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Behavior Analysis Program to Improve Habits of Physical Activity, Eating, and Sleeping

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BEHAVIOR ANALYSIS PROGRAM TO IMPROVE HABITS OF
PHYSICAL ACTIVITY, EATING, AND SLEEPING

by

Ivan Noe Martinez Salazar

A dissertation submitted to the Graduate College
in partial fulfillment of the requirements
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BEHAVIOR ANALYSIS PROGRAM TO IMPROVE HABITS OF PHYSICAL ACTIVITY, EATING, AND SLEEPING

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Western Michigan University, 2015

An Internet-based five-week duration program to improve “health habits” using behavior analysis principles and eHealth technology was developed and evaluated. The “health habits” include recurring behaviors that impact health status such as eating, sleeping, and physical activity.

Ten adult participants were recruited online from Mexico. A multiple baseline design was used and participants were randomly assigned into two different groups (i.e., ABBAA and AABBA groups). Participants received online training using videos describing the characteristics of the program and its components. Each participant recorded selected health behaviors using a Microsoft Excel® tool designed specifically for this program’s goal achievements. Participants reported their performance on a daily basis to their “performance manager” via text messages (i.e., sending a picture of the tool and any preferred tracking device they wanted to use and have access to), which assisted their performance manager in tracking their progress. Goal attainment, as assessed through the text messages, was rewarded by monetary compensation awarded from the performance manager during the two weeks of intervention. During all the experimental phases, participants consulted with their performance manager and set health behaviors improvement goals. These goals were adjusted on a weekly basis. Failure to attain goals
resulted in feedback from the performance manager on how to overcome barriers. It was concluded that health behaviors do not increase only under the intervention phases (e.g., money contingencies) but during all the phases. This is explained by the monitoring and feedback procedures.

A social validity survey was used to assess participant satisfaction. The participants scored the program and its components as beneficial for the improvement of physical activity, eating, and sleeping habits (4.72/5.0 points). All these “healthy habits” have statistical significant differences \((p < 0.05)\) comparing the results before and after the program. Finally, weight reduction was not statistically significant for all the participants. Nevertheless, this was not the main goal of the program but a secondary benefit for those interested in achieving this goal. A longer duration of the program may be likely to improve weight reduction results.
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Ivan Noe Martinez Salazar
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INTRODUCTION

Health and Daily Habits

People engage in a wide array of daily activities that impact the quality of their health in a positive or negative way. Those recurring daily activities that impact health (e.g., eating, exercise, sleep) will be referred to as “health habits” for the purposes of this dissertation.

If people can improve their health habits and maintain those improvements, it may be possible to lower the risk of certain chronic, lifestyle diseases (e.g., cardiovascular disease, obesity, cancer, emphysema) and improve the management of other chronic diseases that have clear genetic and biological causes (e.g., diabetes, asthma). This study evaluated the effects of a contingency contracting intervention that involved goal setting, feedback, and monetary consequences for improved health habits such as physical activity, eating, and sleeping (dependent variables).

Health, Behavior and Habits Definitions

A number of different definitions of health have been proposed. For example, the World Health Organization (WHO, 2003b) defined health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” While this definition was hailed as an improvement over prior ones due to the focus on well-being as independent of the absence of disease, it can be seen as unrealistic. It suggests a static and often unattainable state that is either present or absent. A different and a more compelling definition was provided by Bircher (2005), who
defined health as “a dynamic state of well-being characterized by a physical, mental and social potential, which satisfies the demands of a life commensurate with age, culture, and personal responsibility. If the potential is insufficient to satisfy these demands, the state is disease” (p. 336). This definition emphasizes functional well-being, which is the ability to engage in meaningful activities of a physical, mental, and social nature.

Behaviors that have an impact on health have been identified, for example, specific behaviors related to the lack or reduction of physical activity in combination with the amount of caloric intake and the lack of correct sleep hygiene habits. Improving behaviors related to physical activity, eating, and sleeping is important in an effort to manage and improve health status and quality of life. These behaviors may be difficult to manage, because often individuals do not pay attention to them. Therefore, self-monitoring these behaviors alone can improve the frequency of their performance.

When specific behaviors are repeated frequently, they are called “habits,” which can be defined as “a particular act or way of acting that you tend to do regularly” (“Habit,” 2015). Thus, individuals engage in repetitive behavior patterns, or habits, some of which have a meaningful impact on health and quality of life.

The rationale of the current study is that habits (i.e., repeated specific behaviors such as physical activity, eating, and sleeping) can be experimentally manipulated in order to achieve the goal of improving the quality of health. Before presenting the behavioral concepts supporting this rationale, it is important to identify those recurring behavior patterns that have been associated with the development of chronic diseases and degradations of functional well-being.
Effects of Habits on Health and Prevalence of Diseases

Krebs, Prochaska, and Rossi (2010) wrote:

Health behaviors account for an estimated 60% of the risk associated with chronic illnesses such as diabetes, cardiovascular diseases, and some cancers (Institute of Medicine, 2001). With chronic illness responsible for the majority of deaths in the United States (Centers for Disease Control, 2008). Effective strategies must be developed and disseminated for improving health-related behaviors on a population level. (p. 215)

A number of health habits should be considered a high priority from a public health perspective because of the prevalence and high costs (financial, mortality, and morbidity) of the health conditions associated with those health behaviors. These are discussed below.

**Obesity**

There are specific problems related to health habits. Currently, the most common and problematic is the increase in the number of individuals who are overweight or obese and the outcomes associated with being overweight. For conceptual clarification, the differences and characteristics of what it means to be overweight and obese will be explained.

The Centers for Disease Control (2015) defined *overweight* and *obesity* as:

Having excess body weight for a particular height from fat, muscle, bone, water, or a combination of these factors. Obesity is defined as having excess body fat. Overweight and obesity are the result of caloric imbalance—too few calories
expended for the amount of calories consumed—and are affected by various genetic, behavioral, and environmental factors.

The most common way to classify overweight and obesity is by calculating one’s Body Mass Index (BMI). A BMI score “does have some limits. It may overestimate body fat in athletes and others who have a muscular build. BMI also may underestimate body fat in older people and others who have lost muscle” (National Heart, Lung, and Blood Institute, 2012).

Waist measurement is a different procedure used to screen for possible health risks related to overweight and obesity in adults. If a person has abdominal obesity and most of his or her fat is around the waist rather than at the hips, there is an increased risk for diseases such as coronary heart disease and type 2 diabetes. “The risk goes up with a waist size that is greater than 35 inches for women or greater than 40 inches for men” (National Heart, Lung, and Blood Institute, 2012).

Any person can measure his or her waist size. Finding the top of the hip bone and the bottom of the ribs, then breathing out normally, and placing a tape measure midway between these points and wrap it around the waist. The risk of developing diseases starts with a waist size of 94 centimeters (37 inches) for men, and 80 centimeters (31.7 inches) for women (Heart Foundation, 2015).

While not technically a “disease,” obesity has been identified as a major global health challenge. The World Health Organization (2012) published their World Health Statistics report, which highlighted that “between 1980 and 2008, the worldwide prevalence of obesity (body mass index ≥30 kg/m2) almost doubled” (p. 36). It was also stated that “obesity increases the risk of type 2 diabetes mellitus, coronary heart disease,
stroke and some cancers” (Gaddi, Capello, & Manca, 2014, p. 27). Ogden, Carroll, Kit, and Flegal (2012) further stated that “in 2009, over 78 million U.S. adults and about 12.5 million U.S. children and adolescents were obese” (p. 3).

There are specific behaviors that produce obesity, such as a higher intake of calories combined with the low performance of physical activity. Also, the type of food eaten may contribute to the development of this health problem. Eating produces immediate positive consequences (e.g., taste, escape from hunger pains). Excessive eating produces incremental effect (i.e., gradual increase in adipose tissue) (Bennett et al., 2012).

**Habits: Physical Activity**

**Definition of Physical Activity: Why Is It Important for Health?**

First, it is important to define physical activity because it implies a broad number of possible behaviors. “Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure” (World Health Organization, 2015b). Physical activity can encompass a multitude of different activities, such as walking and running.

Why is physical activity important for health? “Physical inactivity has been identified as the fourth leading risk factor for global mortality causing an estimated 3.2 million deaths globally” (World Health Organization, 2015b). There is an extremely high number of preventable deaths caused by the lack of engaging in moderate physical activity.
Research on Physical Activity

Many studies related to the topic of physical activity and its effects on health have been conducted. In the current section, a selection of research used in the design of the present program will be presented. Those studies utilizing technological approaches for the improvement of physical activity will be highlighted.

Bauman et al. (2009) conducted an interesting study, which looked at 20 countries between the years of 2002 and 2004. The International Physical Activity Questionnaire (IPAQ) was developed for international surveillance, and a standardized protocol using IPAQ was used to assess physical activity participation in 20 countries (total $N = 52,746$, aged 18–65 years). In this study, physical activity levels were categorized as “low,” “moderate,” or “high.” The findings indicated:

The majority of the population in most participating countries or regions appeared to undertake at least a moderate amount of physical activity when assessed using the multi-domain IPAQ. This suggests that most adults in these countries are obtaining some activity, yet the global problem of rising prevalence of obesity remains. Thus, it appears total physical activity in most countries remains insufficient to ensure energy balance and prevent obesity or that the ratio of energy expenditure to dietary intake is unbalanced to maintain weight stability.

(Bauman et al., 2009, p. 8)

It is clear then, that physical activity alone is insufficient to prevent obesity. This particular problem requires a multicomponent approach (Hagstromer, Sjostrom, Pratt, & The IPS Group, 2009). The present dissertation aimed to provide a multicomponent
program including physical activity, eating, and sleeping habits control, as will be explained in detail later.

Several articles have described different approaches for direct measures of physical activity, such as pedometers, heart rate monitors, and accelerometers (Van Camp & Hayes, 2012). Several software programs, available at no cost on the Internet, can be downloaded onto mobile phones as an application (“app”). Many of these apps measure physical activity while exercising, providing the individual with information on distance, calories, time, and other feedback about the performance. Running or walking in a park or on a track and using a watch and chronometer for measurement performance is an easy method for recording this kind of information. Moreover, self-management seems to be essential to increase physical activity. Self-monitoring and goal setting have been replicated in different research studies as the necessary steps required to apply self-management correctly. Encouraging results have been demonstrated when combined with feedback (Croteau, 2004; Dinger, Heesch, & McClary, 2005; Donaldson & Normand, 2009; Goran & Reynolds, 2005; Hager, Hardy, Aldana, & George, 2002; Hustyi, Normand, & Larson, 2011; Normand, 2008; VanWormer, 2004).

Donaldson and Normand (2009) developed a study using goal setting, self-monitoring, and feedback. This treatment package was used to increase the daily caloric expenditure of five obese adults. The authors used email communication and the results indicated that all participants were successful in increasing their caloric expenditure during intervention phases.

VanWormer (2004) developed a treatment package that evaluated the increase of daily steps taken by three overweight adults. In this study, the participants used email
communication, wore pedometers, and used a Microsoft Excel® spreadsheet and graph. “Two participants approximately doubled their daily step total and lost a modest amount of weight by study end” (p. 421).

A different type of physical activity approach combined with technology consists with exergaming, an interactive area of video game technology aimed specifically at promoting exercise. Exergaming has been evaluated in several recent studies. Fogel, Miltenberger, Graves, and Koehler (2010) compared the level of physical activity in exergaming sessions and typical physical education sessions in four overweight and sedentary fifth grade children. Results showed that exergaming produced substantially more minutes of physical activity and opportunity to engage in physical activity than did the standard physical education program (p. 591).

Shayne, Fogel, Miltenberger, and Koehler (2012) developed a similar study, which was conducted with four active third grade males. Results indicated that “exergaming produced substantially higher percentages of physical activity and opportunity to engage in physical activity. In addition, an evaluation of the exergaming equipment showed that exergaming stations were associated with differential levels of physical activity across participants” (p. 211).

Finally, in their review “Assessing and Increasing Physical Activity,” Van Camp and Hayes (2012) mention that “additional research is needed to identify effective reinforcers to increase physical activity when self-monitoring, goal setting, and feedback are not sufficient” (p. 874). Further, the use of new technology may be encouraged if such technology is user friendly and low-cost.
Different measures of different behaviors can be obtained, but in order to improve the quality of health, it is necessary to have well-established parameters of physical activity. Next, recommendations regarding this topic will be given.

**Recommendations for Physical Activity**

The Office of Disease Prevention and Health Promotion (2015) summarized the 2008 Physical Activity Guidelines for Americans:

The Physical Activity Guidelines for Americans describes the major research findings on the health benefits of physical activity:

- Regular physical activity reduces the risk of many adverse health outcomes.

- Some physical activity is better than none.

- For most health outcomes, additional benefits occur as the amount of physical activity increases through higher intensity, greater frequency, and/or longer duration.

- Most health benefits occur with at least 150 minutes (2 hours and 30 minutes) a week of moderate intensity physical activity, such as brisk walking. Additional benefits occur with more physical activity.

- Both aerobic (endurance) and muscle-strengthening (resistance) physical activities are beneficial.

- Health benefits occur for children and adolescents, young and middle-aged adults, older adults, and those in every studied racial and ethnic group.
• The health benefits of physical activity occur for people with disabilities.
• The benefits of physical activity far outweigh the possibility of adverse outcomes.

These recommendations are clearly stated, have been studied, and are therefore recommended by the U.S. Department of Health and Human Services. For the purposes of the present study, these recommendations will be implemented for the participants.

Habits: Eating Habits

Definition of Eating Habits: Why Are They Important for Health?

To eat can be defined as to “put [food] into the mouth and chew and swallow it” (“Eat,” 2015). Eating habits can be defined as “the way a person or group eats, considered in terms of what types of food are eaten, in what quantities, and when” (“Eating Habits,” 2015).

Different research has found that the amount and quality of food, and even the speed of eating, can affect weight of the body. Therefore, the health of people can be affected by these variables.

Research on Eating Habits

Dealing with overweight and obesity represents a methodological challenge to develop experimental designs that may isolate confounding variables and have strong experimental control (Carpenter, Finley, & Barlow, 2004; Cushing & Steele, 2015; Delichatsios et al., 2001; Glasgow & Toobert, 2000). Nevertheless, it is possible to conduct such research in addition to obtaining reliability and generalization, even in larger samples.
Speed of eating and water consumption appear to be interacting factors worthy of study. For instance, Andrade, Greene, and Melanson (2008) presented a “slow condition” in which 30 women “were instructed to take small bites, put down the spoon between each bite and chew each bite 20 to 30 times” (p. 1187). The results “showed that the combined techniques of taking small bites, pausing between bites, and chewing thoroughly can decrease the rate of food ingestion, and enhance effects on satiation, decreasing energy intake” (p. 1189).

Other studies (Albers, 2003; Rolls, 2005) have suggested that by slowing down and savoring the sight, smell, taste, flavor, texture, and feel of food, and sensing hunger being suppressed, more satisfaction can result from fewer calories (Andrade et al., 2008).

In their study, Andrade et al. (2008) suggested that a potential confounding variable is the consumption of water. “Greater water consumption under the slow condition led to higher total meal weight, which might have induced more stomach distension, and thus satiation. However, this factor reflects the real-life situation, because eating slowly allows more time for water consumption” (p. 1190).

Bachman, Phelan, and Wing (2011) studied the effects of eating frequency and also cited different studies.

Number of daily eating occasions—meals and snacks consumed per day—which is often reported as eating frequency, may be important in achieving a lower weight status (Holmback, Ericson, Gullberg, & Wirfalt, 2010; Ma et al., 2003). Eating more frequently may help to control hunger, which is believed to decrease the chance of overeating (Burley, Paul, & Blundell, 1993). Research investigating the relationship between eating frequency and weight has found mixed outcomes.
Bellisle, McDevitt, & Prentice, 1997). Methodologic limitations in previous investigations, such as not examining the potential influence of physical activity (Duval et al., 2008) and including dietary under-reporters in analyses (Bellisle et al., 1997), have been suggested as potential reasons for the unclear outcomes between eating frequency and weight. (p. 1730)

In their study, Bachman, Phelan, and Wing (2011) examined eating frequency (self-reported meals and snacks consumed per day) in weight loss maintainers (WLM) who had reduced from overweight/obese to normal weight, normal weight (NW) individuals, and overweight (OW) individuals. Time between meals and snacks was more than one hour. The authors also included self-reported physical activity, which was highest in WLM participants, followed by NW, and then OW. The number of daily snacks consumed was highest in NW, followed by WLM, and then OW. The results of the study suggest that “eating more frequently, characterized by an eating pattern of approximately three meals and two snacks, was related to lower BMI and maintenance of weight loss” (p. 1734).

Despite the fact that almost everybody can identify healthy versus unhealthy food and explain the feeling of hunger and satiation, individuals still eat what they should not eat and sometimes in an unhealthy higher quantity (Anderson, Winett, Wojcik, Winett, & Bowden, 2001).

Loro, Fisher, and Levenkron (1979) compared three behavioral weight-reduction treatment procedures. These included (a) situational engineering (SE), which emphasized the situational and stimulus control of external cues for eating; (b) eating behavior control (EBC), which emphasized directly modifying eating habits and reinforcing eating
behavior change, eating dietetic foods, eating slowly, and the return of previously
deposited money; and (c) development of individuals’ own application of a model of self-
control and providing effective feedback regarding progress toward weight-loss goals. A
particular characteristic of this study was that the self-initiated (SI) treatment “was
designed to be less directive than many behavioral treatment packages and to be more
realistic about the expectations of subjects and the actual eating habits of overweight and
normal weight people” (p. 141). The results found that all treatments produced weight
losses; however, the “EBC surpassed SE during treatment. SI losses during treatment did
not differ from SE or EBC, but SI was the only group that lost weight throughout follow-
up” (p. 141).

Another challenge with healthy eating is that it may be difficult for individuals to
decide which healthy foods are better to eat (Baranowski et al., 2003; McGuire, Wing,
Klem, & Hill, 1999). Stock and Milan (1993) developed a study that aimed to improve
dietary practices in elderly individuals. The researchers used three intervention packages
consisting of enhanced prompts, feedback, and social reinforcement. A lottery and a
confederate were added and removed in sequence as an additional condition in an
extended withdrawal design aimed to assess their effects on the dietary choices of elderly
persons. Three participants “demonstrated a marked increase in healthy choices of food
items in response to the package of enhanced prompts, feedback, and social
reinforcement. No additional increase occurred with the introduction of the lottery and
serving as a confederate” (p. 379). An interesting conclusion found was that “food-choice
data indicated that most of these improvements could be attributed to healthier entree and
dessert choices” (p. 379).
The importance of combining physical activity practice and dietary habits control in order to achieve the goal of weight control has been well proven. But the goals of weight control programs must be addressed to change behaviors and not to pursue a final result (i.e., weight reduction). For instance, “some otherwise well-designed weight loss programs have not been successful because behavior change contingencies were placed on the goal (reduced weight) and not on the behaviors necessary to produce the goal” (Cooper, Heron, & Heward, 2007, p. 61).

**Recommendations for Eating Habits**

The World Health Organization (2003a) published a report containing the collective views of an international group of experts about diet, nutrition, and the prevention of chronic diseases. “The trend to consider physical activity alongside the complex of diet, nutrition and health” (p. 3) was presented extensively. In the same document, the experts described some relevant aspects:

Physical activity has great influence on body composition—on the amount of fat, muscle and bone tissue. To a large extent, physical activity and nutrients share the same metabolic pathways and can interact in various ways that influence the risk and pathogenesis of several chronic diseases . . . physical activity and food intake are both specific and mutually interacting behaviours that are and can be influenced partly by the same measures and policies. (p. 3)

Any recommendation attempting to improve eating habits must be combined with the physical activity recommendations stated above. However, and specifically referring to eating behaviors, the World Health Organization (2003a) experts recommended that
“within the time frame of a week, at least 20 and 44 . . . biologically distinct types of foods, with the emphasis on plant foods, are required for healthy diets” (pp. 44-45).

Further, the experts recommended “to increase the consumption of fruits and vegetables, to increase the consumption of fish, and to alter the types of fats and oils, as well as the amount of sugars and starch consumed, especially in developed countries” (p. 45). Sugar and high-energy foods should be controlled, too. “Reduce the intake of sugar-sweetened drinks (particularly by children) and of high-energy density foods that are micronutrient poor” (p. 45).

As mentioned before, there are specific factors that contribute to the development of overweight and obesity, factors like frequency of eating, nutrition, and environment (Jensen, Aylward, & Steele, 2012; Irvine, Ary, Grove, & Gilfillan-Morton, 2004). “Eating behaviours that have been linked to overweight and obesity include snacking/eating frequency, binge-eating patterns, eating out, and (protectively) exclusive breastfeeding . . . environmental issues are clearly important, especially as many environments become increasingly ‘obesogenic’ (obesity-promoting)” (World Health Organization, 2003a, p. 62).

There are many strategies for weight loss; however, not all of them are effective or scientifically correct. Dietary restrictions can lead to counterproductive effects such as the development of eating disorders (e.g., anorexia nervosa). The control of the environment and changes in specific behaviors affecting physical activity and food habits have been described as solutions to prevent and control obesity.

The effectiveness over the long term of most dietary strategies for weight loss, including low-fat diets, remains uncertain unless accompanied by changes in
behaviour affecting physical activity and food habits. These latter changes at a public health level require an environment supportive of healthy food choices and an active life. (World Health Organization, 2003a, p. 64)

The specific recommendations related to types of food are:

The fat and water content of foods are the main determinants of the energy density of the diet. A lower consumption of energy-dense (i.e., high-fat, high-sugars and high-starch) foods and energy-dense (i.e., high free sugars) drinks contributes to a reduction in total energy intake. Conversely, a higher intake of energy-dilute foods (i.e., vegetables and fruits) and foods high in NSP (Non-Starch Polysaccharides) (i.e., wholegrain cereals) contributes to a reduction in total energy intake and an improvement in micronutrient intake. It should be noted, however, that very active groups who have diets high in vegetables, legumes, fruits and wholegrain cereals, may sustain a total fat intake of up to 35% without the risk of unhealthy weight gain. (World Health Organization, 2003a, p. 70)

In summary, reducing the speed of eating, increasing water consumption, increasing satiation, and controlling caloric intake are recommended health eating habits. As well, incrementing the number of meals per day to five (three meals and two snacks) appears as the best option to control satiation and quantity of food (Bachman et al., 2011).
Habits: Sleeping (Sleep Hygiene)

Definition of Sleeping Habits: Why Are They Important for Health?

Sleep refers to “a condition of body and mind such as that which typically recurs for several hours every night, in which the nervous system is relatively inactive, the eyes closed, the postural muscles relaxed, and consciousness practically suspended” (“Sleep,” 2015).

Malott (2008) defined behavior as “muscular, glandular or neuroelectrical activity” (p. 5) and explained the “Dead Man Test; if a dead man can do it, it is not behavior” (p. 5). Sleeping can be defined then as a behavior. In other words, a dead man cannot sleep as there are neuro-electrical, muscular, and glandular activities occurring during sleep. Sleeping is a behavior that humans should repeat frequently, and therefore can be defined as habit.

Habits of sleep have several effects. The effects of sleep on health have been studied and results have found that “although sleep is a necessity, about 60 million Americans are affected by chronic sleep disorders and sleep problems that can impair physical well-being and cognitive functioning” (Liu et al., 2013, p. 1). It is also expected that every human has experienced sleep deprivation at least once in his or her life, and that everybody should be able to describe the effects of not sleeping well. Sleep loss, long-term sleep deprivation, and perceived insufficient rest/sleep are common in modern society. Nearly one third of adults report sleeping under 6 hours on average, leading some people to suggest the occurrence of a sleep-deprived society (Institute of Medicine, 2006; Shankar, Syamala, & Kalidindi, 2010).
Sleep characteristics are related to the development of chronic diseases, which has been linked to premature death. The type of chronic diseases and conditions related to sleep problems include diabetes, cardiovascular disease, obesity, and depressive disorders (Centers for Disease Control and Prevention, 2013a; Chapman et al., 2012; Chapman, Liu, et al., 2013; Chapman, Presley-Cantrell, et al., 2013; Liu et al., 2013).

Liu et al. (2013) studied 375,653 U.S. adults aged ≥ 18 years in the 2009 Behavioral Risk Factor Surveillance System, where they assessed the relationship between insufficient sleep and chronic disease. The relationships were further examined using a multivariate logistic regression model after controlling for age, sex, race/ethnicity, education, and potential mediators (Frequent Mental Distress and obesity). The overall prevalence of insufficient sleep was quite high, with 10.14% of respondents reporting insufficient sleep in every one of the prior 30 days, 17.0% of the respondents claiming insufficient sleep for 14 to 29 days of the prior 30 days, and 42.0% reporting insufficient sleep for 1 to 13 days. In contrast, only 30.6% reported adequate sleep for each of the prior 30 days. The positive relationships between insufficient sleep and each of the six chronic diseases were significant ($p < 0.0001$) after adjusting for covariates. They were also modestly attenuated but not fully explained by Frequent Mental Distress. The relationships between insufficient sleep and diabetes and high blood pressure were also modestly attenuated but not fully explained by obesity. In conclusion, routine medical examinations should include an assessment of sleep quantity and quality and the encouragement of optimal sleeping habits.

Obesity is probably one of the most complex health epidemics that humanity has faced, as there are many factors involved in the development of this condition. Different
epidemiological studies revealed an association between short sleep duration and excess body weight in all ages, but especially in children (Centers for Disease Control and Prevention, 2013b; Taheri, 2006). Thus, it can be said that sleeping well, especially for children, is an important component in efforts to control the obesity epidemic.

Ford et al. (2014) studied 13,742 participants aged ≥ 20 years from the National Health and Nutrition Examination Survey 2005-2010. Sleep duration was categorized as ≤ 6 hours (short sleepers), 7 to 9 hours, and ≥ 10 hours (long sleepers). Compared to participants who reported sleeping 7 to 9 hours per night, short sleepers were more likely to be obese and have abdominal obesity, and as stated previously, obesity is related to obstructive sleep apnea and cardiovascular diseases.

**Research on Sleep Hygiene**

Gellis and Lichtein (2009) developed an Internet-based investigation where they assessed the frequency of multiple sleep hygiene practices in a sample of 220 people, of whom 128 were good sleepers and 92 were poor sleepers (mean age = 41.6, SD = 12.8, 61.8% women). Participants were categorized as good and bad sleepers using the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), which is used to measure sleep quality (PSQI scores <5 = good sleep, >7 = poor sleep). It is important to recall that the most prevalent sleep disorder is insomnia. “Poor sleep is associated with increased fatigued, psychological distress, risk of suicide” (p. 1). It was found that “although sleep hygiene practices were generally good, poor sleepers showed increased cognitive activity in the bed, even after controlling for global indices of depression and anxiety” (p. 1).
Environmental factors can affect the quality of sleep and were assessed in this study. Gellis and Lichtein’s (2009) study found that “poor sleepers also reported statistically significant increases in excessive noise in the bedroom, uncomfortable nighttime temperature, and activities that were exciting, emotional, or demanded high concentration near bedtime” (p. 1). Thus, these factors are concluded to contribute to poor sleep. It is important to note the identified limitations of the study. “It is possible that individuals volunteering for Internet-based studies show worse sleep as compared to the population, particularly among males” (p. 7), and it is suggested that in order to improve research in this area, “future studies . . . should continue to assess the validity of using the Internet sample to accurately assess sleep characteristics in the population” (p. 7).

Sleep hygiene can be used to improve the quality of sleep, and there are different recommendations from different institutions and experts.

**Recommendations for Sleep Hygiene Habits**

As described above, sleep habits have the potential to impact one’s quality of health. An interesting approach to control sleep habits is sleep hygiene.

The Centers for Disease Control and Prevention (CDC, 2012) defined sleep hygiene as “the promotion of regular sleep.” The National Sleep Foundation (as cited in CDC, 2012) recommends the following sleep hygiene tips to improve sleep:

1. Go to bed at the same time each night and rise at the same time each morning.
2. Make sure your bedroom is a quiet, dark, and relaxing environment, which is neither too hot nor too cold.
3. Make sure your bed is comfortable and use it only for sleeping and not for other activities, such as reading, watching TV, or listening
to music. Remove all TVs, computers, and other “gadgets” from the bedroom.

(4) Avoid large meals before bedtime.

The Center for Clinical Interventions (CCI) is a specialist province-wide program that is administered through North Metropolitan Health Services in Western Australia. This program suggests a list of 15 sleep hygiene tips (CCI, 2008), which are similar but more detailed than the CDC (2012) sleep hygiene recommendations. Gellis and Lichstein (2009) studied a list of 19 sleep hygiene recommendations based on the *International Classification of Sleep Disorders: Diagnosis and Coding Manual* (2nd edition; ICSD-II) criteria for inadequate sleep hygiene and listed a variety of activities that are characteristic of poor sleep hygiene (American Academy of Sleep Medicine, 2005).

All these recommendations should be considered as popular advice for improving sleep. The efficacy of this advice requires scientific evaluation (Martinez-Salazar & Fuqua, 2015). Nevertheless, Gellis and Lichstein (2009) evaluated some of these recommendations.

The sleep hygiene recommendations listed below were used in the design of the current study.

1. “Get regular. – Go to bed and get up at more or less at the same time every day, even on weekends and days off” (CCI, 2008). People tend to sleep more during the weekends or days off; the common way of thinking is that if a person sleeps more during those days, he or she will recover the hours of sleep missed during the week (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

2. “Sleep when sleepy. – Only try to sleep when you actually feel tired or sleepy, rather than spending too much time awake in bed” (CCI, 2008. People tend to remain in
bed waiting or “trying” to sleep. This practice is ineffective, according to sleep hygiene principles (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

3. “Get up and try again. – If you haven’t been able to get to sleep after about 20 minutes or more, get up and do something calming or boring until you feel sleepy, then return to bed and try again” (CCI, 2008). This common advice recommends getting out of bed if a person cannot sleep and trying to find a non-stimulating activity to engage in until feeling sleepy (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

4. “Avoid caffeine and nicotine. – . . . for at least 4-6 hours before going to bed” (CCI, 2008. Some individuals drink coffee or smoke, with the belief that these substances help them sleep. As described before, this is physiologically incorrect. These substances activate the central nervous system and therefore create feelings of awareness (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

5. “Avoid alcohol. – . . . for at least 4-6 hours before going to bed” (CCI, 2008). Alcohol is well known as a depressor of the central nervous system; however, it is a substance that should be avoided in order to sleep well. This can be related to the consumption of the substance in a particular environment (e.g., stimulating social gathering) or because of the activity of the internal organs (e.g., liver) necessary to process alcohol through the system. (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

6. “Bed is for sleeping. – Try not to use your bed for anything other than sleeping and sex” (CCI, 2008). It is clear that the intention of this recommendation is to
psychologically relate the bedroom only with the activity of sleep. However, having sex can be considered as an arousal activity as well (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

7. “No naps. – If you can’t make it through the day without a nap, make sure it is for less than an hour and before 3 pm” (CCI, 2008). In the studies described previously, this is one of the common recommendations. It is well known that the time used to take a nap is time taken away from the total amount of sleep later that night, frequently producing insomnia (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

8. “Sleep rituals. – You can develop your own rituals of things to remind your body that it is time to sleep . . . 15 minutes before bed each night,” (CCI, 2008). The usual justification for this recommendation is to psychologically prepare the body and the mind to sleep. Most individuals engage in the same activities before going to bed every night without knowing that those activities should be done, in the exact same sequence each night (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

9. “Bath time. – [Have] a hot bath [or shower] 1-2 hours before bedtime” (CCI, 2008). The justification for this recommendation is that helps the body to improve the blood circulation by relaxing the muscles and allowing the body to fully rest (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

10. “No clock-watching. – Many people who struggle with sleep tend to watch the clock too much. Frequently checking the clock during the night can wake you up” (CCI, 2008). The rationale for this recommendation is that if individuals continue observing the
clock when they cannot sleep, their anxiety will increase. This increased anxiety will arouse the individual and perpetuate the inability to sleep (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

11. “Use a sleep diary. – [Make] sure you have the right facts about your sleep, rather than making assumptions” (CCI, 2008). This is a popular recommendation that is prescribed for those people with the diagnosis of a sleep disorder. And although not common among the general population, it can be beneficial to all individuals (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

12. “Exercise. – Try not to do strenuous exercise in the 4 hours before bedtime” (CCI, 2008). This is recommended in order to avoid an arousal in the body’s physiology (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

13. “Eat right. – It can be useful to have a light snack, but a heavy meal soon before bed can also interrupt sleep” (CCI, 2008). As with the previous recommendation, this is suggested in order to avoid an increase in the activation of the metabolic process within the body, which therefore would delay sleep (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

14. “The right space. – It is very important that your bed and bedroom are quiet and comfortable for sleeping” (CCI, 2008), and be sure to control the light, noise and temperature. This is probably one of the most studied factors that if not controlled for can disrupt sleep. As was described before, noise and temperature are frequent contributors to insomnia (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).
15. “Keep daytime routine the same. – Even if you have a bad night sleep and are tired it is important that you try to keep your daytime activities the same as you had planned. . . . Don’t avoid activities because you feel tired” (CCI, 2008). This is perhaps one of the most difficult recommendations for many individuals to follow. As was described in some of the studies listed previously, many of the participants felt fatigued and reported this affected their daily activities, emotions, thoughts, and social interactions (American Academy of Sleep Medicine, 2005; CDC, 2012; Gellis & Lichstein, 2009).

Sleep hygiene is the last habit of the three that will be addressed in this study of habits control.

**Definition of eHealth and Related Research**

It is clear that it is urgent to continue the development of behavioral research as health problems are becoming more complex. Furthermore, people now have access to different technological resources in order to improve their health. Technology that provides data about the state of one’s health allows people to record, measure, and even obtain feedback on their health habits. All these technological tools can be defined under the concept of eHealth.

eHealth represents a keystone concept for the purposes of the current study, because many technological tools were used in it. Gaddi, Capello, and Manca (2014) wrote, “electronic Health, or ‘eHealth,’ is the term used to describe interactions with health services that can be performed using computer-based communication technologies. It evolved from telemedicine and tele-health where telecommunication is the delivery method for health care” (p. 16). One of the most important components of the present
study was the daily interaction between the researchers and the participants through different eHealth tools, which will be described later.

The World Health Organization also provides a definition of eHealth that includes one of the main components in the design of the present study; one of the main advantages of eHealth is the possibility to educate people. “eHealth is the use of information and communication technologies (ICT) for health. Examples include treating patients, conducting research, educating the health workforce, tracking diseases and monitoring public health” (World Health Organization, 2015a). As can be seen within this definition, eHealth allows for conducting research to monitor health, and for the purposes of this study, to monitor specific behaviors, which are a part of habits.

About the aim of eHealth, Gaddi et al. (2014) mentioned that “a general high-level objective is that they should lead to better, more efficient services and treatment” (p. 17). Furthermore, these technological tools include people in a more active way for their own health state, motivating them and allowing them to obtain valuable data about themselves. “Patients are currently the most underused resource in health care . . . engaging with eHealth provides a vehicle to empower and motivate patients, giving opportunity to take wider ownership and control over their own health” (Gaddi et al. 2014, p. 17).

One of the advantages of using technology is that it permits professionals and patients to interact when they are separated over long distances. It also can provide the ability to reach groups that are difficult to engage with (Bickmore, Gruber, & Picard, 2005; Bholat, Ray, Brensilver, Ling, & Shoptaw, 2012; Block, Block, Wakimoto, & Block, 2004; Block, Wakimoto, et al., 2004; Gonzalez et al., 2013; Hageman, Walker, &
Pullen, 2005; Long & Stevens, 2004; Marshall, Leslie, Bauman, Marcus, & Owen, 2003; McKay, Glasgow, Feil, Boles, & Barrera, 2002). For instance, Franklin, Waller, Pagliari, and Greene, (2006) created and studied a program called “Sweet Talk” about patient education and behavior change. This program consisted of a text messaging system providing motivational messages to young people with diabetes, which reported improved self-efficacy and adherence to medication. A similar example is the program “txt2stop,” which provided a support system to aid smoking cessation (Bennett & Emberson, 2011). A systematic review of SMS (Short Message Service) reminder systems found that these systems lead to improved attendance rates when reminders are sent prior to appointments (Hasvold & Wootton, 2011).

A different approach used by eHealth consists of social media and websites, which allow interactions between peers. According to Gaddi et al. (2014), “further online learning and peer support are available via social media websites such as Facebook and Twitter where online groups have been set up by healthcare organizations for the exchange of information to aid self-management” (p. 24).

Sahama, Liang, and Iannella (2012) designed and implemented the program “PatientsLikeMe” in which people with long-term conditions are paired with each other to provide personal support and first-hand testimonials. In this study, the authors designed a web platform where individuals were able to share the same personal profile of one user with different social networks. This simulated the most common social networks currently available while allowing private information to be shared only with health professionals. An interesting conclusion of this study was that the lack of complete
and accurate data of daily activities (i.e., behaviors) of the person could negatively impact a treatment.

Norman et al. (2007) reviewed eHealth intervention studies for adults and children that targeted behavior change for physical activity, healthy eating, or both. They included 49 articles, 13 of which focused on physical activity, 16 on dietary behaviors, and 20 on both physical activity and dietary behavior change. All articles were published between 2000 and 2005. However, their conclusions were not as positive as might be expected. “Results indicated mixed findings related to the effectiveness of eHealth interventions. Interventions that feature interactive technologies need to be refined and more rigorously evaluated to fully determine their potential as tools to facilitate health behavior change” (Norman et al., 2007, p. 336).

In this review, “overall, the studies mainly aimed at improving physical activity and dietary behaviors in the context of preventing chronic diseases” (p. 341). However, the interventions consisted of desktop applications and the authors suggested that the use of “mobile devices such as handheld computers, cellular telephones, and text messaging devices are emerging as new platforms for delivering health information” (p. 343). Then they described one of the most important tools for the development of the present study design, which is the use of feedback using these new technologies. “These platforms are also incorporating new functions such as sensing, monitoring, geospatial tracking, location based knowledge presentation, and a host of other information processes that will potentially enhance the ability for accurate assessment and tailored feedback” (p. 343).
Kreps, Prochaska, and Rossi (2010) conducted a meta-analysis that evaluated 88 studies that used computer-feedback, computer-based, printed, or phone call assessments. Those computer-tailored interventions were published between 1988 and 2009 and focused on four health behaviors: smoking cessation, physical activity, eating a healthy diet, and receiving regular mammography screening. The main conclusion was that tailored interventions using computers have the potential to improve health behaviors. Forty-three percent of the participants who received those types of interventions followed the WHO’s physical activity recommendations and increased incrementally their consumption of fruits and vegetables. This meta-analysis also found that it is possible to perform simultaneous interventions over different behaviors without blocking the effectiveness of any one intervention.

At this stage, definitions of health, behaviors, and habits have been provided. The effects of habits and related behaviors on the development and prevalence of chronic diseases were described, and a specific tool (i.e., eHealth) to study habits and behaviors was analyzed by describing previous research.

**Behavior Analysis Concepts and Habits Control**

For the purposes of the present study, it is necessary to provide the behavioral concepts that supported the experimental design of the program. The first concept is behavioral contingencies. Different types of these will be described, specifically, those related to habits control.

**Behavioral Contingencies**

Malott (2008) defined a behavioral contingency as “the occasion for a response, the response, and the outcome of the response.” He continued, “The occasion is a
stimulus in the presence of which a particular response (behavior) will produce a particular outcome” (p. 16). In this order of ideas, it can be assumed that for control of the different habits (i.e., physical activity, eating, and sleeping habits), first it is necessary to identify the behaviors that constitute those habits and the specific responses and outcomes they produce.

**Reinforcement**

Cooper, Heron, and Heward (2007) wrote:

Three qualifications must be considered regarding the conditions under which the effects reinforcement will occur. These qualifications are (a) the delay between the response and onset of the consequence, (b) the stimulus conditions in effect when the response was emitted, and (c) the strength of the current motivation with respect to the consequence. (p. 258)

Habits and their specific behaviors are reinforced by different outcomes that can be immediate (e.g., taste of food) or delayed (e.g. weight reduction after a month of exercise). For Michael (2004), the direct effects of reinforcement involve “temporal relations between behavior and its consequences that are on the order of a few seconds” (p. 161). A consequence must follow the response in a few seconds, in order to reinforce that response. Particularly for eating behaviors, this assumption may be what accounts for eating fast, or eating sweetened flavors or high quantities of foods until a person is satiated.

“When human behavior is apparently affected by long-delayed consequences, the change is accomplished by virtue of the human’s complex social and verbal history, and should not be thought of as an instance of the simple strengthening of behavior by
reinforcement” (Michael, 2004, p. 36). Frequently in the case of habits, reinforcement is delayed and implies what is known as rule-governed behavior; this concept will be explained later.

For physical activity, eating, and sleeping habits, the motivation concept is fundamental. Cooper et al. (2007) wrote that “the momentary effectiveness of any stimulus change as reinforcement depends on an existing level of motivation with respect to the stimulus change in question” (p. 261). For example, many people argue that the lack of motivation is the primary reason for not performing physical activity.

Motivating operations (MO) are environmental variables that have two effects on behavior: (1) They alter the operant reinforcing effectiveness of some specific stimuli, objects, or events (the value-altering effect); and (2) They alter the momentary frequency of all behaviors that has been reinforced by those stimuli, objects, or events (the behavior-altering effect). The value-altering effect, like response-reinforcement delay, is relevant to the effectiveness of the reinforcer at the time of conditioning, and stating that the consequence is a form of reinforcement implies that a relevant MO is in effect and at sufficient strength. (Michael, 2004, p. 31)

Two aspects related to motivation are satiation and deprivation. For instance, if a person has already eaten and is experiencing satiation, it is improbable that the individual will seek more food. But if the person has been deprived of food for a significant period of time, it is highly probable that he or she will be involved in food-seeking behaviors. In both examples, the food value and the behaviors related are affected by motivation.
Cooper et al. (2007) wrote that “for a stimulus change to ‘work’ as reinforcement at any given time, the learner must already want it” (p. 263).

Following the example of food presented earlier, motivating operations can take two different forms.

An MO that increases the current effectiveness of a reinforcer is called an establishing operation (EO) (e.g., food derivation makes food more effective as a reinforcer); an MO that decreases the current effectiveness of a reinforcer is an abolishing operation (AO) (e.g., food ingestion reduces the effectiveness of food as a reinforce. (Cooper et al., 2007, p. 263)

In the case of habits, it can be said that there are many establishing operations (EOs) affecting the behaviors and responses involved in those habits (McGill, 1999). One of the goals of the current program was to identify those EOs and use them in the improvement of health. “EOs determine what an individual wants at any particular moment. EOs are dynamic, always changing. The reinforcer value (the want) goes up with increasing levels of deprivation and goes down with levels of satiation” (Cooper et al., 2007, p. 264).

A question arises here: Is health deprivation a stimulus, event, or condition powerful enough to control one’s habits? In some cases, yes. For instance, when some individuals become ill or experience pain, they will become involved in behaviors that allow them to escape those aversive conditions.

Moreover, not all the stimuli, events, or conditions function as reinforcers or with the same intensity, as some may prefer a particular reinforcer over another. It is necessary to explain how reinforcers are classified.
Classifying reinforcers. Cooper et al. (2007) described the classification of reinforcers by origin. “A reinforcer is the product of the evolution of the species (an unconditioned reinforcer) or the result of the learning history of the individual (a conditioned reinforcer)” (p. 269).

For the purposes of the present program, money (i.e., independent variable) was used as a specific learned conditioned reinforcer and was expected to have experimental control over individuals’ habits of physical activity, eating, and sleeping (i.e., dependent variables). Other types of reinforcers that were important in the present study are social approval and the sight of graphics, which will be explained in later sections.

In order to classify reinforcers by formal properties, Cooper et al. (2007) explained that “reinforcers are typically classified as edible, sensory, tangible, activity, or social” (p. 270). Examples of tangible reinforcers are stickers, trinkets, school materials, trading cards, and toys. “An object’s intrinsic worth is irrelevant to its ultimate effectiveness as a positive reinforcer. Virtually any tangible item can serve as a reinforcer” (p. 271). Examples of social reinforcers are “physical contact (e.g., hugs, pats on the back), proximity (e.g., approaching, standing, or sitting near a person), attention, and praise” (p. 273).

A stimulus, event, or condition presented to a person might serve as a reinforcer in that it may increase or maintain a behavior. However, the same stimulus, event, or condition and its contingent removal might also serve to decrease a behavior.

Punishment by Removal of a Stimulus (Negative Punishment)

Cooper et al. (2007) provided a definition of punishment by removal of a stimulus:
Punishment by the contingent removal of a stimulus is referred to as negative punishment. In negative punishment, an environmental change occurs such that a stimulus is removed subsequent to the performance of a behavior, and the corresponding future frequency of the preceding behavior is reduced. By contrast, in positive punishment, a stimulus is presented, and the corresponding future frequency of that behavior is reduced. (p. 357)

Theoretically, a punishment contingency represents an important component of the current program to improve physical activity, eating, and sleeping habits. Specifically, a negative punishment contingency is when a stimulus (e.g., money) is removed as a reinforcer for non-performance or incorrect performance (e.g., lower minutes of exercise per day than planned). This removal is expected to decrease the frequency of the undesired behavior. In a later section, the relationship of negative punishment with a different type of contingency (i.e., avoidance of loss of a reinforcer contingency) when a deadline is added will be explained.

Cooper et al. (2007) stated that “negative punishment occurs in two principal ways: time-out from positive reinforcement and response cost” (p. 357). For the purposes of this study, response cost was the type of negative punishment used. When a person did not perform correctly any planned behavior, he or she lost a specific amount of money. For instance, participants were given $50 USD at the beginning of the program. If they were required in their program to walk for 30 minutes on a specific day but instead walked for only 10 minutes, a specific portion of the $50 USD was removed (response cost). Detailed explanations of the program characteristics will be provided later. This
example is given to present the theory of negative punishment as it is directly related to this program.

In 2007, Cooper et al. explained:

Response cost is a form of punishment in which the loss of a specific amount of reinforcement occurs, contingent on an inappropriate behavior, and results in the decreased probability of the future occurrence of the behavior. As negative punishment, response cost can be classified and is defined by function. Specifically, if the future frequency of the punished behavior is reduced by the response-contingent withdrawal of a positive reinforcer, then response cost has occurred. However, if the removal of the reinforcer increases the level of the behavior or has no effect on it, response cost has not occurred. (p. 364)

The main idea of the current dissertation is to assess the effects of money as a reinforcer to perform specific behaviors related to habits of physical activity, eating, and sleeping. The contingent removal of money (response cost) occurred when a person did not perform, or did not perform in the appropriate way, a specific behavior related to the habits of interest.

Cooper et al. (2007) suggested that “positive reinforcers cannot be removed from a person who does not have any. Prior to using response cost, the practitioner must ensure a sufficient reinforcer reserve. Without a reserve, the procedure is unlike to be successful” (p. 369). For example, at the beginning of this program, the researchers provided a monetary incentive of $50 USD to each participant upon their agreement to participate. This amount was susceptible to reduction if the participant did not accomplish different specific behaviors.
Another way to explain and understand negative punishment is through the concept of penalty contingency. Malott (2008) defined it as “the response-contingent removal of a reinforcer (positive reinforcer) resulting in a decreased frequency of that response” (p. 83). He explained that behind the penalty contingency is the penalty principle: A response becomes less frequent if loss of a reinforcer or a decrease in a reinforcer has followed in the past. Note that this is a form of punishment—punishment by the loss of reinforcers (negative punishment). (p. 83)

He provided another definition of response cost as, “the response-contingent removal of a tangible reinforcer” (p. 87). For the purposes of the current study, the tangible reinforcer was the amount of money (i.e., $50 USD divided amongst the different tasks).

Moreover, if a deadline is added to the contingency with the intention of maintaining or increasing a specific behavior, then an avoidance contingency is created. This was the most important type of contingency for the present study.

**Avoidance Contingencies**

It was previously mentioned that there is an important theoretical interaction between negative punishment and avoidance contingencies. Malott (2008) defined avoidance contingency as “response-contingent prevention of an aversive condition resulting in an increased frequency of that response” (p. 256). For example, an individual would lose access to a specific amount of money if he or she did not perform a specific behavior (e.g., “walk 20 minutes today”). This person would have an understanding of this contingency because he or she would have lost the reinforcer (negative punishment) previously. The individual would then act to prevent the loss of that reinforcer again.
Operating behind this contingency is the avoidance principle: a response becomes more frequent in the future if it has prevented an aversive condition in the past. Avoidance contingencies are a type of reinforcement contingency. In other words, avoidance contingencies increase the frequency of the causal response. This is reinforcement by preventing the presentation of an aversive condition (Malott, 2008, p. 256).

**Avoidance of loss contingency.** The avoidance contingency represents the most important type of contingency in this study. A specific subtype was used in this program to maintain and increase the behaviors related to the improvement of habits and, therefore, the improvement of health. This subtype is the avoidance of loss contingency.

Malott (2008) described the avoidance of loss contingency:

Response-contingent, prevention of loss of a reinforcer resulting in an increased frequency of that response. Operating beneath this contingency is the principle of avoidance of loss—a response becomes more frequent in the future if it has prevented the loss of a reinforcer in the past. (p. 259)

Fundamental to the theoretical understanding of the avoidance contingencies is the existence of clear and specific deadlines. For example, a person might say, “I will lose $2 if I do not walk 20 minutes before 10 p.m.” If there were not deadlines, participants may not promptly engage in the desired behavior. In this example, the deadline is 10 p.m.

More details about the use of these theoretical concepts of avoidance contingencies and deadlines in the development of the current program will be explained in later sections. Next, it is necessary to present contingency contracting. This concept
will explain how to establish the different rules, specific responses, and their consequences needed to achieve specific behavioral goals.

**Contingency Contracting (Behavioral Contract)**

Cooper et al. (2007) stated:

A contingency contract, also called behavioral contract, is a document that specifies a contingent relationship between the completion of a specified behavior and access to, or delivery of, a specified reward such as free time, a letter grade, or access to a preferred activity. (p. 551)

For instance, during the present study, a behavioral contract established the activities that a person must perform and the way to do them. This contract is in place to assist the participant in avoiding the loss of a reinforcer (i.e., money). The researchers and each participant electronically signed this behavioral contract, which allows the researchers to function as “behavior managers.”

A specific study assessing the use of behavioral contracts and weight control was developed by Solanto, Jacobson, Heller, Golden, and Hertsz (1994). These authors studied the rate of weight gain in inpatients with anorexia nervosa under two behavioral contracts. “The behavioral contract signed by the patient on admission specifies the minimum 4-days weight gain necessary to earn increasing ward privileges, such as phone, frequency of visits, etc.” (p. 989). The results were that “behavioral contracting intervention was associated with an increase in the rate of weight gain without an accompanying increase in complications of refeeding” (p. 989).

Three major parts compose a behavioral contract: “a description of the task, a description of the reward, and the task record. Essentially, the contract specifies the
person(s) to perform the task, the scope and sequence of the task, and the circumstances or criterion for task completion” (Cooper et al., 2007, p. 551).

The task side of the contract consists of four parts that can be explained by answering the following questions:

Who is the person who will perform the task and receive the reward. . . . What is the task or behavior the person must perform. . . . When identifies the time that the task must be completed. . . . How well is the most important part of the task side, and perhaps of the entire contract. It calls for the specifics of the task. (Cooper et al., 2007, p. 551)

The reward side of the contract must be as complete and accurate as the task side.

Who is the person who will judge the task completion and control delivery of the reward? What is the reward? When specifies the time that the reward can be received by the person earning it. With any contract it is crucial that the reward come after successful task completion. However, many rewards cannot be delivered immediately following task completion. (Cooper et al., 2007, p. 551)

For example, in the present study, the reward was earning up to $50 USD, but the reward was delivered only if the person completed the five-week program.

Including on the contract a place to record task completion serves two purposes. First, recording task completion and reward delivery on the contract sets the occasion for all parties to review the contract regularly. Second, if a certain number of task completions are required to earn the reward, a check mark, smiley face, or star can be placed on the task record each time the task is completed successfully. Marking the contract in this manner helps the person remain focused
until the assignment is completed and the reward is earned. (Cooper et al., 2007, p. 552)

A record tool was designed for the purposes of the present study: a Microsoft Excel® Spreadsheet specific to each participant. This tool allowed participants to record daily behaviors and to have control over the money earned or lost. It also presented graphics about the performance of the participant. This tool and more details will be explained in later sections.

Following all these recommendations, a behavioral contract was designed, which can be found in Appendix A. A general view of the behavioral contract that was used in the present program of habits control is as follows: Each participant had to perform different tasks. (The data were to be recorded and sent to the researchers before 11 p.m. each day.) The data from tasks included (a) physical activity (walking a minimum of 20 min/day, 1–5 push-ups/day, 1–5 sit-ups/day; (b) a score given to eating habits (1 of 3 points minimum); and (c) a score given to sleep hygiene habits (1 of 4 points minimum). During a five-week period (Monday through Saturday), the participant had to perform all the tasks, but only during a two-week period was money earned or lost. A total of 72 tasks had a monetary value of $0.69 USD for each task, and if the participant did not perform the task or did not perform the task correctly, that person lost money. If the participants did not send the researchers their daily records each day before 11 p.m., they lost the money for all of the tasks completed that day.

A question presented by Cooper et al. (2007) arises here:

How do contracts work? Several principles, procedures, and factors are likely to apply. Certainly reinforcement is involved, but not in as simple or direct a fashion
as it might seem at first. Rule governed behavior is probably involved (Malott, 1989; Malott & Garcia, 1991; Skinner, 1969). (p. 551)

Another definition of behavioral contract was written by Malott (2008):

“Performance contract (behavioral contract or contingency contract)—A written rule statement describing the desired or undesired behavior, the occasion when the behavior should or should not occur, and the added outcome for that behavior” (p. 395).

Wysocki, Hall, Iwata, and Riordan (1979) conducted a study related to the practice of physical activity. They used behavioral contracting to encourage physical exercise among college students. Subjects deposited items of personal value with the experimenters, which they could earn back with fulfillment of two types of contract contingencies. Subjects selected weekly aerobic point criteria, which they could fulfill by exercising in the presence of other subjects. In addition, participants contracted to observe and record the exercise of other subjects and to perform an independent reliability observation once each week, with both of these activities monitored by the experimenters. Results indicated that the contract contingencies produced increases in the number of aerobic points earned per week for seven of eight subjects. The aerobic point system possessed several advantages as a dependent variable for behavioral research on exercise, and inexperienced observers could be quickly trained to observe exercise behavior and to translate those observations into their aerobic point equivalents.

A similar study developed by Mann (1972) found that items considered valuable by the subject could be used successfully to modify one’s habits when used procedurally, both as reinforcing and punishing consequences. A systematic analysis of the
contingencies indicated that aversive consequences presumably were a necessary component of the treatment procedure.

Ethical concerns always arise around the concept of punishment. However, behavioral designs developed with appropriate ethical considerations being taken (e.g., thinking in the best interest of participants) must continue to be studied. This is one of the main goals of the present study.

**Rule-Governed Behavior**

The concept of rule-governed behavior was fundamental for the development of the present program of habit control. Without a clear statement of rules, it might be impossible to accomplish the goals to improve habits. The importance of the behavioral contract and rules were a keystone of the present study.

Rule-governed behavior can function as a strategy to ethically protect people from getting involved in inappropriate behaviors. Malott (2008) defined this concept as “a behavior under the control of a rule.” He distinguished rule control from contingency control, which is “the control of behavior by a contingency without the involvement of rules” (p. 364).

As was stated before, a clear statement of rules was a fundamental part of this program. Rules need a clear statement of deadlines in order to be useful. Malott (2008) described the effects produced by the addition of a deadline to contingencies: “Putting a deadline into the contingency changes it from an analog of a discriminated reinforcement contingency to an analog of a discriminated avoidance contingency” (p. 365). In a previous section, it was mentioned that the avoidance of loss contingencies would be crucial during this program.
In order to control habits, rules and deadlines are needed, as frequently the outcomes do not come immediately after a response. These are indirect contingencies.

“Direct acting contingencies [are] contingencies with outcomes that follow the response by less than 60 seconds, usually much less; whereas indirect-acting contingencies have outcomes that follow the response by more than 60 seconds, usually much more” (Malott, 2008, p. 366).

Malott (2008) wrote, “If a contingency is indirect acting, what is controlling the behavior more directly? The statement of a rule is describing that contingency. Wherever you have an effective indirect-acting contingency, you have rule-governed behavior” (p. 367). A more detailed explanation of indirect contingencies is required to understand the importance of those in the control of daily habits; the concept of an “analog” will clarify this theoretical approach.

Analog: two procedures are analogous when they are alike in some ways and not in other important ways. For example, suppose a response occurs; then immediately afterward, a reinforcer follows, and that’s reinforcement. Now here’s an analog; it’s like reinforcement in some ways but not in others: A response occurs, and one day later a reinforcer follows; and that response increases in frequency as a result; that’s not reinforcement, even though the response increased in frequency. Both the procedure and the results of this analog look much like reinforcement, but not quite—1-day delay between the response and the reinforcer is too great for this to be reinforcement. (Malott, 2008, p. 368)

At the end, what were used in this program are analogs of avoidance of loss of reinforcer contingencies, with a clear deadline set. For example, “I will lose $0.46 USD
tonight, if I do not exercise 20 minutes before 11 p.m.” Malott (2008) wrote that “rule-governed analog to a behavioral contingency [is] a change in the frequency of a response because of a rule describing the contingency” (p. 368).

At this stage, the type of contingencies needed for this program have been mentioned. As well, the importance of behavioral contracting and how this is integrated by the clear statement of rules has also been discussed. Therefore, rule-governed behavior is a key cornerstone for this study. In order to have success in the control of habits, it is necessary to understand “goal setting.” Individuals often need a point of reference, clear goals to reach, and feedback on how well they are performing the specific behaviors. Feedback is the method that was used to provide information about the characteristics of one’s performance within this study. “Feedback may have multiple effects, increasing one aspect of performance and deceasing another. Feedback may also have no effect on future responding whatsoever” (Cooper et al., 2007, p. 263).

**Goal Setting and Feedback**

In order to improve one’s quality of health through the control of habits, it is necessary to have clear goals related to the correct performance of specific behaviors.

Cooper et al. (2007) stated, “Behavior analysts can better help clients achieve their goals by selecting target behaviors that are the most directly and functionally related to those goals” (p. 61). In this case, the goal was to improve an individual’s quality of health. “Behavior analysis efforts that not only target important behaviors but also change those behaviors to an extent that a person’s life is changed in a positive and meaningful way, are said to have social validity” (Cooper et al., 2007, p. 69). Social validity is a different factor that was analyzed in this program. A final goal of this study is to know if
the program was socially acceptable for the participants. Details about the concept of social validity will be presented in a following section.

The goal of this program was to improve the participants’ quality of health through the control of daily physical activity, eating, and sleeping habits. A gradual achievement of goals was required from the participants. For example, at the beginning of the study, participants were required to do a minimum of 20 minutes of any preferred physical activity. This specific goal was set in accordance with the recommendations of the physical activity guidelines presented in an earlier section. Cooper et al. (2007) wrote that “regardless of the method used, specifying treatment goals before intervention begins provides a guideline for continuing or terminating a treatment. Further, setting objective, predetermined goals help to eliminate disagreements or biases among those involved in evaluating a program’s effectiveness” (p. 69). A strong effort has been made to ensure that the goals required from participants were ethically correct and in the best interest of participants. Detailed goals of performance during the program will be presented in the methodology section.

Now it is appropriate to discuss how people know if their performance is correct or incorrect while they are in the pursuit of those goals. People require feedback that consists of the “information a person receives about a particular aspect of his or her behavior following its completion” (Cooper et al., 2007, p. 262).

Malott (2008) wrote that feedback is “nonverbal stimuli or verbal statements contingent on past behavior that can guide future behavior” (p. 379). The intention within this program was to provide valuable feedback in order to change, maintain, or improve
the performance of different behaviors related with daily habits that impact one’s quality of health.

Feedback is most often provided in the form of verbal descriptions of performance, but it can also be provided by other means such as vibration or lights (Greene, Bailey, & Barber, 1981). Because feedback is a consequence that often results in the increased future frequency of behavior, it sometimes leads to the faulty assumption that reinforcement must involve feedback or that reinforcement is just a behaviorist’s term for feedback. (Cooper et al., 2007, pp. 261-262)

For instance, during this program, participants received feedback through mobile phone messages, which are visual stimuli.

It is important to distinguish between reinforcement and feedback. Reinforcement always increases the future frequency of responding. Feedback may result in an increase in the future frequency of the student’s performance as a reinforcement effect and/or a prompt or instruction on how to respond next time. . . . Feedback may also result in a reduction in the frequency of some aspect of the learner’s performance as a function of punishment or instruction. (Cooper et al., 2007, p. 263)

Feedback provided during this program was expected to reinforce appropriate performance of specific behaviors, but not inappropriate behaviors. On the contrary, inappropriate behaviors were contingent on the loss of money. Then, participants learned which specific behaviors were reinforced and which were not. This, in turn, would strengthen the rules described in the behavioral contract.
Wack (2012) conducted a specific study providing feedback in order to improve running performance of participants looking to increase distance. Electronic meetings were found to be just as effective, and far more convenient, than in-person meetings for some participants in gaining their feedback. One of the principal reasons for individuals to not get involved in an exercise program or even to attend a regular follow-up meeting with a physician is the lack of available free time. The use of technology, like videoconferencing or text messages, has the potential to solve this problem. eHealth technology allowed the researcher to provide feedback during this program.

In this section, the concept and importance of goal setting were explained. Goals, like time and distance while performing exercise, need to start at a low point and be increased gradually and slowly. The goal of interventions attempting to improve the quality of health is to have them endure for a long time; therefore, fast achievement of impressive results must not be the main goal. People need to train themselves in self-management and impulsivity control, not only while eating or exercising, but also during any sort of intervention related with health improvement. At the end, one of the goals of this research was to train participants to observe and control their own behaviors. This is where the importance of frequent and beneficial feedback resides.

Health improvement will always be a good goal for any behavioral intervention. However, interventions need to be designed with the best interest of the participants in mind. After all, it is they who will judge the value of the intervention. This judgment is called social validity.
Social Validity

Many of the intervention programs that seek to improve the quality of health would likely be accepted by society. However, not all the interventions or the procedures used are socially acceptable. Malott (2008) defined social validity as “the goals, procedures, and results of an intervention [that] are socially acceptable to the client, the behavior analyst, and society” (p. 79).

Poling, Methot, and LeSage (1995) presented a similar definition citing other authors. “Behavior analysts use the term social validation to refer to methods of determining the social significance of the goals, appropriateness of the procedures, and social importance of the results of an intervention (Kazdin, 1977; Wolf, 1978)” (p. 45). Geller (1991, as cited in Poling et al., 1995) presents the importance of the significance of goals, appropriateness of procedures, and importance of outcomes.

A socially significant goal represents a deficit in functioning as society views it (e.g., a lack of appropriate social skills). An appropriate procedure is one that produces minimal adverse effect (a drug reduces aggressive behavior without producing gross sedation). A socially important outcome is one that enhances subjects’ functioning in their environment (e.g., a disabled person becomes competent in the use of public transportation). (pp. 45-46)

Kazdin (1977) described the two methods suggested to accomplish social validation: subjective evaluation and social comparison.

Social validation may be accomplished by subjective evaluation or social comparison. . . . With subjective evaluation method, the goals, procedures, and outcomes of an intervention are evaluated by the subject, people who interact with
the subject on a regular basis (e.g., parents, teachers), or experts in an area relevant to the subject’s problem. With the social comparison method, the behavior of a subject before and after treatment is compared to the behavior of “normal” peers . . . an intervention that brings a subject’s behavior within the range of his or her peers’ behavior would constitute a socially important effect, because the subject’s behavior after treatment would be indistinguishable from that of normal peers. (Poling et al., 1995, p. 46)

For example, the present program has been designed with the goal of improving individuals’ quality of health. In this case, the participants were provided their subjective evaluation through a survey every week during the five weeks of the program. At the end of the program, the participants’ performances were compared with the previously stated public recommendations of health improvement (i.e., physical activity, eating, and sleeping habits recommendations). If the participants followed those recommendations and maintained their performance, then the program should be socially valid. This program is susceptible to comparison with other treatments methods, and participant performance consequently has been compared with normal peers (i.e., healthy people) as studied in other research.

Cooper et al. (2007) cited Van Houten (1979): “Two basic approaches . . . determine socially valid goals: (a) [assessing] the performance of people judged to be highly competent, and (b) experimentally [manipulating] different levels of performance to determine empirically which produces optimal results” (p. 69).

After describing the concept of social validity, it is clear that the final goal of this program was to improve participants’ quality of health. Nevertheless, individuals must
learn how to take care of their health correctly and their performance of physical activity, eating, and sleeping habits can prevent the development of chronic illness. Hence, individuals need to learn how to monitor and manage their daily behaviors.

**Self-Monitoring and Self-Management**

The concepts of goal setting and feedback were analyzed earlier. Now presented are the final two fundamental concepts for the design of this study, self-monitoring and self-management. This will be the final strategy necessary to achieve the lasting results after this program has been completed.

Cooper et al. (2007) explained:

A person should begin self-monitoring as soon as he has defined the target behavior. Self-monitoring makes a person observant of events occurring before and after the target behavior, information about antecedent-behavior consequent correlations that may be helpful in designing an effective intervention. (p. 607)

For example, studies described previously had asked people to monitor different behaviors. For the purposes of the present program, participants monitored three target habits (i.e., physical activity, eating, and sleep habits), which further included monitoring specific behaviors and their characteristics: physical activity (e.g., types, rate, intensity), eating (e.g., rate, speed, quantity), and sleep hygiene recommendations (e.g., stimulus related, frequency) per day. Details on these habits will be further discussed in the following sections; however, they are presented here as a reference for the theoretical conceptualization.

“Self-monitored baseline data provide valuable guidance in determining initial performance criteria for self-administered consequences” (Cooper et al., 2007, p. 607). In
other words, with the information obtained from the self-monitoring procedure at the beginning of a procedure, participants can make changes during future phases of an experiment or treatment. “Self-monitored baseline data provide an objective basis for evaluating the effects of any subsequent interventions” (Cooper et al., 2007, p. 607).

During this program, participants had to register data in a Microsoft Excel® tool. It was predicted that this practice would affect their performance due to the awareness created of their daily behaviors. Therefore, “another reason to begin self-monitoring as soon as possible without employing additional self-management tactics is that the desired improvement in behavior may be achieved by self-monitoring alone” (Cooper et al., 2007, p. 607).

When behavior analysts attempt to present an intervention in order to change a specific behavior, they frequently have to work around competing natural contingencies. For instance, a person who wants to exercise one hour per day may experience a slight increment of health for doing this exercise. And since this is a very small, delayed outcome, it often does not matter how critical the outcome can be, because there are other contingencies currently competing. This person may prefer not to do the exercise because in the past exercising for one hour produced the experience of muscle pain or fatigue. The aversive stimulus of pain or fatigue is competing with the performance of exercise.

“When self-monitoring alone does not result in the desired behavior changes, the next step is designing a contrived contingency to compete with the ineffective natural contingencies” (Cooper et al., 2007, p. 607). In the previous example, the ineffective natural contingency is, “I have a slight increment of health for exercising one hour” and this competes with a natural contingency, “If I exercise for one hour, I will experience
pain or fatigue.” The current program used a strategy designed by Malott (2008) to handle these ineffective natural contingencies through the use of “the three-contingency model of performance management” (p. 405).

The first step in self-management is identifying a clear personal goal or objective. “A self-management program begins with identifying a personal goal or objective and the specific behavior changes necessary to accomplish that goal or objective” (Cooper et al., 2007, p. 607). For example, if a person would like to improve his or her health, exercising for one hour per day is a good idea. The next step is to identify specific behaviors (e.g., choosing between walking outside or on a treadmill) that will facilitate accomplishing this goal.

In this example, it was stated that the final result could be a slight increment in health. In other words, this outcome may be deemed too small to be worth risking possible pain or fatigue, even though it is a worthy goal. Previously it was believed that the reason for performance management activity failures was because of delayed outcomes. However, as Malott (2008) pointed out, “The mythical cause of poor self-management . . . occurs because immediate outcomes control our behavior better than delayed outcomes do” (p. 397).

Malott (2008) explained the need for rules, and specifically those that are easy to follow. In order to have control and better performance of one’s behavior and to achieve the desirable behavior change, reasonable rules need to be in place.

Rules that are easy to follow—Describe outcomes that are both sizable and probable. The delay isn’t crucial . . . and rules that are hard to follow . . . [are]
outcomes that are either too small (though often of cumulative significance) or too improbable. The delay isn’t crucial. (Malott, 2008, p. 400)

For Malott, the real cause of poor self-management is that the results are either too small or too improbable. Since humans have verbal behavior and can follow rules, the delay is not crucial as it is for animals. However, individuals need to be able to understand these rules, so they must be stated in a clear way and describe sizable and probable outcomes.

Malott (2008) asked the following question: “When do we need performance management? We need performance management when natural contingencies do not effectively support the appropriate behavior” (p. 402). Recalling the example of exercising for one hour, the natural contingency describing a slight increment on one’s health does not provide a sizable outcome, or perhaps the outcome is too small to control one’s behavior. But if a clear rule was stated and described a more sizable and probable outcome, the behavior would be expected to change. For this purpose, Malott described the following model, which was the basis for the feedback procedure provided within this program.

**The Three-Contingency Model of Performance Management**

Malott (2008) defined the three-contingency model of performance management as “the ineffective natural contingency; the effective, indirect-acting performance-management contingency; and the effective, direct-acting contingency (theoretical contingency)” (p. 405). He explained that “natural contingencies are the automatic, built-in (intrinsic), non-programmed contingencies, not the added (extrinsic), programmed ones” (p. 402). For instance, exercise for one hour produces a slight increment in health.

Malott also asked the following question:
How do we manage the performance of verbal clients? Often we add indirect-acting contingencies to the ineffective natural contingencies. In other words, we supplement rules that are hard to follow by adding rules that are easy to follow [of course, sometimes we add or remove direct-acting contingencies]. (p. 403)

Following the exercise example from before, if someone exercises for one hour today, he or she will be able to go to the movies tonight.

Malott (2008) also asked, “Why do rules stating or implying deadlines work? Stating such rules causes noncompliance to become a sufficiently aversive condition that escape from that aversive condition reinforces compliance” (p. 403). The individual who exercises for one hour today before 6 p.m. will be able to go to the movies at 8 p.m. This contingency could have been created by a behavior manager or by the same individual. Either way, the goal is the same: produce the behavior of exercising for one hour.

In Malott’s three-contingency model of performance management, “you don’t need the third contingency when the performance-management contingency is direct acting . . . the aversive before condition in the third contingency is a conditional aversive condition: approaching the deadline and not having made the response” (p. 405). In other words, the same person may experience anxiety for not being able to go to the movies tonight. Then, if he or she exercises for one hour, the experience of anxiety would no longer be present. The effect is immediate, so is a direct-acting contingency.

Malott (2008) described the “analog to avoidance principle—if an indirect-acting contingency is to increase or maintain performance, it should be an analog to avoidance . . . deadline principle—if an indirect-acting contingency is to increase or maintain performance, it should involve a deadline” (p. 413). For example, the same person now
has a clear rule that says that he or she will lose the opportunity to go to the movies tonight if he or she does not exercise for one hour before the deadline of 6 p.m.

With this last example, both the literature review and the section of behavioral concepts related to the current program are concluded.

As a summary of the literature review and as a preview for the present study, this program of improvement of physical activity, eating, and sleeping habits consists of the use of a behavioral contract. This contract was signed by both the researcher and the participant and included clear and mutually agreed-upon goals that gradually increased the participant’s performance. These goals were based on public recommendations of physical activity, eating, and sleep habits, as previously described and that have been evaluated in the multiple studies presented during this literature review. eHealth technology was used to train people in the different characteristics of the program, to achieve self-monitoring of the participant, and to establish communication with the researchers. The three-contingency model of performance management was used to address difficult behaviors and to provide daily feedback and support to participants. It was expected that participants would modify their habits through the direct assessment and manipulation of the related behaviors. A social validity procedure was used with the objective to evaluate if it is a good tool for people in the quest of health improvement. Finally, the experimental question was: What effect will money (i.e., independent variable) being used as a reward have on participants’ performance during the program? Will it motivate them to engage appropriately in the specific behaviors related with physical activity, eating, and sleeping habits (i.e., dependent variables)?
All the behavioral interventions that were used in this study have been evaluated in previous research. They are also based on health promotion recommendations made by federal health institutions such as the National Institutes of Health and the U.S. Department of Health and Human Services (Butte, Ekelund & Westerterp, 2012; Daniels et al., 2005; De Luca & Holborn, 1992; Donaldson & Normand, 2009; Franklin et al., 2006; Hustyi, Normand, & Larson, 2011; Hustyi, Normand, Larson, & Morley, 2012; Krebs et al., 2007; Krebs et al., 2010; Liu et al., 2013; Loro et al., 1979; Mann, 1972; Napolitano et al., 2003; National Heart, Lung, and Blood Institute, 2012; Noble, Stead, Jones, McDermott, & McVie, 2007; Norman et al., 2007; Normand, 2008; Oenema, Tan, & Brug, 2005; Ogden et al., 2012; Palmer, Graham, & Elliott, 2005; Papadaki & Scott, 2005; Pinto et al., 2012; Rovniak, Hovell, Wojcik, Winett, & Martinez-Donate, 2005; Shneerson, 2005; Stevens, Glasgow, Toobert, Karanja, & Smith, 2002; Stock & Milan, 1993; U.S. Department of Health and Human Services, 2008, 2012, 2014; Van Camp & Hayes, 2012; VanWormer, 2004; Verheijden et al., 2004; Wack, 2012; Washington, Banna, & Gibson, 2014; Winett, Moore, & Anderson, 1991; Wooley, Wooley, & Dyrenforth, 1979; WHO, 2002, 2003a, 2010, 2012, 2015a, 2015b; Wysocki et al., 1979; Yoo, Hwang, Lee, & Kim, 2003).

As can be seen, several details about the program have been already presented. Those details have been stated as examples during the previous literature review, which was necessary because of the length, complexity, and social importance of the health topics discussed thus far. Nevertheless, now it is time to present and explain the detailed methodology of the present study and the detailed tasks that were required to be performed by the participants.
METHODS

Subject Recruitment

As this is applied behavioral research, it is possible to demonstrate experimental control with a small number of participants and by using a multiple baseline design. Fourteen adult participants were recruited, but only 10 completed all phases of this experiment.

The inclusionary criteria for subjects included: 18–99 years; any gender; Spanish-speaking, Mexican citizens; and individuals who do not have any physical health or mobility restrictions that would prohibit them from engaging in moderate physical activity. Individuals who have been recommended to begin a physical activity regimen by a physician were encouraged to participate.

A central exclusion criterion for subjects was any individual diagnosed with an eating disorder or who has a medical restriction on exercise. This exclusion was put in place to avoid adverse side effects of physical activity. Another exclusion was any person who has an academic, professional, or close relationship with the researchers so as to limit the potential for multiple relationships, conflicts of interest, and coercion. If these conflicts occurred, they could negatively influence data collection and results.

Participants were recruited through an online flyer (Appendix F), which was published on the web page and Facebook group of the Mexican organization “Instituto Unisahm” (owned by the student investigator). Using only the social network group, https://www.facebook.com/pages/Instituto-UNISAHM/224285284257957, recruited
participants were Spanish language speakers and Mexican citizens currently residing in Mexico.

The justification to perform the recruitment process in this manner was that this study’s student investigator provided feedback to the participants in Spanish. Although his English language skills are sufficient to accomplish this task, in order to avoid any language miscommunications through text messages (e.g., colloquial terminology), Spanish was used exclusively to facilitate clear communication with the Spanish-speaking participants.

The justification to recruit only Mexican citizens currently residing in Mexico is that the student investigator has the credentials to identify and provide medical advice or referral to these individuals. In the case that it may be necessary for a participant to have access to these referrals, the student investigator would be able to comply ethically. The student investigator does not have the legal authorization to medically refer within the United States.

The procedures for recruitment were the same for each individual. All materials were translated into both English and Spanish versions in order to promote a collaborative effort between all investigators. A complete recruitment script and flyer can be found in Appendix F.

The participants accessed the Survey Monkey® electronic platform where they found the informed consent document and the behavioral contract (Appendix A). They were able to sign the informed consent document electronically.

An educational introductory survey including videos was available online to supplement the potential participants’ learning (Appendices B and C).
Potential participants were able to contact the investigator(s) by email or phone if they had any additional questions. Contact information was provided in the recruitment flyer and on the Survey Monkey® tool. Communication between the researchers and potential participants was made only through official Western Michigan University email addresses or phone. No communication was conducted through Facebook. The investigator responded to individuals expressing interest in the study by providing answers in a private and confidential manner. Individual questions and answers were never displayed publicly.

The stated inclusionary criteria was to accept any consenting adults of any gender who wanted to improve their health habits, and these individuals had to be Spanish-speaking Mexican citizens. Exclusion criteria included non-Spanish speakers, non-Mexican citizens, and those who had a diagnosis of an eating disorder or physical activity restrictions. As this program has not been tested yet among that population, these exclusion criteria are justified. Although these excluded individuals might have benefited, this area needs further research and requires a different experimental control due to the possibility of interference with their previously established treatments.

Finally, when participants completed the informed consent document, they were required to acknowledge if they have or might have a prior diagnosis of an eating disorder or a medical condition that would exclude their participation in this study. If an individual was excluded due to any of these conditions, the survey tool provided them with the contact information of the “Instituto Unisahm” where they were able to request a medical referral. Excluded individuals, at no cost to them, could obtain information for a
recommended specialist close to the individual’s location. It was not necessary to complete any referrals since no potential participants were excluded.

**Research Procedures**

**Phases of the Study**

The study consisted of two different phases presented to each participant using a multiple baseline design. In this design, the independent variable (i.e., money) was presented and withdrawn at the end of each phase, with a delay of one week for both the experimental and the control groups.

**Randomized Assignment of Group Procedure**

When a participant completed the initial tools (Appendices A and B), he or she was randomly assigned to a group by the student investigator flipping a coin—a quarter—to ensure equal assignment. Once the first participant was recruited and randomly assigned to a group, the second recruited participant was immediately assigned to the opposite group to ensure equal numbers. This procedure continued until both groups were completed with seven participants in each group. However, because four participants abandoned the study during the first two weeks of the program, at the end, one group had six participants and the other group had four participants.

The first experimental group was called the “ABBAA group.” In this group, the money incentive intervention was introduced during the second week of the study. The second experimental group was called the “AABBA group.” For this group, the money incentive intervention was presented during the third week of the study.
Retrospective Data (Before Phase)

Using the educational tool found in Appendix B, participants were asked about their previous or current behavior performance (i.e., physical activity, eating, and sleeping habits) without our intervention. Each participant received an explanation of the minimum requirements of the program, such as walking 20 minutes per day (included in their daily activities), 1–5 push-ups and 1–5 sit-ups per day, and 1 point per day in both eating and sleeping habits scales. Also, each participant received an explanation about how the increment of increased physical activity was the decision of the participant, but that no more than 25% per week was encouraged. These retrospective data were collected in order to differentiate one’s previous performance from their “Phase A” performance, as it was expected that simply beginning to record performance may affect its frequency.

Phase A (Baseline and Follow-up)

Phase A consists of baseline and follow-up phases. At the beginning of the study, each participant started recording all of his or her activities using an Microsoft Excel® sheet tool (Appendix G), designed and sent by email to each participant after completing the educational survey tool. Then, the participant had to send daily an electronic photo of the tool to the student investigator; participants received feedback daily using that photo. Feedback consisted of using the three-contingency model of performance management, asking the participant about his or her daily performance and the difficulties faced while accomplishing the requested tasks, and identifying the competing natural contingencies involved. The structure of the feedback can be found in the Appendix H (script for text messages feedback). No money was paid for accomplishing activities during this phase. Likewise, during the follow-up phase (following the intervention weeks), money was not
contingent on the performance of tasks. For definition purposes, the final weeks for each group were called “follow-up,” but they entailed the same procedures as the beginning baseline weeks.

The start of this phase was different for each group. The ABBAA group had one “baseline” week at the beginning, and two “follow-up” weeks at the end of the study, for a total of three “A” weeks (i.e., ABBAA). The AABBA group had two “baseline” weeks at the beginning, and only one “follow-up” week at the end of the study, again for a total of three “A” weeks (i.e., AABBA).

**Phase B (Intervention)**

For both groups, the intervention phases lasted for two weeks, and only during these weeks was money contingent on the performance of tasks.

The ABBAA group started the money intervention during the second week of the study, and the AABBA group began the money intervention during the third week.

**General Activities**

The general activities within this program took place in the following order.

Participants agreed to an online informed consent document in the Survey Monkey® platform, which also included the behavioral contract. The behavioral contract explained in detail all the tasks required of the participant and all the general characteristics of the program (Appendix A). If participants had additional questions, they could exit the tool at any time and contact the investigators.

After signing the informed consent document and behavioral contract, the participant answered an online educational survey with instructional videos (Appendices B and C), also found in the Survey Monkey® platform. Once completed, the participant
received the Microsoft Excel® sheet tool (Appendix G) by email. This step was designed with the intention to ensure thorough understanding by the participant of all the procedures and tasks within the program.

The participant used the Excel tool to register his or her participation in daily activities and to track the photo submissions each day. Photos were of any preferred tracking device for the physical activity that the participants chose, which they had to submit to the investigators before 11 p.m. every night. Participants could find these free tracking devices online, which assisted in data collection fidelity (e.g., photo of the number of steps taken as captured by pedometer).

With the photos, the student investigator provided feedback to the participant using mobile phone text messages. This feedback was provided using the three-contingency model of performance management, and it had the intention to support the participant in the achievement of the required tasks.

At the end of the first and last week of the program, the participants completed an online social validity survey on the Survey Monkey® platform (Appendix E).

**Researchers Function as Behavior Managers**

The researchers functioned as behaviors managers, with the following functions. First, they needed to protect the participant from risky behaviors, such as overtraining or dietary restrictions that were overly strict. The strategy designed to achieve this behavior management goal was to require proof of performance from the participant using any preferred tracking devices. This was done via the daily photo submission.

A second strategy designed to protect the participant was that each was required to record his or her daily activities in a Microsoft Excel® sheet (Appendix G). Every
night at 10 p.m. the investigator sent a text message to the participants reminding them about the 11 p.m. deadline for photo submission. The Microsoft Excel® tool provided graphics that were designed to show accurate behavior changes. With this tool the investigator were able to observe any dramatic performance changes. This tool was also designed to alert the participants and investigators if the physical activity increased by more than 25% per week, for safety concerns. If this alert was triggered, the investigator intervened appropriately.

The last point leads to the final strategy for protection of the participants, which consisted of the investigator providing daily feedback using mobile phone text messages. Feedback was provided within the 12 hours after receiving the participant’s photos. The phone number of each participant was stored in the investigator’s secure mobile phone under a pseudonym chosen by the participant. The investigator’s phone had a passcode to protect the contact information. Only the investigator had access to the phone and to the passcode.

The final function of the researchers as behavior managers was that they delivered the money earned by each participant. The monetary amount earned was updated daily with the data registered in the Excel tool by the participant themselves. At the end of the program, the participants sent an email to the researchers with the fully completed Excel tool.

Money was delivered after the fifth week of the program by each participant’s preferred option (i.e., electronic transfer or cash). The investigators then contacted all the participants six months after program completion to follow up on the status of their implementation of techniques learned in the program.
Money Contingencies

During this program, each participant could earn up to $50 USD. Money was provided by the investigators and could be earned for accomplishing the different tasks required within the program. Money could be earned or lost only during two weeks of the total five weeks of the program, which were designated as intervention phases. A total of 72 tasks were required during the intervention weeks. Each task was valued at $0.69 USD. The Microsoft Excel® sheet tool, which was completed by the participant daily, provided automatic feedback about the money each person earned or lost each day.

All the tasks were explained in detail prior to participant engagement and were referenced in the informed consent document, the behavioral contract, or educational videos (Appendices A, B, and C), as needed. By agreeing to take part in the study, participants earned $50 USD. For each unaccomplished task, participants lost the specified amount of $0.69 USD. The idea was that participants would engage in the requested tasks in order to prevent the loss of money. The independent variable was the money and the dependent variables were the behaviors related to the habits of physical activity (e.g., eating and sleeping).

Instrumentation

The instruments that were used included:

- Informed consent document and behavioral contract. Both were available to be electronically signed on the Survey Monkey® platform (Appendix A).

• Online educational videos available on the Survey Monkey® platform. (Scripts of the four videos can be found in Appendix D.)

• Social validity survey, available on the Survey Monkey® platform (Appendix E).

• Microsoft Excel® sheet tool (Appendix G).

• Script for text messages feedback (Appendix H).

**Records and Specific Tasks Activities**

The participants completed a daily Microsoft Excel® Spreadsheet (Appendix G), which was designed to record their physical health related or “target behavior” activities (dependent variables). The following list provides the operational definitions of physical activity and each exercise, with the requested parameters for each of those activities:

• Records – Record of all the target behavior activities during the day.

• Physical activity – Any physical activity the participants added to their daily routine (e.g., walking to work or school, running, exercise classes, etc.) that lasted at least 20 minutes per day (the goal was to maintain a total of 150 minutes/week). In the Microsoft Excel® sheet tool, participants tracked whether or not they performed any physical activity that day, and if so, the total minutes of activity.

• Push-ups and sit-ups – Starting with a small number of repetitions (e.g., one per day), participants were to slightly increase their participation in these
activities weekly. Participation should not increase by more than 25% per week. A push-up is defined as a “physical exercise performed by lying with your face down and using only your arms to raise and lower your body” (“Push-up,” 2015). Sit-up is defined as “an exercise that strengthens your stomach muscles in which you lie down and lift yourself into a sitting position without using your arms” (“Sit-up,” 2015). Push-ups and sit-ups were chosen in order to exercise the upper regions of the body, while walking and running were chosen to exercise the lower region. In the Excel tool, participants tracked if they performed push-ups and sit-ups, and the total numbers of these per day.

- **Eating habits** – Using a 3-point scale, participants tracked their eating habits. The scale was made up of a rating system that included three recommendations: (a) eating slowly, (b) eating 5 times per day, and (c) not eating double servings at any meal. A participant could earn 1 point for each recommendation established on the scale, but only if the recommendation was accomplished during all that day. A maximum of 3 points could be earned for the eating scale; each participant was requested to have at least 1 point per day in order to count this task as accomplished and earn the corresponding money for this task. In the Excel tool, participants tracked if they followed these rules and scored themselves each day.

- **Sleep hygiene habits** – Using a 4-point scale, individuals tracked their sleep hygiene habits. The scale consisted of the following four recommendations: (a) control the environment (e.g., light, noise, temperature of bedroom);
(b) control eating and drinking during a specific period of time before going to bed (e.g., caffeine, other stimulants, full meals); (c) avoid physiologically arousing or stressful activities before bedtime (e.g., exercising, studying); and (d) avoid inappropriate activities inside the bedroom (sleep and sex are the only recommended activities). A participant could earn 1 point for each recommendation established on the scale, but only if the recommendation was accomplished during the previous night. A maximum of 4 points could be earned for the sleeping scale; each participant was requested to have at least 1 point per day in order to count this task as accomplished and earn the corresponding money for this task. Participants tracked if they engaged in these recommended habits and scored themselves daily.

**Location of Data Collection**

Participants were recruited only from Mexico, as has been described in the recruitment section. There are two language versions of all the tools in the Appendices; the English version is presented in order to facilitate the evaluation of the present dissertation from the different authorities of Western Michigan University (i.e., Human Subjects Institutional Review Board, dissertation committee members).

Each participant completed the program in his or her own locations, such as at home, a fitness center, or school. Participants were encouraged to engage in the recommended physical activity as a part of their everyday routine. For example, if the participant walked to his or her workplace and avoided elevators during the day for at least 20 minutes, this could fulfill the daily physical activity requirement. This program aimed to be flexible and user-friendly, with most aspects depending on time management
instead of drastic lifestyle changes. This is why this program was designed to improve habits. As well, the technology component allowed the participant to establish contact with the investigators when necessary, making support easily accessible.

**Duration of the Study**

The program had a total duration of five weeks. It is possible to observe physiological changes like weight control or reduction within a five-week period, and as drastic changes are not desired or expected, this time frame is appropriate. One of the goals of this program was to teach participants to control their habits in the long term; therefore, a six-month follow-up will be conducted with all participants after finishing the program. Participants will be contacted via text messages and asked if they are continuing to implement these techniques on their own, and if so, if they are willing to share their results.

**Methodology**

**Design**

The design of this study consisted of a multiple baseline experimental design, in which each participant was exposed to a single independent variable (i.e., money). Participants were recruited and randomly assigned to two different groups. For the first group, the initial baseline lasted for one week. For the second group, the initial baseline lasted for two weeks, after which each participant in both groups was exposed to the independent variable during the next two weeks. Money was lost only during these two phase B weeks when the participant did not accomplish the required tasks. The independent variable was then withdrawn and the remaining weeks were used for a follow-up of the participants until five weeks of the program were completed.
Independent Variables

**Money contingency.** Money is the only true independent variable that was directly manipulated with the intention to produce effects on the dependent variables. The experimental design was structured around this single independent variable.

During the two weeks of intervention, there were a total of 72 tasks with a value of $0.69 USD per task. These tasks were required to be performed from Monday to Saturday. See previous sections for details on these tasks.

Goal setting and the amount of work (e.g., recording, sending photos, physical activity) also appear to be independent variables, but they were not directly manipulated with the intention to produce specific effects. They also remained constant during the entire experiment. The participants had the choice to increase their activity goals and depart from the minimum required, or they might maintain the minimum levels required. Increasing the amount of physical activity was encouraged, but it was not a requirement. When the minimum requirements were met, the activities were considered completed. For the scales (i.e., eating and sleeping), participants were required to do at least one activity per day and were encouraged to increase 1 point per week. Again, if they engaged in the minimum requirement, the activity was considered completed.

**Feedback.** It is true that the feedback procedure affected the performance of participants; however, it was always provided following the three-contingency model of performance management. It was not contingent on task completion. As well, supportive feedback was offered whenever the participant solicited it.

Therefore, money was the only true independent variable in this study. This is because the money intervention was presented and withdrawn using a multiple baseline
design with the intention to observe the effects produced on each participant’s behavior. If no clear effects were produced by the money contingencies, this could be explained by the structure of the design (i.e. feedback, goal setting). A detailed explanation of the results will be provided later.

**Dependent Variables**

**Physical activity.** The daily and weekly average of physical activity was recorded and analyzed. An average goal of 20 minutes per day or 150 minutes per week was determined as appropriate for this study based on World Health Organization standards. An increment of 25% each week was encouraged but not necessary, and higher increments were not recommended.

**Push-ups and sit-ups.** The daily and weekly average of push-ups and sit-ups were recorded and analyzed. A minimum of 1–5 was required for both exercises. An increment of 25% each week was encouraged but not necessary, and higher increments were not recommended.

**Eating habits scale scores.** The daily and weekly average of the eating habits scale were recorded and analyzed. A minimum average of 1 point per week was set as the beginning goal for this program. A maximum of 3 points per day could be earned on this scale and an increment of 1 point per week was encouraged.

**Sleep hygiene habits scale scores.** The daily and weekly averages of the sleep hygiene scale were recorded and analyzed. A minimum average of 1 point per week was set as the beginning goal for this program. A maximum of 4 points per day could be earned on this scale and an increment of 1 point per week was encouraged.
**Weight and waist circumference.** The participant weighed himself or herself at the same time daily and recorded results. There was no beginning goal set for this variable. A drastic decrease in weight was not encouraged, due to the short time frame of this study. A minimum decrease of weight was expected, with no increase in weight. At the beginning and end of the program, participants were encouraged to measure their waist circumference.
RESULTS

Fourteen adult participants, six women and eight men, were recruited at the beginning of the study. All of them were then randomly assigned to the two groups. After the first two weeks, four participants dropped out the program. One of them explained that because during the second week (of the ABBAA group) he started to lose money, he preferred to stop, explaining that his main objective was to earn money. In the AABBA group, a married couple (67 and 62 years old) decided to stop the program, mentioning that they were not familiar with the use of technology, but that they did not have any problem using the tools or procedures. They commented that they preferred to continue using the recommendations but outside the program. Money was not a motivation for them. They usually walked three times per week and were accomplishing the goal of 150 minutes per week of physical activity, but they did not want to do push-ups or sit-ups. Also, the wife was facing other health problems that interrupted their daily activities, which affected their performance, and ultimately might affect the results of the study. They preferred to discontinue. The last participant who discontinued the program stopped sending records during the second week. He later communicated with us that his work schedule did not allow him to continue.

In the end, 10 participants completed the program with 37.20 years of age being the average ($SD = 4.24$) between the five men and five women. Six participants in the group ABBAA and four participants in the group AABBA completed the group make-up.
Physical Activity

In the ABBAA group and using the retrospective data obtained from the educational survey (Appendix C), an average of 125 minutes ($SD = 72.04$) of physical activity per week was recorded. The AABBA group had a previous performance average of 230 minutes ($SD = 144$) of physical activity per week. Details for each participant can be observed in Table 1.

Table 1

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<th>1st Week</th>
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Note. ANOVA one-way test comparing the results of all participants before vs. 5 Week = $P$-Value (0.0061)
Considering these numbers, it appears the second group was more active than the first. However, the standard deviation shows that this is not quite correct. Participants 1 and 2 in the AABBA group engaged in a great deal of exercise per week (i.e., running and swimming). Details for all participants’ performances can be observed in Figure 1. The minutes of physical activity for almost all the participants increased as they started recording data, which continued during the five-week study.

Figure 1. Physical activity—individual performance.
One of the goals of this study was to evaluate the effects of the independent variable (i.e., money contingencies) on the performance of tasks, in this case, physical activity performance. It can be seen that money contingencies did not affect the performance, since it increased during all the phases in both groups. Details can be observed in Figure 2.

**Figure 2.** Physical activity—group performance.
The total average time for all the participants at the beginning of the study was 167 minutes \((SD = 113.14)\) of physical activity. After the fifth week, the total average time was 369 minutes \((SD = 172.21)\). Using an ANOVA one-way test, comparing the total time before with the total time in the fifth week, a \(p\)-value of 0.0061 was obtained. It can be concluded that the increased minutes of physical activity by the participants was statistically significant. Finally, it was possible to observe that at the end of the program all the participants exceeded the 150 minutes of physical activity recommended by the different health authorities.

**Push-ups and Sit-ups**

For the purposes of this program, push-ups and sit-ups were chosen as complementary exercises. The reason was to increase strength but to allow fat burn in the upper part of the body, considering the fact that waist measure is a predictive value for developing heart diseases. Participants could choose any preferred way to do the exercises. For instance, push-ups could be done placing the knees on the floor or standing up against a wall, and sit-ups could be done through different types of movements. Both exercises required abdominal muscle engagement, according to the definitions of both exercises presented earlier.

Participants had to start with a minimum number of 1–5 repetitions per day for each type of exercise, and they could choose to do them at any time of the day. Each participant set a personal goal of number of repetitions increment per week.

Using the educational survey tool, it was possible to assess the performance of all participants before the program; 70% did not do push-ups, and 60% did not do sit-ups. At the end of the fifth week, only one participant (#3 in the ABBAA group) continued not
doing both exercises. Details for each participant’s performance can be observed in Tables 2 and 3.

Table 2

Total Average of Push-ups per Week

<table>
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<tr>
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<th>Gender</th>
<th>Age</th>
<th>Before</th>
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<td>13.43</td>
<td>13.87</td>
<td>12.45</td>
<td>10.40</td>
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</tbody>
</table>

*Note.* ANOVA one-way test comparing the results of all participants before vs. 5 Week = *P*-Value (0.0046)
Table 3

*Total Average of Sit-ups per Week*

| Group | Participant | Gender | Age | Before | 1<sup>st</sup> Week | 2<sup>nd</sup> Week | 3<sup>rd</sup> Week | 4<sup>th</sup> Week | 5<sup>th</sup> Week | Total Average | Total SD |
|-------|-------------|--------|-----|--------|---------------------|-------------------|-------------------|-----------------|----------------|-----------|
| ABBAA | 1           | M      | 33  | 0      | 0                   | 4                 | 10                | 10              | 19             | 37.20     | 4.24     |
|       | 2           | M      | 31  | 0      | 16                  | 13                | 0                 | 41              | 30             | 10.80     | 17.47    |
|       | 3           | M      | 35  | 0      | 5                   | 2                 | 10                | 0               | 0              | 24.10     | 29.10    |
|       | 4           | F      | 40  | 15     | 10                  | 30                | 30                | 30              | 30             | 30.80     | 28.84    |
|       | 5           | F      | 36  | 50     | 25                  | 50                | 50                | 40              | 63             | 31.40     | 28.45    |
|       | 6           | F      | 42  | 0      | 10                  | 20                | 20                | 25              | 30             | 35.10     | 26.73    |
| AABBA | 1           | M      | 43  | 0      | 10                  | 15                | 21                | 27              | 33             | 39.20     | 27.00    |
|       | 2           | F      | 34  | 10     | 25                  | 34                | 32                | 33              | 40             | 38.75     | 36.75    |
|       | 3           | F      | 42  | 0      | 40                  | 40                | 41                | 45              | 47             | 47.25     | 48.50    |
|       | 4           | M      | 36  | 33     | 100                 | 100               | 100               | 100             | 100            | 51.25     | 51.25    |

Total Average ABBAA: 38.33, Total SD ABBAA: 4.17

Total Average AABBA: 38.75, Total SD AABBA: 4.43

*Note.* ANOVA one-way test comparing the results of all participants before vs. 5 Week = *P*-Value (0.0012)

At the beginning of the program, both types of exercises were initially accepted by the participants, but with some reservation. Many of them expressed that those exercises were difficult to engage in. Once the minimum number required was explained, and they understood that they could choose the physical form of the behavior, it was easy for almost all participants to engage in these tasks. Individual performance of sit-ups and push-ups can be observed in Figure 3.
Figure 3. Sit-ups and push-ups—individual performance.

One of the goals of this study was to evaluate the effects of the independent variable (i.e., money contingencies) over the performance of tasks, in this case, push-ups and sit-ups performance. It can be seen that money contingencies did not affect the
performance since it increased during all the phases in both groups. Details can be observed in Figure 4.

![SIT-UPS & PUSH-UPS](image)

Figure 4. Sit-ups and push-ups—group performance.

The total average of push-ups for all the participants at the beginning was 3.50 ($SD = 5.80$) repetitions. After the fifth week, the total average of push-up repetitions for all the participants was 17.40 ($SD = 12.29$). Using an ANOVA one-way test, comparing all the before results with the fifth-week results, a $p$-value of 0.0046 was obtained. It can
be concluded that the increment of push-up repetitions of the participants was statistically significant.

The total average of sit-ups for all the participants at the beginning was 10.80 ($SD = 17.40$) repetitions. After the fifth week, the total average of sit-up repetitions for all the participants was 39.20 ($SD = 27.00$). Using an ANOVA one-way test, comparing all the before results with the fifth-week results, a $p$-value of 0.0012 was obtained. It can be concluded that the increment of sit-up repetitions of the participants was statistically significant.

**Eating and Sleeping Habits**

For the purposes of this program, eating and sleeping habits were chosen as complementary variables of the performance of physical activity. The reason was to potentiate the effect of the program over the health quality of people, considering the fact that the three habits (e.g., physical activity, eating, and sleeping) have been associated with the risk of developing chronic diseases. Participants scored themselves following two different scales. The eating scale consisted of three recommendations: eating slowly, controlling the quantity of food per meal, and eating five times per day. Each one of these recommendations had a value of 1 point, for a total of 3 points per day. The sleeping scale consisted of four sleep hygiene recommendations: controlling the environment of sleep, avoiding stressful activities or situations close to bedtime, avoiding drinking or eating heavy meals close to bedtime, and not doing anything other than sleep or having sex inside the bedroom. Each one of these recommendations had a value of 1 point, for a total of 4 points per day. In order to accomplish the task, the participants were only
required to follow one of the recommendations per day, and were encouraged to increase at least 1 point per week.

The most difficult eating habit for the participants was eating slowly, followed by eating five times per day, and, finally, controlling the quantity of food per meal. Details can be observed in Table 4.

Table 4

*Total Average Eating Scores per Week*

<table>
<thead>
<tr>
<th>Group</th>
<th>Participant</th>
<th>Gender</th>
<th>Age</th>
<th>Total Average Eating Scores per Week</th>
</tr>
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<td></td>
<td></td>
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<td>Before</td>
</tr>
<tr>
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<td>6</td>
<td>F</td>
<td>42</td>
<td>0</td>
</tr>
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<td>M</td>
<td>43</td>
<td>0</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>4</td>
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<td>36</td>
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</tr>
</tbody>
</table>

Total Average 37.20 0.40 2.00 2.73 2.87 2.85 2.90
Total SD 4.24 0.52 0.77 0.34 0.25 0.32 0.27
Total Average ABBA 38.33 0.33 1.78 2.69 2.78 2.75 2.83
SD ABBA 4.17 0.52 0.61 0.39 0.29 0.39 0.34
Total Average AABBA 38.75 0.50 2.33 2.79 3.00 3.00 3.00
SD AABBA 4.43 0.58 0.94 0.32 0.00 0.00 0.00

*Note.* ANOVA one-way test comparing the results of all participants before vs. 5 Week = P-Value (0.0001)

The most difficult sleep hygiene habit for the participants was keeping the bed for sleep only. Almost all the participants tended to watch television, read, study, or play
videogames in their bedrooms. The second difficult sleep habit was not eating or drinking close to bedtime. The participants often drank (e.g., coffee, alcohol) or ate less than one hour before bedtime. The third difficult habit for participants was stopping stressful activities close to bedtime. The easiest habit was controlling the environment of sleep.

More characteristics will be explained more in the discussion section. Details for each participant performance can be observed in Table 5.

Table 5

*Total Average Sleeping Scores per Week*

<table>
<thead>
<tr>
<th>Group</th>
<th>Participant</th>
<th>Gender</th>
<th>Age</th>
<th>Before</th>
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<th>2nd Week</th>
<th>3rd Week</th>
<th>4th Week</th>
<th>5th Week</th>
</tr>
</thead>
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<td>3.00</td>
<td>3.83</td>
<td>3.33</td>
<td>4.00</td>
<td>4.00</td>
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<td>M</td>
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<td>4.00</td>
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<td>3.00</td>
<td>3.33</td>
<td>3.66</td>
<td>3.83</td>
</tr>
</tbody>
</table>

**Total Average** | 37.20 | 0.80 | 2.80 | 3.67 | 3.62 | 3.75 | 3.83 |
**Total SD** | 4.24 | 0.92 | 1.10 | 0.41 | 0.50 | 0.47 | 0.42 |
**Total Average ABBAA** | 38.33 | 0.50 | 2.44 | 3.64 | 3.47 | 3.64 | 3.75 |
**SD ABBAA** | 4.17 | 0.84 | 1.03 | 0.40 | 0.56 | 0.58 | 0.54 |
**Total Average AABBA** | 38.75 | 1.25 | 3.33 | 3.71 | 3.83 | 3.92 | 3.96 |
**SD AABBA** | 4.43 | 0.96 | 1.12 | 0.48 | 0.34 | 0.17 | 0.09 |

*Note.* ANOVA one-way test comparing the results of all participants before vs. 5 Week = P-Value (0.0001)
With the use of the educational survey tool, it was possible to assess the performance of all participants before the program. Prior to participation, only 40% regularly practiced one of the eating recommendations, and 50% regularly practiced one of the sleep hygiene recommendations. At the end of the fifth week, all the participants were actively following both eating and sleeping recommendations. Individual performance of eating and sleeping habits can be observed in Figure 5.

**Figure 5.** Eating and sleeping scores—individual performance.
One of the goals of this study was to evaluate the effects of the independent variable (i.e., money contingencies) over the performance of tasks, in this case, eating and sleeping habits. It can be seen that money contingencies did not affect the performance since it increased during all the phases in both groups. Details can be observed in Figure 6.

**Figure 6.** Eating and sleeping scores—group performance.
The total average of eating habits scale points for all the participants at the beginning was 0.40 (SD = 0.52) repetitions, and after the fifth week, the total average was 2.90 (SD = 0.27) out of a maximum 3 points. Using an ANOVA one-way test, comparing all the before results versus the fifth-week results, a p-value of 0.0001 was obtained. It can be concluded that the increment of eating habits scale points of the participants was statistically significant.

The total average of sleeping habits scale points for all the participants at the beginning was 0.80 (SD = 0.92) repetitions. After the fifth week, the total average of sleep scale points for all the participants was 3.83 (SD = 0.42) out of a maximum 4 points. Using an ANOVA one-way test, comparing all the before results versus the fifth-week results, a p-value of 0.0001 was obtained. It can be concluded that the increment of sleeping habits scale points of the participants was statistically significant.

**Body Mass Index**

The main goal of the program was to improve physical activity, eating, and sleeping habits. A secondary benefit of improving these habits could be the control of weight. This program did not include a diet reduction component, but it was expected to have variations over the participants’ weight with a tendency to have weight reduction. Sixty percent of participants had the goal of weight reduction.

The National Heart, Lung and Blood Institute (2015) defined Body Mass Index (BMI) as “a measure of body fat based on height and weight that applies to adult men and women. . . . the BMI categories are: Underweight <18.5, normal weight 18.5–24.9, overweight 25–29.9, and obesity 30 or greater.” Prior to the program, the participants fell
into the following BMI categories: 5 normal, 1 overweight, and 4 obese. After the program, the results were 5 normal, 2 overweight, and 3 obese.

The weight reduction average of all participants at the end of the fifth week was 2.06 kilograms ($SD = 1.02$), or 4.54 pounds ($SD = 2.25$). The person who lost more weight was participant #1 from the AABBA group (4 kilograms or 8.82 pounds); it is important to comment on several points regarding this participant. He mentioned that his goal was precisely to decrease weight. He is also the participant with more minutes (639) of physical activity (i.e., running and walking) at the end of the fifth week. However, this participant is still in the BMI obesity category. He expressed that before the program he was not meeting his weight reduction goals and was not following any dietary restriction. This participant was also a smoker with an average use of 11 cigarettes per day. He completed the program with an average use of 4 cigarettes per day. He also had hypertension, and his blood pressure at the beginning of the program was higher than recommended. After the program, his blood pressure was at a normal level. By using the three-contingency model of performance management, it was possible to develop other extra contingencies to support his performance in the program and to especially consider the need to monitor his health with more care. He was able to stop smoking gradually and follow his hypertension recommendations including medication use. Details of each participant’s BMI can be observed in Table 6 and Figure 7.
Table 6

*Final Body Mass Index per Week*

<table>
<thead>
<tr>
<th>Group</th>
<th>Participant</th>
<th>Gender</th>
<th>Age</th>
<th>Before</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Week</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Week</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Week</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; Week</th>
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<td>30.02</td>
<td>29.68</td>
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</table>


Total SD  | 4.24   | 4.12   | 4.06   | 4.04   | 4.00   | 4.07   | 4.12   |

Total Average ABBAA  | 38.33  | 26.46  | 26.37  | 26.19  | 26.02  | 25.91  | 25.80  |
SD ABBAA  | 4.17   | 4.60   | 4.66   | 4.68   | 4.66   | 4.75   | 4.78   |

Total Average AABBA  | 38.75  | 27.74  | 27.47  | 27.30  | 27.23  | 27.10  | 26.91  |
SD AABBA  | 4.43   | 3.80   | 3.48   | 3.36   | 3.25   | 3.31   | 3.45   |

*Note.* ANOVA one-way test comparing the results of all participants before vs. 5 Week = *P*-Value (0.6851)
One of the goals of this study was to evaluate the effects of the independent variable (i.e., money contingencies) over the performance of tasks. In this case, the task was being overweight. It can be seen that money contingencies did not affect weight.
changes since it decreased during all the phases in both groups. Details can be observed in Figure 8.

![Body Mass Index (BMI)](image)

**Figure 8.** Body Mass Index—group performance.

The total average BMI for all the participants at the beginning was 26.98 ($SD = 4.12$). After the fifth week, the total average BMI was 26.24 ($SD = 4.12$), which classifies this population as overweight. Using an ANOVA one-way test, comparing all the before results with the fifth-week results, a $p$-value of 0.6851 was obtained. It can be concluded that the decrement of weight of the participants was not statistically significant. This was expected, as this was not a goal of the program. However, the
amount of weight reduction presented is important considering that this program did not include any type of dietary restriction.

**Waist Measurement**

At the beginning of the program, participants were asked to measure their waist circumference after being taught how to do it correctly. It is important to remember that the risk of developing diseases starts with a waist size of 94 centimeters (37 inches) for men, and 80 centimeters (31.7 inches) for women. (Heart Foundation, 2015).

Sixty percent of the participants in this study had waist measurements higher than the risk limit before the program, and 40% remained at risk after the program. In the end, the population had a waist reduction average of 2.65 centimeters ($SD = 1.68$) or 1.04 inches ($SD = 0.66$). However, using an ANOVA one-way test, comparing all the before results with the fifth-week results, a $p$-value of 0.6159 was obtained. It can be concluded that the waist reduction of the participants was not statistically significant. Details can be observed in Table 7.
Table 7

*Results Waist Measurements Before vs. Final*

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**Social Validity**

All the participants answered a social validity survey, which was anonymous and available online. The survey was answered at the end of the first and fifth weeks. A Likert scale was used with 1 meaning *strongly disagree* and 5 meaning *strongly agree*. The intention of the survey was to assess the satisfaction of the participants with the program. Since the beginning, the participants had scored the program as beneficial for the improvement of their habits. The components of the program were scored high as
well. When the participants were asked about the money component, they scored it as *neither agree nor disagree*. It can be concluded that the monetary component was a motivation for the participants to accept participation in the program, but that it was not the variable controlling their performance. At the end, the feedback component was what controlled the performance of participants. More details can be observed in Table 8.

Table 8

*Social Validity Survey Scores 1st Week vs. Final*

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<th>End of 5th Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program in general</td>
<td>4.70</td>
<td>4.72</td>
</tr>
<tr>
<td>Physical activity component</td>
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<td>4.70</td>
</tr>
<tr>
<td>Eating component</td>
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</tr>
<tr>
<td>Sleep component</td>
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<tr>
<td>Money component</td>
<td>2.90</td>
<td>1.7</td>
</tr>
<tr>
<td>Feedback component</td>
<td>4.77</td>
<td>4.8</td>
</tr>
</tbody>
</table>

*Note: 1 point (Strongly disagree) – 5 points (Strongly agree)*

**Money Contingencies**

Seventy percent of the participants did not lose any money, earning the total amount of $50 USD at the end of the program. Three participants lost an average of $10.18 USD ($SD = 2.89). Reasons for monetary loss included not engaging in push-ups or sit-ups performance.
DISCUSSION

The first objective of this program was to study the effects of the independent variable (i.e., money) on the dependent variables (i.e., physical activity, eating, and sleeping habits) in each group and for each participant. In the results section, the fact that money contingencies did not control the performance of participants is visually presented. Their performance for all the tasks increased gradually and was maintained during all the phases, with not a visual difference during the intervention phases.

Physical Activity

The gradual increase and maintenance of physical activity can be explained by the monitoring procedure, since the first week of baseline was when the participants started the record of their activities and the performance increased. However, it was the feedback procedure provided using the three-contingency model of performance management (Malott, 2008) that allowed the participants to solve any problems they faced. Many of them complained that “time” was a competing situation for the performance of physical activity, for example, “If I do exercise, I do not have time to do any other activities.” Several participants referred to this as an inconvenience, but once they identified this as a competing natural contingency, they were able to accept that the program’s task of physical activity was included in their daily activities (e.g., walking to their job or using stairs instead of elevators). This situation encouraged them to start monitoring their performance or to start with the minimum time and physical activity requirement (i.e., walking 20 minutes per day). Almost everybody walked that minimal required amount.
daily, but they did not know it was important. After this training, several participants started walking or running more often, dedicating a specific time of their day for this activity. The introduction of a tracking device was one of the keys to this program’s success. Tracking devices provided the participants with immediate reinforcement after their performance, and once they sent photos of these devices, they also obtained social approval from the researchers.

At the end, the performance of tasks provided sizable and probable outcomes for all the participants. In other words, the explanation of the three-contingency performance model, but especially the identification of different competing natural contingencies, allowed participants to achieve their individual goals of physical activity performance. It was expected that money would be the sizable and probable outcome motivating participants’ performances, but this was unfounded. In the end, social approval provided during the daily feedback, social approval from close peers (e.g., spouses), and the visual reinforcement provided by the tracking devices and Microsoft Excel® tool graphs were what maintained and increased the performance of physical activity and all the different tasks.

**Sit-ups and Push-ups**

Different competing natural contingencies arose when participants were required to do push-ups and sit-ups. For example, the difficulty of the exercise, fatigue, or pain were stimuli competing with the performance of these tasks. Several participants expressed at the beginning of the program that these exercises were completely unachievable for them. Once participants realized that the minimal requirements (i.e., 1–5 repetitions per day) were achievable and that they could do them with different styles
(e.g., doing push-ups by placing the knees on the floor or standing up against a wall), then they engaged in these tasks. One participant continued to be reluctant to perform these exercises, and monitoring and feedback were found not powerful enough to engage him in the performance of these activities. As money was the only reinforcer (i.e., independent variable) used during this program, contingencies involving a different reinforcer for this participant’s performance of push-ups and sit-ups were not permitted. As well, the participant verbally declined engaging in these exercises.

One methodological problem during this study was the absence of any tool besides self-report to check the actual performance of push-ups and sit-ups. It is possible that participants may not have engaged in these tasks but reported so anyway, due to the monetary incentive for performance. However, it is assumed that participants were honest with their self-reports. And as some participants sent pictures of themselves performing push-ups or sit-ups, even though this was not required, this provided evidence that this assumption is valid. Future studies might use tracking devices specifically designed for the assessment of these tasks.

**Eating Habits**

Physical activity and eating habits are the most common activities related to the control of weight. Several of the participants expressed their intention of weight reduction. Once it was explained to them that weight reduction was not a primary goal of this study but a possible secondary benefit, some participants were surprised. In the end, they expressed that learning how to improve their health habits was even more rewarding than minimal weight loss, as it can help them reach long-term weight loss goals.
Three eating habit recommendations were evaluated during this program. Almost all participants found that controlling their eating speed was the most difficult to follow. In order to control the speed of eating, it was recommended that participants place their utensil down and interlace their hands under the table after each bite. Then, after swallowing the food in their mouths, they could pick up their utensil and eat another bite. Several participants expressed their surprise of how fast they usually ate and commented that they felt more satiated without the need to eat more food by using this method. This leads to the second most difficult recommendation for participants during this program.

Controlling the quantity of food was rated as the second most difficult recommendation of the eating habits during the program. Once participants controlled the speed of their eating, they mentioned that it was easier to control the quantity because they were more satiated. The quantity of food recommendation consisted of eating only the amount of preferred food that fit on a regular plate. The final recommendation consisted of eating five times per day, with three of those occasions using a regular plate and two using a smaller dessert plate. This last recommendation was the easiest for participants to follow. It involved eating three meals and two smaller snacks. It was recommended that the two small snacks be as healthy as possible (e.g. fruits, nuts), but again, as weight reduction was not a goal of this program, participants could make their own choices. The justification of this recommendation was to control hunger during the day, and it appeared to work. At the beginning, some participants expressed different complications related to their daily schedule. This was solved by the preparation of food at home, especially the snacks. Within this recommendation, participants were advised to try to fill their plates with different types of foods (i.e., vegetables, meat, grains, etc.).
However, the program did not include caloric control as a goal. For those interested in weight reduction, the addition of dieting with caloric control would likely enhance the achievement of their goal. It should be stated that within this program almost all participants presented weight reduction (evaluated in the form of Body Mass Index and waist measurements) as a secondary gain of this program. This weight loss was not statistically significant but was important for the participants’ satisfaction with the program. A more extensive program (i.e., more than five weeks) is likely to yield better weight reduction results. Further consultation by a licensed nutritional professional is recommended for these individuals wanting to pursue greater weight loss.

**Sleeping Habits**

The third and most unique component of the program was the control of sleep habits. Although there are many sleep hygiene recommendations, a previous study developed by the researchers (Martinez-Salazar & Fuqua, 2015) found four in particular to be the most frequently followed.

The most difficult sleep hygiene habit for the participants was not reserving the bed for solely sleep or sexual activity. Most participants tended to watch television, read, study, or play videogames in their bedrooms. Several participants did not know that this habit was likely affecting their sleep. Many were not able to drastically modify their bedroom (e.g., remove the television), but they were able to avoid engaging in the hindering behaviors (e.g., watching television close to bedtime). At times, difficulties arose when the bedroom was shared with other individuals (e.g., a significant other), but participants indicated they mostly received support.
The second most difficult sleep habit was to not eat or drink close to bedtime. Participants often drank or ate less than one hour before bedtime, which contradicts the recommendation to not eat or drink 1–2 hours before bed. Several participants usually drank a lot of water before bedtime, which resulted in waking up during the night. Once they controlled the amount of liquid before bedtime, they experienced a better rest.

The third most difficult habit for participants was not engaging in stressful activities close to bedtime. It was expected that once these activities ceased, the participants would be able to relax and focus on sleeping. However, some of them expressed that once they were in bed, they continued to think about the activities and problems that may occur the next day. A simple breathing relaxation exercise (e.g., imagining a balloon in their stomach and their breath was inflating and deflating it) helped with this concern.

The easiest sleep habit was controlling one’s sleep environment. This was expected, as it had been found in previous research to be an easy modification to increase sleep quality (Martinez-Salazar & Fuqua, 2015). Once participants were educated on what was wrong in their sleep environment, they were able to make appropriate changes (e.g., light, noise, temperature, etc.).

Two specific points must be mentioned in the discussion of sleep habit performance. First, all the information gathered was obtained through self-reports. For future studies, the development and use of specific tracking devices evaluating sleep hygiene practices would likely improve the reliability of the results. However, all the participants expressed that they were satisfied with this component of the program; some mentioned that feeling fatigued upon waking or experiencing frequent headaches had
disappeared due to increased quality of sleep. Second, the use of educational online technology (e.g., a sleep hygiene video) was greatly valued by the participants. The sleep hygiene recommendations were presented at the beginning of the program, and the participants indicated the clarity of the video was crucial to their understanding of the recommendations. This was especially helpful during the feedback procedure, as it was easier for them to understand how the recommended changes could impact their sleeping habits.

**Three-Contingency Model of Performance Management**

An objective of this program was to analyze which behaviors were more difficult for the participants to engage in, and to evaluate the use of the three-contingency model of performance management as a valuable tool for delivering habit performance feedback. Each participant was asked daily about a particular behavior that he or she was having difficulty maintaining or improving. Following the three-contingency model of performance management, the first step was to ask the participant about any competing natural contingencies and address those, if present. When the participants identified the competing natural contingencies, they were then able to understand their behaviors and improve their performances. It was found that people commonly knew they were not achieving their goals or were performing them incorrectly due to the delayed outcomes. However, as Malott (2008) clearly established, the true cause of poor performance is the absence of sizable and probable outcomes, which leads to the second step. Establishing clear daily deadlines for the accomplishment of each behavior is essential to improving performance. In this program, each participant had the 11 p.m. daily deadline by which they had to accomplish their tasks and send their records and photos to the researchers.
Participants received extra help by way of a prompting message sent every day at 10 p.m., reminding them about this deadline. It is possible that the sizable and probable outcome controlling the performance of the participants was the avoidance of loss contingency involving money as a reinforcer (i.e., losing the money for not accomplishing each task), but the participants rated the money contingencies as “neither agree nor disagree” as an important component of the program in the social validity survey. Thus, the money was a variable motivating people at the beginning to participate in the program, but it did not control their performance directly. Following the three-contingency model of performance management, a different and unplanned contingency occurred. This novel contingency consisted of the avoidance of loss of a reinforcer; in this case, the real reinforcer was social approval. The third component of the three-contingency model of performance management included a theoretical contingency describing the immediate outcomes. For example, participants might experience fear or aversive thoughts because of the potential to lose social approval; then after performing the tasks, the consequence of fear or aversive thoughts for losing social approval would decrease.

For the purposes of the present study, the goal was to evaluate money as the independent variable controlling the performance of the dependent variable (i.e., habits). For future cases where social approval or money will not be reinforcers powerful enough to control behaviors, different contingencies can be designed following the three-contingency model of performance management. In conclusion, this model is a valuable tool for individuals aiming to improve their performance of any type of activity. A behavior manager is a powerful figure in that he or she becomes a source of
reinforcement (i.e., social approval) for the participant. This social approval reinforcement was found frequently to be strong enough to achieve performance improvement. The three-contingency model of performance management is an easy method to understand for individuals outside the field of behavior analysis. The participants within this study used the model to achieve external goals from the program such as smoking cessation, medication compliance, and career-related tasks.

**Social Validity**

Another objective of this study was to analyze the program’s validity by using a social validity survey. The final goal was to evaluate participant satisfaction with the program of habits control and its components. It was found that participants scored the program and its components with the highest scores. Only the monetary component was scored as “neither agree nor disagree” as an important factor for the improvement of habits performance. Using the social validity survey, it was then found that the feedback procedure provided following the structure of the three-contingency model of performance management was the most important factor for the success of participants within this program. The social validity survey found that this program was a socially valid treatment package for the improvement of participants’ health quality.

**Future Improvements of the Program**

A specific part of the program that could be improved is the Microsoft Excel® tool. This could be modified as a mobile phone application and still keep the original tool’s integrity (e.g., graphics, layout). This new mobile application could also integrate the options of tracking the different behaviors directly, which would eliminate the need
for other external applications or devices (e.g., pedometers). As well, this new application could have the option to assess the performance of sit-ups and push-ups.

Based on the findings of social approval being a central factor, a possible option in order to increase the effectiveness of the program could be to develop a digital community to support participants. These types of community already exist and have demonstrated some validity; therefore, it may prove advantageous to incorporate them with a behavior modification program. It would be important to maintain the figure of a behavior manager expert in order to provide continued supervision.

A limitation of this program was that many of its components relied on self-report assessments (e.g., push-ups and sit-ups performance). While acceptable within the psychology field, this is a possible area of improvement. A suggestion for improvement is incorporating the use of new technologies (e.g., mobile phone applications). This inclusion may allow for the easy interaction and feedback among the participant, the behavior manager, and even other peers (Martinez-Salazar & Acevedo-Stefanoni, 2015).

Conclusions

One way in which participants benefited from this program was they improved the quality of their health by controlling their daily physical activity, eating, and sleeping habits. A second benefit was the initial control of their weight, even though these findings were not statistically significant. A more extended period of time with the addition of a caloric control component would be likely to produce better results for weight reduction. A third benefit of this program was that participants increased their personal knowledge of health-related behaviors (e.g., how much they are currently exercising, how much they should be eating, etc.).
The benefits of this study as a whole expand upon previous work, which includes the procedures of behavioral contracting and reward contingencies. The most crucial contribution to the field of behavior analysis is its finding of the high effectiveness of the three-contingency model of performance management when providing feedback for habits control.

A contribution to the science is that there are currently no studies that combine three specific health habits (e.g., physical activity, eating, and sleeping). This study demonstrated it is possible to design a successful behavioral intervention targeting the three types of habits. It is common to find studies analyzing the first two, but not the combination of these three habits. Finally, this study expanded on previous research using eHealth technology (e.g., text messages, electronic videos and surveys) for the control of risky behaviors and the improvement of one’s quality of health.
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Appendix A

Consent and Behavioral Contract
Consent and Behavioral Contract
https://www.surveymonkey.com/s/26LZ8SM

Introduction

Western Michigan University
Department of Psychology

Principal Investigator: Wayne Fuqua, Ph.D. BCBA-D
Student Investigator: Ivan Noe Martinez Salazar MD (Mexico)
Title of Study: Behavior analysis program to improve habits of physical activity, eating and sleeping

You are invited to participate in a research project entitled “A behavior analysis program to improve habits of physical activity, eating and sleeping.” This study is designed to analyze the effects of money on the performance of physical-health related habits and is being conducted by Wayne Fuqua, Ph.D. BCBA-D (Principal Investigator) and Ivan Noe Martinez Salazar M.D. (Mexico; Student Investigator) from Western Michigan University’s Department of Psychology. This research is being conducted as part of the doctoral dissertation requirements of the Doctor of Philosophy in Behavior Analysis degree as sought by Ivan Noe Martinez Salazar.

Usted ha sido invitado a participar en un proyecto de investigación titulado "Programa de análisis de la conducta para mejorar hábitos de actividad física, alimentación y sueño", diseñado para analizar los efectos de dinero en la realización de hábitos. Este estudio está siendo conducido por Wayne Fuqua, Ph.D. BCBA-D (Investigador principal) e Ivan Noe Martinez Salazar (Estudiante Investigador) de Western Michigan University, Departamento de Psicología. Esta investigación está siendo realizada como parte del proyecto de disertación doctoral para los requisitos del grado de Doctor de Filosofía en Análisis de la Conducta para ser obtenido aquí por Ivan Noe Martinez Salazar.

* Choose your language
  - English
  - Español

* Has a physician told you in the last year that you may have an eating disorder such as Anorexia Nervosa, Bulimia Nervosa? Do you think that you may have one of these conditions?
  - Yes
  - No
* Has a physician told you in the last year that you may have limited abilities to perform physical activity? Do you think that you may have limited abilities to perform physical activity?
  
  ☐ Yes
  ☐ No

* ¿Durante el ultimo año algún médico te dijo que tienes un desorden alimenticio como anorexia o bulimia, o tu crees tener alguno de estos problemas?
  
  ☐ Sí
  ☐ No

* ¿Durante el último año, algún médico te dijo que tienes una limitación para realizar ejercicio, o tu crees tener alguna?
  
  ☐ Sí
  ☐ No

**CONSENT**

You are invited to participate in a research project entitled "A behavior analysis program to improve habits of physical activity, eating and sleeping." This study is designed to analyze the effects of money on the performance of physical-health related habits and is being conducted by Wayne Fuqua, Ph.D. BCBA-D (Principal Investigator) and Ivan Noe Martinez Salazar M.D. (Mexico; Student Investigator) from Western Michigan University’s Department of Psychology. This research is being conducted as part of the doctoral dissertation requirements of the Doctor of Philosophy in Behavior Analysis degree as sought by Ivan Noe Martinez Salazar.

This informed consent document will explain the purpose and details of this research project including time commitments, procedures to be used, and the risks and benefits of participation. Please read this consent form carefully and completely. Should you have additional questions, the contact information of the student investigator can be found at the end of this document.
What are we trying to find out in this study?
We are evaluating the effectiveness of a behavior analysis program for improving the quality of health in people, particularly through the control of physical activity, eating and sleeping behaviors. We are interested in learning more about the effects earning money can have on the performance of the different health-related habits.

Who can participate in this study?
Individuals eligible to participate in this study must be over 18 years of age, speak Spanish and be a Mexican citizen. You can not have a medical limitation that would prevent you from engaging in moderate exercise or a current diagnosis of an eating disorder. If you think you may have one of these conditions contact us at http://institutoanisahm.org/mail.html for additional information (without any cost) regarding a recommended specialist close to your location.

Where will this study take place?
You will perform all the required activities at a location that is convenient for you, such as a local fitness center. This study will also make use of technology for communication purposes, including electronic videos, e-mail, social media networks, virtual platforms (i.e. Survey Monkey®) and mobile phone text messages. You will perform all the health-related activities anywhere you choose to do them.

What is the time commitment for participating in this study?
You will be asked to follow the program for five weeks. This involves spending 20 minutes per day, six days per week engaging in any type of physical activity (i.e., running, walking, specific exercise classes). You will need to have easy access to the internet as you will need to send a picture of the recording device and track and submit results. The investigators will also provide daily feedback, either through text messaging or e-mail. In total, this study requires a maximum total time per day of 1 hour and 30 minutes.

What will you be asked to do if you choose to participate in this study?
1. Electronically sign this informed consent document and the behavior contract.
2. Review and answer a one time, online survey which contains educational videos, this should not take you more than 20-30 minutes.
3. Perform 20 minutes of physical activity per day and track daily eating and sleeping habits, following the criteria detailed below
4. Record data daily on a Microsoft Excel Spreadsheet.
5. Send a daily electronic picture of the Excel Spreadsheet and a photo of any other electronic tracking devices used (e.g. pedometer). This must be completed every day before 11pm.
6. Answer an online social validity survey once a week for five weeks, this should not take you more than 3-5 minutes.

We will send you all the tools by e-mail and by text messages.
The specific tasks required during this program include:

*** Physical Activity ***
- Any type of physical activity (walking, swimming, running, etc.) for a minimum of 20 minutes per day or 150 minutes per week
- 1-5 push-ups a day
- 1-5 sit-ups a day

*** Eating Habits ***
**Required initial performance: Self-rating of at least 1 point per day on the scale of eating habits***

Eating habit scale (One point is earned for each of the following):
- I eat slow (put the fork down and chew 20-30 times per bite) during each meal of the day
- I eat five times per day (using the model of three big plates and two small plates per day)
- I control the quantity of food (no double servings allowed)

*** Sleep Hygiene Habits ***
**Required initial performance: Self-rating of at least 1 point per day on the scale of sleep hygiene habits***

Sleep hygiene scale (One point is earned for each of the following):
- I control the sleep environment (e.g., noise, temperature, light, etc.).
- I do not eat or drink anything close to bedtime (e.g., no coffee, alcohol, or cigarettes four to six hours before bed; no heavy meals two hours before bed)
- I do not engage in other activities in bedroom besides sleeping and sex (e.g., no studying, watching television, reading, etc.).
- I stop working, studying or engaging in stressful activities close to bedtime (e.g., at least one hour before bedtime).

What information is being measured during the study?

- Each day we will measure the number of minutes you participate in physical activity, your number of push-ups and sit-ups, and your healthy eating and sleep hygiene habit scores. We will also have you measure and report your weight daily.
- During the five-week program (Monday to Saturday) you will be encouraged to perform physical activity and to evaluate and change your daily eating and sleeping habits. Sunday is the day dedicated for relaxing.
- At the beginning of the program you will earn a total of $50 USD. During two weeks of the study, money can be lost for not engaging in the minimum task requirements. A total of 72 tasks with the monetary value of $0.69 USD each can be accomplished or not during this two-week period. If all tasks are completed you will earn $50 USD. For every task that is not performed or performed improperly you will lose $0.69 USD for that specific task.
- During the two weeks, you must send the researchers the records of each day before 11pm or you will lose the money for all of the tasks for that day.
- For the physical activity task, you will start with the minimum amount of time and will be encouraged to increase your participation in the task as the study progresses. Goals will start with low intensity and quantity of physical activity and will increase in accordance with your own preferences and abilities.
- You will record data on a Microsoft Excel Spreadsheet and use at least one different electronic tracking device as proof of your performance. This device will be chosen by you and will be free of charge. The use of free mobile phone applications is encouraged.
- Each day you must send two pictures to the researchers via mobile phone text messaging. The first picture will be of the completed Microsoft Excel Spreadsheet with your daily recording completed, and the second will be of the tracking device data as proof of your performance during that day. The pictures must be submitted before the deadline of 11pm each day.
- With this submitted data, we will provide feedback on your progress using mobile phone text messages or e-mail, within the following 12 hours.
- You can only increase your physical activity performance by a maximum of 25% per week; a higher increment is not required or accepted for safety concerns. Increasing physical activity level is encouraged but not necessary.
- An increment of minimum of one point per week in both scales (eating and sleeping) is encouraged but not necessary.
- We encourage you to maintain your tasks performance during the five-week period, and it is required in order to to earn money during the two week intervention phase. In other words, there cannot be a reduction of 25% on any physical activity task performance during those two weeks, unless this is accorded between you and the researchers (e.g., due to injury or illness).
You can earn up to $50 USD during this study. One week after the fifth week of participation the final amount of money earned will be electronically transferred, physically delivered, or turned in to an electronic money gift card to you. You may choose which method you would prefer for your payment YOU MUST COMPLETE THE FIVE WEEK STUDY IN ORDER TO RECEIVE ANY MONETARY COMPENSATION (e.g. $50 USD).

- Only during a specified two-week period can money be lost for not performing tasks.
- You can be eliminated from the program and therefore not receive any money for participation for any of the following reasons: 1) unsafely increasing physical activity more than 25% in more than two non-consecutive days in a single week and 2) not sending pictures to the researchers more than three non-consecutive days in a single week.
- After six months we will contact you again by text message or e-mail and ask if you continued to use the techniques learned from the program on your own.

What are the risks of participating in this study and how will these risks be minimized?
As in all research, there may be unforeseen risks to the participant, which are out of the control of the investigators. Since the procedures will not take place in a controlled environment or in the presence of the researchers, it is your responsibility to engage in physical activity safely and smartly.
If you get injured while exercising, it is your responsibility to take appropriate care of the injury, including any necessary emergency measures. This releases the researchers of any further claims and no compensation or treatment will be made available except as otherwise specified in this informed consent document. One potential risk of participation is that you may experience discomfort while exercising. It is recommended that you start exercising at a low level of intensity and only increase the intensity gradually and as your body becomes used to the current intensity level. You should always listen to your body and never push yourself unsafely past your body’s current abilities. All your collected information will be kept confidential and only researchers trained to ensure the best treatment possible will review your data. If at any point you need to pause the study due to injury or sickness, you are able to do so with no penalty to you. As well, if you choose to discontinue the study all together, you will incur no penalties for discontinuation. You will also not be awarded the $50 USD unless the full five-week program has been completed. The researchers have taken appropriate steps to minimize any discomfort you may experience in participating in this study. These steps include the ability to pause the program due to injury or illness, and providing, daily, individualized feedback within 12 hours from report submission.

What are the benefits of participating in this study?
One way in which you may benefit from this program is to improve the quality of your health by controlling your daily habits. A second benefit is the possible control of your body weight.

Are there any costs associated with participating in this study?
There are no direct monetary costs for you to participate in this program. However, depending on your mobile phone service provider text messages from you to the researchers may have a cost associated. If this is a problem for you, e-mail communication will be used. As well, you may wish to spend money on a fitness center membership or on purchasing new gear/equipment. These expenses are not required for this study and are therefore completely up to your discretion. Participation in this study does require an approximate maximum time commitment of an hour and a half per day.

Is there any compensation for participating in this study?
You can earn up to $50 USD, but you will need to complete the entire five-week period. Money is transferred and/or delivered after the fifth week of the study. No monetary compensation will be given for partial completion of the study.

Who will have access to the information collected during the study?
All the information collected from you will remain confidential. Your name and all other identification information will not appear on any papers on which this information is recorded. The forms will all be coded to protect your information. The researchers will keep a separate master list with the names and corresponding code numbers away from all participant results in order to maintain privacy. Once data is collected and analyzed, the master list will be destroyed. All other data-related forms will be retained for at least three years in a locked file in the principal investigator’s laboratory at Western Michigan University (room 2704, Wood Hall).
During the course of this study, the researchers will gather information from you and provide you with daily electronic feedback. The student investigator is a doctoral level graduate student in the Department of Psychology and has received specific training in research ethics. There is the potential that information gathered from this study may be published or presented at conferences in which names and all other identifying information will remain confidential and will not be shared with the public.

What if you want to stop participating in this study?
You can choose to stop participating in the study at anytime, and for any reason. You will not incur any penalties for discontinuing. If you choose to discontinue prior to the fifth week of the program, you will be ineligible to receive any monetary compensation. In the case of an injury or illness, the program can be stopped and reinitiated once you are recovered. No penalties will incur for pausing the study due to injury or illness. The investigators reserve the right to discontinue your participation in the study without your prior consent.
If you choose not to participate in this study, you may exit from this page just by closing the browser. Completing this survey indicates your consent for the use of the answers you supply and for participating in the program. If you have any questions, you may contact Wayne Fuqua, Ph.D., BCBA-D at (269) 387-4474, Ivan Noe Martinez Salazar at (269) 910-4514, the Human Subjects Institutional Review Board (269) 387-8293) or the Vice President for research at (269) 387-8298). This study was approved by the Western Michigan University Human Subjects Institutional Review Board (HSIRB) on 3/18/2015. Please DO NOT participate in this study after 3/17/2016. Participating in this online survey indicates your consent for use of the answers you supply.

* Write your name

* Write a pseudonym

* Write your e-mail and mobile phone

* I accept the terms and conditions of this consent
  - Accept
  - Do not Accept

Read the following behavioral contract

* Write your name

* Write your pseudonym

* Write your e-mail and mobile phone
BEHAVIORAL CONTRACT

Who will perform the task and receive the Reward?
(Name of participant) (Pseudonym)

Who will function as Behavior Manager?
Ivan Noe Martinez Salazar M.D. (Mexico).
Behavior Analysis Doctoral Student,
Western Michigan University

When are the tasks performed?
During five weeks (Monday through Saturday) you will have to perform all the tasks. Sunday is the day dedicated for rest.
Only during a two-week period can money be lost for no performing agreed upon tasks.
All tasks must be performed before the daily deadline of 11pm.

What are the tasks (specifics)?

- You will start with the minimum recommended amount of time and repetitions for each task. After starting with a low intensity and quantity of physical activity, you will establish your own goals in accordance with your preferences and abilities.
- You will record data on the Microsoft Excel Spreadsheet and use at least one different electronic tracking device as proof of performance. You may choose which device you would like to use. Use of free mobile phone applications is encouraged.
- Daily, you will send a mobile phone text message or e-mail to the researchers with a picture of the completed Microsoft Excel Spreadsheet and another picture of your preferred tracking device as proof of performance. These pictures must be received before 11pm each day.
- With this data, the researcher will provide personalized feedback to you using mobile phone text messages or e-mail. This feedback can be expected within the following 12 hours after submission.
- Only a 25% increment of physical activity task performance per week will be encouraged. A higher increment is not encouraged or accepted and if engaged in can terminate participation in the study.
- A minimum of one point of increment per week in the eating and sleeping scales is encouraged.
- We encourage you to maintain your task performance during the five weeks period of time, and this is required in order to earn money. During the two-week intervention phase, there cannot be a reduction of 25% or more on any physical activity task performance unless this is accorded to you by the behavior manager due to injury or illness.

*** Physical activity ***
- Any type of physical activity (walking, swimming, running, etc.) for a minimum of 20 minutes per day or 150 minutes per/week
- 1-5 push-ups a day
- 1-5 sit-ups a day

*** Eating Habits ***
Required initial performance: Self-rating of at least1 point per day on the scale of eating habits
Eating habit scale (One point is earned for each of the following):
- If eat slow (put the fork down and chew 20-30 times per bite) during each meal of the day
- I eat five times per day (using the model of three big plates and two small plates per day
- I control the quantity of food (no double servings allowed)

*** Sleep Hygiene Habits ***
Required initial performance: Self-rating of at least1 point per day on the scale of sleep hygiene habits
Sleep hygiene scale (One point is earned for each of the following):
- I control the sleep environment (e.g., noise, temperature, light, etc.).
- I do not eat or drink anything close to bedtime (e.g., no coffee, alcohol, or cigarettes four to six hours before bed; no heavy meals two hours before bed).
- I do not engage in other activities in bedroom besides sleeping and sex (e.g., no studying, watching television, reading, etc.).
- I stop working, studying or engaging in stressful activities close to bedtime (e.g., at least one hour before bedtime).
What physical activity or exercise are you committing to perform each day?

To begin the program, how many minutes of physical activity are you committing to engage in each day?

To begin the program, how many push-ups and sit-ups are you committing to engage in each day?

What is the Reward?

- By engaging in the five-week program you can earn up to $50 USD
- Only during a specific two-week period can, money be lost for not performing tasks
- A total of 72 tasks have a monetary value of $0.69 USD per task.
- When you do not perform the task or perform it improperly, you will lose money for that specific task.
- During the two-week period you must send the researchers your recorded results of the day’s task before 11pm or you will lose the money for all the tasks on that specific day.

When and how will the reward be delivered?

You can earn up to $50 USD during this study. One week after the fifth week of participation the final amount of money earned will be electronically transferred, physically delivered, or turned in to an electronic money gift card to you. You may choose which method you would prefer for your payment. You must complete the five-week study in order to receive any monetary compensation (e.g., $50 USD).

Researchers motives to eliminate participation in the program, and therefore, not provide monetary compensation.

You can be eliminated from the program and therefore not receive any money for participation for any of the following reasons: 1) unsafely increasing physical activity more than 25% in more than two non-consecutive days in a single week and 2) not sending pictures to the researchers more than three non-consecutive days in a single week.

What is your preferred method to receive the money that you will earn during the program?

* I accept the terms and conditions of the behavioral contract

☐ Accept

☐ Do not Accept
Usted ha sido invitado a participar en un proyecto de investigación titulado “Programa de análisis de la conducta para mejorar hábitos de actividad física, alimentación y sueño”, diseñado para analizar los efectos de dinero en la realización de hábitos. Este estudio está siendo conducido por Wayne Fuqua, Ph.D. BCBA-D (Investigador principal) e Ivan Noe Martínez Salazar (Estudiante Investigador) de Western Michigan University, Departamento de Psicología. Esta investigación está siendo realizada como parte del proyecto de disertación doctoral para los requisitos del grado de Doctor de Filosofía en Análisis de la Conducta para ser obtenido aquí por Ivan Noe Martínez Salazar.

Este documento de consentimiento explicará el propósito de esta investigación, así como el tiempo de compromiso, los procedimientos usados en el estudio, y los riesgo y beneficios de participar en este proyecto. Por favor, lea este consentimiento con cuidado y completamente, pregunte si tiene alguna duda, o en el caso de que necesite más clarificación.

¿Qué estamos tratando de encontrar?
Estamos evaluando la efectividad de un programa de análisis de la conducta para mejorar la calidad de la salud de las personas, por medio del control de actividad física, hábitos de alimentación y sueño. En pocas palabras, estamos tratando de encontrar los efectos de ganar dinero por realizar los distintos hábitos.

¿Quiénes pueden participar en este estudio?
Personas elegibles para participar en este estudio tienen entre 18 y 99 años de edad, las cuales no tienen ninguna limitación física para realizar ejercicio moderado y no tienen ningún trastorno de alimentación. Cualquiera que quiera mejorar sus hábitos puede participar.

¿Donde se llevará a cabo este estudio?
Este estudio será conducido utilizando comunicaciones a larga distancia tales como: videos en línea, correo electrónico, redes sociales, plataformas virtuales (Ejem., Survey Monkey) y mensajes de teléfono móvil. Usted realizará las actividades en cualquier lugar que usted elija para ello.

¿Cuál es el tiempo de compromiso para participar en este estudio?
Se le pedirá seguir este programa durante 5 semanas. Los requisitos generales para participar en el programa es poder dedicar 20 minutos por día, 6 días a la semana, para realizar cualquier tipo de actividad física (Ejem., correr, caminar, clases específicas de ejercicio) y tener acceso a internet desde su hogar o un teléfono móvil. Todos los días, usted enviará una foto de sus registros realizados ese día y recibirá retroalimentación. Un tiempo total estimado por día es de 1 hora y 30 minutos [Todas las actividades físicas (30-60 minutos), rastrear hábitos de alimentación y de sueño (10-30 minutos)].

¿Qué se le pedirá realizar si usted elige participar en este estudio?
1. Firmar electrónicamente este consentimiento y el contrato de conducta.
2. Responder una encuesta en línea que contiene videos educativos.
3. Realizar actividad física, calificar sus hábitos de alimentación y de sueño, siguiendo los criterios que serán detallados a continuación.
4. Registrar la información en una hoja de Microsoft Excel.
4. Enviar a los investigadores una foto de esos registros y una foto de cualquier dispositivo de rastreo electrónico de su preferencia, todos los días antes de las 11 pm.
5. Responder en línea una encuesta de validez social cada semana.
Las tareas específicas que tendrá que realizar durante este programa son:

*** Actividad Física ***

- Caminar mínimo de 20 min/día y/o un mínimo de 150 minutos/semana.
- 1-5 lagartijas/día
- 1-5 abdominales/día
- Cualquier otro tipo de actividades físicas son aceptables si duran por lo menos 20 minutos/día (Ejern., nadar, correr, etc.).

*** Hábitos alimenticios (califique sus propios hábitos) ***
Desempeño inicial requerido: 1 punto/día mínimo en la escala de hábitos alimenticios
Escala de Hábitos alimenticios
(Un punto es obtenido por cada uno de los siguientes)

- Yo como despacio (pongo el tenedor en la mesa y mastico 20-30 veces/bocado) durante cada comida del día.
- Yo como 5 veces por día (usando el modelo de 3 platos grandes y 2 platos pequeños por día).
- Yo controlo la cantidad de comida (No esta permitido comer doble ración).

*** Hábitos de higiene de sueño (califique sus propios hábitos) ***
Desempeño inicial requerido: 1 punto/día mínimo en la escala de hábitos alimenticios
Escala de Higiene de Sueño
(Un punto es obtenido por cada uno de los siguientes)

- Yo controlo el ambiente (Ejern., Ruido, temperatura, iluminación, colchón, almohada, mascota, otra persona).
- Yo no como o bebo nada cerca de la hora de dormir (Ejern., Café, alcohol, fumar, 4-6 hours antes) o alimentos pesados (2 horas antes).
- Yo no realzo otras actividades en mi cama, además de dormir y tener relaciones sexuales (Ejern., Estudiar, ver T.V., leer, etc.).
- Yo paro de trabajar, estudiar o estresarme por lo menos u

¿Qué es lo que estamos midiendo?

Estamos midiendo por día: El número de minutos dedicados a cualquier actividad física, número de lagartijas y abdominales, calificaciones en una escala de hábitos de alimentación y en una escala de hábitos de higiene de sueño, peso corporal.
• Durante 5 semanas (de Lunes a Sábado) el participante tendrá que realizar todas las tareas. El Domingo es día de descanso.
• Sólo durante dos semanas, se puede perder dinero por no realizar las tareas.
• Todas las tareas deben ser realizadas antes de las 11pm.
• Al inicio del programa usted obtendrá un total de $50 USD. Únicamente durante dos semanas, se puede perder dinero por no desempeñar las tareas. Un total de 72 tareas tienen un valor monetario. ($ 0.69 USD/tarea). Cuando usted no desempeña alguna tarea o no desempeña la tarea como fue establecido previamente usted perderá el dinero, únicamente de esa tarea en específico.
• Durante dos semanas, usted deberá enviar a los investigadores los registros de cada día, antes de las 11 pm. o perderá el dinero de TODAS las tareas de ese día en específico.
• Usted empezará con un mínimo de tiempo y repeticiones tal y como será establecido a continuación. Sin embargo usted establecerá su propia exigencia de acuerdo con sus propias preferencias y habilidades. Se recomienda empezar a baja intensidad y cantidad de actividad física es recomendado.
• Registro de información en una hoja de Microsoft Excel y la utilización de algún dispositivo electrónico de seguimiento del desempeño, esto último será elegido por usted, no hay ninguna preferencia por parte de los investigadores. Se recomienda, el uso de aplicaciones gratuitas para teléfono móvil.
• Usted deberá enviar un mensaje de texto por teléfono móvil a los investigadores, con una foto de la hoja de Microsoft Excel y una foto del dispositivo de seguimiento como prueba de su desempeño durante ese día, antes de las 11pm de cada día.
• Con esta información, los investigadores proporcionarán retroalimentación por medio de un mensaje de texto por teléfono móvil, dentro de las siguientes 12 horas.
• Únicamente se recomienda un aumento del 25% de las tareas de actividad física por semana, un incremento mayor no es recomendado o aceptado.
• Un mínimo de un punto de incremento por semana en ambas escalas (alimentación y sueño) es recomendado.
• Se recomienda mantener el desempeño durante el periodo de 5 semanas, y se requiere para ganar dinero durante dos semanas, en otras palabras, no puede haber una reducción de 25% en ninguna tarea de actividad física durante esas semanas. Únicamente si esto es acordado entre el participante y el Asesor de conducta (Ejem., Lesión o alguna enfermedad del participante).

• Hasta $ 50 USD se pueden ganar en este programa. Una semana después de la 5/a semana, el monto final ganado será transferido electrónicamente, entregado físicamente, o convertido en una tarjeta de regalo con dinero electrónico, de acuerdo con las preferencias de usted. USTED DEBERA COMPLETAR EL PERIODO DE 5 SEMANAS, PARA OBTENER EL DINERO QUE HA GANADO DURANTE EL PROGRAMA.
• Motivos de eliminación en el programa, y por lo tanto, sin recibir ningún dinero: Si usted incrementa sus tareas de actividad física más de 25 %, en más de dos días no consecutivos (misma semana). Si usted no envía los registros a los investigadores, en más de dos días no consecutivos (misma semana).
• Después de seis meses los investigadores podrán contactarlo, sólo para preguntarle si ha continuado usando las técnicas por su cuenta.

¿Cuáles son los riesgos de participar en este estudio y cómo serán estos riesgos minimizados?
Como en cualquier investigación, pueden existir riesgos imprevistos para usted. Debido a que los procedimientos no se llevarán a cabo en un ambiente controlado y en la presencia de los investigadores, es responsabilidad de usted si resulta lastimado al realizar ejercicio, y usted es responsable de tomar las medidas de urgencia necesarias, liberando a los investigadores de futuras reclamaciones; sin embargo, ninguna compensación o tratamiento se hará disponible con excepción de que este especificado en este consentimiento. Un riesgo potencial de participación es que usted experimente desconfort al realizar ejercicio, la recomendación de ejercicio es empezar en un nivel de intensidad bajo e incrementar gradualmente el tiempo de acuerdo con las preferencias y habilidades que usted tiene. Toda su información será conservada de forma confidencial, personal entrenado manejará toda la información. En cualquier momento usted puede elegir declinar su participación en el programa. No es el deseo de los investigadores causar desconfort en ningún sentido y todos los pasos apropiados serán tomados para minimizar cualquier desconfort que usted pueda experimentar. Estos pasos incluyen el detener el programa sin que usted lo abandone, en el caso de que presente alguna lesión o enfermedad; también, retroalimentación diaria es provista dentro de un margen de 12 horas por los investigadores.
¿Cuáles son los beneficios de participar en este estudio?
Una forma en la que se puede beneficiar de participar en este estudio es mejorar la calidad de su salud por medio del control de sus hábitos; un beneficio secundario es el control de su peso.

¿Existe algún costo asociado con la participación en este estudio?
No hay costos monetarios directos por participar en este programa. Sin embargo, mensajes por teléfono móvil de usted hacia los investigadores pueden tener algún costo, si esto es un problema, comunicación por correo electrónico será utilizada.
Tiempo es un costó durante este estudio, la participación requiere un tiempo máximo aproximado de una hora y 30 minutos por día.
Usted puede gastar dinero en una membresía para algún club deportivo o comprando equipo para realizar ejercicio, estos gastos son completamente de acuerdo a sus preferencias.

¿Existe alguna compensación por participar en este estudio?
Usted puede ganar hasta $50 USD, pero necesitará completar el periodo de tiempo de 5 semanas. El dinero es transferido y/o entregado después de la 5-a semana. Todas los datos recolectados es confidencial. Esto significa que su nombre o algún otro identificador no aparecerá en ningún documento en el cual esta información sea registrada. Todas las formas serán codificadas, y los investigadores mantendrán por separado una lista maestra con los nombres de los participantes y los correspondientes números. Una vez que los datos sean recolectados y analizado, la lista maestra será destruida. Todas las formas serán retenidas por lo menos durante tres años en laboratorio del investigador principal (2704 Wood Hall). Durante el transcurso del estudio, los investigadores, los investigadores recabarán información y proveerán retroalimentación electrónica diariamente. Todos los investigadores son estudiantes de nivel doctoral en el departamento de psicología y han recibido entrenamiento ético específico. La información recabada en este estudio podría ser publicada o presentada en conferencias. En ningún punto nombres u otra información de identificación será compartida con el público.

¿Qué sucede si usted desea dejar de participar en el estudio?
Usted puede elegir dejar de participar en el estudio en cualquier momento y por cualquier motivo. No sufrirá ningún perjuicio o penalización por su decisión de detener su participación, pero no recibirá ningún dinero a menos que complete el periodo de cinco semanas del estudio. Sin embargo, en el caso de una lesión o enfermedad, el programa puede ser detenido y re iniciado una vez que usted este recuperado, sin ninguna penalización. Usted no experimentará NINGUNA consecuencia académica o personal si elige retirarse del estudio. Los investigadores también pueden decidir detener su participación sin el consentimiento de usted.

Si usted elige no participar en este estudio, usted puede salir de esta página simplemente cerrando el navegador. Completar esta encuesta indica su consentimiento para el uso de sus respuestas provistas y para su participación en el programa. Si tiene alguna pregunta usted puede contactar a Wayne Fuqua, Ph.D. BCBA-D al (269) 387-4474, Ivan Noe Martinez Salazar al (269) 910-4514, al Human Subjects Institutional Review Board (269) 387-8293 o al vice presidente de investigación (269) 387-8298. Este estudio fue aprobado por Western Michigan University Human Subjects Institutional Review Board (HSIRB) en 1/20/2015. Por favor, NO participe en este estudio después del 1/20/2015. Participar en esta encuesta en línea indica su consentimiento para el uso de las respuestas que usted provea.

* Escriba su nombre

* Elija un pseudónimo

* Escriba su correo electrónico y su número de teléfono móvil

* Yo acepto los términos y condiciones de este consentimiento
  - [ ] Acepto
  - [ ] NO Acepto
ESPAÑOL - contrato de conducta

* Escriba su nombre

* Escriba su pseudónimo

* Escriba su correo electrónico y su número de teléfono móvil

BEHAVIORAL CONTRACT

¿Quién realizará las tareas y recibirá la recompensa?
- (Nombre del participante) (Pseudónimo)

¿Quién fungirá como el Asesor de Conducta?

Ivan Noe Martinez Salazar M.D. (México).
Estudiante de Doctorado en Análisis de la Conducta
Western Michigan University

¿Cuáles son las tareas que serán realizadas?
- Durante 5 semanas (de Lunes a Sábado) usted tendrá que realizar todas las tareas. El Domingo es día de descanso.
- Sólo durante dos semanas, se puede perder dinero por no realizar las tareas.
- Todas las tareas deben ser realizadas antes de las 11pm.

¿En qué consisten las tareas específicamente?
- Usted empezará con un mínimo de tiempo y repeticiones tal y como será establecido a continuación. Sin embargo usted establecerá su propia exigencia de acuerdo con sus propias preferencias y habilidades. Se recomienda empezar a baja intensidad y cantidad de actividad física es recomendado.
- Registro de información en una hoja de Microsoft Excel y la utilización de algún dispositivo electrónico de seguimiento del desempeño, esto último será elegido por usted, no hay ninguna preferencia por parte de los investigadores. Se recomienda, el uso de aplicaciones gratis para teléfono móvil.
- Usted deberá enviar un mensaje de texto por teléfono móvil a los investigadores, con una foto de la hoja de Microsoft Excel y una foto del dispositivo de seguimiento como prueba de su desempeño durante ese día, antes de las 11pm de cada día.
- Con esta información, los investigadores proporcionarán retroalimentación al participante por medio de un mensaje de texto por teléfono móvil, dentro de las siguientes 12 horas.
• Únicamente se recomienda un aumento del 25% de las tareas de actividad física por semana, un incremento mayor no es recomendado o aceptado.
• Un mínimo de un punto de incremento por semana en ambas escalas (alimentación y sueño) es requerido.
• Se recomienda mantener el desempeño durante el periodo de 5 semanas, y se requiere para ganar dinero durante dos semanas, en otras palabras, no puede haber una reducción de 25% en ninguna tarea de actividad física durante esas semanas. Únicamente si esto es acordado entre usted y el Asesor de conducta (Ejem., Lesión o alguna enfermedad del participante).

*** Actividad Física ***
• Caminar un mínimo de 20 minutos/día y/o un mínimo de 150 minutos/semana.
• 1-6 lagartijas/día.
• 1-6 abdominales/día.
• Algunos otros tipo de actividades físicas son aceptables, si duran por lo menos 20 minutos/día (Ejem., nadar, correr, etc.).

*** Hábitos de alimentación ***
Desempeño inicial requerido: 1 punto/día en la escala de hábitos alimenticios.

Escala de hábitos alimenticios
(Un punto es obtenido por cada uno de los siguientes)
• Yo como despacio (Coloco el tenedor y mastico 20-30 veces/bocado) durante cada comida del día.
• Yo como 5 veces por día (usando el modelo de 3 platos grandes y 2 platos pequeños por día).
• Yo controlo la cantidad de comida (Comer dos porciones no está permitido).

*** Hábitos de higiene de sueño ***
Desempeño inicial requerido: 1 punto/día en la escala de hábitos de sueño

Escala de Higiene de Sueño
(Un punto es obtenido por cada uno de los siguientes puntos)
• Yo controlo el ambiente (Ejem., ruido, temperatura, iluminación, colchón, almohada, mascota, otra persona).
• Yo no como o bebo nada cerca de la hora de dormir [Ejem., Cafe, alcohol, fumar (4-6 horas antes de dormir)] o comidas pesadas (2 horas antes de dormir).
• Yo no realicé otras actividades en mi cama además de dormir y tener relaciones sexuales (Ejem., estudiar, ver T.V., leer, etc.).
• Yo dejo de trabajar, estudiar o de estresarme cerca de la hora de dormir (Ejem., por lo menos

¿Qué actividad física o ejercicio se esta usted comprometiendo a realizar cada día?

¿Cuántos minutos de actividad física o ejercicio se está usted comprometiendo a realizar por día al empezar el programa?

¿Cuántas lagartijas y abdominales se está usted comprometiendo a realizar por día, al inicio del programa?
¿Cuál es la recompensa?

- Al inicio del programa Usted obtendrá un total de $50 USD
- Únicamente durante dos semanas, se puede perder dinero por no desempeñar las tareas.
- Un total de 72 tareas tienen un valor monetario. ($ 0.69 USD/tarea).
- Cuando usted no desempeñe alguna tarea o no desempeñe la tarea como fue establecido previamente el participante perderá el dinero, únicamente de esa tarea en específico.
- Durante dos semanas, usted deberá enviar a los investigadores los registros de cada día, antes de las 11 pm. o perderá el dinero de TODAS las tareas de ese día en específico.

¿Cuándo y cómo se entregará la recompensa?

- Hasta $ 50 USD se pueden ganar en este programa. Una semana después de la 5/a semana, el monto final ganado será transferido electrónicamente, entregado físicamente, o convertido en una tarjeta de regalo con dinero electrónico, de acuerdo con las preferencias de cada participante. USTED DEBE COMPLETAR EL PERIODO DE 5 SEMANAS, PARA OBTENER EL DINERO QUE HA GANADO DURANTE EL PROGRAMA.

Motivos de eliminación en el programa, y por lo tanto, sin recibir ningún dinero.

- Si Usted incrementa sus tareas de actividad física más de 25 %, en más de dos días no consecutivos (misma semana).
- Si Usted no envía los registros a los investigadores, en más de dos día no consecutivos (misma semana).

¿Cuál es su método preferido para recibir el dinero que ganará durante el programa?

* Yo acepto los términos y condiciones del contrato de conducta

- Acepto
- NO acepto

Referral / Referencia

Thank you for your interest in our program. Before you begin we must be sure that you are prepared to participate in this study. We recommend that you schedule an appointment (at your own expense) with a healthcare professional near your location. If necessary, we can recommend a professional within your area at no cost. You can send us a message here

http://institutounisahm.org/mail.html

Muchas gracias por tu interés en nuestro programa, antes de empezar debemos estar seguros que estás preparado para participar. Si aún estas interesado en participar en este estudio, puedes agendar una consulta (a cuenta tuya) con alguno especialistas, o puedes preguntarnos sobre algún profesional que recomendemos cerca de donde
vives
(sin ningún costo). Puede enviarnos un mensaje aquí...

http://institutounisahm.org/mail.html
Appendix B

Educational Videos with Survey (English Version)
Educational Videos with Survey (English Version)
https://www.surveymonkey.com/s/6XBKGSG

1. Welcome to our Program to Improve Physical Activity, Eating and Sleeping habits.

In this survey, you will learn about the components of our program to improve physical activity, eating and sleeping habits through different videos.

Your answers will help to improve our instrument, your feedback is greatly appreciated. Thank you for your participation

Next

2. Contact information

* Contact information
Name
Country
Email
Phone

* What is your age?
☐ 17 or younger
☐ 18-20
☐ 21-29
☐ 30-39
☐ 40-49
☐ 50-59
☐ 60 or older

* Are you male or female?
☐ Male
☐ Female
* Which of the following best describes your current relationship status?
  - Married
  - Widowed
  - Divorced
  - Separated
  - In a domestic partnership or civil union
  - Single, but cohabiting with a significant other
  - Single, never married

* What is the highest level of school you have completed or the highest degree you have received?
  - Less than high school degree
  - High school degree or equivalent (e.g., GED)
  - Some college but no degree
  - Associate degree
  - Bachelor degree
  - Graduate degree

* Which of the following categories best describes your employment status?
  - Employed, working full-time
  - Employed, working part-time
  - Not employed, looking for work
  - Not employed, NOT looking for work
  - Retired
  - Disabled, not able to work

In this section we present an Introduction video of our program. Next, we ask you to answer some questions about the content of the video.
Watch the next video and choose the correct answer
You will advance to the next page, only after choosing the correct answer for this question.

☐ This program attempts to have an impact on the quality of life, where I will set my own exigency and rhythm while performing exercise. I will receive feedback from the researchers and the program will last for five weeks.

☐ This program attempts to impact in my economy. I will be pushed to do as much exercise as possible. I will not receive feedback from the researchers and the program will last for more than five weeks.

☐ I did not understand the purpose of the program. I have to watch the video again.

* How likely is it that you would recommend this video to a friend or colleague?
Not at all likely

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4. Eating

In this section we present a video of the eating component of our program Next, we ask you to answer some questions about the content of the video.

* Watch the next video and choose the correct answer
You will advance to the next page, only after choosing the correct answer for this question.

☐ The eating part of this program consists in controlling the quantity of food, using regular cooking methods and skills, and eating five times per day. It does not require any dietary restriction unless it is needed for a previous medical recommendation that I have.

☐ The eating part of this program consists in following a restrictive diet, controlling the quantity of calories per day.

☐ I did not understand the eating component of this program. I have to watch the video again.

* How likely is it that you would recommend this video to a friend or colleague?

Not at all likely | Extremely likely
---|---
0 | 10
1 | 9
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10 | 0
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5. Physical activity

In this section we present a video of the physical activity component of our program. Next, we ask you to answer some questions about the content of the video.
Watch the next video and choose the correct answer
You will advance to the next page, only after choosing the correct answer for this question.

☐ The most important action to take before exercising is to warm up; this can be done by performing natural movements that begin to increase blood flow. Exercise intensity, quantity and length of engagement must be increased gradually.

☐ It is not necessary to perform a warming up before exercising. Exercise must be performed with the maximum intensity, "no pain no gain".

☐ I did not understand the exercise part of this program. I have to watch the video again.

* How likely is it that you would recommend this video to a friend or colleague?
Not at all likely                          Extremely likely

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6. Sleep

In this section we present a video of the sleep component of our program. Next, we ask you to answer some questions about the content of the video.

* Watch the next video and choose the correct answer
You will advance to the next page, only after choosing the correct answer for this question.

☐ The following are recommendations of good sleep hygiene: 1) have a regular bedtime routine, 2) sleep when sleepy, 3) get up if cannot sleep after approximately 15 minutes, 4) avoid caffeine, alcohol, smoking or eating heavy meals before bedtime, 5) do not take naps during the day, 6) have a ritual for going to sleep, 7) do not watch the clock while in bed, 8) have a sleep diary, 9) create an environment conducive to sleeping comfortably, and 10) adhere to a bedtime routine even if tired.

☐ The following are recommendations of good sleep hygiene: 1) if you are tired sleep during the day, 2) take naps, 3) eat as much as you want, smoke or exercise before bedtime as these activities may help you to sleep, 4) if I cannot sleep the best option is to lay awake in bed.

☐ I did not understand the sleep habits component of the program. I have to watch the video again.

* How likely is it that you would recommend this video to a friend or colleague?
Not at all likely

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![Image](image_url)

7. Previous habits

* During the last week, how many times did you perform any type of physical activity (e.g. walking, running, etc.) for 20 minutes or more?

- ○ 1 time per week
- ○ 2 times per week
- ○ 3 times per week
- ○ 4 times per week
- ○ 5 times per week
- ○ 6 times per week
- ○ none

* During the last week, how many times did you perform push-ups?

- ○ 1 time per week
- ○ 2 times per week
- ○ 3 times per week
- ○ 4 times per week
- ○ 5 times per week
- ○ 6 times per week
- ○ none
* During the last week, how many times did you perform sit-ups?  
- 1 time per week  
- 2 times per week  
- 3 times per week  
- 4 times per week  
- 5 times per week  
- 6 times per week  
- none

* During the last week, how many times did you control the quantity of food that you ate per day?  
- 1 time per week  
- 2 times per week  
- 3 times per week  
- 4 times per week  
- 5 times per week  
- 6 times per week  
- none

* During the last week, how many times did you eat 5 times per day?  
- 1 time per week  
- 2 times per week  
- 3 times per week  
- 4 times per week  
- 5 times per week  
- 6 times per week  
- none
* During the last week, how many times did you control the speed of your eating (i.e., eating slowly)?

- [ ] 1 time per week
- [ ] 2 times per week
- [ ] 3 times per week
- [ ] 4 times per week
- [ ] 5 times per week
- [ ] 6 times per week
- [ ] none

* During the last week, how many times did you control the environment where you sleep (e.g., light, temperature, noise, etc.)?

- [ ] 1 time per week
- [ ] 2 times per week
- [ ] 3 times per week
- [ ] 4 times per week
- [ ] 5 times per week
- [ ] 6 times per week
- [ ] none

* During the last week, how many times did you avoid eating or drinking anything at least 1-2 hours before bedtime?

- [ ] 1 time per week
- [ ] 2 times per week
- [ ] 3 times per week
- [ ] 4 times per week
- [ ] 5 times per week
- [ ] 6 times per week
- [ ] none
* During the last week, how many times did you do something else than sleeping or having sex in your bedroom?

☐ 1 time per week  
☐ 2 times per week  
☐ 3 times per week  
☐ 4 times per week  
☐ 5 times per week  
☐ 6 times per week  
☐ none

* During the last week, how many times did you stop studying, working or having stress at least 1 hour before bedtime?

☐ 1 time per week  
☐ 2 times per week  
☐ 3 times per week  
☐ 4 times per week  
☐ 5 times per week  
☐ 6 times per week  
☐ none
Appendix C

Educational Videos with Survey (Español)
Programa para mejorar hábitos de actividad física, alimentación y sueño.

1. Bienvenido a nuestro Programa para mejorar hábitos

Usando esta encuesta, aprenderás por medio de diversos videos en que consiste cada uno de los componentes de nuestro Programa para mejorar hábitos de actividad física, alimentación y sueño.

Tus respuestas nos ayudaran a mejorar nuestros instrumentos, por lo que tu retroalimentación es muy valiosa para nosotros.

Gracias por participar.
Programa para mejorar hábitos de actividad física, alimentación y sueño.

2. Información de contacto

*Información de contacto

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*¿Cuál es su categoría de edad?

- 17 o menos
- 18-20
- 21-29
- 30-39
- 40-49
- 50-59
- 60 o más

*¿Sexo?

- Masculino
- Femenino

*¿Cuál es su estado civil actual?

- Casado/a
- Viudo/a
- Divorciado/a
- Separado/a
- Soltero/a
Programa para mejorar hábitos de actividad física, alimentación y sueño.

*¿Cuál es el nivel de educación más alto que ha recibido?

- Escuela primaria
- Escuela secundaria
- Preparatoria
- Diploma universitario
- Posgrado (maestría, doctorado, etc.)
- Ninguno
Programa para mejorar hábitos de actividad física, alimentación y sueño.

3. Introducción

En esta sección presentaremos un video de introducción al programa, posteriormente te pediremos contestar algunas preguntas en relación a su contenido.

*Observa el siguiente video y después escoge la opción correcta.

Podrás avanzar a la siguiente página, únicamente cuando hayas seleccionado la respuesta correcta para esta pregunta.

- Este programa busca tener un impacto en la calidad de vida, donde yo usaré mi propia exigencia y ritmo para realizar ejercicio, con retroalimentación por parte de los investigadores y duración de 5 semanas.
- Este programa busca impactar en mi economía, donde se me va a exigir realizar mucho ejercicio, sin retroalimentación por parte de los investigadores y dura más de 5 semanas.
- No entendi el propósito del programa, tengo que ver el video nuevamente.

*¿Qué tan probable es que recomiende este video a un amigo o colega?

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Programa para mejorar hábitos de actividad física, alimentación y sueño.

**Por favor contesta las siguientes preguntas, pensando en el video que acabas de ver.**

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Por favor si tienes algún comentario sobre el video, favor de escribirlo a continuación.
Programa para mejorar hábitos de actividad física, alimentación y sueño.

4. Alimentación

En esta sección presentaremos un video explicativo de la parte de alimentación de este programa, posteriormente te pediremos contestar algunas preguntas en relación a su contenido.

∗Observa el siguiente vídeo y después escoge la opción correcta.
Podrás avanzar a la siguiente página, únicamente cuando hayas seleccionado la respuesta correcta para esta pregunta.

![Video](image_url)

- La parte de alimentación de este programa consiste en controlar la cantidad de comida usando vajilla normal y comiendo 5 veces al día. Pero no require ninguna restricción dietética a menos que sea necesario por algún problema de salud que yo tenga.

- La parte de alimentación de este programa consiste en llevar una dieta restrictiva, controlando la cantidad de calorías que ingiero por día.

- No entendí la parte de alimentación de este programa, tengo que ver el vídeo nuevamente.

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**Programa para mejorar hábitos de actividad física, alimentación y sueño.**

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Programa para mejorar hábitos de actividad física, alimentación y sueño.

5. Ejercicio

En esta sección presentaremos un video explicativo de la parte de ejercicio de este programa, posteriormente te pediremos contestar algunas preguntas en relación a su contenido.

*Observa el siguiente video y después escoge la opción correcta.
Podrás avanzar a la siguiente página, únicamente cuando hayas seleccionado la respuesta correcta para esta pregunta.

Lo más importante antes de hacer ejercicio es el calentamiento, usando movimiento naturales. El ejercicio debe realizarse con un aumento gradual del tiempo, la cantidad e intensidad.

Oh no es necesario realizar calentamiento antes de hacer ejercicio. El ejercicio debe realizarse con la máxima intensidad, “si no duele entonces no sirve”

No entendí la parte de ejercicio de este programa, tengo que ver el video nuevamente

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Programa para mejorar hábitos de actividad física, alimentación y sueño.

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**Programa para mejorar hábitos de actividad física, alimentación y sueño.**

**6. Hábitos de sueño**

En esta sección presentaremos un video explicativo de la parte de hábitos de sueño de este programa, posteriormente te pediremos contestar algunas preguntas en relación a su contenido.

*Observa el siguiente video y después escoge la opción correcta. Podrás avanzar a la siguiente página, únicamente cuando hayas seleccionado la respuesta correcta para esta pregunta.*

Las siguientes son recomendaciones de higiene de sueño: Tener un ritmo regular, dormir cuando tenga sueño, si no puedo dormir levantarme, evitar café, alcohol, fumar o comer en exceso antes de dormir, no tomar siestas, tener un ritual para ir a dormir, no ver el reloj si no puedo dormir, tener un diario de calidad de sueño, no realizar ejercicio intenso antes de ir a dormir, crear un ambiente adecuado donde me sienta cómodo para dormir y seguir mi vida y rutina diarias a pesar de que me sienta cansado.

Las siguientes son recomendaciones de higiene de sueño: Si estoy cansado durante el día, lo mejor es tratar de dormir o tomar una siesta, comer mucho, fumar o hacer ejercicio antes de dormir me ayuda a conciliar el sueño, si no puedo dormir lo mejor es permanecer en la cama hasta que lo logre.

No entendí la parte de hábitos de sueño de este programa, tengo que ver el video nuevamente.

*¿Qué tan probable es que recomiende este video a un amigo o colega?*

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Page 10
Programa para mejorar hábitos de actividad física, alimentación y sueño.

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Por favor contesta las siguientes preguntas, pensando en el video que acabas de ver.
Programa para mejorar hábitos de actividad física, alimentación y sueño.

7. Hábitos previos

**Durante la última semana, ¿en cuántas ocasiones realizó algún tipo de actividad física (p. ejem., caminar, correr, etc.) durante 20 minutos ó más tiempo?**

- [ ] 1 vez por semana
- [ ] 2 veces por semana
- [ ] 3 veces por semana
- [ ] 4 veces por semana
- [ ] 5 veces por semana
- [ ] 6 veces por semana
- [ ] ninguna

**Durante la última semana, ¿en cuántas ocasiones realizó lagartijas?**

- [ ] 1 vez por semana
- [ ] 2 veces por semana
- [ ] 3 veces por semana
- [ ] 4 veces por semana
- [ ] 5 veces por semana
- [ ] 6 veces por semana
- [ ] ninguna

**Durante la última semana, ¿en cuántas ocasiones realizó abdominales?**

- [ ] 1 vez por semana
- [ ] 2 veces por semana
- [ ] 3 veces por semana
- [ ] 4 veces por semana
- [ ] 5 veces por semana
- [ ] 6 veces por semana
- [ ] ninguna
Programa para mejorar hábitos de actividad física, alimentación y sueño.

* Durante la última semana, ¿en cuantas ocasiones controló la cantidad de comida que ingirió por día?
- 1 vez por semana
- 2 veces por semana
- 3 veces por semana
- 4 veces por semana
- 5 veces por semana
- 6 veces por semana
- ninguna

* Durante la última semana, ¿en cuantas ocasiones comió cinco veces por día?
- 1 vez por semana
- 2 veces por semana
- 3 veces por semana
- 4 veces por semana
- 5 veces por semana
- 6 veces por semana
- ninguna

* Durante la última semana, ¿en cuantas ocasiones controló su velocidad al comer (comer despacio)?
- 1 vez por semana
- 2 veces por semana
- 3 veces por semana
- 4 veces por semana
- 5 veces por semana
- 6 veces por semana
- ninguna
**Programa para mejorar hábitos de actividad física, alimentación y sueño.**

*Durante la última semana, ¿en cuantas ocasiones controló el ambiente en el que duerme (p. ejem., control de iluminación, ruido, temperatura, etc.)?*

- [ ] 1 vez por semana
- [ ] 2 veces por semana
- [ ] 3 veces por semana
- [ ] 4 veces por semana
- [ ] 5 veces por semana
- [ ] 6 veces por semana
- [ ] ninguna

*Durante la última semana, ¿en cuantas ocasiones evitó tomar o comer cualquier cosa por lo menos de 1-2 horas antes de acostarse)?*

- [ ] 1 vez por semana
- [ ] 2 veces por semana
- [ ] 3 veces por semana
- [ ] 4 veces por semana
- [ ] 5 veces por semana
- [ ] 6 veces por semana
- [ ] ninguna

*Durante la última semana, ¿en cuantas ocasiones realizó alguna actividad diferente de dormir o tener relaciones sexuales en su habitación?*

- [ ] 1 vez por semana
- [ ] 2 veces por semana
- [ ] 3 veces por semana
- [ ] 4 veces por semana
- [ ] 5 veces por semana
- [ ] 6 veces por semana
- [ ] ninguna
* Durante la última semana, ¿en cuantas ocasiones dejó de trabajar, estudiar o estresarse al menos una hora antes de dormir?

- 1 vez por semana
- 2 veces por semana
- 3 veces por semana
- 4 veces por semana
- 5 veces por semana
- 6 veces por semana
- ninguna
Appendix D

Videos Scripts
Hello, and welcome to this program to improve the quality of your health. The objective of this program is to be useful, simple, and of low cost. But the most important purpose is to have a real impact on the quality of your life. There are many miraculous products offering help in reducing your weight, improving your mood, etc. There are thousands of exercise programs, thousands of diets, but the truth probably is that you, like me, have tried many of them. Yet, at the end, you, like me, probably have experienced frustration, failure, maybe a partial success, or maybe even sometimes, counterproductive effects. Frequently, we have to deal with our excess weight or obesity. We are going to explain to you in this program why it is important to control your weight, why it is important to sleep well, why it is important to manage not just the quantity or quality of food that you eat, but to really ENJOY eating the correct quantity and quality of food. This may sound a little bit complex, but we’re going to look at this step by step. During this program, we’re going to use different videos to explain what we will do, and how are we going to do it. Finally, all you need to start this program is a mobile phone, a watch, a measuring tape, a weight scale, and probably, a good pair of sport shoes. We’re not going to push you beyond what you want to perform. At the end, you are going to follow your own rhythm — in other words, your own exigency (that which is necessary). Fortunately, we’re going to be able to provide you feedback so that you will be able to share your experiences, your advances, and the problems that you might face during this program with other people, without their knowing who you are, or visa-versa.

This program will last for some weeks. At the end, our intention is that you will be able to follow your new life style, improve the quality of your health, and that all of these results will impact your life in a real and positive way. Thank for your participation. See you later.

Hello! In this video that we have entitled “Food”, we're going to explain the "eating" part of this program. You’ve probably experienced several “diets” like me, and as I mentioned before, also several frustrations, anger, and even aversion for any type of dietary regimen. It’s true — we need to eat, but we don't need to eat just for the nutritional benefit. We need to eat because it is important for being in a good mood. Eating is a way to have social interactions, and it will continue to be an important part of your life. What is the secret? It is something really simple; let me show you… The secret is… the quantity of food. What do we usually do? When we like something, we usually eat more. We ask for “second helpings”, or “more of the same”, (of course, when it is possible). The problem is that this way of eating leads us to have a larger caloric intake than what our body needs. Why should I stop eating something that I like? Why should I stop eating pizza, beer, wine, or the pasta that I love? Don’t stop eating your favorite foods! What we will ask you to do is to have control over the quantity of food you eat by using regular dinner-size plates. During the day, the usual advice is to have three meals. But people who have diseases like diabetes should divide their food into 5 smaller meals per day. What we’re
going to ask you to do is to eat using a regular-size plate, and to eat all that fits on it. How many of these plates per day? Three… yes three! Eat all that fits on it, but not more than that. You may not eat more than what fits on the plate. DON'T DO THIS, NO HAGAS ESTO That includes, for example, tortillas, salad, pasta, beef, or whatever you want. All that fits on this size plate will be your meal three times per day. But sometimes I am hungry, and when I’m hungry… I eat more! That’s the time when I usually look for junk food — cookies, chips, or desserts. When you experience hunger… eat! But control the quantity of food. this is the moment when this smaller plates can help you. The small plates that we regularly use for desserts are the ones that you will use to control hunger attacks. Of course, many times in our meal, we have soup or something that is served in a bowl. Again, if it fits in a regular bowl, you can eat one serving — but no more! Control the quantity! With the use of instruments and graphics, you will know what is hurting you, and what is the real impact of the food you eat. If you really have a dietary restriction or need a specific diet, for example, if you have high cholesterol or a food allergy… well, then you must have control over the types of food you eat. But if that’s not the case, you can eat whatever you want — just in the correct quantities. You also will notice that you’re probably eating too fast. A part of this program consists of the control of the speed of your eating. Sometimes, we eat in 3 or 5 minutes because of the fast lifestyle we have, but that is incorrect. The best habit is to take enough time to eat, and to enjoy eating! I know it may sound incongruent! “I like to eat, so that is why I am like this, that is why I feel bad, and that is why I am obese or overweight.” Yes, but you’re eating more than what you need, and you’re eating quantities of food that are not good for your health. But you don’t even know what types of food are hurting you. This is why we’re suggesting quantity control — it’s easy! We’re not going to ask you to have any type of dietary restriction. That is not what we ask from you. You need to identify, by yourself, what is the food that is hurting you. Of course, we will provide advice about foods that are good for your health. Again, you need to follow your dietary restriction, whether you have a metabolic problem such as diabetes, cardiovascular disease, or something like high cholesterol, high triglycerides, or maybe reflux or irritable bowel syndrome. And maybe you don’t even know why you have these types of problems, or what types of food are producing these problems. Information, recorded in our control instruments, which are obtained from the quantity of food you eat, will give you knowledge, and will enlighten you about what you need to change, and what can really target the quality of your health. Let’s go to work!

Exercise Video
http://youtu.be/s4MIY9b7RNc

Hello! I would like to be honest with you. I was reluctant to do this exercise video because what I would like to show you is not necessarily an exercise routine. You’ve had enough exercise routines which you can perform watching TV, or by watching on-line, where you can obtain or purchase any exercise program. I only would like to ask you… What is the most important part before doing any physical activity? It is warming up. Let me quickly share something with you. All my life, I’ve practiced martial arts. Unfortunately, when you are a kid, well, you can be limber, or have a lot of skills, and not really need to be interested in warming up. But when you grow up, not warming up
can be transformed into injuries — injuries of tendons, knees, injuries of the shoulders or hip. In this type of sport, the most important step is to do a good warm up. The best way to do it is to perform the natural movements of each joint, and the correct exercise for each muscular group. Let me show you something quickly. if you are going to walk or run, it is important to do flexion and extension of the feet; 10 repetitions can be enough. Next, you can do the circumduction exercise, or move your foot in circles, first to one side, and then to the other side, maybe 10 repetitions, too. Switch your foot. And repeat. Knees are something you need obviously to walk and run, even on a treadmill. But the natural movement of the knees it is not circular; the natural movement of the knees is also flexion and extension. The important point here is, while doing flexion or extension, do not bend your back. Try to maintain your back as straight as possible, but do the extension and flexion movements. In this way, the knee joint starts to warm up correctly. The hip is an impressive joint. You can see its mobility when the martial artists perform different kicks. The hip has a natural circular movement, also, it can do a movement forward and backward, or what is called abduction and adduction of the limbs. The same is true with the arms: circular, flexion, extension, abduction, and adduction. The arms and the elbows have the same circular mobility. Repeating these exercises will help you to warm up correctly. An exercise that I like a lot is called “Jumping Jacks”. It is only open and close — that simple. Or, front and back, also simple. How many times should I do them? As many as you need for feeling your body warming up. You’re turning on your engines to perform the exercise. One part of this program involves two exercises that we’re recommending you to do: crunches (or sit-ups) and push-ups. For crunches, search as many on-line videos as you can, only remember to take care of your back. If you have an illness such as reflux, you cannot lay down completely. Or, if you have back pain, you may have problems doing crunches. The objective is to perform this exercise as naturally as possible, doing the flexion and extension movements for the exercise to work. Push-ups are the same. Push-ups are a natural movement. If you close your arms, it is still a natural movement. The important point is to feel that you’re exercising your chest. Why are we recommending these exercises? A big amount of abdominal fat, or fat in general, is accumulated in the upper body. We need to do something to decrease the fat we have in this area of the body. It is really important not to injure yourself. You’re going to walk and you’re going to run. These exercises are going to help you with the lower body. The upper body is tackled with the two exercises that we’re suggesting to you. And something else that is important is to measure yourself — in this case, your waist. This measurement is a predictive value for cardiovascular disease risk. That is why crunches, or sit-ups, are important. Enjoy exercising; don't get injured; take care of your self step by step, and gradually increase the intensity and quantity of your exercise practice. Don’t get injured; don’t hurt yourself, but move! Good job!

Sleep Hygiene Video
http://youtu.be/ulGRyGrZTcg

Hello! Welcome to this video on Sleep Hygiene.
RITMO REGULAR RITMO REGULAR, REGULAR RHYTHM
We're going to start explaining what it means to have a regular sleep rhythm. This means always going to bed and waking up at the same time. It doesn't matter what has happened
during the day, you must try to maintain the rhythm — then your body will get use to it, and you won't experience variations. Of course, we understand that because of your work or activities, it may be difficult to always maintain the rhythm, but you need to try to do your best to maintain it.

**Duerme Cuando Tengas Sueño, Sleep When Sleepy**

The next two recommendations are related. The first one, sleep when sleepy; don’t remain in your bed if you cannot sleep. After 20 minutes without sleeping, the best option is to get up and find something boring to do, not a stimulating activity. After a while, you will be able to try to sleep again.

**Evita Substancias Estimulantes, Avoid Stimulant Substances**

Specifically talking about stimulants, at least 4 - 6 hours before bedtime, do not drink coffee, chocolate, soda, or not even alcohol. Have you noticed that when people party at night, they usually drink alcohol and smoke? These substances stimulate people, allowing them to continue partying. Don’t do it. These activities affect your sleep rhythm.

**La Cama Es Para Dormir, Bedroom Is For Sleeping**

A bad habit that many people do is using their bedrooms for several activities other than sleeping or having sex. Your bedroom must be used only for these two activities. Any other activity is not recommended in this area of your home.

**No Tomes Siestas, Don’t Take Nap**

A lot of people are used to taking a nap. This is not recommended. But, if you really cannot make it through your day without taking a nap, the recommendation is that a nap last less than one hour — some experts even recommend a maximum of 20 minutes. The most important recommendation is to take a nap before 3 or 4 pm.

**Rituales Para Dormir, Rituals For Sleeping**

A frequent recommendation for parents of children is to establish rituals for sleeping, and this is the same for you. You need to create a ritual. Step by step, night after night, you need to do the same activities. Some experts recommend drinking a hot beverage, but not really close to bedtime, maybe 2-3 hours before bedtime. Others recommend taking a warm shower or bath to relax. The most important step is to establish a routine for sleeping.

**No Veas El Reloj, No Clock-Watching**

Something that many of us have experienced frequently when we cannot sleep is that we watch the clock. We observe how late it is, and how the minutes are passing. Avoid watching the clock — this only produces negative thoughts about the late hour and how tired you will be the next day. Do not watch the clock.

**Diario De Sueño, Sleep Diary**

The only true method to have a record of the quality of your sleep is to keep a sleep diary. Each day, you write the time of going to sleep, the wake up time, if you got up during the night, and whether you’re tired or rested the next day. This information will let you know if you’re really having good sleep habits.

**Exercise, Ejercicio**

We have already mentioned that exercise must be an important part of your daily routine for at least 20 minutes, 3 times per week. Walking or running are good enough for your health.

**Alimentate Sanamente, Eat Healthy**

It is also important to have a balanced diet, so eat healthy.
AMBIENTE ADECUADO, GOOD ENVIRONMENT
Your bedroom must be a good environment for sleeping. You need to create your own environment by controlling the temperature, making yourself comfortable without feeling cold or hot. Light should be 100% reduced, and the same for noise. You must be perfectly comfortable.

MANTEN TU RUTINA DIARIA, KEEP DAILY ROUTINE
This will be our last recommendation, which is about keeping to your daily routine. Many times we are tired after a bad night and we don’t continue our daily routine. This affects your sleep cycle and even increases the insomnia that you might be experiencing. Accomplish your daily activities as much as you can, even if you feel tired. This is how we are finishing our sleep hygiene video recommendations, hoping this information will be useful for you. See you later! Have sweet dreams and an excellent rest!
Appendix E

Social Validity Survey (English & Spanish Versions)
Social Validity Survey (English & Spanish Versions)
https://www.surveymonkey.com/s/6YW6NDH

1. Social validity survey (Encuesta de validez social)

This is an anonymous survey of the program to improve physical activity, eating and sleeping habits. The goal is to assess the social validity of the program.

Esta es una encuesta anónima del Programa para mejorar hábitos de actividad física, alimentación y sueño, el objetivo es evaluar la validez social del programa.

Next

2. Language selection (Selección de idioma)

* 1. What language do you speak? (¿Qué idioma habla usted?)

Next

3. Social validity survey

* 2. Please respond to the next statements according to your personal experiences in following the program to improve physical activity, eating and sleeping habits

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither disagree nor agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>This program is useful to improve the quality of my health</td>
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<tr>
<td>This program helps me to improve my physical activity habits</td>
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<tr>
<td>This program helps me to improve my eating habits</td>
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<td>This program helps me to improve my sleeping habits</td>
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<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neither disagree nor agree</td>
<td>Agree</td>
<td>Strongly agree</td>
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<tr>
<td>This program helps me to invest money in my well-being</td>
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<tr>
<td>This program is easy to follow</td>
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<tr>
<td>The Microsoft Excel tool is easy to follow</td>
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<tr>
<td>The graphics are excellent tools to help me understand and follow my own performance</td>
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<tr>
<td>The most difficult part of doing physical activity is start</td>
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<tr>
<td>Push-ups are an excellent exercise</td>
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<td>Sit-ups are an excellent exercise</td>
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<tr>
<td>I am eating slower now that I am following the program</td>
<td>☐</td>
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<tr>
<td>I am controlling the quantity of food I eat, as indicated in the program</td>
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<tr>
<td>I am eating five times per day, as indicated in the program</td>
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<tr>
<td>The feedback is a valuable component of this program</td>
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<tr>
<td>The feedback is provided in a supportive and useful way</td>
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<tr>
<td>The money compensation is the most important part of this program</td>
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<tr>
<td>For me, an important struggle I had before starting the program was related to my eating habits</td>
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<tr>
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<td>Strongly disagree</td>
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<td>Neither disagree nor agree</td>
<td>Agree</td>
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<tr>
<td>For me, an important struggle I had before starting the program was related to my sleeping habits</td>
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<td>For me, an important struggle I had before starting the program was related to my physical activity habits</td>
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<td>For me, the most difficult sleep hygiene habit is establishing a routine (e.g., bedtime, wake-up time)</td>
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<td>For me, the most difficult sleep hygiene habit is controlling the environment (e.g., temperature, noise, light, mattress, pillow, etc.)</td>
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<td>For me, the most difficult sleep hygiene habit is not eating or drinking close to bedtime (e.g., heavy meal, coffee).</td>
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<td>For me, the most difficult sleep hygiene habit is engaging in other activities in my bedroom besides sleeping and having sex (e.g., studying, watching television, reading, etc.).</td>
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<td>For me, the most difficult sleep hygiene habit is related with stopping work, studying or being stressed close to bedtime.</td>
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<td>The three contingencies model of performance management is a useful tool to understand my behaviors</td>
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</table>
I have noticed important changes in my personal habits, and I will continue to use this program on my own after finishing this five week program.

3. Thank you, please select exit!

4. Encuesta de validez social

4. Por favor, responda las siguientes preguntas, de acuerdo con su experiencia personal siguiendo el Programa para mejorar hábitos de actividad física, alimentación y sueño.

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<td>Este programa me ayuda a mejorar mis hábitos de sueño</td>
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<td>Este programa me ayuda a invertir dinero en mi bienestar</td>
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<td>Estoy comiendo más despacio ahora que estoy siguiendo este programa</td>
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<td>Estoy controlando la cantidad de comida tal y como esta indicado en este programa</td>
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<td>Estoy comiendo cinco veces tal y como esta indicado en este programa</td>
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<td>La retroalimentación es un componente valioso de este programa</td>
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<td>La retroalimentación es provista de una forma correcta y es útil</td>
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<td>El dinero es la parte más importante de este programa</td>
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<td>El difícil más importante que tenía antes de iniciar este programa estaba relacionado con mis hábitos de alimentación</td>
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<td>El difícil más importante que tenía antes de iniciar este programa estaba relacionado con mis hábitos de sueño</td>
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<td>El difícil más importante que tenía antes de iniciar este programa estaba relacionado con mis hábitos de actividad física</td>
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<td>El hábito de higiene de sueño más difícil esta relacionado con establecer una rutina (ejemplo, hora de dormir, de levantarme).</td>
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<td>El hábito de higiene de sueño más difícil esta relacionado con controlar el ambiente (ejemplo, temperatura, ruido, iluminación, colchón, almohada).</td>
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<td><strong>El hábito de higiene de sueño</strong>&lt;br&gt; mas difícil estar relacionado con comer o beber antes de ir a dormir (ejemplo, comida abundante, café, alcohol, fumar)</td>
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<td><strong>El hábito de higiene de sueño más difícil está relacionado con estar en una habitación, además de dormir y tener sexo (ejemplo, estudiar, ver T.V., leer, etc.)</strong></td>
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<td><strong>El hábito de higiene de sueño más difícil estar relacionado con parar de trabajar, estudiar o estar estresados antes de ir a dormir</strong></td>
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<td><strong>El modelo de 3 contingencias es una herramienta útil para entender mis conductas</strong></td>
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<td><strong>Yo he notado cambios importantes en mis hábitos personales y voy a continuar usando este programa por mi cuenta, después del periodo de cinco semanas</strong></td>
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* 5. Gracias, por favor, seleccione salir.
Appendix F

Script for Flyer and Recruitment Procedures
Script for Flyer and Recruitment Procedures

“Behavior Analysis Program to Improve Physical activity, Eating, and Sleeping Habits”

We would like to invite you to learn more about participating in a distance program designed to improve your daily physical activity, eating and sleep habits. The total time commitment for the program will be five weeks, and includes the use of daily feedback, using mobile phone text messages or e-mail. Restrictions: People with a diagnosis of any eating disorder or any physical restriction to perform moderate exercise. A participant can earn up to $50 USD at the end of the five weeks period of time.

If you have any questions, you may contact
Ivan Noe Martinez-Salazar
ivannoe.martinezsalazar@wmich.edu (269-910-4514)

“Programa de Análisis de la Conducta para Mejorar Hábitos Actividad Física, Alimentación y Sueño”

Nos gustaría invitarlo a aprender más sobre cómo participar en un programa a distancia para mejorar su hábitos diarios, actividad física, alimentación y sueño. Duración de 5 semanas con retroalimentación diaria, utilizando mensajes de texto o correo electrónico
Restricciones: Personas con diagnósticos de algún trastorno alimenticio o cualquier restricción física para realizar ejercicio moderado. Cada participante puede ganar hasta $50 USD al final del periodo de cinco semanas.

Si tiene alguna pregunta, puede contactar a
Ivan Noe Martinez-Salazar
ivannoe.martinezsalazar@wmich.edu (269-910-4514)
Appendix G

Microsoft Excel® Sheet Tool
**HABITS 2.0**

**TOTAL WEEK 4**

**TOTAL**

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**AVERAGE OF SIDE-UPS PER WEEK**

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**FEAR OF LOSING $0.69 USD TONIGHT**

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**THE 3 CONTINGENCY MODEL OF PERFORMANCE MANAGEMENT**

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**DO NOT USE ARROWS OF YOUR KEYBOARD, USE MOUSE OR TRACKPAD, THEN CLICK THE CELL**

**PROGRAM TO IMPROVE HABITS OF PHYSICAL ACTIVITY, EATING AND SLEEPING HABITS**

**Microsoft Excel® Sheet Tool**
### AABBA Group

**HABITS 2.0**

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**TOTAL FINAL**

- **Weight Changes**
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- **Sits-Ups Changes**
- **Quads Changes**
- **Hamstring Changes**
- **Sets Changes**
- **Rating Changes**
- **Calc Changes**
- **Score Changes**
- **Sleep Changes**
- **Total Score**

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### ABBAA Group

**HABITS 2.0**

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**TOTAL FINAL**

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- **Score Changes**
- **Sleep Changes**
- **Total Score**

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Record section of the Excel tool
Graphics and goals sections Excel tool

THE 3 CONTINGENCY MODEL OF PERFORMANCE MANAGEMENT

GOAL LINE

PERSONAL GOALS ACTIVITY

PERSONAL GOALS ACTIVITY

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Appendix H

Script for Text Messages Feedback
Script for Text Messages Feedback

The following questions will be used to guide the daily feedback

1. Did you have any problem today performing any activity?

2. Can you identify any competing behavior, stimulus, event or condition that is interfering with the performance of the task?

3. Do you have a clear daily deadline to accomplish that task?

4. Is the reward of money powerful enough to encourage you to accomplish the task?

Las siguientes preguntas serán utilizadas para proporcionar la retroalimentación diaria.

1. ¿Tuvo usted algún problema hoy al realizar alguna actividad?

2. ¿Puede usted identificar alguna conducta, estímulo, evento o condición que este interfiriendo con la realización de la tarea?

3. ¿Tiene usted cada día una línea de plazo clara para realizar la tarea?

4. ¿Es la recompensa de dinero lo suficientemente ponderosa para motivarlo a realizar la tarea?
Appendix I

Human Subjects Institutional Review Board
Letter of Approval
Date: April 7, 2015

To: Wayne Fuqua, Principal Investigator
    Ivan Noe Martinez Salazar, Student Investigator for thesis

From: Daryle Gardner-Bonneau, Ph.D., Vice Chair

Re: HSiRB Project Number 14-09-29

This letter will serve as confirmation that your research project titled “Design of a Behavior Analysis Program to Improve Habits of Saving, Physical Activity, Eating, and Sleep” has been approved under the full category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may only be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., you must request a post approval change to enroll subjects beyond the number stated in your application under “Number of subjects you want to complete the study”). Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSiRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: March 17, 2016