3.1

For participants in the intervention group, there will be a statistically significant increase in gratitude scores from pretest to posttest.

Hypothesis 3.2

There will be no difference in gratitude scores between adults in the intervention and comparison groups from pretest to posttest.

Research Question 4

Do body mass index (BMI) scores significantly decrease as a result of participating in the 5-week HFAP intervention?

Hypothesis 4.1

For those participating in the intervention group, there will be a statistically significant decrease in body mass index (BMI) from pretest to posttest.

Hypothesis 4.2

There will be no difference in BMI measurements between participants in the intervention and comparison groups from pretest to posttest.

Research Question 5

Do psychological responses such as depression significantly decrease as a result of participating in the HFAP intervention?

Hypothesis 5.1

For those participating in the intervention group, there will be a statistically significant decrease in depression scores from pretest to posttest.

Hypothesis 5.2

There will be no difference in depression scores between adult participants in the intervention and comparison groups from pretest to posttest.

Research Question 6

Is there a statistically significant positive correlation between gratitude and physical activity levels for all those participating in the study?

Hypothesis 6.1

There will be a statistically significant positive correlation between gratitude and physical activity (METs) for those participating in the study.

Hypothesis 6.2

There will be a statistically significant positive correlation between gratitude and step counts (as measured by pedometer) for those participating in the study.

Hypothesis 6.3

There will be a statistically significant positive correlation between gratitude and physical activity for those who participated in the intervention group.

Research Question 7

Is there a statistically significant negative correlation between gratitude and depression for all those participating in the study?

Hypothesis 7.1

There will be a statistically significant negative correlation between gratitude scores and depression scores for all those participating in the study.

Research Question 8

Is there a statistically significant negative correlation between physical activity levels (METs) and depression for all those participating in the study?

Hypothesis 8.1

There will be a statistically significant negative correlation between physical activity levels (METs) and depression scores for all those participating in the study.

Research Question 9

Is there a statistically significant positive correlation between BMI and depression for all those participating in the study?

Hypothesis 9.1

There will be a statistically significant positive correlation between BMI and depression scores for all those participating in the study.

Secondary Aims of the Study

The researcher conducted a process evaluation of the implementation of the HFAP program by collecting survey data on participant demographic information, attendance, and participant satisfaction.

Research Question: Attendance Impact on Dependent Variables

Is there a significant positive relationship between number of program sessions attended and variables representing protective and risk factors (physical activity levels, step counts, BMI, depression, and gratitude)?

Hypothesis 10

There is no relationship between the number of sessions attended and self-reported physical activity levels measured in METs at posttest.

Hypothesis 11

There is no relationship between number of sessions attended and step counts (as measured by pedometer) at posttest.

Hypothesis 12

There is no relationship between number of sessions attended and BMI at posttest.

Hypothesis 13

There is no relationship between number of sessions attended and depression scores at posttest.

Hypothesis 14

There is no relationship between number of sessions attended and gratitude scores at posttest.

Research Questions on the Process Evaluation

The following four questions provided specific information regarding the evaluation of program implementation: 1) what was the average attendance in the program, 2) what are the characteristics of the participants who attended the program?, and 3) what was the overall level of participant satisfaction with the program?

Definitions of Terms

The following key terms and definitions are relevant to understanding the concepts in this study:

Body mass index (BMI): Body mass index is a common and universally accepted way to measure obesity in individuals. BMI provides a score derived from the person's weight (kilograms) divided by the square of the height (meters). An individual with a BMI score of 30 or more is considered obese; if the BMI score equals between 25 and 29 the person can be considered overweight (WHO, 2011a).

Comparison group: Adults ages 31 to 45 who did not receive the HFAP treatment but answered the survey and wore a pedometer at pretest and posttest.

Depression: Depression is defined as a "common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration" (WHO, 2011b). In this study depression refers to moderate symptoms of depression as measured by Radloff's CES-D scale (1977). A score of 16 or higher suggests that an individual may have depressive illness.

Dietary habits: In this study, dietary habits refer to the consumption of fruits and vegetables per week. According to general recommendations, adults should consume at least 30 servings of fruits and vegetables per week.

Excessive body weight: This term refers to body weight that may lead to health risks. According to general recommendations, excessive body weight refers to overweight (BMI $\geq$ 25 or $<$ 30) and obesity (BMI $\geq$ 30).

Expressive writing or journal writing: In this study journal or expressive

writing refers to the act of writing down on paper (or typing) personal feelings, thoughts, experiences, dreams, frustrations, desires, past traumatic experiences, future goals, expressions of gratitude, and any other kind of personal information.

Gratitude: In this study gratitude is defined as ‘‘a sense of thankfulness and joy in response to receiving a gift, whether the gift be a tangible benefit from a specific other, or a moment of peaceful bliss evoked by natural beauty’’ (Emmons, 2004, p. 554). In this study, reflections and the practice of gratitude are centered on being alive, having a body, and the possibility of enjoying good health.

Intervention group: Adults ages 31 to 45 who received the HFAP treatment (5 week program), answered the survey and wore a pedometer at pretest and posttest.

Metabolic equivalent per time (MET): It is a physiological concept that reflects the energy cost of physical activity as multiples of resting metabolic rates. The number of METs denotes the amount of physical activity. According to recommendations, when physical activity ranges between 500 and 1000 or more METs, there are health benefits (Ainsworth et al., 2011).

Obesity: In this study, obesity is defined as an “abnormal or excessive fat accumulation that presents a risk to health.” In this study, an individual is considered obese if the BMI score is equal to or greater than 30 (WHO, 2011a).

Overweight: This term is defined as excessive fat accumulation that may present a risk to health. In this study, an individual is considered overweight if the BMI score is between 25 and 29 (WHO, 2011a).

Protective factors: In this study, protective factors refer to anything that prevents or reduces the vulnerability for the development of becoming overweight or obese.

Healthy dietary habits and regular physical activity would be the two most common protective factors for obesity.

Risk factors: In this study, risk factors for obesity refer to behaviors or circumstances that increase the chances to gain excessive weight. Some common examples of risk factors are: poor dietary habits, lack of physical activity, overeating, lack of rest, and depression.

Sedentary lifestyle: In this study, sedentary lifestyle refers to a lack of physical activity; when individuals are not physically active and spend most of their waking time sitting or inactive.

Moderate physical activity: This type of physical activity is characterized by a minimum intensity of muscular effort. An activity is considered moderate when the heart rate and breath rate slightly increase over normal or resting rates (USDHHS, 1996).

Physical activity: Generally defined as any movement of the human body that produces an expenditure of energy (Meeks, Heit, & Page, 2005). General recommendations for physical activity to receive health benefits are between 500 and 1000 METs per week.

Regular physical activity: Regular physical activity is another notion associated with health-enhancement; this term is related to the number of times that physical activity is performed in a given week. Regular physical activity can be moderate or vigorous. Physical activity of moderate intensity is considered regular when it is performed 5 or more times per week and it lasts about 30 minutes per session (or it is fractioned in short periods of time summing up to a total of 30 minutes per day) (USDHHS, 1996). The USDHHS (1996), in defining regular physical activities, points out that in order to obtain

greater health outcomes individuals should increase the amount of time spent doing activities, and supplementing their regular activities with different types of activity.

Vigorous physical activity: This type of physical activity is characterized by a considerable intensity of muscular effort. An activity is considered vigorous when the heart rate and breath rate rises notably over normal rates. This type of activity is also recognized when an individual finds it difficult to talk because their breathing is intense (USDHHS, 1996).

Study Limitations

Limitations regarding the research methods and design utilized in this study are listed below. Some of these study limitations could not be addressed given the circumstances of conducting this research within the time constraints and limited budget.

Experimental Design Limitations in Internal Validity

The rigor of a research study is the ability to measure what actually happened during the study (Valente, 2002). This is directly influenced by internal validity. This study was not exempt of threats to internal validity; therefore, as Babbie (1998) indicates, the outcomes of the program may not be accurately related to the experiment.

Researchers have pointed out several limitations derived from the inability to determine the actual effectiveness and impact of a program when researchers do not run a true randomized control trial (RCT); this is also true when conducting health promotion research interventions such as the present study (Valente, 2002). Logistics and time constrictions led the researcher of this study to sacrifice a RCT in behalf of a quasi-

experimental design. Even though, quasi-experimental designs may not result in definitive causal inferences, they can provide valuable information (Shadish, Cook, & Campbell, 2002). Considering that quasi-experimental designs are natural experiments, the threats to external validity are minimized and some generalizations could be made to a similar population (Shadish et al., 2002). Furthermore, the use of a comparison group in this type of design will assist in controlling for some threats to internal validity.

On the other hand, this type of design creates some challenges. Lack of random assignment makes it difficult to rule out confounding and extraneous variables always present in social environments (Robson, Shannon, Goldenhar, & Hale, 2001). As a result, we may encounter a variety of threats to internal validity, which make it difficult to draw conclusions of causal inferences or relationships. If confounding variables can be identified, the use of various statistical techniques (i.e., multiple regression) may assist in controlling for such bias or threats to internal validity.

There are three major categories of threats to internal validity: those pertaining to single group studies, selection threats to internal validity (present in multiple group studies), and social interaction threats to internal validity. The following is a description of each category and suggested methods to limit the impact of threats to validity.

Single Group Threats to Internal Validity

These types of threats only apply when researchers study a single group receiving the program. In order to rule out the *single group* threats to internal validity the researcher chose a nonequivalent control group design; a comparison group as equal as possible to the treatment group was selected. By doing so, all possible threats to internal

validity experienced in a single group will be also reflected in the comparison group. Comparison of means at pretest for different variables indicated that both groups were highly equivalent. Results of this testing are shown in the results chapter of this dissertation.

This strong quasi-experimental design controls for the threats of history, maturation, instrumentation, testing, and mortality that usually take place during a single group study (Cozby, 2008).

However, the study design, a nonequivalent control group design, could present *selection* bias—a second type of threats to internal validity. Selection bias or selection threats refers to any factor external to the program that may lead to differences in the posttest outcomes between comparison and treatment groups. The researcher selected participants with similar characteristics in both groups. The two groups were selected from the same religious community; both were adults within the same age range (31 to 45 years), and both seemed interested in implementing a healthy lifestyle. However, those who signed up for the study in order to receive the treatment may have had higher motivation to change behavior than those in the comparison group because they were seeking to lose weight or improve healthy lifestyles. An examination of differences between participants at pretest indicated that there were not statistically significant differences between groups when considering demographic characteristics. However, there were significant differences in depression and BMI scores. This differences may suggest that the outcomes of the study may experience some bias unless the baseline differences are controlled for. According to Trochim (2006), only key measurements before a study starts can provide information on the real equivalence of groups. Such

pretest measures can offer the means to judge and decide the likelihood that a selection bias or threat exists (Trochim, 2006). The likelihood of having selection bias in this study was reduced, but not totally controlled for, by having similar groups.

Notwithstanding our efforts to control for selection bias, the researcher acknowledges that there may have been differences between groups prior to the study that could have impacted the outcomes of the study. If such would be the case, as Trochim (2006) suggests, even under the worst circumstances, such differences could lead us to conclude that the program did not make a difference when in reality it did, or on the other hand, that the program made a difference when there was not a real difference. In any case, further testing of the program will clarify its effectiveness.

Multiple Groups: Potential Threats to Internal Validity

These are threats to internal validity that are common to studies involving two or more groups. Such threats are parallel to the threats of single group studies, but are called *selection threats* to internal validity. These threats refer to factors, other than the program, that lead to posttest differences between the treatment group and comparison group (Trochim, 2000). The following paragraphs elucidate the most common selection threats to internal validity.

Selection History Threat

This threat refers to any event—outside the program—taking place between pretest and posttest; an event that both groups experience differently. The history threat indicates that both groups may differ in the way they react to historical events (Trochim,

2000). For instance, it could be that those in the experimental group watched a new TV program about healthy lifestyles that encouraged them to be more physically active. This may result in a higher average posttest of physical activity scores for the experimental group that would not indicate the true effect of the program. This threat could be controlled by using random selection of participants and random assignment to groups.

Selection Maturation Threat

This threat refers to the possible difference of usual growth for both groups between pretest and posttest. The experimental and comparison groups can be dissimilar in their different rates of maturation in regards to outcome variables of the study. History and maturation threats are different. Generally, history implies a distinct event or a sequence of events while maturation refers to the normal and constant growth or changes in participants, that occur naturally over time as they mature or age, regardless of participation or lack of participation in a program. If both groups are experiencing maturation at different rates in regards to adopting healthy lifestyles, we could not positively conclude that differences at posttest were due only to the HFAP program. These differences could be related to selection maturation effects (Trochim, 2000).

Because this study involved adults of ages 31 to 45 years in both groups, most of their physical maturation was completed. Thus, this limitation was partially controlled by having a design that matched participants' mature age. However, we cannot say that we have identified all the possibilities in which the outcomes of the intervention may have been affected by the different types of growth in participants (Babbie, 1998). It is possible that participants in either group experienced differences in other types of growth,

such as an increased knowledge and desire to live healthier. This threat could be more fully controlled by matching subjects and randomization.

Selection Testing Threat

This threat arises when both groups experience differential effect on the posttest scores as a result of taking the pretest (Babbie, 1998). It is possible that the initial test may have triggered different awareness in both groups or that the groups may have learned differently from taking the pretest. In such cases, the difference observed in the posttest scores cannot be only credited to the program effect—but as a result of selection testing (Trochim, 2006). In this study, all participants knew that they had to take a pretest and posttest. Because of that, some participants in the comparison group may have purposely increased their levels of physical activity for the sake of looking good in posttest data (Posavac & Carey, 2007), also known as social desirability. Having a comparison group helps to control for this threat.

Instrumentation

This threat refers to any difference or change in the measurement strategies and/or instruments used to test both groups at pretest and posttest (Trochim, 2006). In this study, such threat was controlled for by using the same instruments or test during pretest and posttest for both groups. The instrument in this study used to record the outcomes on a self-report survey is the participants own cognitive judgments or perceptions of their weight or level of physical activity. Because these can change with new knowledge and behaviors from pretest to posttest, we controlled for this threat by also using a

retrospective pretest and posttest done at the same time at the end of the intervention. The perceptions of the individuals should be the same on the original pretest and the retrospective pretest when rating their behaviors.

Selection Mortality Threat

This threat occurs when there is a difference—a nonrandom dropout—among participants in both groups between pretest and posttest. For instance, in any study using multiple groups, different types of participants might drop out of each group, or there might be a greater number of drop outs in one of the groups. If such is the case, differences in posttest could be attributed to the different types of dropouts—selection mortality—and not to the program (Trochim, 2006). This threat can be controlled by matching subjects and omission.

In our study, some participants opted to drop out; however, there were not any differences in attrition from the two groups that are likely to impact the outcomes. In order to control for this differential attrition from the groups' threat, we conducted an attrition analysis by group, demographic, and risk variables to determine if more high or low risk individuals remained in the two groups, even if they started out very similar at recruitment. Also those who decided to stop attending the sessions agreed to complete the session for posttest data collection. Our statistical conclusions and comparisons were likely to be affected by this type of limitation; however, a post hoc approach may compensate for this limitation. Different variables from the subjects were contrasted in order to find effects from the program (Babbie, 1998).

Selection Regression Threat

This threat occurs when both groups present different rates of regression to the mean. This regression can happen if a group has scores that are more extreme on the pretest than the other group. For instance, it may happen that the treatment group starts with a disproportionate score of a given variable in contrast to the comparison group (i.e., an extreme desire to lose weight or improve health behaviors). Those initial extreme scorers at pretest would make their mean regress a greater distance toward the overall population mean; which may result in the false assumption that the intervention group gained more than the comparison group. Such gain would not be a real benefit from the program, but a consequence of the selection regression. In the present study, there were not extreme scores at pretest for either group; thus, this type of limitation was most likely controlled. In the case of having extreme scores, we can control for the threat of regression by omitting extreme scores and by using randomization.

Social Interaction Threats to Internal Validity

What would happen if participants from the comparison group find out about the treatment? Even if we have equivalent groups in the study, there are other threats that jeopardize a strong internal validity. These are common threats of social research that arise from human interactions; they are called social interaction threats to internal validity (Trochim, 2000). These threats arise from social pressures during research and may impact posttest differences among groups.

Diffusion or Imitation of Treatment

This threat occurs if the comparison group learns about the intervention from those in the treatment group. The comparison group could create their own type of intervention as they seek to imitate the group receiving the program. This type of threat to internal validity could influence the outcomes of both groups. In this case, the researcher will find it difficult to know if the treatment is indeed the reason of changes from pretest to posttest (Trochim, 2006).

In this study, the likelihood of having participants in the experimental group communicating with those in the comparison group was very high because they were all part of the same social and religious community. Therefore, the results of the study may have been affected by diffusion or contamination (Babbie, 1998). It is likely that participants in the comparison group may have modified their health behaviors as a result of communicating with those receiving the treatment. Measures to control for such a threat consisted in asking participants not to share with others the details and activities received in the program.

Resentful Demoralization

This threat also occurs when the comparison group learns what the treatment group is receiving. In some cases the participants in the comparison group may get discouraged or bothered, resulting in withdrawing from the study (Trochim, 2006). Such may have not been the case for the present study as participants in both groups had great regard for everyone in the study. The attrition was considerably low (19%).

Cognitive Dissonance

Another threat to internal validity refers to a possible response bias related to self-report. This happens when participants overestimate their responses based on their subjective perception of how much change they were supposed to have made, rather than reporting objective changes (Nimon & Allen 2007). Thus, it may be that some participants in the experimental group may have inflated their responses rather than reporting actual improvement or behavior change because they felt they must have improved given all the time they invested in the program. This threat was not controlled for as only the experimental group was exposed to this type of threat.

Limitations to External Validity

Campbell and Stanley (1963) indicated the existence of threats to external validity or threats that jeopardize the generalizability of the experimental findings to a larger or different population. There are several forms in which the generalizability of research findings can be vulnerable to error. Three major threats to external validity relate to people, places, or times. For instance, reviewers of this study could argue that our results are due to the unusual type of subjects participating in the study (a highly educated religious community with desires to improve their health and lifestyle). Similar health promotion studies have used uncommon populations in their studies with resulting risk of external invalidity (Francis et al., 2009). They may perhaps reason that our program might only work because of the unusual location in which the intervention took place (at one of our classrooms at the College of Health at the University of Utah). The reviewers may also object that the study took place in a peculiar period of time—end of spring—

when many individuals become physically active seeking to improve their body image towards the summer season (Trochim, 2006). Other types of threats to external validity are explained below.

Reactive or Interaction Effect of Testing

Studies utilizing a pretest posttest design are subject to validity risks. A pretest can increase or reduce participant's responsiveness to the variable we are studying (Yu & Ohlund, 2010). Thus the program is not as effective without the pretest. This effect of sensitization from the pretest to consequent posttests has been empirically confirmed (Wilson & Putnam, 1982). Our study is susceptible to this threat as we used self-report instruments during pretest that may have resulted in behavior bias. Participants may have realized that their levels of physical activity, or their current healthy lifestyle was not as good as they thought. As a result, they increased their efforts to improve their behavior based on what they learned during pretest (Thomas & Nelson, 2001).

Interaction Effects of Selection Bias and the Experimental Treatment

The reactive effects of experimental arrangements can affect generalizability. If the effect of the intervention was attributable to the experimental arrangement of the research it will be questionable to generalize the outcomes or intervention to non-experimental settings (Yu & Ohlund, 2010). If the group is selected on specific characteristics, the intervention may work only on subjects with similar characteristics (Thomas & Nelson, 2001). For instance, it might be the case that participants in our experimental group were ready to take action in improving their current levels of physical

activity. If such is the case, the same program will not yield the same outcomes when delivered to participants who are not yet contemplating increasing their levels of physical activity. Controlling this type of threat is questionable when using a nonequivalent control group (Campbell & Stanley, 1963). Additional replication of our HFAP program in different settings would confirm if such threat impacted the external validity of our program. A randomized selection of subjects and random assignment to groups would control for this threat.

Reactive Effects of Experimental Arrangements

Some interventions may be effective because they have been designed to be tested in specific settings and controlled circumstances (i.e., laboratory, campus classroom, biomechanics lab), but the same interventions may not prove effective in other settings similar to the real world (Thomas & Nelson, 2001). Controlling this type of threat is also questionable with our current study design (nonequivalent control group) (Campbell & Stanley, 1963).

Multiple Treatment Interference

This threat occurs when multiple treatments are delivered to the same participants. In such cases, it is difficult to control for the effects of prior interventions. This threat was not an issue in the present study as there was only one treatment (Yu & Ohlund, 2010).

Two more threats to external validity are order effects and/or Hawthorne effects. The first one refers to the order in which the treatment is delivered. If the researcher is using a variety of treatments, the order can be a major threat to external validity. The

second one is similar to a placebo effect. The simple presence of other individuals as observers may result in behavior changes for those participating in the study (Heffner, 2004).

Improving External Validity

There is no warranty that all threats to external validity impacting a study like this can be controlled. An alternative study design would have improved external validity. According to Campbell and Stanley (1963), the best way to control for threats to external validity and improve the generalization of the study is by generating a representative randomized sample and minimizing dropout rates. When we select participants, interventions, experimental contexts, and tests in order to represent a larger population we can increase the strength of external validity (Trochim, 2006). Another way to increase external validity is by using the theory of proximal similarity effectively; this is done by describing the ways in which the context of the study differ from other contexts. The researcher must provide rich data regarding the existing similarity between various groups of people, places, and times (Trochim, 2006).

However, the best way to assure a positive generalization is to replicate the study. The more we replicate the study in different circumstances (a variety of places, with a variety of subjects and at different periods of time), the greater and stronger will be our external validity or the ability to generalize our intervention and/or results (Trochim, 2006).

Different threats to internal and external validity have been discussed; however, as Posavac and Carey (2007) pointed out, internal validity threats can be double-edged

swords because they may hide positive or negative program effects. Thus, as indicated previously, extensive replication considering different circumstances and among different demographics is necessary in order to support the existence of internal validity. and also before generalizing and/or disseminating the findings and/or implementation of the HFAP program.

Summary

Rates of physical activity among adults residing in Utah are considerably below recommendations. Most obesity prevention programs include physical activity and nutrition as main components in the curriculum. The above review of literature suggests that there may be other possible ways to increase obesity protective factors. Such ways comprehend gratitude—gaining appreciation for the body, health, and life; and expressive writing. A comprehensive search of literature found no studies that combine gratitude and expressive writing in an effort to increase health protective factors in adults (increase of physical activity levels, decrease in depression scores). The purpose of this study was to test the effectiveness of these elements of the Healthy and Fit Adults Program as a way to improve protective factors (physical activity) and reduce risk factors (depression) for obesity in adults residing in Utah.

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter explores research literature that pertains to the current epidemic of overweight and obesity, as well as selected protective and risk factors for these conditions. Information about innovative approaches that may lead to an improvement of obesity protective factors, as well as the theoretical framework of the prevention program, Social Cognitive Theory, is presented. The major sections of this literature review include 1) Obesity and Health Risks, 2) Evidence-based Programs for Obesity Prevention, 3) Physical Activity and Health, 4) Pedometers and Physical Activity, 5) Psychological Factors of Obesity and Health, 6) Depression, Obesity, and Health, 7) Expressive Writing and Health, 8) Gratitude and Health, 9) Gratitude, Depression and Health, 10) Social Cognitive Theory and 11) Summary.

Obesity and Health Risks

Obesity and overweight are related to high rates of morbidity and mortality; both are major risk factors for more than twenty chronic diseases such as diabetes, mental health, cardiovascular diseases, and cancer (WHO, 2000; RWJF, 2011). Obesity has become a worldwide public health concern of epidemic proportions, both in developed

and developing countries (WHO 2000; De Onis, Blössner,& Borghi, 2010; WHO 2011a). The World Health Organization estimates that by 2015 the number of overweight adults worldwide will reach 2.3 billion. According to recent data from the WHO (2011a), the United States of America ranks number eight in the list of most obese countries in the world.

Not every person faces obesity in the same way; some ethnic minorities experience the highest rates of obesity in the country (CDC, 2010a). However, obesity is reaching most individuals across the country, regardless of age or geographical location. A particular population among those who struggle with this epidemic and its morbidity and mortality consequences are adults residing in Utah. The 2008 BRFSS data report on obesity indicates that those adults residing in Utah suffer high rates of overweight and obesity, 60.1% (UDOH, 2011); around 37% are considered overweight and 23% obese. However, obesity rates in Utah rank among the lowest in the country (RWJF, 2011). Utah is home to more than 2,763,885 people, of which approximately 62% are adults (U.S. Census Bureau, 2011). Among these adults, men were significantly more overweight or obese (67.5%) than women (52.4%) (UDOH, 2011).

Recent research reinforces that both lack of physical activity (PA) and a diet high in sugar and fat, as well as environmental factors related to diet and sedentary lifestyle (i.e., expanded portion sizes, food advertising all around, internet entertainment options, automobile-dependent community designs, etc.) account for most overweight and obesity cases (Sallis & Glanz, 2009). Despite the prevalence of obesity, it seems that physical activity is slowly increasing. Regular PA trends increased 8.6% for women (46.7% in

2005) and 3.5% (49% in 2005) for men from 2001 to 2005 (CDC, 2011c). However, the levels of moderate and intense PA are still low compared to recommendations. About 20% of the U.S. adult population adhere to regular moderate physical activity (at least 30 min. during 5 days/week). Additionally, only 2% of U.S. adults adhere to vigorous physical activity to recognize health benefits (at least 20 min./day for 5 days/week) (Troiano, et al., 2008). Increasing levels of physical activity, decreasing sedentary lifestyles, and improving healthy eating are among the first recommendations by health authorities (CDC, 2010b; WHO 2000).

Health practitioners and authorities are aware of obesity's serious health risks and healthcare costs (RWJF, 2011). Therefore, an increasing number of evidence-based and creative interventions are being developed and tested by health researchers (Orzano & Scott, 2004). A myriad of approaches are implemented in different settings and populations, such as school, community, educational, policy, environmental, children, adults, elderly, and family-based interventions (RWJF, 2011; Stice, Shaw, & Marti, 2006; WHO, 2000).

The following sections will cover existing evidence based programs to prevent obesity as well as the relationship between physical activity, obesity, and health. Later sections of this chapter will explore the relationship between obesity and depression (Luppino et al., 2010; Murphy et al., 2009; Thomas et al., 2010).

Evidence-based Programs for Obesity Prevention

A meta-analysis conducted by Stice, Shaw, and Marti (2006) examined the effectiveness of 64 obesity prevention programs. The effect sizes (*r*'s) ranged from −.024 to .050; there was a small average effect size across all studies ($r = .04$) but significantly larger than zero ($z = 2.94$, $p < .01$). Only 21% of those prevention programs seemed to be significantly effective in preventing weight gain from pretest to posttest, with an average effect size $r = .22$ ($p < .001$) (Stice, Shaw, & Marti, 2006). The authors also indicated that programs of shorter duration (16 weeks or less) and less intensity (fewer hours) ($r = .06$, $p < .01$) as well as programs focusing exclusively in weight change ($r = .09$, $p < .001$) seemed to be more effective. Studies that allowed for self-selecting recruitment also showed larger effect sizes ($r = .14$, $p < .001$) than those for population-based studies (Stice et al., 2006). Furthermore, an investigation on the potential factors moderating the effect size of these interventions revealed that prevention programs seemed to be more effective in those trials in which female participants ($r = .13$, $p < .01$) were enrolled.

In conclusion, these authors pointed out that most weight prevention interventions were not effective in reaching the expected weight reduction or prevention effects; overall the effect of the interventions was typically small.

Orzano and Scott (2004) conducted a review of existing programs shown to be effective in treating excessive weight. Six programs and or treaments were selected as most effective in reducing weight and maintaining the loss in the long term. Top interventions included approaches of diet (reduction of calories), aerobic physical activity, or a combination of both. A fourth treatment included behavioral therapy, which

was combined with other weight loss approaches (Orzano & Scott, 2004).

Two current qualitative studies on obesity prevention contribute to the body of knowledge of what could make obesity interventions more effective. Thomas, Hyde, Karunaratne, Kausman, and Komesaroff (2008) concluded that those "individuals with obesity receive numerous instructions about what to do to address their weight, but very few are given appropriate long-term guidance or support with which to follow through those instructions" (in press). Thomas and associates (2008) suggest that understanding the importance of social support (even social networks) as part of obesity interventions can be of great value in creating more efficient interventions seeking to encourage and engage obese individuals in physical activity.

In another qualitative study, Thomas and associates (2010) further examined other factors that make obesity interventions more effective. A total of 142 obese adults (ages 19 to 75 years) were interviewed. Results indicated that non commercial interventions that focus on "encouraging individuals to make healthy lifestyle changes (regulation, physical activity programs, and public health initiatives)" (Thomas, Lewis, Hyde, Castle, & Komesaroff, 2010, p. 420) had stronger support by those struggling with obesity. On the other hand, "interventions perceived to be invasive or high risk (gastric band surgery), stigmatising (media campaigns), or commercially motivated and promoting weight loss techniques (commercial diets and gastric banding surgery)" had lower support (Thomas et al., 2010, p. 420).

Despite the immediate and larger effect sizes of some obesity interventions, the challenge remains to increase and maintain physical activity levels, and in maintaining

the improvements achieved during the implementation of the weight prevention interventions (Stice et al., 2006). It seems that achieving maintenance in health behavior changes, in order to prevent excess of weight, is one of the greatest challenges for health practitioners (Stice et al., 2006). As prescribed by health authorities (CDC, 2000, 2010; WHO, 2010), the most common prevention programs are focused on increasing levels of physical activity and improving and managing dietary habits, and yet, it seems that other elements could be tested in order to improve effect sizes of such programs. Stice, Shaw, and Marti (2006) pointed out of two other major types of interventions seeking to prevent weight gain: cardiovascular disease prevention programs with several focuses (targeting obesity along with other risk factors for cardiovascular problems), and prevention programs focused on preventing weight gain or obesity. There are other elements such as gratitude, expressive writing, forgiveness, and meditation (among others) that have been proven to be effective in health interventions aiming to improve physical, mental, and emotional health (Dunnack & Park 2009; Emmons & Shelton, 2005; Ke-Ping, Whei-Ming, & Chen-Kuan, 2009; Lawler, Younger, & Piferi, 2003; Sloana, Feinsteina, & Marxa, 2009). Effective evidence-based programs aiming to prevent and/or treat obesity in adults commonly include dietary guidelines or strategies to reduce calorie intake as well as promotion of physical activity. It is reasonable to think that when these suggested approaches are combined with other actions aiming to affect short and long term behavior outcomes (such as expressions of gratitude and expressive writing) the programs may improve their effectiveness.

Physical Activity and Health

Physical activity is generally defined as "any bodily movement produced by skeletal muscles that result in energy expenditure" (Meeks, Heit, & Page, 2005, p. 366). Research suggests that physical activities that enhance the health of people must have a minimum of intensity, duration, frequency, and repetition (USDHHS, 1996). These variables may be present in different types of activities. Physical activities that require a notable participation of the cardio-respiratory system have the highest positive impact on an individuals' health (USDHHS, 1996). Running, shoveling snow, bicycling, and swimming are just a few examples of this type of activity (USDHHS, 1996).

Physical activity is associated with other terms that connect body muscular activity with health benefits. These terms are exercise, physical fitness, and moderate or vigorous regular physical activity. The capacity to engage in physical activity in order to respond to daily needs with higher or lower intensity is known as physical fitness (USDHHS, 1996). Health improvements in each of the components of physical fitness are directly related with the capacity to work, play, or exercise efficiently during longer periods of time. The higher the intensity of any given activity in which a person participates, the more his physical fitness will increase (USDHHS, 1996). Research indicates that higher levels of fitness are positively correlated with lower risks of premature death (Aldana, 2005).

Regular physical activity is another notion associated with health enhancement. This term is related to the number of times that physical activity is performed in a given week. Regular physical activity can be moderate or vigorous. Activities such as brisk

walking, dancing, gardening, raking leaves, touch football, or mowing the lawn usually produce a gentle increase in one's breathing or heart rate. These activities have moderate intensity. Other activities such as wrestling, playing basketball, jumping rope, or high-impact aerobic dancing produce a notable increase in one's breathing and heart rate. These are considered activities of vigorous intensity (USDHHS, 1996). Physical activity "does not have to be strenuous to achieve health benefits" (Meeks et al., 2005, p. 367). As suggested by Meeks et al. (2005), one may "break [30 minutes of dancing activity] up into three 10-minute periods of activity and still receive the same health benefits" (p. 370).

Past and current research consistently supports a positive relationship between physical activity involvement and physical health (Astrand, 1969; Page & Tucker, 1994; Rowland, 1990), emotional health (Brown, Welsh, Labbe, Vitulli, & Kulkarni, 1992; Sevcikova, Ruzanska, & Sabolova, 2000), mental health (Richardson, Faulkner, McDevitt, Skrinar, Hutchinson, Piette, 2005; Stein & Motta, 1992; USDHHS, 1996), and social development (Svoboda, 1994; Wandzilak, Carroll, & Ansorge, 1988). For instance, a study conducted by Gardner (2003) indicated that regular involvement in "physical activity and maintaining a healthy body weight are associated with numerous physical and psychological benefits, including a reduced risk of heart disease, cancer, depression, and anxiety". Notwithstanding these benefits, "about 60% of American adults" and an increasing number of children "are not physically active and 64% are overweight or obese" (p. 4676).

Physical activity may positively affect not only weight loss, but also some aspects

of an individual's emotional health. Functional exercising or exercise for health or enjoyment has been associated with a decrease of eating disorder symptoms and improved body satisfaction (DiBartolo & Shaffer, 2002). Results from a meta-analysis on studies examining the relationship between exercise and body image (Hausenblas & Fallon, 2006) indicated that exercise might have a variety of positive effects that directly affect emotional health. Hausenblas and Fallon (2006) concluded that exercise might benefit weight loss, improve body satisfaction, reduce eating problems, and boost self-esteem.

Increased positive mood, higher self-esteem, and positive self-image increase self-confidence and reduce aggressive behavior and antisocial behaviors (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005). Part of the underlying factors of these relationships is attributed to physiological changes that take place during exercise (USDHHS, 1996). Another factor that may play a role in improving mental health and relationships is the increased level of endorphins in the body resulting from exercise (Phillips, Kiernan, & King, 2001; USDHHS, 1996). Endorphins are hormones that are considered to be "the body's own mood-elevating, pain-relieving compounds. Endorphins appear to reduce levels of stress and depression" (USDHHS, 1996, p. 7). Consequently, regular participation in physical activities may not only provide important physical health benefits, but it may also improve mental and emotional health.

Sharpe, Granner, Hutto, Ainsworth, and Cook (2004) investigated the association between physical activity and body mass index (BMI). Among the 1810 individuals they found that for obesity and overweight individuals, the odds ratios were statistically

significant (0.50 [.38, .64] and 0.70 [.56, .88], respectively $p < .05$) when compared to the normal/underweight reference group. Conclusions of this study and others (Adams-Campbell et al., 2000) suggest that the excess of body weight (higher BMI) is correlated with lower levels of physical activity.

Even though the health benefits from regular physical activity have been largely evaluated and proved, one great challenge for health educators and practitioners is to motivate individuals to start and adhere to regular exercise. Ryan et al., (1997) emphasized the importance of intrinsic motivation in order to engage and adhere in physical activity. Although, some studies indicate that motives to improve physical appearance and fitness (extrinsic motives) are important for some individuals starting physical activity programs (e.g.,Wankel, 1993; Frederick & Ryan, 1993), there is a need for intrinsic motives if the habit of exercising is to be maintained (Ryan et al., 1997). Enjoyment and a feeling of competence seem to be factors that are highly correlated with stronger maintenance or adherence to exercise programs (Ryan et al., 1997). The intervention designed for the present study (HFAP) includes activities (fun physical activities) that have been proved to be enjoyable, motivating, and easy to participate in ("Research," 2010; Fenollar, 2007; Schwab et al., 2007). The researcher of this study sought to develop an intervention intended to promote healthier behaviors, including that of increasing physical activity levels and decreasing depression symptoms as a means to prevent and/or decrease excessive weight.

In order to motivate participants to choose to participate in physical activities, the researcher decided to combine several elements that have been proved to enhance

physical, mental, and emotional health. These elements are expressive writing (Mackenzie, Wiprzycka, Hasher, & Goldstein, 2008; Mosher, & Danoff–burg, 2006 ; Pennabaker, 1997; Sloana, Feinsteina, & Marxa, 2009; Wright, 2009) and gratitude (Kashdan & Breen, 2007; Lyubomirsky et al., 2005; McCullough, Emmons, & Tsang, 2002; Seligman et al., 2005). These two elements and their relationship with health are described later in this chapter.

Pedometers and Physical Activity

Researchers and exercise practitioners may benefit from a variety of body-worn motion sensor devices such as pedometers, accelerometers, iPhone Apps, or even the new bodybuggSP™ system. These devices and others can objectively measure levels of physical activity (PA) in free-living conditions. Concretely, pedometers and accelerometers have been widely tested in a variety of circumstances with heterogeneous populations (Berlin, Stori, & Branch, 2006; Hamed, & Abd-elwahab, 2011; Raedeke, Focht, & Salter, 2010; Rovniak et al., 2010; Tudor-Locke, Johnson, & Katzmarzyk, 2010; Tudor-Locke & Lutes, 2009). Seeking to obtain an objective measure of physical activity levels at pretest and posttest, the researcher of this study decided to use pedometers.

A pedometer is a small battery-operated device with a micro-electro-mechanical system that can detect vertical accelerations. When attached to the body it can measure vertical oscillations of the hip and count steps taken while walking. The number of steps is usually displayed digitally on a feedback screen (Tudor-Locke, 2002). According to their internal mechanisms, there are three types of pedometers: spring-levered arm,

magnetic reed, and piezoelectric crystal. The spring-suspended levered arm and the newer piezoelectric pedometers are the most commonly used (Schneider, Crouter, Lukajic, & Bassett, 2003). All existing pedometers have been extensively tested and several studies have shown certain brands and models to be more accurate than others (Pitchford & Yun, 2010; Schneider et al., 2003, 2004). Some pedometers can be programmed to measure estimates of energy expended (Kcals) and/or distance travelled during walking (in kilometers or miles) (Tudor-Locke, 2002); others may also measure distance, and time. However, these measures have shown lower accuracy than the measurement of steps (Bassett et al., 2000; Tudor-Locke, 2002). Therefore, this study focused on the measurement of steps taken, or steps per day. According to experts, steps should be adopted as the universal standard unit of measure during data collection, report of results, and interpretation of data obtained through pedometers (Rowlands, Eston, & Ingledew, 1997; Tudor-Locke & Myers, 2001a).

A leading world researcher in objective physical activity assessment, Dr. Catrine Tudor-Locke, has consistently used pedometers as practical and accurate tools to measure low and high levels of PA in numerous studies for over a decade (Tudor-Locke, 2002, 2010; Tudor-Locke & Lutes, 2009). Tudor-Locke (2002) has established well accepted directions to use pedometers during scientific studies. Following Tudor-Locke's directions, the researcher trained participants in how to use and wear the device. Pedometers can be worn in the waistband centered between the belly button and side of the hip, or just above the kneecap. If not properly worn, pedometers may register inexact steps. Pedometers were to be worn during waking hours, at the start of each day,

participants had to reset the pedometer to zero. The pedometer was removed when going to sleep or while taking a shower. At the end of the day (according to protocol) participants did register the number of steps on the screen in the activity log provided by the researcher. Studies suggest that between 3 and 5 consecutive days wearing a pedometer (including at least one weekend day) in order to obtain data, might provide a reliable measurement of PA levels (Tudor-Locke, 2002; Tudor-Locke & Myers, 2001a). For this study, participants were asked to wear the pedometer between 4 and 5 days, including at least one weekend day.

The researcher determined the average steps in each day by dividing total number of steps by the number of days the pedometer was worn.

Pedometers are also used by researchers as a way to motivate and promote physical activity (Tudor-Locke & Lutes, 2009). In clinical studies, the use of pedometers has accounted for a significant increase in physical activity, as well as a reduction in blood pressure and BMI (Bravata, 2007). Researchers have attempted to determine an optimal number of daily steps in order to reach health benefits (Tudor-Locke, 2002); for some researchers such a benchmark is 10,000 steps per day (Scheider et al., 2006; Tudor-Locke & Bassett, 2004). For instance, overweight and obese middle-aged adult participants who adhered to the goal of 10,000 steps a day (a third of all participants) lost weight during the 20 week program (Scheider et al., 2006). However, when determining a specific number of steps as a goal, researchers must consider that not everyone can reach those levels. For instance, 10,000 steps or 8 kilometers a day is unrealistic for most elderly persons; and that same goal would fall short in meeting children's PA needs

(Tudor-Locke & Bassett, 2004).

Currently, researchers face the challenge of trusting the manufacturers recommendations and reports on accuracy and reliability of pedometers. In deciding which pedometer would best fit the research purposes, the researcher followed Tudor-Locke (2000) recommendations; the researcher conducted a simple test in order to figure out if the pedometers he was intending to use would be accurate. The researcher walked "a short distance at a normal walking pace wearing the pedometer as specified by the manufacturer and simultaneously counted actual steps taken" (Tudor-Locke, 2002, p. 3). The researcher found that there was a minimum error (acceptable between 1% - 5%) in accuracy in the pedometers selected for this study. Such a margin of error is common and acceptable (Ryan, Grant, Tigbe, & Granat, 2006; Vincent & Sidman, 2003).

The use of pedometers presented some advantages and some disadvantages. Advantages included the simplicity in design and that these devices did not require additional software, high expertise, or a long time to access and interpret data (Tudor-Locke, 2000). Results from recorded steps were displayed as a total in the screen. The simplicity of use and instant access to total steps might have also assisted some participants to pursue and achieve small goals towards increased number of daily steps (Steinbaugh, Errickson, Lutes, & Raedeke, 2010).

The main disadvantages found in this study regarding the use of pedometers were: 1) pedometers could not record intensity, 2) false steps could have also been recorded as it is possible that in some instances the hips of participants may have experienced vertical motion not from walking (i.e., when a participant bends down to pick up something or

while riding in a vehicle on a very bumpy road), 3) missing data when some participants forgot to check the screen each day and record total steps on the log-sheet. Pedometers did not register good measures in activities done on an incline or from isolated muscles from the upper body (Welk et al., 2000), and 4) it was very likely that participants in both groups increased their number of steps at pretest and posttest just for the sake of wearing the pedometer (Tudor-Locke & Lutes, 2009).

Depression, Obesity, and Health

As defined by the WHO (2011b) "depression is a common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration" (p.1). Often, these symptoms "become chronic or recurrent and lead to substantial impairments in an individual's ability to take care of his or her everyday responsibilities" (WHO, 2011b, p.1). The World Health Organization (WHO) stated that depression, when measured as years lived with disability (YLDs), is the leading cause of disability (WHO, 2011b). Furthermore, depression is also the second cause of DALYs ("sum of years of potential life lost due to premature mortality and the years of productive life lost due to disability") among men and women ages 15 to 44 years. The WHO projects that by 2020, depression could reach second in the ranking of DALYs for all ages and both genders (WHO, 2011b). These numbers are even more alarming in the U.S. where an estimate of one out of ten adults reports to suffer from major depression or "other depression" (CDC, 2011b). Utah ranks number one on the list of depression; according to the last CDC report on

mental health by state, about 10.1 % of Utah adults suffer depression symptoms (CDC, 2011b). It is possible that some of these Utah adults suffering depression may also struggle with being overweight or obese (Luppino et al., 2010).

The relationship between depression and obesity has been consolidated in the last decade (Luppino et al., 2010; Murphy et al., 2009; Thomas et al., 2010). Murphy et al., (2009) indicated that subjects in a community sample (*n*=1396) showed more severe symptoms of depression than those who were non obese. This fact was significantly higher among obese women under 45 years of age, who showed a higher prevalence of depression (Murphy et al., 2009).

Substantial evidence indicates that overeating and physical inactivity can result in negative moods and mental disorders (Levitan & Davis, 2010; Luppino et al., 2010). Current research suggests "perceived stress and anxiety are strong contributors to emotional eating and must be addressed if long-term improvements in eating behavior are to occur" (Levitan & Davis, 2010, p. 793).

A recent meta-analysis of cross-sectional studies conducted by Luppino and associates (2010) examined the relationship between depression and obesity among 204,507 adults in the general population. The authors found a significant association between depression and obesity. It was concluded that "obese persons had a 55% increased risk of developing depression over time, whereas depressed persons had a 58% increased risk of becoming obese" (Luppino et al., 2010, p. 225). This association appears to be more noticeable among women than men. More research is needed in order to identify the underlying factors or causal pathways of this association. However,

researchers have already indicated that by alleviating symptoms of depression, individuals may increase their mood and therefore, they may adopt healthier dietary habits and decrease physical inactivity (Levitan & Davis, 2010). Journal writing and practicing gratitude could be a valuable approach to alleviate negative emotions in these individuals struggling with depression symptoms as well as excessive weight (Sloana, Feinsteina, & Marxa, 2009; Wright, 2009).

Expressive Writing and Health

In the early 1900s, a pathologist concluded "the sorrow that hath no vent in tears, may make other organs weep." The conversion of emotional upheavals into verbal or written expressions can result in improved physical, mental, and emotional health (Berry & Pennabaker, 1993; Mackenzie, Wiprzycka, Hasher, & Goldstein, 2008; Mosher & Danoffburg, 2006; Pennabaker, 1997; Sloana, Feinsteina, & Marxa, 2009; Wright, 2009).

Written personal disclosure of feelings can have numerous health benefits. Several studies have indicated that simple ways of journaling (expressive writing) can result in improvements of mood, relationships, subjective and objective health, and overall wellbeing (Banburey, 2003; Smyth, Stone, Hurewitz, & Kaell, 1999). Current and classic studies have proven that there is great health value in personal disclosure (Dunnack & Park 2009; Sloana, Feinsteina, & Marxa, 2009). For instance, a classic study concluded that participants writing for 4 days in a row (20 minutes a day) about traumatic experiences reported more positive moods, improved measures of cellular immune-system function, less visits to the doctor, and fewer illnesses than those participants who

only wrote about common daily events (Pennebaker & Francis, 1996). The researchers concluded that writing, as a means to face traumatic experiences was physically beneficial. This might also contribute to explain why *blogging* has become so popoular.

The way the words are used during the process of writing says much about the types of personalities and attitudes people have towards things and other people (Pennebaker, Mehl, & Niederhoffer, 2003). This information may be valuable in the process of assisting people to understand their own strengths or weaknesses towards specific health behaviors, such as body image, engagement in regular physical activity, relationship with food, and so on. A study conducted by Slatcher and Pennebaker (2006) concluded that the words written by participants revealed much of the "processes underlying interactions in close relationships" (p.663). A voluntary increase in words implying emotions may have influence in the quality of personal relationships; researchers point out that an "increased expression of positive emotions [during journal writing] can result in better outcomes for relationships" (p. 663). These conclusions are supported by previous research in the topic (Butler et al., 2003; Gottman & Levenson, 2000).

Gratitude may also go hand in hand with journal writing. Researchers McCullough and associates, (2001, 2002) and Emmons and McCullough (2003) have consistently found that those participating in their studies experienced a significant effect on their well being when they engaged in writing about gratitude experiences in their journals. Thus, talking or writing about traumatic experiences and/or gratitude appears to be linked to an improvement in physical health as well as healthy behaviors (Pennebaker,

1996).

In this study, mentally healthy participants were asked to write about both traumatic events and experiences for which they felt thankful. They were also encouraged to use positive terms while engaging in expressive journal writing. By doing so, the researcher sought to provide an ongoing opportunity that might assist participants in accessing their own resilient qualities (Richardson, 2002) as they wrote and reflected on themselves, their lives, their bodies, their current health status, their self-chosen health goals, as well as their current or desired relationship with food.

Gratitude and Health

Consistent research suggests that adults who reflect and practice gratitude may experience positive health outcomes (Bono & McCullough, 2004; Emmons & McCullough, 2003; Emmons & Shelton, 2005; Fredrickson & Joiner, 2002). Increasing evidence links gratitude to higher scores of psychological and physical well-being (Emmons & McCullough, 2004). Gratitude has been reported to be negatively correlated to depression, social anxiety, and even envy (Kashdan & Breen, 2007; Lyubomirsky et al., 2005; McCullough, Emmons, & Tsang, 2002; Seligman, Steen, Park, & Peterson, 2005). Furthermore, gratitude also assists in building strong social relationships (Fredrickson, 2004).

Gratitude can be defined as ‘‘a sense of thankfulness and joy in response to receiving a gift, whether the gift be a tangible benefit from a specific other or a moment of peaceful bliss evoked by natural beauty’’ (Emmons, 2004, p. 554). Being alive, having

a body, and enjoying good health can be gifts for which great appreciation is felt and can be expressed in different ways—including awareness of healthy living. There may be also some who may take these gifts for granted.

Researchers have pointed out the value of exploring and applying interventions using gratitude in different settings and populations in order to spread health and happiness to as many people as possible (Bono, Emmons, & McCullough, 2004; Kashdan, Mishra, Breen, & Froh, 2009). Given the current call for research on gratitude and health outcomes, this study sought to examine how promoting reflection and the practice of gratitude (on the gifts of life, the body, and health) may bring forth a sense of responsibility for protecting and enhancing health—by increasing levels of physical activity and adopting other healthy habits. The researcher also hypothesized that by increasing levels of gratitude; existing levels of depression—which could be correlated to obesity—may be reduced (Luppino et al., 2010; Murphy et al., 2009; Thomas et al., 2010).

Expressive Writing, Gratitude, Depression, Obesity, and Health

It seems that expressive writing and gratitude have a universal application among all cultures. Both may help improve mental and emotional health (Rakel, 2007; Sloana, Feinsteina, & Marxa, 2009; Wright, 2009). By inference, it seems logical that combining expressive writing with reflections and a practice of gratitude may have a positive effect on an individual's overall health (Wood, Maltby, Gillett, Linley & Joseph, 2008). As a result of an improvement of psychological factors such as mood, it can be assumed that

symptoms of depression will decline (Wood et al., 2008). Given the relationship between depression and obesity, it seems reasonable that some individuals may reduce their body weight as a result of decreasing levels of depression and thus, increasing their control to adopt healthier behaviors (such as regular physical activity and dietary habits) (Murphy, et al., 2009).

There is substantial evidence that emotions play an important role in weight gain as a result of food consumption and physical inactivity (Levitan & Davis, 2010; Thomas et al., 2010). High-caloric and highly palatable foods "are most problematic in terms of weight gain and obesity" and also "have the strongest effect on alleviating negative mood states in most contexts" (Levitan & Davis, 2010, p. 793). Some foods have an effect on the reward center of the brain and areas that regulate addictive behaviors (Levitan & Davis, 2010). Given that many individuals seek to ease negative emotions by consuming food, "addressing the obesity epidemic with a greater focus on emotional processes will be necessary if significant progress is to be made" (Levitan & Davis, 2010, p. 793).

Another factor that may influence negative emotions and food consumption is poor body image. Data suggest that younger women, who struggle the most with body image, show stronger association between depression and obesity (Chen, 2009). A study examining this relationship indicated that obesity might actually trigger depression in some women as perceptions of weight were an important predictor for reporting depression symptoms when BMI was not a relevant predictor (Chen, 2009). Furthermore, another study indicated that younger women struggling with severe obesity and poor body image were at high risk for depression (Dixon, Dixon, & O'Brien, 2003). Thus, body

image should also be considered when examining the relationship between depression and obesity, specifically among women.

Murphy and associates, (2009) warn that a major concern arises when poor body image may lead to depression, which in turn may lead to overeating resulting in increased weight gain. This spiraling effect should be addressed if health practitioners are to be successful in treating both, depression and obesity; this 'vicious cycle' should be interrupted if more serious health problems are to be prevented (Murphy et al., 2009).

In another study, Thomas et al. (2010) conducted interviews with a community sample of 142 obese adults. They sought to find out how these adults felt about themselves and their bodies, the reasons of such feelings, and ways in which they would cope with those feelings. Results showed that weight was associated with feelings of shame, guilt, and blame, reinforcing "the growing international evidence on the impact of weight-based stigma on obese adults" (Thomas et al., 2010, p. 39). The society in general must change this damaging weight-based stigma; meanwhile those struggling with excessive weight would greatly benefit if they could change their personal attitudes towards themselves as being overweight or obese. This is a vital need if these individuals are to experience a healthy view of themselves, their health, and their lives.

As mentioned previously, expressive writing as well as reflecting and practicing gratitude can be key strategies in alleviating negative emotions and enhancing life satisfaction, self-acceptance, and overall mental and physical health (Sloana, Feinsteina, & Marxa, 2009; Wright, 2009; Kashdan & Breen, 2007; Lyubomirsky et al., 2005; McCullough, Emmons, & Tsang, 2002; Rakel, 2007; Seligman et al., 2005). David Rakel

(2007) indicates "journaling or expressive writing is a simple, gentle, and inexpensive healing technique" (p. 6). On the basis of the above arguments, it seems reasonable to develop training or educational programs in which individuals learn to engage in expressive writing and reflective gratitude. The application of such strategies may assist these individuals in alleviating negative emotions linked to childhood trauma (Rohde et al., 2008), weight-based stigma (Thomas et al., 2010), and poor body image (Murphy et al., 2009). Such changes may have a positive impact on behaviors interconnected with obesity protective factors. It is more likely that individuals feeling emotionally healthy will avoid unhealthy behaviors linked to negative emotions—such as overeating or physical inactivity (Levitan & Davis, 2010). If such is the case, excessive weight may decrease among these individuals.

An extensive search of existing literature indicates that there is no intervention for adults residing in Utah that combines all the elements of the HFAP's curriculum: reflections on gratitude, journal writing, and fun and inexpensive physical activities as a way to reduce levels of depression and elicit motivation to improve levels of physical activity and other healthy behaviors. Thus, this exploratory health promotion study is an answer to the call for innovative programs and research that may yield evidence-based interventions to reduce and/or prevent not only current obesity trends but also depression symptoms among adults residing in Utah.

Social Cognitive Theory and Health Interventions

This intervention indented to improve physical activity was developed as an adjunct to an effective evidence-based program designed to improve protective factors in families, namely the Strengthening Families Program (SFP) (Kumpfer & DeMarsh, 1985). The intervention theory guiding the SFP and contributing to its effectiveness as the most effective substance abuse prevention program (Foxcroft et al., 2003) is the Social Cognitive Behavior Theory (Bandura, 1989). Likewise, in this study the tenants of the SCT will be used to guide the processes of health behavior changes among adult participants.

Social Learning Theory (Bandura, 1986) suggests that individuals can learn not only by personal experiences, but also by observing others' behaviors and the consequences associated to those behaviors. Professor Bandura upgraded this theory adding a new component, the construct of self-efficacy. Since Bandura's modification (Bandura, 1989), the theory is called Social Cognitive Theory (SCT).

This theory, basically describes an active process of continuous interaction that involves different factors: personal, environmental, and human behavior. Each of these factors has some kind of influence on each other. In the area of health the theory suggests that healthy behaviors will be affected by three main dimensions: self-efficacy, goals, and outcome expectancies. When an individual has a sense of freedom to choose a behavior or action and being able to successfully accomplish a given task (self-efficacy), then this person can change his behavior despite some barriers. On the other hand, the lack of confidence or perceived control of a person over a specific behavior (such as stopping

overeating or increasing physical activity levels) will diminish the motivation to act or endure in an attempt to change behavior when barriers are presented. When an individual adopts a new behavior, this fact will interact with his environment and with the way in which he usually manages himself or his interactions with others. There is interaction between environment and behavior (individual). These are not isolated parts of the behavior. For instance, if adult participants decide to increase the amount of physical activity, as a consequence of participating in this health promotion program (in which they will be educated and build confidence in themselves and their ability to perform, self-regulate, and value physical activity participation), such new behavior will affect their environment in different ways. They may clear up the front yard and get a trampoline or a basketball hoop in order to increase their accessibility to recreational activities that include physical activity. Such behavior will have an impact (interaction effect) on their close friends and relatives. Their friends may increase their physical activity behavior as well, as a consequence of observing their close friends engaging in this new behavior.

There are several constructs that must be considered in order to understand the processes involved in SCT. These are: reciprocal determinism, behavioral capability, expectations, self-efficacy, observational learning (modeling), and reinforcements.

Application of SCT to Health Promotion Interventions

Many interventions seeking to increase levels of physical activity among different populations have been developed under the basis of Social Cognitive Theory (Hortz &

Petosa, 2006, 2008; Jones et al., 2008). Likewise, the HFAP 5-week intervention seeks to affect behavior changes by promoting interactive learning, modeling, reinforcements to behaviors, and understanding of outcome expectations.

Behavioral capability, expectations, and self-efficacy have an important part in the HFAP curriculum. Behavioral capability suggests that in order to perform a given behavior an individual needs to know how to do it and what to do. A behavior can be promoted as we teach to master such behavior through learning and skills training. This is an important part in the curriculum of the intervention. The construct of expectations refers to the outcome expectations of a person as she anticipates specific results from her behavior or action. If a health behavior is expected to yield positive outcomes, it is more likely to be adopted. Self-efficacy is a key construct on behavior change. It is often presented in theories of health behavior. Self-efficacy can be increased by setting incremental goals, behavioral contracting (a formal contract that is tied to pre-accorded goals and rewards), and monitoring and reinforcement (offering feedback on one's own performance or keeping record of performances). Self-efficacy is the major component in guiding health behavior change processes in the curriculum of the research study.

Major components of these constructs are present in the activities of the sessions in order to achieve an improvement in levels of physical activity: adult participants becoming confident that they can be role models of an active life, participants rewarding other participants' behaviors; participants being exposed to physically active role models during sessions; activities that provide opportunities for self-efficacy, and lessons targeting the value of change in order to improve outcome expectancy value.

Research on self-efficacy indicates that lack of parental modeling on physical activity may be a barrier to children in regards to exercising; youth are very vulnerable to both influences for an increase or decrease in physical activity behaviors (Baranowski, Perry, & Parcel 2002). Some adult participants may have been raised in conditions in which parents were not good role models in regards to healthy habits. The HFAP intervention includes a variety of ways in which adults participating in the intervention may experience positive influences towards physical activity through being exposed to effective role models, by reinforcing self-efficacy through small steps to improvement, giving verbal persuasion, facilitating exemplar models, providing opportunities to enjoy diverse fun physical activities, and inviting participants to commit to self-chosen plans to action.

The Healthy and Fit Adults Program incorporates most of the components present in one of the most effective skills training program, the Strengthening Families Program. Such elements have been adopted after much examination of the Social Cognitive Theory. Considering the effectiveness of the Strengthening Families Program as a health prevention program increasing protective factors among youth against substance abuse, the investigator found valuable to develop a program that would utilize similar theoretical foundation as part of the present intervention. Several elements were included to the HFAP: a) group learning, b) positive praise for small improvements in demonstrating the new behavior, c) homework assignments, d) support from participants and group leader in order to monitor how often participants practiced the new skills, and e) monitoring efforts towards personal health goals outside the classroom setting.

Summary

There is an urgent call for innovative interventions to prevent and reverse the current epidemic of overweight and obesity. In the basis of the above arguments, the researcher of this study developed a curriculum (HFAP) that may respond to such a call. The above literature entails that one possible way to increase obesity protective factors is to gain appreciation for the body, health, and life. A comprehensive review of literature found no studies that combine gratitude and expressive writing in an effort to increase health protective factors (such as physical activity levels) in adults. The purpose of this study was to test the effectiveness of these elements of the Healthy and Fit Adults Program as a way to improve protective factors and reduce risk factors for obesity in adults residing in Utah.

CHAPTER 3

METHODS

Chapter three describes the methods used to conduct the study including the following major headings: 1) Purpose of the Study, 2) Study Design, 3) Subjects, 4) Variables, 5) Measures, 6) Procedures, 5) Analysis of Data and, 5) Summary.

Purpose of the Study

There is a need for innovative evidence-based obesity prevention programs. A review of current research on obesity, depression, expressive writing, and gratitude suggests that a possible way to boost obesity protective factors (i.e., physical activity) is to gain appreciation for the body, health, and life. A comprehensive review of literature found no studies that combine gratitude and expressive writing in an effort to increase obesity protective factors (such as physical activity levels) in adults. The purpose of this study was to test the effectiveness of an innovative intervention, the Healthy and Fit Adults Program, which includes expressive writing and practice of gratitude as a way to improve protective factors for obesity in adults residing in Utah.

Research Design

This study consisted of one of the most commonly used quasi-experimental designs, a non-equivalent control group design (hereafter NEGD). According to Trochim (2006), the NEGD is one of the most widely used designs in social research. NEGD is similar to a pretest posttest randomized study; however, it lacks random assignment of participants. The lack of random selection and assignment in research studies makes the study vulnerable to selection bias, which may negatively affect the internal validity of the study. In order to minimize this threat, the researcher made efforts to ensure that the subjects selected to be part of the experimental and comparison group would be as similar as possible. This equivalency between groups was established by recruiting subjects of similar demographic characteristics (same age group, similar education level, same geographical area, and same religious congregation).

When both groups seem highly similar, it is critical to statistically compare the treatment and comparison groups (Trochim, 2006). As shown in the results chapter, a comparison of the means in different variables at pretest demonstrated that groups were highly equivalent.

Participants

Protection of Human Subjects

Prior to data collection and intervention, the investigator requested and received approval from IRB (the Human Subjects Research Committee at the University of Utah), Bishop Harmsen of the Monument Park 19th Ward (The Church of Jesus Christ of Latter-day Saints), and Glenn Richardson (former Chair of the Department of Health Promotion

and Education at the University of Utah). Participation was completely voluntary and there was a minimal risk associated with participating in this study. Participants in both groups (experimental and comparison) were informed they could withdraw from the research study at any time without consequence. All data collected at pretest and posttests were coded to protect subjects' confidentiality. In addition, any personal information from participants or contact information was kept in a locked cabinet in the researcher's office and only the researcher had access to the data. At the end of study, all personal and contact information was destroyed. See Appendix A for the letter of approval from Bishop Harmsen and for the adult consent form.

Selection of Subjects

The sample of this study consisted of 63 adults, 27 participants enrolled in the Healthy and Fit Adults Program and 36 in the comparison group. Participants ranged between 31 to 45 years of age (M= 36.4, SD=4.3). All participants were recruited from a religious community, the Monument Park 19th Ward of the Church of Jesus Christ of Latter-Day Saints, in Salt Lake City, Utah. Recruitment took place by invitation. The leaders of this church contacted all members in the congregation via email and extended an invitation to participate in a health promotion study for adults. In our first approach, potential participants were informed that they would be assigned to an intervention group or a comparison group waiting list. Thus, we could perform a true experiment. However, the number of participants who signed up to take part in the study was not large enough to conduct a random assignment to treatment or comparison. All those who were present

at our first meeting (*n*=27) and expressed their desire to participate were enrolled as members of the treatment or experimental group.

Additionally, the leaders of this religious congregation as directed by the researcher extended a second invitation to the members of the congregation asking them to take part in the health study only as a comparison group (receiving no treatment). Some of these participants indicated that if they would not have experienced barriers to participation (mostly time constrains), they would have also enrolled to receive the intervention.

Most participants were female, 68%. The majority of the sample, 89%, consisted of Caucasians. Over two thirds of participants, 72%, reported a college degree or higher education. A third of the sample, 32%, were overweight or obese (BMI > 25) at baseline.

The intervention group received a total of five sessions of the program plus a pretest data collection session. The comparison group did not receive any kind of information or materials during the length of the study. Comparison group participants were only contacted via email and during church meetings in order to receive the pretest and posttest surveys at approximately the same time that the data was collected from the intervention group.

Exclusion Criteria

Specific exclusion criteria included those participants who did not speak or read English and also those ruled out on the Physical Activity Readiness Questionnaire (PAR-Q) screening. The PAR-Q is a 10-item test designed to identify a small number of adults for whom physical and aerobic fitness activities may not be appropriate. This test was

required by the IRB committee and it was administered to all those who wanted to be part of this study. There were other prospective participants who needed approval to participate in this study. Such approval was granted or declined by the researcher after considering any high health risk of participants. This would include those with heart disease, pregnancy, severe mental disorders, and other health risk factors.

Only those adult participants who successfully cleared the PAR-Q qualified to participate in this study. However, there were a small number of prospective participants who did miss one or two items of the PAR-Q but wanted to be part of the study. These participants were asked to provide a doctor's referral saying that they were physically capable to participate in low to moderate physical activities. As indicated in the PAR-Q protocol, these participants met with the researcher and they agreed that they would avoid activities that may result in health risks. They were asked to sit and observe the rest of participants during any activity requiring physical effort. See Appendix C for PAR-Q survey.

Participant Attrition

A total of 63 adults enrolled to take part in this research study, 27 in the experimental group and 36 in the comparison group. At the conclusion of the study, 48 participants (26 in experimental and 22 in comparison group) were retained representing an overall attrition rate of 23.8%. That is, 15 out of 63 participants dropped out of the study sometime after pretest data collection. One participant dropped out from the experimental group (1.5%) and 14 (22.2%) from the comparison group.

Location of Intervention

The intervention took place from May 15th through June 8th 2011, at the University of Utah campus, at the Annex building, at room 2102. This location was submitted and approved by the IRB committee.

Recruitment Procedures

The researcher contacted and explained the program to the ecclesiastical leaders of the Monument Park 19th Ward (religious congregation), who served as gatekeepers and committed to support the study recruitment. During two Sundays the leaders of the church verbally informed the members of their congregation about the program. By word of mouth, members shared with other members about the program. Members also received an email with details about the address and directions to the location where the intervention would take place. They also learned about the tentative schedule and contact information of the main researcher. Those interested in participating in the study contacted the main investigator via email and/or phone. The researcher informed prospective participants about inclusion and exclusion criteria. The researcher then invited those participants who still were interested to attend a first session intended to provide information about the details of the program, gather the consent forms, and collect pre-test or baseline data.

Variables

The following dependent variables were measured to determine the effectiveness of the HFAP intervention (Blessing, 2001):

1. Self-reported physical activity levels as measured by International Physical Activity Questionnaire (IPAQ). The unit of measure suggested in this scale was METs (Metabolic Equivalents per Time) (Craig, et al., 2003).
2. Self-reported depression as measured by the CES-D scale (Radloff, 1977).
3. Self-reported gratitude as measured by GQ-6 (McCullough, Emmons, & Tsang, 2002)
4. Physical activity levels as measured by pedometers (SM2000 and DMC-03) at pretest and posttest.
5. Physiological responses as measured by body mass index (BMI).

Independent variables are selected in advance and often are causative or important to the logical purpose of the study (Blessing, 2001). This study included one main independent variable, the Healthy and Fit Adults Program intervention. However, during data analysis, two types of independent variables were used: group with two levels and time with two levels. The group variable in this study refers to those self-selecting to participate in the intervention (experimental group) and those self-selecting to participate in the comparison group. The independent variable of time with two levels is represented by pretest measurements done before the intervention (time 1) and posttest measurements collected after intervention (time 2).

Measures

In order to obtain reliable data on physical activity levels, objective and subjective data was collected. Objective measurements included steps (pedometers) and body mass

index; whereas subjective data methods were self-reported scales on physical activity, gratitude, and depression.

Objective Measurements: Pedometers

Many health outcome variables (i.e., obesity, cancer, cardio vascular disease, hypertension, glucose tolerance, depression) are often correlated to levels of physical activity. When measuring physical activity, researchers ask for reliable and accurate measurements (Le Masurier & Tudor-Locke, 2003). In the past years technology has provided different bodyworn ways to measure physical activity, both in laboratory and field conditions (i.e., bodybuggSP™ systems, pedometers, accelerometers, iphones, etc.). Pedometers are used to measure the steps taken while walking, jogging, or running; they are made to detect vertical accelerations of the hip (Bassey et al., 1987). Considering that most physical activity take place during waking hours as a result of walking, jogging, and running, the use of pedometers was considered as an important tool to measuring an objective increase of physical activity levels from pretest to posttest.

A pedometer is a small battery-operated device with a micro-electro-mechanical system that can detect vertical accelerations. When attached to the body it can measure vertical oscillations of the hip and count steps taken while walking. The number of steps is usually displayed digitally on a feedback screen (Tudor-Locke, 2002). The most commonly used pedometers have a spring-suspended levered arm (Schneider, Crouter, Lukajic, & Bassett, 2003). Most existing pedometers have been extensively tested and several studies have shown certain brands and models to be more accurate than others (Pitchford & Yun, 2010; Schneider et al., 2003, 2004). Some pedometers can be

programmed to measure estimates of energy expended (Kcals) and/or distance travelled during walking (in kilometers or miles) (Tudor-Locke, 2002); others may also measure distance, and time; however, these measures have shown lower accuracy than the measurement of steps (Bassett et al., 2000; Tudor-Locke, 2002). Therefore, researchers recommend that the measurement of *steps* taken or *steps per day* should be adopted as the universal standard unit of measure during data collection, reports of results, and interpretation of data obtained through pedometers (Rowlands, Eston, & Ingledew, 1997; Tudor-Locke & Myers, 2001a).

Two different brands of pedometers were used in this study: the SM-2000 and the DMC-03. The two models of pedometers (SM2000 and DMC-03) used in this study have been reported to have an accuracy of 92 % to 96% (Pedometer USA, 2011). Currently, researchers face the challenge of trusting the manufacturers recommendations and reports on accuracy and reliability. In deciding which pedometer will best fit the researcher purposes, Tudor-Locke (2002) recommend conducting a simple test in order to figure out if a pedometer will be accurate: walking "a short distance at a normal walking pace wearing the pedometer as specified by the manufacturer and simultaneously count actual steps taken" (Tudor-Locke, 2002, p. 3). Researchers indicate that there will be always a minimum error (acceptable between 1% - 5%) in accuracy (Ryan, Grant, Tigbe, & Granat, 2006; Vincent & Sidman, 2003). For this study, the researcher conducted the above test and the minimum error was between recommendations (1% - 5%).

Data collected with these pedometers provided baseline and posttest intervention levels of physical activity in the form of step counts. A week before the program started, participants were asked to wear a pedometer during 5 days (including at least one

weekend day) (Tudor-Locke & Myers, 2001a). Pedometers were provided to study participants as an incentive.

Participants were trained by research assistants to wear pedometers correctly with proper placement at the waistband centered between the belly button and side of the hip. Participants were asked to wear pedometers during waking hours and at the start of each day participants had to reset the pedometer to zero. The pedometer was to be removed when going to sleep or while taking a shower. At the end of the day (according to some protocols) participants registered the number of steps on the screen in the activity log provided by the researcher.

It seems that in this study, the use of pedometers had a positive effect in promoting physical activity (Tudor-Locke & Lutes, 2009). In clinical studies, the use of pedometers has accounted for a significant increase in physical activity, as well as a reduction of blood pressure and BMI (Bravata, 2007).

There were some disadvantages from using pedometers. Pedometers used in this study could not register or record intensity of physical activity. Furthermore, pedometers may have registered false steps. For instance, there are cases in which the hip experiences vertical motion not from walking (if a person bends down to pick up something or while riding in a vehicle on a very bumpy road). Studies using pedometers may also experience missing data. This happens when research participants forget to check the screen each day and record total steps on the log-sheet. Another limitation when measuring physical activity with the pedometer is that this device cannot be worn to measure water-based activities. Finally, pedometers do not get good measures in activities done on an incline or from isolated muscles from the upper body (Welk et al., 2000).

Objective Measurements: Body Mass Index

Another objective measurement in this study was body mass index (BMI). Even though, the researcher was aware that the outcomes of the HFAP 5-week health promotion intervention may not result in a significant difference or decrease of BMI, this physiological measurement was taken in order to provide long-term results. Participants will be invited to meet for a follow-up meeting, 6 months after intervention, in order to collect posttest data such as BMI. Body mass and height were measured using a reliable scale and a stadiometer by three trained research assistants. Participants were asked to wear light clothing and no shoes as they were taken physical measurements. These measures were the basis to calculating the body mass index (BMI) score for each participant. BMI was calculated by using the BMI calculator and norms provided by the Center for Disease Control (CDC, 2011a). Only one participant did not feel comfortable about stepping on the scale and refused to provide measures of weight and height. All physical measurement recordings were recorded on a sheet that linked data with participants' code numbers (i.e., initials of name and last name and four last digits of phone or social security number).

Physical Activity Self-reported Data

In order to collect self-reported data on physical activity levels, the researcher used the short version of the International Physical Activity Questionnaire (s-IPAQ). The s-IPAQ's psychometric properties concerning construction and validation are as good as other established self-report physical activity measures (Craig et al., 2003). This short scale is applicable to different settings and languages (Craig et al., 2003). Spearman

correlation coefficients (0.8) from test-retest reliability indicate very good repeatability. Criterion validity of the self-report s-IPAQ data against accelerometers indicated correlations of 0.80 ($p < .05$) for reliability and 0.30 for validity (Craig et al., 2003). Concurrent validity coefficient was 0.67 (95% CI 0.64–0.70). Psychometric properties of the scale can be affected if the wording or order of the questions is modified (Craig et al., 2003).

The s-IPAQ has 7 items and it has been used with individuals 18 to 65 years old (Craig, et al., 2003). This scale assesses physical activity (PA) in four domains: leisure time PA, domestic and gardening activities, work-related PA, and transport-related PA. The items can provide individual scores about three specific types of activity within each domain: walking, moderate-intensity activities, and vigorous-intensity activities. However, the scale does not provide specific estimates for each domain. The scores can be categorical (low, moderate, high) or continuous. Continuous scores for each type of PA (walking, moderate, and vigorous) are expressed in MET-minutes/week (computed by adding the duration [number of minutes] and frequency [days] of each activity). Exemplars of items: "during the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?" and "how much time did you usually spend doing vigorous physical activities on one of those days?" (in hours and minutes). During a study in which reliability for the IPAQ was tested (Craig et al., 2003), the scale developers used specific formulas (i.e., Walking MET-minutes/week = 3.3 * walking minutes * walking days) to create average MET values for walking (3.3 METs), moderate PA (4.0 METs) and vigorous PA (8.0 METs). MET stands for "metabolic equivalents per time.

Some of the advantages of using this scale are: 1) the s-IPAQ scale can be administered with little training (Johnson-Kozlow et al., 2006); 2) the s-IPAQ provides continuous score for different types of PA and indicates inactivity; 3) the scoring is simple; and 4) this scale can be used at no cost and includes a comprehensive instructions of use, scoring, data cleaning. However, the use of this scale may also have some disadvantages. For instance, respondents may misunderstand what is being asked (Craig, et al., 2003); some respondents may have difficulty in recalling detailed information on past PA; a study showed a significant impact on the results when comparing the IPAQ against accelerometry (Johnson-Kozlow et al., 2006).

The revised guidelines (IPAQ, 2005) of the IPAQ suggest the following guidelines in order to calculate the MET value so data can be processed and analyzed:

> Median values and interquartile ranges can be computed for walking (W), moderate intensity activities (M), vigorous-intensity activities (V) and a combined total physical activity score. All continuous scores are expressed in MET-minutes/week as defined below. The selected MET values were derived from work undertaken during the IPAQ Reliability Study undertaken in 2000-2001 (Craig et al., 2003). An average MET score was derived for each type of activity. For example; all types of walking were included and an average MET value for walking was created. The same procedure was undertaken for moderate-intensity activities and vigorous-intensity activities. The following values continue to be used for the analysis of IPAQ data: Walking = 3.3 METs, Moderate PA = 4.0 METs and Vigorous PA = 8.0 METs. Using these values, four continuous scores are defined: Walking MET-minutes/week = 3.3 * walking minutes * walking days. Moderate MET-minutes/week = 4.0 * moderate-intensity activity minutes * moderate days. Vigorous MET-minutes/week = 8.0 * vigorous-intensity activity minutes * vigorous-intensity days. Total physical activity MET-minutes/week = sum of Walking + Moderate + Vigorous METminutes/week scores (p. 5).

Other than physical activity levels, participants were asked to fill out several scales measuring different variables as well as some socio-demographic questions.

Following there is a description of these scales and items. Information regarding the IPAQ scale is included in Appendix C.

General Socio-Demographic Questions

Participants were asked for their gender, age, level of education and reasons for which they decided to participate in the study.

Depression

This variable is added to the study because depression symptoms are hypothesized to improve as a result of the HFAP. The Center for Epidemiologic Studies-Depression Scale (CES-D) is a popular and reliable scale that can be used for free and without permission. It was developed and published by the Center for Epidemiologic Studies (Radloff, 1977). This is an excellent self-report psychological screening instrument that consists of 20-items. The scale was designed to measure typical symptoms of depression taking place during the previous week. Symptoms such as poor appetite, hopelessness, pessimism, and fatigue are measured by the CES-D (Radloff, 1977). Each question is answered on a scale of 0-3 (0 indicating no symptom presence and 3 signifying that symptoms are present "most or all of the time"). For instance, "how often you have felt this way during the past week" could be answered as follows: zero as "rarely or none of the time (less than 1 day)," one as "some or a little of the time (1–2 days)," two as "occasionally or a moderate amount of time (3–4 days)," and four as "most or all of the time (5–7 days)." Scores obtained from the CES-D range from 0 to 60. Higher scores suggest more severe depressive symptoms. A score of 16 would be

considered the cutting point by which subjects who may be suffering from depression symptoms can be identified (Radloff, 1977). Scores lower than 16 may suggest the absence of clinical depression.

The psychometric properties of the CES-D seem to be consistent. Research has demonstrated the validity and reliability of this popular scale among researchers seeking to screen for typical symptoms of depression. It has an internal consistency coefficient alpha of .85 and a test-retest score of .51; Radloff (1977) pointed out that for a general population (healthy subjects), the internal consistency (alpha coefficient) was .85 and .90 for samples of patients. Frequent testing of the test-retest estimates of reliability conducted in time periods of 2 weeks to 48 months often resulted in scores between .45 and .70. These scores were consistent with the scale's design (Radloff, 1977). The validity and reliability of the CED-S has been investigated by numerous researchers with Hispanic, African American, Asian American, Japanese, French and other populations (Naughton & Wiklund, 1993). The researcher of this study also tested the reliability at pretest (.855) and posttest (.91). These results reinforce the established reliability of the CES-D and suggest that the scale is also reliable among adults ages 31 to 45 residing in Utah. Information regarding the CED-S scale is included in Appendix C.

Gratitude

This 6-item self-report scale evaluates individual differences in the frequency and intensity with which participants experience gratitude. The items of the *GQ-6 gratitude scale* are scored on a 7-point Likert-type scale. Scores of items 3 and 6 must be reversed in the analysis. McCullough, Emmons, and Tsang (2002) reported interitem consistency

reliabilities ranging from .76 to .84. The researcher of this study also tested the reliability at pretest (.74) and posttest (.63). Further assessment on confirmatory factor analyses indicates that the scale correlates with other measurements of gratitude. The researcher of this study included an additional item to this scale in order to better understand specific gratitude towards the body. The scoring instructions for the GQ-6 scale are as follows: 1) the scores for items 1, 2, 4, and 5 are added up; 2) scores for items 3 and 6 are reversed; that is, a score of "7," is reversed into "1," a "6," will change into a "2," etc.; and 3) the reversed scores for items 3 and 6 are added up to the total score from Step 1. These calculations will provide a total GQ-6 score, which should fall between 6 and 42. The higher the score, the higher the self-reported gratitude. Information regarding the GQ-6 scale is included in Appendix C.

Client Satisfaction or Attitudes Toward Intervention

Adults were asked to rate the intervention in terms of how interesting, enjoyable, and helpful it was. These measures were based on a previous user-satisfaction questionnaire on the post-tests that asked participants to rate various aspects of the program using a 5-point Likert-type scale (Kumpfer & Tala, 2009). Scores across the individual items were averaged to obtain an overall user satisfaction score. Information regarding this questionnaire is included in Appendix C.

Procedures

At the time of the first recruitment meeting, prospective participants were asked to fill out the PAR-Q screening survey. If any potential participant answered "yes" to any question on the PAR-Q, he or she was instructed to obtain permission from a physician in order to participate in the 5 week physical activity program. Twenty-seven participants fulfilled the requisites to participate as the experimental group. Those in the comparison group did not complete the PAR-Q survey as they were not required to participate in any physical activity. All those who qualified to participate in the physical activity program and wanted to be part of experimental group were asked to read and sign the adult consent form. Those who expressed desires to take part of the study as comparison group (n = 35) were also asked to read and sign the adult consent form. Appendix C contains information regarding the PAR-Q screening survey.

In order to differentiate surveys and consent forms of intervention and comparison groups, all the forms and surveys of the comparison group were marked with a specific identifier. In order to obtain reliable data on physiological measures such as weight and height (BMI), a data collection session was scheduled at the same time of the day at pretest and posttest for the intervention group. On the other hand, time constrains made difficult to collect physiological measures (height and weight) from those in the comparison group. All those in the comparison group were asked to take the surveys home and include an accurate height and weight on their own when they would fill out the surveys.

To decrease potential attrition, the researcher sent weekly emails to participants reminding them about the date and time of the following session. See Appendix B for a

copy of the email containing the weekly remainder. Participants in the comparison group also received two reminders about completing and bringing the surveys during pretest and posttest data collection.

Training

Research assistants included three doctoral students and one PhD alumni in Health Promotion and Education from the College of Health at the University of Utah. All assistants were trained to assist in administering the PAR-Q, the consent forms, and the questionnaire as well as how to follow the protocol to measure height and weight. Research assistants were trained in tow to teach participants to wear and use the pedometer as well as how to read and record the steps at the end of each day in the pedometer log. These research assistants were not part of the study as subjects. An assessment of reliability was conducted for those scales used in the study. Results of this evaluation are presented in the next chapter of this manuscript.

The Intervention

To test the effect of the intervention Healthy and Fit Adults Program (HFAP) only one group of participants (intervention group) was given the treatment. Data collection locations were different. Only the treatment group received training and follow up on how to reflect and practice gratitude, how to do expressive or journal writing, encouragement to set goals to increase levels of physical activity and other healthy behaviors of their own choice, pedometers, instructions on how to use the pedometers,

and log sheets to record pedometer steps. As indicated previously, data were collected using different scales from participants of both groups.

Participants in the intervention group were asked to attend all sessions of the program. Each session took place weekly and lasted 1 hour. In those five sessions participants learned the following: the importance of reflecting and practicing gratitude, the value of journal or expressive writing, the importance of regular physical activity, and basic knowledge about proper nutrition. Participants were encouraged to write in their journals at least three times a week during the length of the program. During the first session participants were invited to select those healthy behaviors they wanted to improve and set up simple goals towards improving health behaviors. They were also asked to select another participant in the group and contact him or her at least once a week in order to follow up with their own personal goals. The researcher sent weekly emails encouraging participants to keep up with their goals and to be in touch with the person in the group they were supposed to follow up.

The researcher used the scales and measures described in the previous section in order to collect data from participants of both groups following the timeline displayed by Table 3.1. Only for the intervention group there was a pretest data collection meeting scheduled the week previous to starting the program. Participants in the comparison group took part in pretest and posttest data collection in a different way. The researcher talked with them, one-on-one and gave them specific instructions about how to fill out the survey and how to wear and use the pedometer. Participants in the comparison group received a different model of pedometer.

Table 3.1
Data Collection Timeline

		Weeks of Study				
Data Collected: Both Groups	Week Prior Study	1	2	3	4	5
Physical Activity Readiness Questionnaire (PAR-Q) (Only Intervention Group)	X					X
Consent Form	X					X
Demographics	X					X
International Physical Activity Questionnaire (I-PAQ)	X					X
CES-D Depression	X					X
G6-Q Gratitude	X					X
Pedometer Steps Log	X					X
Height	X					X
Weight	X					X
HFAP Program (Only Intervention Group)		X	X	X	X	X

Description of Preintervention Meeting with Participants

A week previous to intervention, the researcher met with participants and described the purpose of the study. Details of the program procedures and data collection were explained. Participants could ask questions at any moment. After the informative meeting, those who wanted to participate as intervention group were asked to take the PAR-Q, sign up the consent form and complete the battery testing on self-reported physical activity, gratitude, and depression. In this first meeting, participants in the intervention group completed the following measures:

1. Demographic information.
2. Self-reported levels of physical activity during last 7 days (average week) (IPAQ).
3. Self-reported gratitude (GQ-6).
4. Self-reported depression (CES-D).
5. Height to calculate BMI.
6. Weight to calculate BMI.

During this prior to intervention meeting, participants in the experimental group were trained in how to use the pedometer and how to record the steps in the log sheet. Pedometers and log sheets to register steps during 5 days were given to each participant.

Participants in the comparison group did not attend a meeting but were approached one by one by the researcher. In those personal meetings the researcher gave the same instructions and materials as those given to the intervention group. All participants in both groups received at least one email reminding them to wear the pedometer and return the log sheet and pedometer to the researcher. At the end of the study, those who wanted to keep a pedometer were instructed to ask the researcher.

Pedometer Instructions

All participants were instructed to place the pedometer on the waistband of their pants or skirt during waking hours and remove it only if they had to take a shower. The pedometer had to be removed when going to bed each night. Each participant received a sheet containing the above instructions and a table to record the total steps at the end of each day (5 days) (Tudor-Lock & Bassett, 2004).

Posttest Data Collection

During the fourth session, all participants in the intervention group were given a pedometer and asked to wear it for 5 more days in order to collect posttest data. Following the same procedures than pretest data, participants were asked to enter the total steps at the end of each day and return the pedometer and sheet log to the researcher the following session. During this fourth session, these participants (intervention group) were

informed that during the last session (fifth session) the researcher would dedicate thirty minutes to collect posttest data. The following activities took place during this last session:

1. Review of materials taught during the program and time for questions and answers.
2. Physical activity (dance) and healthy potluck.
3. Data Collection:

    3.1. Self-reported levels of physical activity during last week or previous average week (IPAQ).

    3.2. Self-reported gratitude (G6-Q).

    3.3. Self-reported depression (CES-D)

    3.4. Height to calculate BMI

    3. 5. Weight to calculate BMI

Participants in the comparison group were also asked to complete the measures described in the above paragraph. As it happened during pretest data collection, the researcher contacted all participants in the comparison group in order to provide a hard copy of the battery test, the pedometers, and the pedometer sheet log. Twelve participants in the comparison group did not complete or return posttest data.

Social Cognitive Theory and HFAP Program

An overview of the activities and instruction provided during the HFAP intervention as well as a description of the activities is described in the following paragraphs.

The HFAP interventions uses the foundational framework of Bandura's Social Cognitive Theory (Hortz & Petosa, 2006, 2008; Jones et al., 2008). The HFAP intervention seeks to affect behavior changes by promoting interactive learning, modeling, reinforcements to behaviors, and understanding of outcome expectations.

Behavioral capability, expectations, and self-efficacy have an important part in the HFAP curriculum. Behavioral capability suggests that in order to perform a given behavior an individual needs to know how to do it and what to do. A behavior can be promoted as we teach to master such behavior through learning and skills training. This is an important part in the curriculum of the intervention. The construct of expectations refers to the outcome expectations of a person as she anticipates specific results from her behavior or action. If a health behavior is believed to yield positive outcomes, it is more likely to be adopted. Self-efficacy is a key construct on behavior change. It is often presented in theories of health behavior. Self-efficacy can be increased by setting incremental goals, behavioral contracting (a formal contract that is tied to pre-accorded goals and rewards), and monitoring and reinforcement (offering feedback on one's own performance or keeping record of performances). Self-efficacy is the major component in guiding health behavior change processes in the activities of the HFAP.

Other major components of the SCT constructs are present in the activities of the sessions of the HFAP in order to achieve an improvement in levels of physical activity. For instance, adult participants becoming confident that they can be role models of an active life, participants rewarding other participants' behaviors; participants being exposed to physically active role models during sessions; activities that provide

opportunities for self-efficacy, and lessons targeting the value of change in order to improve outcome expectancy value.

Research on self-efficacy indicates that lack of parental modeling on physical activity may be a barrier to children in regards to exercising; youth are very vulnerable to both, influences for an increase or decrease in physical activity behaviors (Baranowski, Perry, & Parcel 2002). Those who participated in this study may have been raised in conditions in which parents were not good role models in regards to healthy habits. The HFAP intervention includes ways in which adults may experience positive influences towards physical activity through being exposed to effective role models, by reinforcing self-efficacy through small steps to improvement, giving verbal persuasion, facilitating exemplar models, providing opportunities to enjoy diverse fun physical activities, and inviting participants to commit to self-chosen plans to action.

Description of Sessions

The five sessions of the HFAP included a variety of activities projected to increase a sense of gratitude for life, health, and the body. The purpose of the activities was also to motivate participants to adopt healthier behaviors such as regular physical activity and healthy dietary habits. Participants were instructed on the following:

- Reflection and practice of gratitude (for life, health, and body)
- How to practice expressive writing
- Gratitude letters
- Gratitude Body Scan (relaxation practice)
- Self-selection of goals pertaining to the adoption of healthy behaviors.

- Fun physical activities (dance).

- Instructions on the benefits of physical activity

- Instructions on the benefits of healthy nutrition

Some questions to ponder and reflect during the sessions included: how much do I value my life, my body, and my health? What is my relationship with my body, with the food I eat, with exercising? What do I want to do to improve in my health related behaviors?

Home Practice and Assignments

Additional activities and instructions of the HFAP sessions included home assignments or practicing skills from the sessions as well as social support. Participants were asked to choose a partner from the intervention group and keep in contact at least once (via email, text messaging, and/or phone) during the time period between sessions in order to follow up and encourage to keep up with their self-selected personal goals.

Structure of the Sessions

Each session lasted approximately 1 hour and included the following parts:

- Welcome (5 minutes)

- Review/report “Homework Practice” (5 minutes)

- Activities to develop gratitude and benefits of healthy lifestyle (main topic of the session) (30 minutes)

- First time for fun activity (5 minutes)

- Homework Practice Assignment (5 minutes)

- Departing and last time for fun activity (5 minutes)

- Questions and answers (5 minutes)

In the following section, the author will discuss the steps and actions pertaining to data analysis.

Analysis of Data

All self-reported data and objective data provided by participants were entered by the researcher in a data base. Data were checked for accuracy of input prior to analysis. The researcher reversed the scores of those items in the depression and gratitude scales that were written to support the validity of the responses. Body mass index (BMI) scores were calculated by following the formula provided by the CDC (2011a): ratio of weight (kg) to height (m^2). A total score of steps was calculated for every participant at pretest and posttest. The researcher calculated an average count of steps per day out of 3 to 5 days.

There were two sets of data: pretest and posttest. Both sets were entered in the same data base. Each variable was labeled and computed for a total score in each participant (total physical activity in METs, total depression, total gratitude, total average steps per day, and BMI).

Two different software programs (Microsoft Excel 2010 and SPSS 19.0) were used to compute different numbers: to reverse scores of specific scale items, to calculate METs (physical activity scores), and to calculate body mass index from the ratio of weight (kg) to height (m^2). All data from variables were analyzed and plotted to determine the type of distribution after data collection. For those variables that had a

normal distribution, parametric tests were performed. On the other hand, nonparametric tests were used for those variables that did not present a normal distribution.

All data were analyzed using SPSS 19.0 software (SPSS, Inc., Chicago, IL) and Microsoft Excel 2010. Frequencies and percentages (descriptive statistics) were generated to describe two categorical demographic variables (gender and education) in both groups (intervention and comparison). Continuous and interval level data (age, BMI, depression, gratitude scores, step counts) were described using the following descriptive statistics: mean, standard deviation, range, and median.

Change over time was calculated as posttest minus pretest (i.e. total scores at posttest minus totals at pretest). For continuous or interval data, the normality assumption was assessed by visual examination of plots as well as using the Shapiro-Wilk test of normality. If the Shapiro-Wilk p-value exceeded .05, then parametric statistical tests were used. Otherwise, nonparametric tests were used.

Changes over time within both groups were tested with either paired t-test or Wilcoxon signed rank test. This test assesses the existence of mean differences between two similar samples. Differences between intervention and comparison groups were tested with RM-ANOVA (for Gaussian data sets), the Wilcoxon two-sample test or Friedman test (for non-Gaussian or normally distributed data sets). In order to better examine the difference between groups from pretest to posttest, the researcher decided to use ANCOVA tests. The ANCOVA allowed the researcher to control for the major differences between groups at baseline (i.e., depression, gratitude, BMI). Categorical demographic characteristics were compared between groups using Chi-square tests.

All statistical tests were conducted as though the null hypothesis is "no difference" and the alternative hypothesis is "a difference." Correlations between variables (physical activity levels in METs, step counts, depression, and BMI) were analyzed using the Spearman Rank Order correlation coefficient (nonparametric test for non-Gaussian sets of data) or Pearson correlation coefficient tests for normally distributed data.

The following statistical tests were used to assess the hypotheses and later describe the findings:

Independent samples *t*-test, Wilcoxon Signed Rank tests or Paired-samples *t*-tests (depending on the assumption of normality) were used to test hypotheses 1.1, 1.2, 3.1, 4.1, and 5.1; RM-ANOVAs, ANOVAs, Mann-Whitney tests, and Wilcoxon Signed Rank tests for hypotheses 2.1, 2.2, 3.2, 4.2, and 5.2; and Spearman rank order correlation coefficient or Pearson correlation coefficient tests (depending on the assumption of Gaussian distribution) for hypotheses 6.1, 6.2, 6.3, 7.1, 8.1, and 9.1.

Summary

This chapter delineates and depicts the methods, instruments, and procedures used for collecting data collection and testing the effectiveness of the Healthy and Fit Adults Program (HFAP) as an intervention for increasing physical activity levels and decreasing depression symptoms among adults residing in Utah. This was accomplished by measuring and testing several hypotheses related to four dependent variables (levels of physical activity in METs and step counts by pedometer, BMI, and depression) and one independent variable (gratitude as a result of the HFAP program implementation). A

variety of statistical procedures were conducted in order to analyze the data: descriptive statistics to describe the variables and demographic information, parametric tests to analyze normally distributed variables, and nonparametric tests to examine variables presenting abnormal distributions.

CHAPTER 4

RESULTS

The results of the data analyses are presented in this chapter under the following headings: 1) subject recruitment and retention, 2) demographics about participants, 3) changes in outcomes within the intervention group, 4) changes in outcomes within the comparison group, 5) changes in outcomes: Intervention versus comparison group, 6) correlations between dependent variables, 7) attendance impact on dependent variables, and 8) research questions on the process evaluation. Last of all, the results of hypotheses testing are presented and discussed in relationship to the main research questions.

Participant Recruitment and Retention

All participants were recruited from the Monument Park 19th Ward of the Church of Jesus Christ of Latter-Day Saints, in Salt Lake City, Utah. The leaders of this church contacted all members in the congregation via email and extended an invitation to participate in a health promotion study for adults. The fact that participants knew they had to provide their weight may have had a unfavorable effect on participation for those who are overweight or obese. The recruited participants from the Monument Park 19th

Ward were designated as intervention or comparison groups. The 5 week study was conducted from May 2011 through June 2011.

Participant Attrition

A total of sixty-three adults enrolled to take part in this research study, 27 in the experimental group and 36 in the comparison group. At the conclusion of the study, 48 participants (26 in the experimental group and 22 in the comparison group) were retained representing an overall attrition rate of 23.8%. That is, 15 out of 63 participants dropped out of the study sometime after pretest data collection. One participant (1.5%) dropped out from the experimental group and fourteen participants (22.2%) from the comparison group did not complete the posttest.

Demographic Characteristics of Participants

The sample of this study consisted of 48 adults. Participants ranged between 31 and 45 years of age (M= 37.38, SD=4.03). Gender composition was female (66.7%) and male (33.3%). The ethnicity of the sample consisted of approximately 89% Caucasians and 11% Hispanics. The majority of the sample (84%) reported a bachelors degree or higher. Of a total of 48 participants, more than half (56.3%, n=27) were overweight or obese with a body mass index (BMI) equal or greather than 25. Approximately a quarter of participants (29.2% , n=14) were obese with BMI equal or greater than 30 at baseline (pretest); and thirteen participants (27.1 %) where overweight. Twenty-one participants (43.8%) had a BMI smaller than 25. As a group, the BMI mean was 27.3 (SD=6.5). All participants were single. Comparison of means at pretest indicated that there were no

statistically significant differences in demographic characteristics between the intervention and comparison groups except depression scores and BMI values (see Table 4.1).

Intervention Group

Initially, 27 participants were enrolled into the intervention group. Five of these participants demonstrated that there may be some risks associated with participating in physical activity. These participants were asked to obtain consent from their healthcare provider so they could receive medical clearance. Those participants who did not receive clearance were given another alternative so they could be part of the study. They were asked to abstain from participating in any physical activity that may imply a risk to their health. They received the educational portion. Thus, all 27 participants took part in the intervention group. Twenty-six of those enrolled in the intervention group successfully completed the HFAP program and took part in the pretest and posttest data collection. One participant did not complete the posttest data.

Intervention group participants were 73% females and 27% males, with the average age of 38.6 (*SD*=3.9). Most participants self-identified themselves as Caucasian (89%). The great majority held a bachelor degree or higher (89%). More than half of this group (61.5%, *n*=16) were overweight (19.2%, *n*=5) or obese (42.3%, *n*=11).

Comparison Group

Initially, 36 participants were recruited for the comparison group. Thirty-three of them participated in pretest data collection; however, only 22 completed and returned

Table 4.1
Equivalency of Experimental and Comparison Groups at Baseline

Characteristics of Participants	Comparison (*n*=22)		Experimental (*n*=26)		*p*-value
	M	*SD*	*M*	*SD*	
Age	35.82	3.67	38.6	3.9	.682[1]
BMI (Kg/m2)	25.98	4.45	28.54	7.85	.173[1]
Depression	14.5	6.9	21.3	12.4	.021*[1]
Gratitude	35.2	4.9	33	4.9	.128[1]
Total METs	2627	2698	1950	2227	.559[1]
Pedometer	7060	2759	7802	3493	.136[1]
Gender	n	%	n	%	
Male	9	41	7	27	.617[2]
Female	13	59	19	73	.289[2]
Education	n	%	n	%	
Grad School	10	45.5	8	30.7	.637[2]
College Deg.	10	45.5	13	50	.532[2]
Associates, other	2	9	5	19.3	.655[2]
BMI < 25	11	50	10	38.5	.082[3]
BMI = 25-29.9	5	36.4	5	19.2	.082[3]
BMI >29.9	3	13.6	11	42.3	.082[3]

*represents a statistical significant difference ($p < .05$) (n=46)
[1]Analysis: Independent sample test: t-test for equality of means
[2]Analysis conducted using Chi-square test (nominal data)
[3]Analysis conducted using Crosstabs, Chi-squre. All participants included.

posttest data. Therefore, 22 adults in the comparison group successfully completed the requirements to be part of the study and were included in the analysis.

Participants in the comparison group are described as 59 % females and 41 % males, and the average age was 35.8 (*SD*=3.6). Most participants in the comparison group held a bachelor degree or higher (91%). Almost half of the participants in this group were also overweight (36.4%, n=8) or obese (13.6%, n=3), which was not statistically significant when compared with intervention group when considering overall BMI mean scores.

Equivalency of Intervention and Comparison Group at Baseline

A nonequivalent groups design (quasi-experimental design) was used in this study. Two different groups (i.e., intervention and comparison) were compared over two different points in time. When groups are highly similar or equivalent, it is more likely that some common threats to internal validity will be controlled for (Trochim, 2000). Therefore, the researcher evaluated the equivalence of both groups at baseline. During pretest data collection, a week prior to intervention, the researcher collected data on six measures: physical activity levels, called METs (metabolic equivalents per time); BMI; depression; gratitude; pedometer (step counts); and demographics (gender, age, education). Only one measure was statistically significantly different between the two groups at pretest, depression scores (F= 8.521; t = 2.402; df = (1, 46); p = .021). The intervention group's mean for depression was seven units higher than the comparison group (comparison group, M=14.55, SD=6.9; experimental group, M= 21.38, SD=12.4). Radloff (1977) indicated that scores of 16 or higher in the depression scale denote symptoms of clinical depression. Table 4.1 depicts the equivalency between intervention and comparison groups at pretest.

Changes in Outcomes within the Intervention Group

Changes over time were measured for all participants in the intervention group from baseline (a week prior to intervention) to the last week of intervention (week 5) for five main outcome measures: Physical activity METs, pedometer steps, depression, gratitude, and BMI. After checking for normality in the distribution of the different data sets (Shapiro-Wilk test for normality), the researcher found that most data sets show

approximation but not Gaussian distribution (Table 4.2). Likewise, observation of the plots signified a few outliers in most data sets, resulting in moderately skewed distributions; therefore, the researcher considered using nonparametric tests in order to assess possible changes over time within the intervention group. The following paragraphs show the results of change in those variables.

Physical Activity in METs

In the intervention group, the average level of self-reported physical activity (PA) was converted into METs. During the study period, the total MET score increased from pretest to posttest. A paired-samples *t* test and a Wilcoxon Signed Rank test analysis were performed on physical activity levels in METs reported by 21 participants for both week 1 and week 5. Physical activity scores from four participants were left out because they were not valid for the analysis. The mean of PA in METs during week 1 was M = 2362 METs, with a SD = 2294 METs. The mean of PA in METs during week 5 (posttest) was M = 4048 METs, SD = 3188 METs. The results of the paired-samples *t* test indicated that the 1908 METs (SD=3735) mean increase between week 1 and week 5 was statistically significant, $t(18) = -2.280$, $p = .034$. The standarized effect size index, d ($d = t/\sqrt{N}$), was 0.53. An additional test, the Wilcoxon Signed Ranks Test, showed that after the 5 week HFAP intervention there was a statistically significant change in physical activity levels measured in METs for those in the intervention group ($Z = -3.242$, $p = .001$, see Table 4.3). The results indicated that 17 out of the 21 total participants in the intervention group (80%) increased their levels of physical activity, and 4 out of 21 decreased their levels of PA from pretest to posttest. The effect size for the current test was calculated dividing the

Table 4.2
Shapiro-Wilk Test of normality for pretest and posttest data sets

Variables	Pretest Data				Posttest Data			
	Intervention Group Shapiro-Wilk Test		Comparison Group Shapiro-Wilk Test		Intervention Group Shapiro-Wilk Test		Comparison Group Shapiro-Wilk Test	
	Statistic df	Sig.	Statistic Df	Sig.	Statistic df	Sig.	Statistic df	Sig.
Phys Act METs	.813 20	.001*	.781 17	.001*	.880 20	.018*	.806 17	.002*
Phys Act Pedometer	.975 20	.853	.966 17	.751	.984 20	.976	.945 17	.387
Depression	.877 20	.016*	.969 17	.808	.896 20	.034*	.952 17	.495
Gratitude	.919 20	.095	.847 17	.010*	.883 20	.020*	.821 17	.004*
BMI (kg/m^2)	.928 20	.140	.688 17	.000*	.916 20	.082	.771 17	.001*

* Data set is considered normally distributed

value of Z by square root of N (total number in the sample). In the calculation of the effect size of Wilcoxon Signed-rank, a value of 0.5 or greater signifies a large effect size. The current test showed that there is a medium effect size (r = 0.648).

Pedometer Steps

Step count as measured by the pedometers increased slightly (no statistically significant) over the course of the study. The mean of daily steps at baseline (pretest) was 7802.9 per day (*SD* = 3493.8). The mean of steps at posttest was 8390.3 (*SD* = 3116.5). The test for normality indicated that the pedometer data set was normally distributed. There were, however, a few outliers in the data set, and considering that the sample was small (n=24), the researcher decided to run both a parametric (Paired-samples *t* test) and

Table 4.3
Changes in outcomes over time within the intervention group

Outcome	Intervention Group (n=26)									
	Pre-Intervention (1 week prior program)			Post-intervention (at week 5)			Change Over Time (Posttest-Pretest)			Sig.
	M	*SD*	Median	*M*	*SD*	Median	*M*	*SD*	Median	
Phys Act METs	2362	2294	1278	4048	3188	3469	1908	3735	1755	.018*[1] .008*[2]
Phys Act Pedometer	7802	3493	7457	8390	3116	8167	564	1871	506	.153[1] .137[2]
Depression	21.3	12.4	17	17.6	10.4	14	-3.76	8.7	-3.0	.037*[1] .0038*[2]
Gratitude	33.0	5.0	33.5	35.6	3.7	37.0	2.57	3.5	3.0	.001*[1] .004*[2]
BMI (kg/m^2)	27.8	7.27	26.7	27.5	7.19	26.6	-.351	.613	-.20	.010*[1] .008*[2]

* represents a statistically significant difference ($p \leq .05$)
[1]Analysis performed using a Paired Samples t test
[2]Analysis performed using a Wilcoxon signed rank test

a nonparametric test (Wilcoxon Signed Ranks Test) in order to evaluate change from pretest to posttest. The Wilcoxon Signed Ranks Test showed that after the 5-week HFAP intervention there was not a statistically significant change in physical activity levels as measured by pedometers for those in the intervention group (Z= -1.486, p = .137); the Paired-samples t test also showed no statistically significant change (95% CI = -1354.6 to 226.02; t = -1.477; df = 23; p = .153, Table 4.3). The results indicated that 17 out of the 24 total participants (70%) in the intervention group increased their levels of physical activity, and 7 out of 24 decreased their levels of steps from pretest to posttest. The current test showed that there is a medium effect size within the group (r = 0.30).

Depression Scores

The average depression score as measured by the CES-D scale (Center for Epidemiologic Studies Depression Scale) significantly decreased from week 1 to week 5 for those participants in the intervention group. The protocol of the CES-D scale indicates that a score higher than 16 reflects the existence of clinical depression symptoms (Radloff, 1977). Data were collected from 26 participants at pretest and posttest. The mean for depression scores at pretest (prior to intervention) was 21.38 (*SD* = 12.4). The mean 5 weeks later (postintervention) was 17.6 (*SD* = 10.4). Considering the small sample (n=26) and no evidence of a normal distribution in the data set, a Wilcoxon Signed Ranks Test was used. The test indicated that after the 5-week HFAP intervention there was a statistically significant decrease in depression levels for those in the intervention group (Z = -2.074, *p* = .038; see Table 4.3). The mean of depression at pretest was 21.3 (*SD*=12.4) and at posttest was 17.6 (*SD*=10.4). The current test showed an effect size within the group of *r* = 0.40, which is considered between medium and large for a Wilcoxon Signed Ranks Test. The results in the ranks indicated that 18 out of the 26 total participants in the intervention group (69.2%) decreased their levels of depression, and 7 (26%) out of 26 increased their levels of depression from pretest to posttest. One participant did not experience changes after the intervention.

Gratitude Scores

The average score of self-reported gratitude towards life in general as well as gratitude for the body increased from week 1 to week 5 for those participants in the intervention group. Data were collected from a total of 26 participants at pretest and

posttest. The mean of gratitude scores during week 1 was *M* = 33.04, *SD* = 4.98, and during week 5 was *M* = 35.62, *SD* = 3.71. This 2.58 increase in the mean from week 1 to week 5 was statistically significant. Once again, considering the small sample (*n*=26) and lack of normal distribution, a Wilcoxon Signed Ranks Test was used. The test indicated that after the 5 week HFAP intervention there was a statistically significant change in self-reported gratitude scores for those in the intervention group (Z = - 2.885, *p*= .004) (Table 4.3). The ranks showed that, from pretest to posttest, 17 participants (65.3%) in the intervention group (n=26) increased their levels of self-reported gratitude as measured by the GQ-6 (Gratitude Questionnaire); three participants decreased their levels of gratitude, and six remained the same. The current test showed an effect size within the group of *r* = 0.566, which is considered a large effect size for a Wilcoxon Signed Ranks Test.

Body Mass Index

The average of Body Mass Index (BMI) slightly decreased from week 1 to week 5 for those participants in the intervention group. A nonparametric test was used to evaluate possible changes over time within the intervention group. Data were collected from 24 participants during both week 1 and week 5. The BMI mean during week 1 was *M* = 27.88, *SD* = 7.27, and during week 5 was *M* = 27.53, *SD* = 7.19. This 0.35 decrease in the BMI mean from week 1 to week 5 was statistically significant. The Wilcoxon Signed Ranks Test showed that after the 5 week HFAP intervention there was a statistically significant change in BMI measures for those in the intervention group (Z = -2.650, *p*= .008; see Table 4.3). The ranks showed that, from pretest to posttest, 15 participants

(62%) in the intervention group (n=24) decreased their BMI score; six participants increased their BMI, and three participants remained the same. The current test showed an effect size within the group of $r = 0.541$, which is considered a large effect size for a Wilcoxon Signed Ranks Test.

Changes in Outcomes within the Comparison Group

Changes over time were also measured in the comparison group from baseline (a week prior to intervention) to the last week of the program (week 5) for five main outcome measures: Physical activity METs, pedometer steps, depression, gratitude, and BMI. After checking for normality in the distribution of the different data sets (Shapiro Wilk test for normality), the researcher found that most data sets showed approximation but not Gaussian distribution. Observation of the plots showed a few outliers in most data sets, resulting in moderately skewed distributions; therefore, the researcher considered the use of nonparametric tests in order to assess possible changes over time within the comparison group. None of the changes in the outcomes of these five variables from pretest to posttest within the comparison group were statistically significant (see Table 4.4).

Changes in Outcomes: Intervention versus Comparison Group

Changes over time (5 weeks passed between pretest and posttest) were assessed in order to find significant difference between the intervention and the comparison groups. All five main outcome measures were analyzed: physical activity METs, pedometer steps, depression, gratitude, and BMI. The researcher selected three different procedures

Table 4.4
Changes in outcomes over time within the comparison group

Outcome	Comparison Group (*n*=22)									
	Preintervention (1 week prior program)			Postintervention (at week 5)			Change Over Time (Posttest-Pretest)			Sig.
	M	*SD*	Median	*M*	*SD*	Median	*M*	*SD*	Media *n*	
Phys Act METs	2942	2770	1926	3563	3849	2772	620	2995	319.5	.229[1] .296[2]
Phys Act Pedometer	7122	2980	6780	7630	3502	7611	508	3547	221	.420[1] .551[2]
Depression	14.5	6.9	14.00	13.5	8.4	13.5	-1.00	5.7	.00	.420[1] .221[2]
Gratitude	35.3	5.0	37.0	35.3	3.7	36.0	0.09	4.4	-0.5	.925[1] .720[2]
BMI (kg/m^2)	26.2	4.6	26.7	26	4.4	26.6	-.178	.483	.00	.125[1] .139[2]

* represents a statistically significant difference ($p \leq .05$)
[1]Analysis performed using a Paired-samples *t* test
[2]Analysis performed using a Wilcoxon signed rank test

to assess the existence of statistically significant difference between groups on the five independent variables of the study.

The first method consisted of a repeated measures ANOVA (RM-ANOVA); this parametric test has several advantages over independent tests examining the difference of the means within each separate group. The RM-ANOVA examines difference over time, within and between groups, as well as the interaction between time and groups. It is a more powerful test because it includes more individuals, a larger sample. It is also a stricter test because the statistic outcome has been drawn under a number of requirements or assumptions. The following assumptions were met in our analyses: ratio (continuous) variables, distributions approximately close to normal (Gaussian), and participants being tested in one dependent variable at least two times.

A second course of action was centered on examining for a significant statistical change (posttest minus pretest) between both groups. Considering that the sample was relatively small and the data were not a perfect Gaussian distribution, the *p*-value of the RM-ANOVA could not reflect some significant change and may prevent the researcher from identifying potential patterns of change or meaningful findings. Thus, in this second approach, a Wilcoxon singed rank test (nonparametric procedure) was used to examine the change (posttest minus pretest) in each dependent variable between groups.

Finally, ANCOVAs were used as the third method in order to examine statistically significant difference between groups for each independent variable from pretest to posttest. The ANCOVAs allowed the researcher to control for existing differences between the experimental group and the no-treatment comparison group at baseline (i.e, depression, gratitude, BMI). The next paragraphs contain the results of both statistical procedures.

Physical Activity in METs

The repeated measures ANOVA determined that physical activity in METs mean differed statistically significantly between the two time points ($F(1, 45) = 9.679$, $p = .003$). However, the interaction effect between time and group, which examines the interaction between both groups from pretest to posttest, was not statistically significant ($F(1, 45) = 2.093$, $p = .155$). We can, therefore, conclude that the 5-week program HFAP does elicit a statistically significant increase in physical activity METs over time within the experimental group but this increase of physical activity METs is not statistically significant when compared to the comparison group.

Difference in change (posttest minus pretest) was examined using a Wilcoxon signed ranks test. This test indicated that after the 5-week HFAP intervention there was a statistically significant change in self-reported physical activity METs when comparing intervention and comparison groups (Z =-1.969, p= .049; see Table 4.5). In contrast to the result of the RM-ANOVA, this nonparametric test indicated that change or improvement in self-reported physical activity in METs was significant. The effect size (Partial Eta Squared) of the interaction resulting from the RM-ANOVA was small (partial η^2 = .044); however, the effect size for all participants from pretest to posttest was large (partial η^2 =.177).

In order to control for METs' differences between groups at baseline, a one-way analysis of covariance (ANCOVA) was also conducted. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(1, 38) = 2.769$, $MSE = 27719651.7$, $p = .105$; partial $\eta^2 = .071$. The ANCOVA was not significant, $F(1,38) = .867$, $MSE = 9091304.4$, $p = .358$. The mean difference between the treatment and the no-treatment comparison group from pretest to posttest was not significant. Therefore, it can be concluded that when controlling for baseline differences, participating on the HFAP did not result in a statistically significant increase in physical activity (METs).

Pedometer Steps

The RM-ANOVA determined that the mean of physical activity in steps (as measured by pedometer) did not differ statistically significantly between time points

Table 4.5
Changes in outcomes over time: comparison versus intervention group

Outcome	Comparison Group *n*=22	Intervention Group *n*=26	*p*-value
	Change Over Time (Posttest-Pretest) *M* *SD*	Change Over Time (Posttest-Pretest) *M* *SD*	
Phys Act METs	*M* = 2368.8 *SD* = 3958.8	*M* = 8650.4 SD = 3030.2	.049*[1]
Phys Act Pedometer	*M* = 564.3 *SD* = 1871.7	*M* = 508.3 *SD* = 3547.8	.929[1]
Depression	*M* = -3.76 *SD* = 8.7	*M* = -1.0 *SD* = 5.7	.237[1]
Gratitude	*M* = 2.57 *SD* = 3.59	*M* = 0.09 *SD* = 4.492	.003*[1]
BMI (kg/m^2)	*M* = -0.301 *SD* = 0.720	*M* = 0.711 *SD* = 3.197	.443[1]

* represents a statistically significant difference ($p \leq .05$)
[1]Analysis performed using a Mann-Whitney Test or Wilcoxon Signed Ranked Test

($F(1, 40) = 1.607$, $p = .212$). The interaction effect between time and group, which examines the interaction between both groups from pretest to posttest, was not statistically significant ($F(1, 40) = .004$, $p = .948$). It can, therefore, be concluded that the 5 week program HFAP did not elicit a statistically significant increase in physical activity steps over time when comparing the interaction effects between experimental and comparison groups.

Difference in change was examined using a Wilcoxon signed ranks test. This test indicated that after the 5-week HFAP intervention there was not a statistically significant change in objective physical activity (steps) when comparing the intervention and comparison groups ($Z = - 0.89$, $p = .929$; see Table 4.5). The effect size of the interaction

as reported in the RM-ANOVA was small (partial η^2 = .000); and so was the effect size for all participants from pretest to posttest (partial η^2 =.039).

In order to control for differences on physical activity in steps between groups at baseline, a one-way analysis of covariance (ANCOVA) was also conducted. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(1, 40) = 1.107$, $MSE = 6840331.4$, $p = .299$; partial $\eta^2 = .028$. The ANCOVA was not significant, $F(1, 40) = .147$, $MSE = 908290.2$, $p = .704$. The mean difference between the treatment and the no-treatment comparison group from pretest to posttest was not significant. Therefore, it can be concluded that when controlling for baseline differences, participating on the HFAP did not result in a statistically significant increase in physical activity in steps as measured by pedometers.

Depression Scores

The repeated measures ANOVA determined that the mean of the depression scores differed significantly between the time points ($F(1, 45) = 4.813$, $p = .033$). However, the interaction effect between time and group, which examines the interaction between both groups from pretest to posttest, was not statistically significant ($F(1.0, 45) = 1.623$, $p = .209$). Therefore, the 5-week program HFAP showed a statistically significant decrease in depression symptoms over time within the experimental group but this decrease was not statistically significant when compared to the comparison group.

Difference in change was examined using a Wilcoxon signed ranks test of Mann Whitney test. This test indicated that after the 5-week HFAP intervention there was not a statistically significant change in depression scores when comparing intervention and

comparison groups (Z = - 1.182, p= .237; see Table 4.5). The effect size of the interaction was small (partial η^2 = .034); however, the effect size for all participants from pretest to posttest was medium (partial η^2 =.095).

In order to control for depression differences between groups at baseline, a one-way analysis of covariance (ANCOVA) was also conducted. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(1, 46) = 1.524$, $MSE = 68.58$, $p = .224$. The ANCOVA was not significant, $F(1, 46) = .055$, $MSE = 2.51$, $p = .815$. The mean difference between the treatment and the no-treatment comparison group from pretest to posttest was not significant. Therefore, it can be concluded that when controlling for baseline differences, participating on the HFAP did not result in a statistically significant decrease of depression scores.

Gratitude Scores

The repeated measures ANOVA determined that the gratitude mean differed statistically significantly between the points in time ($F(1, 45) = 5.229$, $p = .027$). The interaction effect between time and group, which examines the interaction between both groups from pretest to posttest, was also statistically significant ($F(1.0, 45) = 4.540$, $p = .038$). Therefore, the 5-week program HFAP showed a statistically significant increase in self-reported gratitude levels over time within the experimental group compared to the comparison group.

Difference in change (posttest minus pretest) was examined using a Wilcoxon signed ranks test. This test indicated that after the 5 weeks there was a statistically significant change in self-reported gratitude scores when comparing intervention and comparison groups (Z = - 2.953, p= .003). The effect size of the interaction was medium to large (partial η^2 =.090); and the effect size for all participants from pretest to posttest was large (partial η^2 =.102).

In order to control for gratitude differences between groups at baseline, a one-way analysis of covariance (ANCOVA) was also conducted. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(1, 46) = .604$, $MSE = 5.496$, $p = .441$; partial $\eta^2 = .014$. The ANCOVA was not significant, $F(1, 46) = 2.013$, $MSE = 18.159$, $p = .163$. The mean difference between the treatment and the no-treatment comparison group from pretest to posttest was not significant. Therefore, it can be concluded that when controlling for baseline differences, participating on the HFAP did not result in a statistically significant increase in gratitude.

Body Mass Index

The RM-ANOVA determined that the BMI mean did not differ significantly between the time points ($F(1, 42) = .375$, $p = .544$). The interaction effect between time and group, which examines the interaction between both groups from pretest to posttest, was not statistically significant ($F(1, 42) = 2.284$, $p = .138$). Therefore, the 5-week

program HFAP did not demonstrate statistically significant decrease in BMI over time when comparing the effects within subjects in the experimental and comparison groups.

Difference in change was examined using a Wilcoxon signed ranks test. This test indicated that after the 5-week HFAP intervention there was not a statistically significant change in BMI when comparing intervention and comparison groups (Z = - .776, p= .443; see Table 4.5). The effect size of the interaction was small (partial η^2 = .01); however, the effect size for all participants from pretest to posttest was large (partial η^2=.131).

In order to control for BMI differences between groups at baseline, a one-way analysis of covariance (ANCOVA) was also conducted. A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable did not differ significantly as a function of the independent variable, $F(1, 41) = 1.065$, $MSE = .321$, $p = .308$; partial $\eta^2 = .027$. The ANCOVA was not significant, $F(1, 41) = .644$, $MSE = .195$, $p = .427$. The mean difference between the treatment and the no-treatment comparison group from pretest to posttest was not significant. Therefore, it can be concluded that when controlling for baseline differences, participating on the HFAP did not result in a statistically significant decrease in BMI.

Considering that both groups were similar in demographics at baseline (with the exception of depression mean scores) the researcher decided to compare the differences between the two groups just at week 5 (posttest). A Wilcoxon two-sample test was used to examine the differences between groups at posttest. Results of this test indicated that none of the differences were statistically significant at posttest (Table 4.6). Therefore,

those in the intervention group experienced an improvement in self-reported depression symptoms as measured by the CES-D scale, to the extent that depression mean scores after the 5-week program were similar to those of in comparison group at baseline.

Correlations between Variables

Correlations between the different variables were examined using data collected at posttest from all those participants that completed the study.

Correlation between Depression and Gratitude

A Spearman's Rank Order correlation was run to determine the relationship between 46 participants' self-reported depression scores and gratitude. There was a statistically significant moderate negative correlation between depression and gratitude scores ($r_s(46) = -.410$, $p = .004$; see Table 4.6). The same correlation between variables was even stronger when using posttest data that only included participants with BMI equal or greater than 25, ($\boldsymbol{r_s}(23) = -.586$, $p = .003$).

Correlations between Physical Activity and Gratitude

A Spearman's Rank Order correlation was run to determine the relationship between 48 participants' self-reported physical activity in METs and gratitude. There was a very weak, negative correlation between METs and gratitude scores, which was not statistically significant ($r_s(46) = -.139$, $p = .347$; see Table 4.6). An additional test examined the correlation between gratitude for the body (a single item included in the gratitude scale) and physical activity in METs among participants with BMI equal or

Table 4.6
Correlations between dependent variables for all participants

Variables	Correlation Sig. (2-tailed) *n* Gratitude	Correlation Sig. (2-tailed) *n* Depression	Correlation Sig. (2-tailed) *n* Intervention (BMI)	Correlation Sig. (2-tailed) *n* Intervention (Gratitude for Body)
Phys Act METs	-.139[1] *p* = .347 48	-.053[1] *p* = .720 48	-.114[1] *p* = .587 25	.023[1] *p* = .913 25
Phys Act Pedometer	-.195[1] *p* = .217 42	-.376[1]* *p* = .022 25	-.414[1] ** *p* = .049 23	.194[1] *p* = .376 23
Depression	-.410[1] ** *p* = .004 48	1.000[1] . 48	.007[1] *p* = .974 25	-.495[1] ** *p* = .012 25
Gratitude	1.000[1] . 48	-.410[1] ** *p* = .004 48	-.037[1] *p* = .859 25	.703[1] ** .000 25
BMI (kg/m^2)	.058[1] .698 47	.125[1] .403 47	1.000[1] . 25	-.055[1] *p* = .798 24

[1] Spearman's rho Correlation Coefficient
** Correlation is significant at the .01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

greater than 25. The results of the Spearman correlation coefficient test indicated a positive correlation greater than the correlation between gratitude in general and physical activity ($\boldsymbol{r_s}(23) = .332$, $p = .142$).

A Spearman's Rank Order correlation was run to determine the relationship between 48 participants' objective physical activity in steps (measured by pedometer) and gratitude. There was no correlation or very weak, negative correlation between step counts and gratitude scores, which was not statistically significant ($r_s(40) = -.195$, $p =$

.217; see Table 4.6). An additional test also examined the correlation between gratitude for the body and physical activity in steps among those participants with BMI equal or greater than 25. The results of the Spearman correlation coefficient test showed a very weak positive correlation which was not statistically no significant ($\boldsymbol{r_s}(23) = .112$, $p = .601$).

Correlation between Depression and Physical Activity

Spearman's Rank Order correlation was run to determine the relationship between 25 participants' objective physical activity in steps (measured by pedometer) and depression. There was a weak to moderate negative correlation between step counts and depression scores, which was statistically significant ($r_s(23) = -.376$, $p = .022$; see Table 4.6).

Correlation between Depression and BMI

A Spearman's Rank Order correlation was run to determine the relationship between 47 participants' self-reported depression and BMI. There was a very weak, positive correlation between depression scores and BMI values, which was not statistically significant ($r_s(45) = .125$, $p = .403$; see Table 4.6).

Correlation between BMI and Physical Activity

A Spearman's Rank Order correlation was run to determine the relationship between BMI and step counts (pedometer) among intervention group (n=23) participants.

There was a moderate to strong, negative correlation between depression and gratitude scores, which was statistically significant ($r_s(21) = -.414$, $p = .049$; see Table 4.6).

Correlation between Depression and Gratitude for the Body

A Spearman's Rank Order correlation was run to determine the relationship between 25 intervention group participants' self-reported depression scores and gratitude for one's body. There was a moderate negative correlation between depression and gratitude scores, which was statistically significant ($r_s(23) = -.495$, $p = .004$; see Table 4.6).

Attendance Impact on Dependent Variables

Spearman's Rank Order correlations were run to determine the relationships between 26 experimental group participant's attendance and all five main dependent variables of the study (physical activity in METs, step counts, BMI, depression, and gratitude). There were no correlations between attendance and the main variables of the study (see Table 4.7).

Research Questions on the Evaluation Process

The following three questions provided specific information regarding the evaluation of program implementation:

1. What was the average attendance in the program? There were five sessions and a total of 26 participants in the intervention group. More than half of those participants 53.8 % (14 participants) attended all 5 sessions of the program; six participants, or 23.1%

Table 4.7

Correlations between number of sessions attended and dependent variables

Posttest Values for Intervention Group	Spearman's rho Correlation Coefficients Number of Sessions Attended	
	Coefficient	Sig. (2-tailed)
Phys Act METs	-.022	.915[1]
Phys Act Pedometer	.169	.430[1]
Depression	-.200	.326[1]
Gratitude	-.163	.427[1]
BMI (kg/m^2)	.067	.750[1]

[1] Spearman's rho Correlation Coefficient

attended four sessions; four participants or 15.4% attended three sessions; and two participants, or 7.7% attended only two sessions.

2. What are the characteristics of the participants who attended the program? Those who participated in the program were members of the Church of Jesus Christ of Latter-day Saints residing in Salt Lake Valley, Utah. Intervention group participants were females (73%) and males (27%). Most participants were Caucasians, with only two Hispanics. They were single adults ages 31 to 45; average age was 38.6 (*SD*=3.9). The intervention group was highly educated; most participants held a bachelor or graduate degree (81%). More than half of this group was overweight (20%, *n*=5) or obese (40%, *n*=10).

3. What was the overall level of client satisfaction with the program? All 26 participants in the intervention group responded questions regarding their attitude or satisfaction towards the program. The overall attitude from participants was positive.

Most participants felt the program was valuable and they improved their lifestyle as a result of participating. The maximum score of 40 reflected that participants were very satisfied with the program, and a minimum score of 12 points signify that participants were not satisfied at all with the program. The overall score from all participants denoted that most participants were satisfied and very satisfied (*M*=31; *SD*=6.36).

Hypotheses Testing as they Relate to the Main Research Questions

The research questions and hypotheses stated in Chapter 1 are presented and answered in the following section as they relate to the data analyses.

Research Question 1

Does the 5-week Healthy and Fit Adults Program intervention significantly increase physical activity levels among participants in the intervention group?

Hypothesis 1.1

For those participants taking part in the intervention group, there will be a statistically significant increase in self-reported physical activity levels (METs) from pretest to posttest.

The level of physical activity in METs increased an average of 1908 METs (*SD*=3735) from pretest to posttest for those participating in the intervention group (p = .018). Thus, the hypothesis was not rejected.

Hypothesis 1.2

For those participants taking part in the intervention group, there will be a statistically significant increase in objective physical activity levels (steps measured by pedometers) from pretest to posttest.

The level of physical activity in steps as measured by pedometers did increased an average of 564.3 steps (*SD*=1871) from pretest to posttest for those participating in the intervention group; however, this increase was not statistically significant (*p*=.153). Thus, the hypothesis was rejected.

Research Question 2

After the 5-week intervention, will there be significant differences in physical activity levels between the intervention and comparison groups?

Hypothesis 2.1

After the 5-week intervention, there will be no difference in self-reported physical activity levels (METs) between the intervention and comparison groups.

Intervention group physical activity in METs increased an average of 2368 (*SD*=3958) from pretest to posttest (*p*=.001). Comparison group METs increased an average of 865 (*SD*= 3030) from pretest to posttest (*p*= .296). The change of physical activity in METs between the intervention and comparison groups was statistically significant from pretest to posttest (Z = - 2.185, *p*= 0.029). A RM-ANOVA indicated that there is not a statistically significant difference between both groups from pretest to posttest when looking at the effect of the interaction between groups and time (*F*(1.0, 45)

= 1.603, p = 0.212). Considering that the sample was small and not normally distributed, the RM-ANOVA would result to be strict and may not be the best test; thus, the researcher decided to choose the results obtained from the non-parametric test (Wilcoxon Signed Ranks Test), a more suitable test given the characteristics of the sample and the data. Therefore, the null hypothesis was rejected.

Hypothesis 2.2

There will be no difference in total steps (pedometer) between the intervention and comparison groups from pretest to posttest.

Intervention group step counts increased an average of 564.3 (*SD*= 1871.7) from pretest to posttest (p= .137). Comparison group step counts increased an average of 508 (*SD*=3547) from pretest to posttest (p= .420). The difference of physical activity as measured by pedometers between the intervention and comparison groups was not statistically significant from pretest to posttest (Z = - 0.89, p= 0.929). Thus, the null hypothesis was not rejected. A RM-ANOVA was also used to analyze the effect of the interaction between group and time; the difference was not statistically significant (F(1.0, 40) = 0.004, p = .948).

Research Question 3

Do self-reported gratitude scores as measured by the G6-Q scale, significantly improve in those who participated in the 5 week HFAP as intervention group?

Hypothesis 3.1

For participants in the intervention group, there will be a statistically significant increase in gratitude scores from pretest to posttest.

Self-reported levels of gratitude as measured by the scale G6-Q did increased an average of 2.57 points (*SD*=3.5) from pretest to posttest for those participating in the intervention group. This increase was statistically significant (*p*=.004). Thus, the hypothesis was not rejected.

Hypothesis 3.2

There will be no difference in gratitude scores between adults in the intervention and comparison groups from pretest to posttest.

Intervention group gratitude scores increased an average of 2.57 (*SD*=3.5) from pretest to posttest (*p*= .004). Comparison group gratitude scores increased an average of 0.09 (*SD*=4.4) from pretest to posttest (*p*= .720). The difference of gratitude scores (as measured by the scale G6-Q) between the intervention and comparison groups was statistically significant from pretest to posttest (Z = - 2.953, *p*= 0.003). An additional analysis using a RM-ANOVA also produced a similar result. The interaction between group (intervention and comparison) and time (pretest and posttest) was statistically significant ($F(1.0, 45) = 4.540$, $p = .038$). Thus, the null hypothesis was rejected.

Research Question 4

Do body mass index (BMI) scores significantly decrease as a result of participating in the HFAP intervention?

Hypothesis 4.1

For those participating in the intervention group, there will be a statistically significant decrease in body mass index (BMI) from pretest to posttest.

BMI scores did decrease an average of -0.301 points (*SD*=0.72) from pretest to posttest for those participating in the intervention group. This decrease was statistically significant (*p*=.016). Thus, the hypothesis was not rejected.

Hypothesis 4.2

There will be no difference in BMI measurements between participants in the intervention and comparison groups from pretest to posttest.

Intervention group BMI scores decreased an average of -0.301 points (*SD*=0.72) from pretest to posttest (*p*=.016). Comparison group BMI increased an average of 0.71 (*SD*=3.19) from pretest to posttest (*p*=.814). The difference of body mass index between the intervention and comparison groups was not statistically significant from pretest to posttest (Z = - 1.241, *p*= 0.215). Thus, the null hypothesis was not rejected.

Research Question 5

Do psychological responses such as depression significantly decrease as a result of participating in the HFAP intervention?

Hypothesis 5.1

For those participating in the intervention group, there will be a statistically significant decrease in depression scores from pretest to posttest.

Self-reported levels of depression as measured by the scale CES-D decreased an average of -3.76 points (*SD*=8.7) from pretest to posttest for those participating in the intervention group. This decrease was statistically significant (*p*=.0038). Thus, the hypothesis was not rejected.

Hypothesis 5.2

There will be no difference in depression scores between adult participants in the intervention and comparison groups from pretest to posttest.

Intervention group depression scores decreased an average of 3.76 points (*SD*=8.7) from pretest to posttest (*p*=.0038). Comparison group depression scores decreased an average of -1.0 (*SD*=5.7) from pretest to posttest (*p*= .221). The difference of self-reported depression scores (as measured by the scale CES-D) between the intervention and comparison groups was not statistically significant from pretest to posttest (Z = - 1.182, *p*= 0.237). A RM-ANOVA was also used to analyze the effect of the interaction between group and time; the effect was not statistically significant ($F(1.0, 45) = 1.623$, $p = .209$). Thus, the null hypothesis was not rejected.

Research Question 6

Is there a statistically significant positive correlation between gratitude and physical activity levels for all those participating in the study?

Hypothesis 6.1

There will be a statistically significant positive correlation between gratitude and physical activity (METs) for those participating in the study.

Among those participating in the study (comparison and intervention groups), there was not a statistically significant correlation between gratitude and physical activity in METs ($r_s(46) = -.139$, $p = .347$). Thus, the hypothesis was rejected.

Hypothesis 6.2

There will be a statistically significant positive correlation between gratitude and step counts (as measured by pedometer) for those participating in the study.

Among those participating in the study (comparison and intervention groups), there was not a statistically significant correlation between gratitude and step counts ($r_s(46) = -.195$, $p = .217$). Thus, the hypothesis was rejected.

Research Question 7

Is there a statistically significant negative correlation between gratitude and depression for all those participating in the study?

Hypothesis 7.1

There will be a statistically significant negative correlation between gratitude scores and depression scores for all those participating in the study.

Among those participating in the study (comparison and intervention groups), there was a statistically significant negative correlation between gratitude and depression scores ($r_s(46) = -.410$, $p = .004$). Thus, the hypothesis was not rejected.

Research Question 8

Is there a statistically significant negative correlation between physical activity levels (step counts as measured by pedometers) and depression for all those participating in the study?

Hypothesis 8.1

There will be a statistically significant negative correlation between physical activity levels (step counts as measured by pedometers) and depression scores for all those participating in the study.

Among those participating in the study (comparison and intervention groups), there was not a statistically significant correlation between physical activity levels (as measured by pedometer) and self-reported depression scores ($r_s(39) = -.256$, $p = .102$). Thus, the hypothesis was rejected.

Research Question 9

Is there a statistically significant positive correlation between BMI and depression for all those participating in the study?

Hypothesis 9.1

There will be a statistically significant positive correlation between BMI and depression scores for all those participating in the study.

Among those participating in the study (comparison and intervention groups), there was not a statistically significant correlation between body mass index (BMI) scores and self-reported depression scores ($r_s(45) = .125$, $p = .403$). Thus, the hypothesis was rejected.

Secondary Aims of the Study

The researcher conducted a process evaluation of the implementation of the HFAP program by collecting survey data on participant demographic information, attendance, and client satisfaction.

Research Question: Attendance Impact on Dependent Variables

Is there a significant positive relationship between number of program sessions attended and variables representing protective and risk factors (physical activity levels, step counts, BMI, depression, and gratitude)?

Hypothesis 10

There is no relationship between the number of sessions attended and self-reported physical activity levels measured in METs at posttest.

Among those participating in the study as intervention group there was not a statistically significant correlation between self-reported physical activity levels (as

measured in METs) and number of sessions attended (r_s = -.022, p =.915). Thus, the null hypothesis was not rejected.

Hypothesis 11

There is no relationship between the number of sessions attended and step counts (as measured by pedometer) at posttest.

Among those participating in the study as intervention group there was not a statistically significant correlation between self-reported physical activity levels (as measured by pedometer) and number of sessions attended (r_s = .169, p =.430). Thus, the null hypothesis was not rejected.

Hypothesis 12

There is no relationship between number of sessions attended and BMI at posttest.

Among those participating in the study as intervention group there was not a statistically significant correlation between body mass index (BMI) scores and number of sessions attended (r_s = .067, p =.750). Thus, the null hypothesis was not rejected.

Hypothesis 13

There is no relationship between number of sessions attended and depression scores at posttest.

Among those participating in the study as intervention group there was not a statistically significant correlation between self-reported depression scores and number of sessions attended (r_s = -.200, p =.326). Thus, the null hypothesis was not rejected.

Hypothesis 14

There is no relationship between number of sessions attended and gratitude scores at posttest.

Among those participating in the study as intervention group there was not a statistically significant correlation between self-reported gratitude scores and number of sessions attended (r_s= -.163, p =.427). Thus, the null hypothesis was not rejected.

Summary

The results produced from the data analyses were presented in this chapter. All 48 participants ranged between 31 to 45 years of age (M= 37.38, SD=4.03). Most participants were female, 66.7%. Most participants were Caucasian (89%). The vast majority of the sample, 84%, reported to have a bachelors or graduate degree. Of a total of 46 participants, more than half (54.3%, n=25) were overweight (28.2%, n=13 with BMI between 25 and 30) or obese (n=12, 26 % with BMI > 30) at baseline. As a group, the BMI media was 27.3 (SD=6.5). All participants had a marital status of single and all of them resided in Utah. An examination of subjects at pretest indicated that there were not statistically significant differences in demographic characteristics between the intervention group and the comparison group. There were only two variables that showed statistically significant difference between comparison and intervention groups at baseline: levels of BMI and depression. The experimental group showed a higher mean in BMI and depression scores. There were more participants in the intervention group who struggled with symptoms of clinical depression than participants in the comparison group which was correlated to their increased weight. Prior to start the program (baseline), the

experimental group showed higher scores of BMI than the comparison group; however, the difference was not statistically significant as it was the difference of depression scores.

When comparing the interaction of both groups, there were no statistically significant differences in mean scores for physical activity levels as measured by METs or pedometers, BMI scores, and self-reported depression scores from pretest to posttest. However, when examining the outcomes of participants within the intervention group, the changes in self-reported physical activity levels (METs), gratitude scores, BMI scores, and depression scores from pretest to posttest were statistically significant.

The RM-ANOVA indicated that the intervention group showed a statistically significant increase in gratitude scores over the course of the study (from pretest to posttest) when compared with the comparison group.

Even though, the statistical tests did not result in a statistically significant difference for most of the variables at baseline when comparing both groups, it was evident that there was a major difference between groups by observing the means of each group for all the independent variables. Therefore, the researcher also conducted an ANCOVA analysis in order to control for such disparity of means at baseline. The results of the ANCOVA indicated no statistically significant difference for any of the independent variables from pretest to posttest when controlling for the differences between the no-treatment comparison group and the experimental treatment group.

There was no statistically significant correlation between physical activity (METs or pedometer) and gratitude for all those in the study. The results revealed that the relationship between depression scores and physical activity levels for both groups was

not statistically significant for those in the study. However, there was a statistically significant negative correlation between gratitude and depression for all those in the study. The implications of these results will be discussed in the last chapter of this dissertation, Chapter 5.

CHAPTER 5

CONCLUSION

The purpose of this study is to test the effectiveness of an innovative intervention, the Healthy and Fit Adults Program, which includes expressive writing and practice of gratitude as a way to improve protective factors for obesity in adults residing in Utah. In this final chapter of the manuscript the researcher presents the following headings: 1) research questions, 2) summary of study, 3) no rejected hypotheses, 4) rejected hypotheses, 5) discussion, 6) limitations, 7) implications and future recommendations.

Research Questions

This research study seeks to answer the following research questions.

Research Question 1

Does the 5-week Healthy and Fit Adults Program intervention significantly increase physical activity levels among participants in the intervention group?

Research Question 2

After the 5-week intervention, will there be significant differences in physical activity levels between the intervention and comparison groups?

Research Question 3

Do self-reported gratitude scores as measured by the G6-Q scale, significantly improve in those who participated in the 5-week HFAP as intervention group?

Research Question 4

Do body mass index (BMI) scores significantly decrease as a result of participating in the HFAP intervention?

Research Question 5

Do psychological responses such as depression significantly decrease as a result of participating in the HFAP intervention?

Research Question 6

Is there a statistically significant positive correlation between gratitude and physical activity levels for all those participating in the study?

Research Question 7

Is there a statistically significant negative correlation between gratitude and depression for all those participating in the study?

Research Question 8

Is there a statistically significant negative correlation between physical activity levels (step counts as measured by pedometers) and depression for all those participating in the study?

Research Question 9

Is there a statistically significant positive correlation between BMI and depression for all those participating in the study?

Secondary Aims of the Study

Two secondary research questions are also included in order to gain knowledge regarding the process evaluation and the impact of program attendance.

Evaluation Process

Was the program implemented with fidelity and quality? Did the clients feel they benefited from the intervention? Did attendance impact the outcomes? To address these questions the researcher conducted a process evaluating the implementation of the HFAP program. Since the program was implemented by the developer, the quality and fidelity was monitored. To address the other questions, survey data was collected from the participants on their demographic information, attendance, and client satisfaction.

Attendance Impact on Dependent Variables

Is there a significant positive relationship between number of program sessions attended and variables representing protective and risk factors such as physical activity levels, step counts, BMI, depression, and gratitude?

Summary of Study

Five main outcomes were measured before and after the 5-week intervention: self-reported physical activity measured in METs, physical activity measured in steps by the use of pedometers, self-reported depression, self-reported gratitude, and body mass index (BMI).

The intervention group received a total of five sessions of the program plus a pretest data collection session. The comparison group did not receive any kind of health instruction, information, or materials during the length of the study.

Each participant in the intervention group learned about the importance of expressing and practicing gratitude. Journal writing was used as a tool that might facilitate the reflection on gratitude for life, for the body, and for health. Participants were also taught about the basic principles of physical activity, nutrition and its benefits. They were encouraged to adopt healthy behaviors of their own choice. During the week prior to the intervention and the last week of the intervention, participants were asked to wear a pedometer for 5 consecutive days (including at least one weekend day) and to fill out a survey that included questions about physical activity behaviors, nutrition habits, gratitude, and depression.

The convenience sample of this study consisted of 63 voluntary adults, 27 participants enrolled in the intervention group and 36 in the comparison group. Participants ranged between 31 to 45 years of age (M= 36.4, SD=4.3). All participants were recruited from a religious community, the Monument Park 19th Ward of the Church of Jesus Christ of Latter-Day Saints, in Salt Lake City, Utah. Most participants were female, 68%. One third of the sample, 32%, was overweight or obese (BMI > 25) at baseline.

Sixty-three adults enrolled to take part in this research study, 27 in the experimental group and 36 in the comparison group. At the conclusion of the study, 48 participants were retained representing an overall attrition rate of 19.6%. Twenty-six or 96% participants who started the experiment completed the study. Twenty-two or 61% participants who started in the comparison group completed the study. That is, 15 out of 63 or 23.8% of total participants starting the study dropped out of the study sometime after pretest data collection. One participant dropped out from the experimental group (4%) and fourteen (39%) from the comparison group. Demographic characteristics were analyzed at pretest and there were no statistically significant differences between groups (comparison and intervention).

The results shown in Chapter 4 indicated that protective and risk factors for obesity such as physical activity in METs, physical activity step counts, body mass index, and depression, did not show a statistically significant improvement for those adults enrolled in the intervention group when they were compared with those in the comparison group during the length of the study. However, participants in the intervention group experienced a statistically significant improvement in their levels of

gratitude from pretest to posttest when they were not compared with the comparison group. There was also a statistically significant negative correlation between self-reported depression and self-reported gratitude among all those participating in the study.

Accepted Hypotheses

Based on the results only the ANOVA within-S analysis results and not considering the large baseline differences in the experimental and comparison groups presented in the previous chapter of this manuscript, the following twelve hypotheses out of 20 (60%) were not rejected. However, when the ANCOVA analysis controlled for baseline differences, none of the hypotheses of positive changes in the participants could be accepted.

Hypothesis 1.1: For those participants taking part in the intervention group, there will be a statistically significant increase in self-reported physical activity levels (METs) from pretest to posttest.

Hypothesis 2.2: There will be no difference in total steps (pedometer) between the intervention and comparison groups from pretest to posttest.

Hypothesis 3.1: For participants in the intervention group, there will be a statistically significant increase in gratitude scores from pretest to posttest.

Hypothesis 4.1: For those participating in the intervention group, there will be a statistically significant decrease in body mass index (BMI) from pretest to posttest.

Hypothesis 4.2: There will be no difference in BMI measurements between participants in the intervention and comparison groups from pretest to posttest.

Hypothesis 5.1: For those participating in the intervention group, there will be a statistically significant decrease in depression scores from pretest to posttest.

Hypothesis 7.1: There will be a statistically significant negative correlation between gratitude scores and depression scores for all those participating in the study.

Hypothesis 10: There is no relationship between number of sessions attended and self-reported physical activity levels measured in METs at posttest.

Hypothesis 11: There is no relationship between number of sessions attended and step counts (as measured by pedometer) at posttest.

Hypothesis 12: There is no relationship between number of sessions attended and BMI at posttest.

Hypothesis 13: There is no relationship between number of sessions attended and depression scores at posttest.

Hypothesis 14: There is no relationship between number of sessions attended and gratitude scores at posttest.

Rejected Hypotheses

Based on the results presented in chapter four of the manuscript, the following eight hypotheses out of 20 (40%) were rejected:

Hypothesis 1.2: For those participants taking part in the intervention group, there will be a statistically significant increase in objective physical activity levels (steps measured by pedometers) from pretest to posttest.

Hypothesis 2.1: After the 5-week intervention, there will be no difference in self-reported physical activity levels (METs) between the intervention and comparison groups.

Hypothesis 3.2: There will be no difference in gratitude scores between adults in the intervention and comparison groups from pretest to posttest.

Hypothesis 5.2: There will be no difference in depression scores between adult participants in the intervention and comparison groups from pretest to posttest.

Hypothesis 6.1: There will be a statistically significant positive correlation between gratitude and physical activity (METs) for those participating in the study.

Hypothesis 6.2: There will be a statistically significant positive correlation between gratitude and step counts (as measured by pedometer) for those participating in the study.

Hypothesis 8.1: There will be a statistically significant negative correlation between physical activity levels (step counts as measured by pedometers) and depression scores for all those participating in the study.

Hypothesis 9.1: There will be a statistically significant positive correlation between BMI and depression scores for all those participating in the study.

Discussion

An in-depth review of the literature suggests that interventions including reflection upon gratitude and participation in expressive writing may have a positive effect on health behaviors, and may even be considered protective factors or preventive against obesity (Bono, & McCullough, 2004; Emmons & Shelton, 2005; Kashdan, et al.,

2009; Luppino et al., 2010; Mackenzie, Wiprzycka, Hasher, & Goldstein, 2008; Murphy et al., 2009; Pennabaker, 1997; Sloana, Feinsteina, & Marxa, 2009; Thomas et al., 2010; Wright, 2009). The purpose of this study is to test the effectiveness of an innovative intervention, the Healthy and Fit Adults Program, which includes expressive writing and acknowledgment of gratitude with the expectation that there will be an improvement of protective factors for obesity in adults residing in Utah. The results of the present study suggest that teaching adults to reflect and practice gratitude (through journal writing) may not produce a significant improvement in levels of physical activity—one of the main protective factors against overweight and obesity (Aldana, 2005; Blair & Brodney, 1999; CDC, 2011c; WHO, 2000). In this study, the interaction between comparison and intervention groups were compared over time (from pretest to posttest), and only self-reported gratitude—hypothesized as a protective factor against obesity—showed an important improvement. When measuring differences over time within the intervention group, the improvement in physical activity levels in METs, body mass index (BMI), and self-reported depression are also notable. The following paragraphs contain a discussion of the results of the present study.

Several researchers have explored the relationship between gratitude and health outcomes (Bono, & McCullough, 2004; Emmons & McCullough, 2003; Emmons & Shelton, 2005; Kashdan & Breen, 2007; Lyubomirsky et al., 2005; McCullough, Emmons, & Tsang, 2002; Seligman et al., 2005). These findings led the author of this study to assume that by increasing the levels of gratitude (reflecting and practicing gratitude) individuals may also improve their current health behaviors and even adopt new health behaviors (Emmons & McCullough, 2004; Fredrickson, 2004; Kashdan et al.,

2009; Luppino et al., 2010), this may lead to reduced weight among those who struggle with excessive weight. In order to explore such an assumption, the researcher examines existing correlations between the variables of the study.

Consistent research supports an important link between depression and gratitude. Generally, those who display higher levels of gratitude are more likely to cope with depression symptoms (McCullough, Tsang, & Emmons, 2004; Murphy et al., 2009; Rohde et al., 2008; Wood et al., 2008). The results of this study support such universal findings. All participants in the study (n=46), were considered in order to examine the relationship. A Spearman's Rank Order correlation produced a statistically significant negative correlation (r_s (46) = -.410, p = .004) between self-reported depression and self-reported gratitude. This correlation was examined on two occasions: first, prior to the study, and second, five weeks later at posttest. In both cases the results were the same, producing a statistically significant negative correlation. It could be assumed that the consistency of the results indicates that participants may have not been biased in responding to both self-reported scales (depression and gratitude scales) (McCullough, Tsang, & Emmons, 2004; Wood, Joseph, & Linley, 2007). However, there is the possibility that participants may have been biased when responding to questions relating psychological constructs (social desirability) such as gratitude or depression (Sigmon, 2005). Considering that the findings in the present study regarding the correlation of such constructs are consistent by former research results (Slade, 2010), it could be assumed that the responses were not inflated and the findings are reliable. The researcher assumed that if the levels of gratitude would increase, the levels of depression would diminish. This relationship may also have a connection with the positive correlation that exists

between depression and obesity (Chen, Jiang, & Mao, 2009; Thomas et al., 2010). The researcher did not find any study examining the relationship between gratitude and both protective (physical activity) and risk (depression) factors for obesity. Therefore, the researcher found it suitable to examine other possible correlations among dependent variables in the study (physical activity, depression, gratitude, and BMI) in order to further the knowledge in the topic and answer some of the research questions presented in this study. Such questions are: Is it gratitude correlated with levels of physical activity? Is there a correlation between depression and physical activity? Is there a correlation between depression and body mass index? Is gratitude correlated with healthy weight?

The results from the analyses of correlations between the variables examined in this study are very particular; thus, caution should be used when seeking to apply the results to a larger population. The unique characteristics of the sample (ages 31 to 45, highly educated, same religious congregation) make it difficult to go beyond the scope of this group. In the following paragraphs the researcher discusses the results of the correlations. Such results may have been affected by the unique characteristics of the sample.

Contrary to expectations, there was not a statistically significant positive correlation between physical activity and gratitude. The researcher assumes that such a correlation could be possible under the supposition that individuals who reflect and practice gratitude, including gratitude for the body, may also have higher commitments to health behaviors such as being physically active.

The researcher of this study has not found any research exploring the relationship between gratitude and physical activity. There are however, studies that suggest

exchangeable benefits from both variables (Aldana, 2005; Seligman, Steen, Park, & Peterson, 2005). Those who are physically active may improve their mood, and therefore be more inclined to express positive emotions such as gratitude (Strawbridge, Deleger, Roberts, & Kaplan, 2002; USDHHS, 1996). On the other hand, those who express gratitude may also experience a positive mood (Emmons & McCullough, 2003) that may lead to engage in healthy behaviors such as physical activity. However, such relation is yet to be explored.

For those participating in this study, there was a weak negative correlation (statistically non significant) between depression and physical activity. This finding is not supported by the numerous studies demonstrating a consistent and strong significant positive correlation between physical activity and depression (Strawbridge, Deleger, Roberts, & Kaplan, 2002; USDHHS, 1996). Once again, it may be the uniqueness of the sample that yields such results. Further examination using a larger sample and a heterogeneous group of participants may confirm that depression and physical activity indeed are highly correlated.

The correlation between depression and body mass index was not statistically significant. Recent research suggests that depression is correlated with obesity or vice versa (Chen, 2009; Levitan & Davis, 2010). For those participating in this study, the relationship between these two variables is not statistically significant. Once again, it might be that the characteristics of the sample provide results contrary to most research on the topic. Further exploration with a larger sample may produce the expected correlation.

The researcher did also examine the relationship between gratitude and healthy weight. The results indicated that the association was not statistically significant. It may seem logical that those who have a healthier weight could be more grateful, but such is not the case for the participants in this study. The researcher did not find any study examining the relationship between gratitude and weight. Thus, the examination of this relationship was important because present research depicts little knowledge on the subject. Given the results, further research with a larger sample may produce a different outcome that may support or reject the value of gratitude and its relationship to obesity and protective factors for excessive weight.

The results of the study did not support the main expected outcomes, those related to increasing physical activity levels and reducing weight. Decreases in weight and increases in physical activity were not statistically significant for those participating in the study when compared with those in the comparison group. Those participants receiving the Healthy and Fit Adult Program intervention reported slight to moderate increases in physical activity levels (both objective and subjective levels); those in the comparison group also experienced an a slight increase of physical activity levels. Change in physical activity levels was not statistically significant for those in the experimental group or in the comparison group. Body mass index also decreased for those in the intervention group, but it was not statistically significant when compared with those in the comparison group. Only one outcome supported one of the main assumptions of the researcher; there was a moderate to strong negative correlation between levels of gratitude and depression. There was also a statistically significant change in levels of gratitude and depression among those in the intervention group from

pretest to posttest. This might suggest that increasing levels of gratitude may have a positive effect on some health outcomes, specifically mental health (McCullough, Tsang, & Emmons, 2004; Murphy et al., 2009; Rohde et al., 2008; Wood et al., 2008). Those who experience depression are more likely to experience unhealthy behaviors that may lead to excessive weight (Chen, 2009; Levitan & Davis, 2010).

In the following paragraphs, the author of this study suggests several reasonable explanations for the findings presented above.

First of all, the nature of the recruitment should be considered. The investigator sought to recruit individuals struggling with excessive weight. Twenty-five participants (54.3%), of those enrolled in the study (n=46) had issues with overweight or obesity; in the comparison group, 10 participants (47.5%) had excessive weight; in the intervention group 15 participants (60%) were overweight or obese. The current study was designed for those who wanted to improve their health behavior as means to lose weight. Many potential participants seeking to improve their lifestyle and seeking to lose weight felt intimidated by the procedures of recruitment. Some may have refrained from participating because they were asked to be weighted. Asking people about their weight may intimidate a large number of participants. Thus, many of those who may have benefited the most from this program did not enroll in the study. On the other hand, twenty one participants in the study (43.7%) were already a healthy weight. The author believes that some of these participants may have lacked motivation to improve their current physical activity level for the sake of losing weight. This circumstance may have influenced the outcomes of the study.

Another aspect that may have affected the results refers to the characteristics of the activities presented in the intervention. Participants were given very flexible directions regarding the type of health behavior they would like to implement in their lives. The tenants of Social Cognitive Theory (Bandura, 1986) were used in order to instruct or train participants regarding their potential and ability to implement new health behaviors. Most activities taught to participants in the intervention group consisted of simple skill-training as foundations of new health behaviors. For instance, journal writing, reflecting in gratitude, changing options of physical activity, and basics of nutrition may lead participants to build their own outcome expectancies as they become more confident (self-efficacy and behavioral capability) that they can perform those tasks. Activities also had a strong element of observational learning (modeling), reinforcements for attempting new behaviors or improvements of existing behaviors, self-selection of goals, and interactive learning (group support) (Bandura, 1986). Thus, participants had the flexibility to choose which type of behavior they wanted to improve. Such flexible expectations may have also led some participants to set goals that were too easy (resulting in little or no behavior change) or unrealistic (resulting in frustration and abandonment of efforts).

Participants were invited to perform at home all those skills learned during the sessions. Lack of specific requirements regarding home practice and healthy behavior changing goals may have also been a factor in the outcomes. Among those who took part in the experimental group, neither self-selected goals nor home practice were recorded as part of the data. Interaction among participants or group support was not reported other than in an informal way at the beginning of each session. Specific commitments and

written reports on the goals and weekly practice of the new behaviors may have had a more positive effect on participants. It is possible that the voluntary weekly interaction (support by phone, emails, or text messages) may have been casual among participants and not as a means to improve or adopt health behaviors. Past research suggests that exercise-specific social support for people seeking to exercise was a good predictor of adherence to exercise (Christensen, Schmidt, Budtz-Jorgensen, & Avlund, 2006; Spink & Carron, 1992). However, in this study, the researcher did not sufficiently emphasize that the interaction among participants (social support) should have been focused on health behavior changes with support. Interactions intended for social support were not recorded and therefore there is no evidence that the outcomes of such interaction had any influence in behavior changes for those participating in the HFAP intervention. According to the findings of Christensen et al. (2006), intentional manipulation of an intervention and curriculum in order to create work-teams and in order to pursue specific goals as a team would help to improve the outcomes of the study.

In support of the more flexible approach used in the HFAP curriculum (the lack of specific direction in goal setting or group interaction), the researcher sought to provide an environment in which each participant might feel comfortable about his or her own interactions between participants as well as their own selection of healthy behavior goals.

Another factor to consider when explaining the results of this research relates to the season of the year (spring) in which the study took place. Several participants among both groups (comparison and intervention) expressed that during the time period in which the research was taking place (May through June) there were a few major sporting events for the community. Some participants were getting ready for an annual marathon and

others for some long-distance races within the state of Utah. Particularly, there were several in the comparison group already committed to participate in such events. They expressed their concern that the data provided from wearing the pedometer would not reflect their average level of physical activity. Such participants were not identified among those in the data set because all data collection procedures were anonymous. The researcher did not find enough reasons to justify removing data from the small number of participants who provided extreme scores in self-reported (IPAQ) or objective (pedometer) physical activity. These extreme scores were not identifiable, and therefore, could not be linked with those who said they had participated in extraordinary events involving extreme levels of physical activity. If the researcher had sought to control for such extreme scores, the results of the study may have been different; the physical activity mean (METs and steps) for those in the comparison group would have been lower and the difference between groups at posttest might have resulted in significantly different results.

The existing differences between self-reported physical activity and objective measurements of physical activity (pedometers) among participants could have several plausible explanations. For instance, social desirability or social approval may produce a bias resulting in a significant difference in the responses of participants. The quality of the pedometers and the ability to accurately measure different types of physical activities may have also affected the difference between these two measures. A third possible reason is that the protocol given to participants regarding the use of pedometers was flexible and may explain the differences between self-reported and pedometer data. Participants only reported pedometer readings of 3 to 5 days a week. There is a

possibility that some participants were reporting (self-reported physical activity survey) activities that were not measured by the pedometers (i.e., swimming, weight lifting, bicycling), or perhaps, a large amount of their physical activity took place in those days in which participants were not wearing the pedometers.

Some participants in the intervention group (including overweight and obese) criticized the accuracy of the pedometers, suggesting that the reading in the pedometers was not accurate. Findings in studies using pedometers among participants who were overweight and obese concluded that some pedometers might have decreased accuracy when there is an increase of body mass index, waist circumference, and pedometer tilt (Crouter, Schneider, & Bassett, 2005; Shepherd, Toloza, McClung, & Schmalzried, 1999). Thus, it is possible that the lack of accuracy reported by some participants may be linked to factors associated to excessive weight. Furthermore, it is also possible that the perceived lack of accuracy in the pedometers may have discouraged some participants to be active while using the pedometers.

Self-reported physical activity may pose a challenge when participants have difficulty accurately recalling the amount of physical activity during the previous week or in an average week (Durante & Ainsworth, 1996). It is possible that some participants may have responded—not with what is real and objective—but with what they desire or anticipate will soon happen in their lives in regards to physical activity involvement. Considering that all participants knew the principal researcher, it may be plausible to conclude that some participants may have overstated their self-reported physical activity responses. This plausible explanation will be discussed in greater detail in the limitations section of this chapter.

Perhaps the greatest impact or effect in physical activity resulting from this intervention is not reflected in the outcomes obtained from the short-term data collection at week 5. Some of the unique components presented in the intervention (psychological constructs of gratitude and depression) may take longer to internalize in order to produce the expected results. Thus, an additional round of data collection (long term follow-up) in three or six months may eventually result in more significant increases of physical activity and the implementation of other health behaviors. Once the intervention and posttest data collection ended, several participants expressed that they were starting to get the value of the intervention and the importance of expressing gratitude for the body and health by adopting healthier lifestyles. It seems that for some individuals, the possible psychological changes resulting from reflecting and practicing gratitude take time. Further research should consider the differences in outcomes between short-term outcomes and long-term outcomes (King & Miner, 2000).

In retrospect, it would have been beneficial to include incentives (approved by the IRB) for those participants who completed at home all those assignments or tasks relating to gratitude, expressive writing, and physical activity engagement. For instance, Yancey et al., (2006) investigated the effect of incentives in physical activity participation. An incentive such as a free one-year gym membership was tested. They found that this specific incentive resulted in significant increases in physical activity levels at 2 and 6 months, as well as retention of 71% among all participants. Thus, economic incentives (i.e., free 1 year gym membership) could have been a valuable addition to the intervention, as some types of incentives may even have more power to produce changes than the intervention itself (Yancey et al., 2006).

Lack of ongoing interaction and cues to action between the researcher and participants may have also affected the outcomes of this study. Past research suggests that higher rates of compliance in completing home assignments or practicing at home require ongoing (at least weekly) interaction between the researcher and participants (Jakicic, Polley, & Wing, 1998). Such ongoing interaction should also include simple cues to action (i.e., words of positive reinforcement and validation) that may result in motivating participants to daily action in pursuing of self-selected health behavior goals. The Health Belief Model proposes that the presence of ongoing cues to action is an important factor in increasing motivation to pursue or adopt healthy behaviors such as physical activity (Becker & Maiman, 1975). In this current study, the researcher had at least one weekly interaction (cue to action and reminders) with participants via email. However, this weekly email may have not been adequate becasue not every person checks email messages on a daily basis. A future study might also include individualized telephone calls or text messages to increase compliance and achieve self-selected behavior goals.

In terms of physiological measures, the intervention group body mass index (BMI) mean did not significantly decrease when both groups were compared; however, the reduction of BMI was statistically significant within the intervention group (Tiruneh, 2009). Both groups experienced a slight decrease in BMI scores. Once again, there are many plausible explanations for this reduction other than the program. As it has been stated before, the season in which the study took place may have influenced this physiological measure. Another possible explanation is diffusion. Those in the comparison group may have learned about the activities and information given to those in the program. It is also possible that participants in the comparison group reduced their

BMI because they were seeking to increase their levels of physical activity and healthy behaviors even before enrolling in this study. However, these possible explanations are unknown to the researcher.

Limitations

When interpreting the results of this study some limitations should be considered. First of all, the study lacked a true experimental design that might have better controlled for the baseline differences reported by the participants in the experimental and comparison groups that led to the nonsignificant improvements in the hypothesized outcome measures despite significant improvements in the intervention group as measured by the within-S RM-ANOVA. The lack of randomization to the two groups led to large baseline differences and also many treats to internal validity and external validity not being controlled for.

Also there was a lack of random selection of the participants that could have biased the outcomes. Delivering the intervention to a religious group could have primed them to be more responsive to a curriculum that included gratitude for their bodies and their lives. The program should be replicated with a nonreligious group. The lack of randomization generally increases biases into the study, which in turn may negatively affect its validity. As described in Chapter 1, the researcher sought to control this potential threat by selecting participants with characteristics as equal as possible. There were not statistically significant differences between groups at baseline when considering demographics (age, gender, and education) or when considering the dependent variables (physical activity in METs, physical activity in steps, gratitude, and body mass index).

However, there was a statistically significant difference in levels of depression between groups at baseline. Body mass index (BMI) was also statistically significantly different when the sample was divided in BMI scores smaller or greater than 25. Given the unique characteristics of the sample (single adults members of the same religious congregation), the applicability of the findings may be limited to the population from which the sample was drawn or populations of equal characteristics.

A third limitation was the small sample size (n=48). When samples are small, the statistical power of the study is affected (limited). If the researcher would have estimated a sample size prior to recruitment, the study would have increased the statistical power. Considering that most of the variables measured in this study had large standard deviations, a priory estimation of the sample size would have resulted in a larger sample than the current one. As stated previously, the distinctive characteristics of the sample will make it difficult to make any inferences from the results or findings to a greater population that may not be limited to adults (ages 31 to 45) residing in Utah and members of the same congregation.

Differential attrition between groups was another limitation linked to sample size. Sixty-three adults enrolled to take part in this research study: 27 in the experimental group and 36 in the comparison group. At the conclusion of the study, 48 participants (26 in experimental and 22 in the comparison group) were retained representing an overall attrition rate of 23.8 %. That is, 15 out of 63 participants dropped out of the study sometime after pretest data collection. One participant (1.5%) dropped out from the experimental group and 14 (22.2%) from the comparison group. A higher retention among comparison group participants may have yielded different outcomes.

A fourth limitation was related to the problems associated to self-reported questionnaires, particularly, scales asking to report on psychological constructs (i.e., depression, gratitude) and scales asking participants to recall past physical activity (i,e., IPAQ). Most of the data collected in this study were self-reported. Durante and Ainsworth (1996) indicated that self-reporting of physical activity is not exempt from diverse sources of bias and error like other human behaviors. Physical activity questionnaires designed to asses free-living physical activity levels usually capture 50% or less of the variance of the physical activity (Durante & Ainsworth, 1996). Considering the noteworthy inequality between self-reported (IPAQ) and objective (pedometers) data on physical activity levels, it is highly probable that some answers may have been affected by the personality traits of social desirability and social approval (Adams, 2005). For some individuals, topics such as physical activity levels and obesity or weight may carry an emotional charge; thus, it is likely that responses on such topics may reflect the respondents' idealizations of themselves or socially acceptable norms rather than real facts (Adams et al., 2005).

Fifth, participants in the intervention group and the comparison group received different models of pedometers. Budget limitations and other constrains did not allow the researcher to acquire enough devices of the same model. Thus, all participants in the intervention group were given the pedometer SM-2000 and participants in the comparison group were given a pedometer of lower quality, DMC-03. The two models of pedometers (SM2000 and DMC-03) used in this study have been reported to have an accuracy of 92 % to 96% (Pedometer USA, 2011). Currently, researchers face the challenge of trusting the manufacturers recommendations and reports on accuracy and

reliability. Tudor-Locke (2002) recommended conducting a simple test in order to figure out if a pedometer is accurate: walking "a short distance at a normal walking pace wearing the pedometer as specified by the manufacturer and simultaneously count actual steps taken" (p. 3). Several researchers indicate that there will always be a minimum error (acceptable between 1% - 5%) in accuracy (Ryan, Grant, Tigbe, & Granat, 2006; Vincent & Sidman, 2003). For this study, the researcher conducted the above test and the minimum error found for both types of pedometers was between recommendations (1% - 5%). Notwithstanding the test for accuracy, some participants reported their distrust in the reading of the pedometers. Some expressed that the pedometer was overestimating the real steps; on the other hand, some participants in both groups suggested that the reading was underestimating the real number of steps. Some participants in the comparison group also expressed an additional limitation of using low quality pedometers; on a few occasions, without any action from participants, the pedometer would reset the number of steps. The researcher acknowledges such limitations and that the data from pedometers may be misleading. In order to control for such limitation in future studies, the researcher should use pedometers of higher quality among all participants that have passed the test of accuracy. It is also important to provide an effective training for participants in the use of pedometers.

Sixth, during the study period, some participants may have increased their physical activity levels as a result of wearing a pedometer. There is evidence that just the fact of wearing a pedometer may motivate individuals to increase their levels of physical activity (Rooney, Smalley, Larson, & Havens, 2003). In this study, several participants in the comparison group expressed their disappointment that they were not working out as

hard as they would like in order to increase the reading in the pedometer. Such responses from participants suggest that subjects in both groups sought to increase their current level of physical activity during pretest and posttest as a result of wearing a pedometer. Participants were advised to have a normal life and not to change their physical activity patterns as a result of wearing the pedometer. However, it might be that such recommendations were not followed by all participants. Some participants expressed their inability to comply with all recommendations. Thus, the reading of the pedometer may not be reliable if we assume such reading equals normal conditions or daily routines in the lives of participants. If such is the case, depending on the amount of physical activity resulting from wearing a pedometer, the results of this study may carry a threat to internal validity. In other words, the differences in physical activity may not all be attributed to participating in the program, but other factors such as wearing pedometers during pretest and posttest data collection. There was no possible way to control for a psychological motivation to increase physical activity levels. Ongoing reminders about the instructions given to participants, a research design including a larger sample, random selection, and random assignment of participants to both groups (comparison and intervention) may decrease this type of limitation.

Seventh, data collection procedures may have also posed some threats to internal validity. Those in the comparison group did not attend any of the meetings scheduled for data collection. The researcher met them at their church after church meetings in order to provide surveys, the pedometers, and instructions on how to fill out the survey and wear the pedometer. Additionally, they were asked to report weight and height, which they would measure on their own. Thus, it is likely that body mass index (BMI) scores for

those in the comparison group may have been subject to some personal bias (social desirability and social approval). Another source of bias may have also come from the intervention group as data were collected by the researcher and research assistants, which were not blinded to the study. However, the probability of this type of bias is very unlikely, since there were few positive results that could be credited to the intervention.

Eight, the disparity between self-reported physical activity and physical activity levels as measured by pedometers. There was a significant difference between self-reported physical activity and step counts. Several plausible explanations could be considered. First is the lack of sensitivity and accuracy of the pedometers in measuring different types of physical activity. Some participants may have reported physical activity that was not measured by pedometers. For instance, cycling may not be properly registered by the pedometer if vertical oscillations of the hip are not strong enough. Other activities that may have been reported, but not recorded by the pedometer are dancing, gardening, skating, swimming, and weight lifting. The researcher tested the accuracy and sensitivity of the pedometer to measure cycling and dancing. The test showed that the pedometer was highly accurate in measuring most common waking activities. However, it is the intensity of the vertical oscillation of the hip which registers activity. Taking in consideration the possibility that all pedometer readings could have been highly accurate at registering total physical activity levels, it can be assumed that the difference in increase from pretest to posttest between the means of self-reported physical activity and pedometer are the result of social desirability. If such is the case, there is no reason to distrust the data obtained from the pedometer; but the doubt rises when considering self-reported data. This could be true for those participants seeking social approval, especially

those who were obese or overweight at baseline (Adams, 2005; Van de Mortel, 2008). If this is true, it could be assumed that some participants inflated their self-reported physical activity responses. As a result, another threat to internal validity should be considered.

There is another plausible explanation to this difference in means. Participants were told to wear the pedometer for 5 days a week. Most participants wore the pedometer 4 or 5 days. The researcher calculated the average of 4 days, disregarding the amount that was farther away from the mean. A few participants only provided data on 3 days. It is also possible that participants had higher levels of physical activity when they were not wearing the pedometer. This fact may justify part of the difference between self-reported and objective levels of physical activity. However, if the mean of self-reported physical activity (METs) at posttest was twofold the pretest mean, this explanation may not account for all the difference.

Ninth, psychological constructs such as gratitude and depression may be challenging to quantify (Schmitt & Klimoski, 1991). The researcher acknowledges that measuring and quantifying psychological constructs can be difficult; which in turn may result in additional limitations. It is probable that participants at posttest provided answers based in their personal desire and subjective perception of the moment rather than providing answers based on what took place the previous week. Again, social desirability and social approval play important roles in this type of response. If participants did indeed improve their levels of physical activity during the last week, they may also have felt inclined to report higher levels of gratitude and lower levels of depression in order to please the researcher or to satisfy their personal desire to do better (Adams, 2005; Van de Mortel, 2008).

Tenth, the researcher did not measure ongoing efforts by participants to implement home assignments such as expressive writing and reflecting and practicing gratitude. The levels of self-reported gratitude experienced a statistically significant increase from pretest to posttest for participants in the intervention group; however, the researcher did not collect data on expressive writing or gratitude while the program was implemented. Once again, time constrains made difficult the planning and implementation of this important action. It would have been useful to collect an ongoing data log about the occasions in which participants practiced expressive writing and expressions of gratitude. Such information would be valuable in determining if participants learned and implemented the lessons on gratitude and expressive writing provided in the sessions of the program. These specific data would have been useful to controlling some of the limitations associated to social desirability and approval.

Eleventh, the time frame in which the study took place may pose a limitation. The intervention took place during between May and June, 2011. This is a season of change in the Salt Lake valley. The weather becomes notably warmer and many adults opt to engage in physical activity in anticipation of the summer. Both groups (comparison and intervention) experienced an increase in physical activity levels during the study. Though not a significant change, and such an increase may partly be the result of seasonal changes. If such is the case, the intervention may not have as much effect on the variance in physical activity. Having a comparison group would help to control for such a limitation if the results at posttest would have been statistically significant when comparing groups over time. However, the differences in METs or in step counts at week 5 between groups were not significant; thus, it cannot be stated that the difference in

physical activity within the experimental group was the result of participating in the program.

Lastly, the closeness between participants may have also posed a common threat to internal validity—diffusion. Transmission of information across both groups may have also taken place as all participants were part of the same religious congregation. It is likely that participants in the experimental group shared information regarding the activities and goals presented during the intervention with those in the comparison group. Most participants in both groups knew each other well. It was not easy to control for such a threat. If diffusion took place, then it can be assumed there is an additional threat to the internal validity of the findings.

Several strengths should also be considered as part of this investigation. There are few studies that focus on examining the relationship between gratitude and protective factors against obesity (i.e., increasing levels of physical activity, decreasing depression symptoms, decreasing weight, adopting a healthy diet). The Healthy and Fit Adult Program was designed to increase levels of gratitude in order to positively affect health behaviors among adults. Current research suggests that individuals who reflect and practice gratitude may reduce depression symptoms. Recent investigations also indicate that obese people have higher risk of depression and individuals struggling with depression have higher risk to become overweight or obese. Notwithstanding the existing limitations, this study may open a new door for further examination in the relationship between reflecting and practicing gratitude (as well as expressive writing) and protective factor for those adults struggling with obesity or depression.

Implications and Recommendations

The current investigation has several implications for understanding the effects of gratitude on protective factors against obesity in adults (i.e., increase physical activity and decrease depression). During the study, participants in the intervention group were encouraged to set self-selected personal goals in order to enhance current or adopt new protective factors, as well as reducing risk factors for obesity. Through modeling, participants were given a few examples of goals. Future studies should consider an interaction model of guiding individuals in the selection of goals. If the researcher and research assistants are involved in assisting participants to select their goals and following up in their progress during the study, it is likely that the outcomes of the intervention can be more successful.

It is also important to consider that expressive writing and the reflection and practice of gratitude were not measured. Even though the levels of self-reported gratitude experienced a significant increase from pretest to posttest for those participants in the intervention group (when considering the RM-ANOVA results), the researcher did not collect data in such key variables while the program was implemented. For future research on the subject, it is recommended to develop a system by which this type of data will be collected throughout the study. Such data may provide rich information on existing correlations between gratitude, expressive writing, physical activity, depression, and other related variables. Furthermore, the results from different statistical techniques will reveal which variables (i.e., journal writing, gratitude) have greater effect on protective or risk factors.

As mentioned in the limitations section, the study took place during a season in which the weather becomes warmer. As a result, many adults engage in physical activity. When conducting similar research, it is advised to test the intervention during longer periods of time or several times during different seasons of the year.

Another valuable recommendation refers to accurately measuring physical activity levels. The current study lacked such accuracy. An extensive review of current studies comparing direct versus self-reported measures of physical activity in adults concluded that there is a need for valid, accurate, and reliable measures of physical activity in evaluating current and changing levels of physical activity, physical activity interventions, and the relationship between physical activity and health outcomes (Prince et al., 2008). However, as technology evolves, researchers considering assessing physical activity and its correlation to other variables should consider the use of new devices that can measure levels of physical activity with high accuracy and precision. There are numerous options to measuring physical activity (i.e., direct observation, doubly labeled water technique, electronic or electromechanical devices, self-reported scales, diary recall logs, etc.). Budget is very important when deciding the way of measuring (Tudor-Locke & Myers, 2001b). If budget permits one possible method could include two light, portable devices—latest tested technology (i.e., the Polar S625X, Polar Active, or Apps such as Walk n'Play application for iPhone or iPod). These devices include a built-in accelerometer and software; they allow for participant's personal input (i.e., weight, height) and measure and store data of multiple variables (distance, intensity, duration, and frequency of physical activity) as well as energy expenditure and steps and/or activity counts. These devices can collect data during several days, 24 hours a day, in any

condition (i.e., outdoors, indoors, water-based activities, biking, jumping ropes, in altitude, etc.) and at different intensities of physical activity (from very low to high intensity).

Preferably, each participant should wear two of these light, waterproof devices (two transmitters—one being a receptor) for a more precise measure of mobility. One device could go on the foot (ankle or shoe), and the other on the wrist (i.e., watch type) or arm (i.e., nano iPod type) (Karabulut, Crouter & Bassett, 2005). These two sensors would also measure mobility during activities involving only upper or lower body muscles (i.e., bench press, cycling). This method of measurement can be very convenient as participants will not have to worry about forgetting to reset the device or write down the counts at the end of the day in a daily physical activity log (as in many studies). An ideal way of measuring dependent on the latest technology should consider devices selected that include mobile technology for data transmission and GPS technology for location and distance identification. The GPS can indicate in real time the altitude, speed of movement, and distance travelled during physical activities. Wireless mobile technology can transmit data in real time to a computer for daily analysis and continuous monitoring of measurements (Elgethun et al., 2007; Le Faucheur et al., 2008; Troped et al., 2008; Webber & Porter, 2009).

Another alternative to producing reliable and accurate data on physical activity levels is direct observation (including video recording). Even though it is a demanding method (as observers must be trained and data collection can be tedious), this approach will provide rich quantitative and qualitative data, and it will accurately describe what takes place during physical activity settings (Welk, 2002). With the advantages of latest

software linking physiological measures to observation in real time, with direct observation researchers will be able to obtain valuable data. These data will not only be about the environment in which physical activity takes place, but also about the types of activities, intensity, patterns, and barriers to physical activity.

In the current study, for the intervention group, gratitude scores significantly increased and depression scores significantly decreased during the course of the study. These results are supported by research conducted by McCullough, Kimeldorf, and Cohen (2008) and McCullough, Tsang, and Emmons (2004). These authors indicate that depression symptoms can be reduced by increasing gratitude levels. The review of literature supports a strong correlation between depression and obesity. Future investigations should consider this valuable piece of information and further the knowledge of the underlying factors that may link gratitude, depression, and obesity. Such knowledge would be beneficial in the creation and developing of health prevention interventions and treatments to fight overweight and obesity among adults and other populations.

Participants of this study were part of a Christian congregation, the Church of Jesus Christ of Latter-Day Saints. It is universally known that gratitude is one of the most important values among Christians and those of other faiths. Future researchers may consider comparing participants who have no religious affiliation with those who often learn about the importance of gratitude as part of their religion. Findings may yield valuable knowledge. For instance, we may learn if those who are not affiliated to any religion may or not significantly increase their sense of gratitude when compared with those who are religious.

Most data collected in this study were self-reported (physical activity, gratitude, depression) at two specific points of time: pretest and posttest. The researcher identified a few flaws that could be avoided in future studies. Researchers using self-reported physical activity should consider pilot testing self-reported questionnaires and the use of pedometers among participants. It is not always easy to recall details of the physical activities that took place in the past seven days or previous average week. A way to overcome this limitation may include alternative methods of data entry/collection. For instance, regular telephone calls from the researchers and research assistants to participants may be of great value in order to record reports on physical activity for the day or the last 2 or 3 days. Logging the information online daily may also facilitate data collection. Such methods of regular data entry by participants may ensure the accuracy of the data as well as preservation of data by the researcher. Researchers may also consider incentives (gift certificates, pedometers, money) for those participants who complete and submit in a timely fashion as required by the researcher.

Conclusions

Researchers are asking for innovative evidence-based interventions that may assist in reversing the current obesity and overweight rates. Interventions including components such as gratitude and expressive writing may help in promoting protective factors against health risks. Excessive weight is a health risk of major concern and the risk may be reduced as a result of increasing protective factors such as physical activity levels and decreasing risk factors such as depression. The review of literature indicates that gratitude and expressive writing are highly correlated with lower levels of

depression. It further suggests a strong correlation between obesity and depression. It seems that few studies have examined how increasing gratitude may affect obesity, and how gratitude may have a positive effect on physical activity. Although results of the current study only support the association between gratitude and depression, the many limitations of this study may hinder the reliability and validity of the findings.

There were, however some results that deserve some attention and further exploration. For instance, physical activity levels as measured in METs experienced a statistically significant increase from pretest to posttest for those within the intervention group. Likewise, self-reported levels of gratitude increased considerably (a statistically significant change) for those in the intervention group from week 1 to week 5 when compared with the comparison group. Levels of self-reported depression also decreased significantly within participants in the intervention group from pretest to posttest. It is highly probable that such an increase in gratitude and decrease in depression was the result of the intervention. However, after controlling for differences in independent variables between groups at baseline using an analysis of co-variance (ANCOVA) the researcher found no statistically significant differences for any of the variables from pretest to posttest when comparing groups. This disparity in the results of the different statistics suggests mostly that a better matching procedure was needed to get better equivalence in dependent variables at pretest between the experimental and the comparison group. The solution is to use a true experimental design rather than a quasi-experimental design. However, even then given the differential high attrition rate from the no-treatment comparison group, baseline equivalence still would not have been assured unless there was also random assignment from matched pairs with replacement

for drop outs. Having a larger sample size would also have helped to improve statistical power and allow drawing clearer conclusions. There is no evidence to assert that an increase in physical activity levels within the intervention group was the result of an increase in gratitude scores or a reduction in self-reported depression or that any of the changes was a product of the intervention itself. It is interesting to notice that both groups (comparison and intervention) experienced an increase in physical activity levels probably due to the timing of the study in the spring when some people are getting more physically active; however, the change experienced by both groups was only statistically significant for the intervention group when no controlling for baseline differences.

The health of adults is very important. Adults ages 31 to 45 are among those who experience the highest rates of obesity and depression in Utah. Thus, the risk for morbidity and premature mortality are considerably high. One of the reasons adults struggle with excessive weight is physical inactivity, and this study has attempted to explore new ways in which such an epidemic may be reversed among adults. The body of knowledge in this area has been expanded in a new direction, however there is still a great need for health researchers to continue to explore and investigate new, creative, and innovative ways to inspire and encourage adults to adopt healthier lifestyles and maintain such behaviors. It appears that all efforts to fight obesity will mostly include physical activity and healthy nutrition. Thus, a successful combination of elements (i.e., gratitude, expressive writing) that may serve as catalysts to increase physical activity and adopt healthier diets may eventually boost the adoption and maintenance of protective factors against obesity.

APPENDIX A

LETTER OF COMMITMENT

LETTER OF COMMITMENT FROM MONUMENT PARK 19TH WARD

THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS

February 20, 2011

Karol L. Kumpfer, Ph.D., Professor and Joaquin Fenollar, MS.
The Department of Health Promotion and Education
2142 Annex, 1901 South Campus Drive
University of Utah
Salt Lake City, UT 84112

Dear Dr. Kumpfer and Joaquin Fenollar,

We are pleased to participate in this wonderful collaborative opportunity funded by the Utah Department of Health and coordinated by the Health Promotion and Education Department at the University of Utah.
We are certain that all participants of the Monument Park 19th Ward will greatly benefit from the research both personally and collectively. We appreciate being invited to assist in this important research that should benefit many people beyond our ward.

We recommend your program "Healthy and Fit Families Program" to the members of our ward. Those who participate will understand the program's participation requirements We understand that the program is free to our ward members. I believe that the research results for you and our ward members will be more positive if the research and follow up are held at the University of Utah. However, if available space if s problem, I believe we could use space in our church building.

We thank you for inviting us to participate and look forward to being part of this important research program.

Sincerely,

Bishop Randall G. Harmsen
1486 S. Devonshire Dr.
Salt Lake City, Utah 84108
Phone: 801-583 1663

APPENDIX B

SAMPLE OF WEEKLY EMAIL

SAMPLE OF A WEEKLY EMAIL

Hello to those participating in the Health Study!

I wish you a genuine present moment and a joyful rest of Monday and Week!

This is just a quick, and hopefully effective reminder...if you act upon it today & tomorrow....about the 3 things I invited you to do during our last session. Remember also to take 30 seconds and call your partner and find out how she/he is doing with her/his personal goals.

Thanks,
Joaquin

PS. Below you have additional information about the things I invited you to do before next class.

1. Each night, when you get in bed, take five minutes, breath deep, relax and do a "Body Scan" ...make "peace" with each part of your body. Talk to your body and say as many "heartfelt" "THANK YOU!!" as you want or need.

2. Write two GRATITUDE letters:
One letter to your body. Write to your body as you would write to a best friend. Ask also questions to your body in your letter (What would you like me to do for you?)....and pay attention to possible impressions.
Another letter of GRATITUDE to the Creator or Giver of your Body. Express gratitude, if such is what you feel, for your body to the creator of your body. Explain how you care about your body...or if you did not that much...explain that you will do since now on, if such is your intention. Listen to any impression you may perceive and write it down in that letter.

3. Dance randomly, freely, expressing what you feel at the melody, rhythm of your favorite "up beat" music. Do it at least three times throughout this week (till next Wednesday). Pay attention how you feel when you express yourself freely, with no embarrassment. You may dance as long as you wish. Now your limits, do not overdo it. Use moderation and progression in intensity

4. Remember to contact with your partner (make sure there is exchange of opinions and information,..., so voice contact would be preferable) and check or remind him/her about his/her goals and the three activities for this week.

Note: If you have not partner yet, let me know. If your partner never contacts you and would like a change, let me know.

APPENDIX C

QUESTIONNAIRES

The following questions and questionnaires were used in this study:

Demographic questions:

Gender:_____ Age: _____ Level of formal education: _____

Questionnaires:

1. **Physical Activity Readiness Questionnaire (PAR-Q)**

   Available at: http://medicalcenter.osu.edu/pdfs/cwp/Par-Q.pdf

2. **International Physical Activity Questionnaire (IPAQ)**

   Available at: https://sites.google.com/site/theipaq/questionnaires

3. **Depression Scale** (**CES-D)** (Radloff, 1977)

   Available at: http://www.chcr.brown.edu/pcoc/cesdscale.pdf

4. **Gratitude Scale** (**GQ-6)** (McCullough, Emmons, Tsang, 2001)

   Available at: http://www.psy.miami.edu/faculty/mmccullough/gratitude/GQ-6.pdf

5. **Client Satisfaction and Attitude towards Program** (Kumpfer, 2002)

   Requests to Dr. Kumpfer: 801-581-7718, karol.kumpfer@health.utah.edu

APPENDIX D

PEDOMETER PROTOCOL

PEDOMETER PROTOCOL

It is very important that you:

a) Don't modify or change your physical activity habits or lifestyle as a result of wearing the pedometer during the study. Just keep your regular routines as you have done during last weeks. Do not worry at this time if you have too many or too few steps.

c) Wear the pedometer for 5 days starting tomorrow Tuesday. Wear the pedometer since you get up until you go to bed. Don't wear it as you take a shower, swim or sleep. Be careful not to drop it when you use the restroom (it happens that it falls in the bowl) :) At the beginning of the day, open the lid, reset to Zero and close the lid. Then, at the end of the day, open the lid and check the number of steps. Write the number down, right away, in the log-sheet provided. Then, reset to Zero for next day. Repeat this process for five days (Tuesday through Saturday). You are asked to come up with five different numbers (total steps from five days).

c) Be honest as you record your information.

More instructions on how to wear the pedometer: Wear it as the image below or attached picture. On your waist, clipped to your pants or skirt, just above your knee cap. Check that it works. You will see that this pedometer is not high tech. It is a simple one, but it may be good enough to get an estimate of overall steps. The pedometer has been tested for accuracy in measuring steps and it works well. There is a minimum error in counting steps.

Control Group:
d) Please, **bring the pedometer, pedometer log-sheet, the survey, and signed consent form to Church this Sunday.** Put the surveys in the box that will be provided in the south foyer of our chapel before and after church. Put consent forms in the other box. This way, the information you provide will be confidential. I will take the pedometers as I have to assign a number so you can use the same one in five weeks from now.

Thanks so much!

Joaquin

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