Southern California CSU DNP Consortium

California State University, Fullerton
California State University, Long Beach
California State University, Los Angeles

A Technology-Based Intervention to Address Obesity in College Students

A DOCTORAL PROJECT

Submitted in Partial Fulfillment of the Requirements

For the degree of

DOCTOR OF NURSING PRACTICE

By

Christina M. Campbell

Doctoral Project Committee Approval:

Jean O'Neil, DNP, RN, FNP-BC, Team Leader
Kathleen Hinoki, PhD, MSN, RN, CNS, Committee Member

May 2020

ABSTRACT

Obesity is one of the most significant health issues in the United States. Multiple chronic illnesses and an increase in all-cause mortality are associated with obesity. Additionally, obesity contributes to decreased quality of life, added healthcare costs, and overutilization of scarce healthcare resources. Obesity is prevalent in all age groups, including college-age students. College students face many obstacles in achieving or maintaining a healthy weight and adopting healthy lifestyle choices. Medical and nursing providers in college health clinics often have limited time and resources to provide adequate support to students who desire to make lifestyle changes. Since college-age students are avid users of social media and mobile technology, a technology-based intervention is appropriate and convenient.

The purpose of this Doctor of Nursing Practice (DNP) scholarly project was to evaluate the feasibility and effectiveness of a technology-based weight loss and healthy lifestyle promotion intervention for college students. The objectives were to: 1) decrease Body Mass Index (BMI), 2) lower blood pressure (BP), 3) improve healthy lifestyle behaviors, and 4) increase perception of healthy lifestyle benefits and 5) reduce perception of barriers in college student participants. The Health Promotion Model was used to guide this project (Pender, 2011).

The intervention was an 8-week program through which students received healthy lifestyle information twice weekly in a private Instagram group and coaching via text messaging two times a week. Measures included BMI, BP, and scores on the Health

Promoting Lifestyle Profile (HPLP) II (Murdaugh et al., 2019), an investigator-developed benefits/barriers scale, and a program satisfaction survey. The participants met with the investigator three times (Weeks 1, 4, and 8) and had height, weight, BMI, and blood pressure recorded. At Weeks 1 and 8, the HPLP II and the benefits/barriers scale were administered and a satisfaction survey was delivered via Survey Monkey at the conclusion of the program.

Seven participants completed the program. The participants had a mean decrease in weight of 3.1 pounds, a mean reduction in BMI of 0.6, a mean decrease in systolic BP by 4.3 mm/hg and diastolic BP by 0.3mm/hg. The participants improved their HPLP II scores by an average of 15.1 points and their Benefits/Barriers score by 6.4 points. The seven participants gave an average score of four out of five ("agree") on the following post-satisfaction survey items: 1) feeling healthier; 2) recommend the program to others; 3) useful information. Suggestions on how to improve the program were to have more in-person meetings and to have a longer program duration.

The short duration of this program and the small number of participants were limitations to this project. However, overall weight loss, decreased blood pressure, increased healthy lifestyle behaviors, improved perceived benefits/barriers, and positive satisfaction scores were found despite these limitations. This program was inexpensive, easy to implement, well-received by the students, and can be replicated in other college settings.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

viii

ACKNOWLEDGMENTS

BACKGROUND

Obesity is one of the most significant health issues that currently exists in the United States and has been documented in all age groups. Obesity is linked to a multitude of chronic illnesses and is associated with an increase in all-cause mortality (Centers for Disease Control and Prevention [CDC], 2018a). The effects of obesity cause an overwhelming burden on an already overtaxed healthcare system in the United States. In 2008, it was estimated that obesity-related costs in the United States were 147 billion dollars (CDC, 2018a). Overall, obesity contributes to decreased quality of life, added healthcare costs, and overutilization of scarce healthcare resources (Swanson, 2016). Pertinent to this study, college students face many obstacles when attempting to achieve or maintain a healthy weight or adopt a healthier lifestyle.

Medical and nursing providers in college health clinics often have limited time and resources to provide adequate support to promote students' weight loss and healthy lifestyle behaviors. Healthy lifestyle counseling for obese students in the clinic often includes a brief discussion with the student about diet and exercise with no subsequent follow-up on their weight or lifestyle choices. Since college-aged students are avid users of social media and mobile technology, an intervention using these modalities could be easily implemented in college health clinics to promote healthy weights and lifestyles (Kozak et al., 2017).

Identification of the Problem

At the student health center (SHC) at California State University, Dominguez Hills (CSUDH), students who are overweight and obese are commonplace. A brief random chart review of 130 patients in 2017 at the CSUDH SHC showed that 36% of the

patients were obese and 25% were overweight. Obesity was more prevalent among CSUDH Hispanic students (47%) and Black students (39%) than among White (28%) or Asian (11%) students (Gaal, 2017). A systematic review and meta-analysis by Fedewa, Das, Evans, and Dishman (2014) found the average weight gain during the freshman year to be 1.6 kilograms. Dowd and Zajacova (2014) found an association between being obese at age 25 and a higher level of obesity later in life. Many of the students at CSUDH are already overweight or obese, and, thus, are at risk for additional weight gain during their college years and later in life.

The SHC provides many health services, including routine physicals, women's health, sexually transmitted disease testing, care for acute and chronic illness, and psychosocial health. The staff includes two medical doctors, two nurse practitioners, a pharmacist, two clinical laboratory consists of technicians, two health educators, a registered nurse, a licensed vocational nurse, and 10 psychologists. These services are invaluable to a student population who often has no other access to medical services. The students pay a flat fee per semester for these services at the SHC.

The current process for addressing a student who is overweight or obese is not standardized at this campus clinic. The options include student counseling on weight loss, diet and exercise by the medical providers or having the student see a health educator for an hour-long session on the same. One of the physicians gives lectures on healthy eating and weight loss on campus two to three times per year, with an attendance rate of 10 to 20 students. The providers have expressed frustration that the current system provides inadequate support for students who are interested in weight loss.

The United States Preventive Services Task Force (USPSTF, 2018) recommends the screening of all adults with a body mass index (BMI) measurement in conjunction with "intensive, multicomponent behavioral interventions" for adults diagnosed with obesity (p. 1163). The adoption of a technology-based intervention in the SHC would be a relatively easy way to address the problem of college-age obesity and meet the recommendation from the USPSTF.

Epidemiology

The standard for diagnosing an adult patient with obesity is done by BMI. Body mass index is calculated by dividing an individual's weight in kilograms by the square of their height in meters. In adults, obesity is defined as having a BMI value of over 30. Overweight is defined as a BMI between 25 and 30 (CDC, 2018c). The prevalence of obesity in the United States in 2015 was 39.8%. By age group, obesity prevalence was 20.6% in individuals aged 12 to 19 and 35.7% for individuals aged 20 to 39. In adults aged 20 and older, the prevalence of obesity was highest in those who are Hispanic (47%) and who are non-Hispanic Blacks (46.8%). Non-Hispanic Whites had a prevalence of 37.9%. Similarly, among youths aged 12 to 19 years, the rates for Hispanics (25.8%) and non-Hispanic Blacks (22%) were higher than those for non-Hispanic Whites (14.1%; Hales, Carroll, Fryar, & Ogden, 2017).

The current enrollment at CSUDH is 15,741 students. The ethnic backgrounds of the students are (61.6 %) Hispanic/Latino, (11.44%) Black/African American, (8.7%) Asian, (7.27%) White, and (10.99%) other ethnicities. (CSUDH, 2019).

Health Risks of Obesity

The presence of obesity has been linked to multiple chronic diseases. Cardiovascular complications include hypertension, dyslipidemia, coronary artery disease, and stroke. Obesity is also associated with Type 2 diabetes, gallbladder disease, sleep apnea, and various types of cancer. The psychological effects of obesity include anxiety and depression (CDC, 2018b). A prospective cohort study showed that obesity at age 21 is associated with a 40% to 90% increased risk of mortality later in life (Hirko et al., 2015). Weight gain in young to middle adulthood (ages 18 to 55) has additionally been associated with a significantly increased risk of developing chronic diseases (Zheng et al., 2017).

Use of Social Media and Mobile Technology

The use of social media and mobile technology is pervasive among college-age students, with 90% of young adults aged 18 to 29 using it daily. There appears to be no significant differences in usage among ethnic groups (Perrin, 2015). The most common platforms used by college-age students are Snapchat, Instagram, and Twitter. In young adults ages 18 to 24, 78% use Snapchat, 71% use Instagram, and 45% use Twitter (Perrin, 2015).

Project Objectives

The objective of this DNP project was to develop and evaluate a technology-based weight loss and healthy lifestyle promotion intervention for use at the CSUDH SHC. If this intervention was observed to have been successful, dissemination to other college health services could be considered. The overall goal is to improve health-promoting activities among overweight or obese college students, decrease their weight and BMI, and optimally lower their potential for obesity-related illnesses.

Theoretical Framework

Health Promotion Model

The use of a theory, framework, or conceptual model in a scholarly project serves multiple purposes. In general, its use provides an organizational structure in which to frame the project. It also helps define the concepts within the project and how these concepts are related. In addition, having adequately defined concepts helps ensure consistency within the project (Bonnel & Smith, 2014). The health promotion model (HPM) first appeared in nursing literature in 1982 and is based on concepts from expectancy value theory and social cognitive theory (Pender, 2011). The model attempts to explain why individuals participate or do not participate in health-related behaviors.

There are three major components to this model: individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes (Murdaugh, Parson, & Pender, 2019). The theory posits that individuals have unique individual characteristics and experiences that affect ensuing action, that behavior-specific cognitions and affect can be modified through interventions, and that health-promoting behavior is the desired outcome (Murdaugh et al., 2019; Petiprin, 2016). The HPM was an appropriate choice to guide this DNP project because its goal is to help individuals lose weight and choose healthier lifestyle options. Understanding factors that influence the adoption of healthy behaviors can assist nurses in developing interventions that help individuals change behavior.

HPM Components

The first component of the HPM encompasses the individual's characteristics and experiences. These characteristics and experiences include *prior related behavior* and

personal factors. Prior related behavior influences the likelihood that an individual will engage in health promotion behaviors. Personal factors are designated as biological (age, weight), psychological (self-esteem, self-motivation), and sociocultural (race, ethnicity, education, socioeconomic status). These personal factors also influence health behavior (Murdaugh et al., 2019; Pender, 2011)

The second component of the model is *behavior-specific cognitions and affect*, which includes eight different variables. *Perceived benefits of action* are the perceptions of the positive consequences of adopting a health behavior. *Perceived barriers to action* are the perceptions of the impediments or blocks to undertaking a health behavior. The self-confidence that one has the capability to carry out a health behavior is defined as *perceived self-efficacy. Activity-related affect* is the subjective feeling state before, during, and following a specific health behavior. *Interpersonal influences* are the thoughts involving the behaviors, beliefs, and attitudes of others (family, peers, health care providers).

The perceptions of life situations that can aid or hamper health-related behaviors are considered *situational influences.* The intention to carry out a specific health behavior with identified strategies is the *commitment to a plan of action. Immediate competing demands and preferences* refer to obstacles in the moment that can interfere with the ability to carry out a desired health behavior (Murdaugh et al., 2019; Pender, 2011). The third and last component is *health-promoting behavior.* This component is the desired behavior that is the outcome of decision-making and preparation for action (Pender, 2011).

INDIVIDUAL
CHARACTERISTICS
AND EXPERIENCES

BEHAVIOR-SPECIFIC
COGNITIONS
AND AFFECT

BEHAVIORAL
OUTCOME

PERCEIVED
BENEFITS
OF ACTION

PERCEIVED
BARRIERS
TO ACTION

IMMEDIATE COMPETING
DEMANDS
(low control)
AND PREFERENCES
(high control)

PRIOR
RELATED
BEHAVIOR

PERCEIVED
SELF-EFFICACY

ACTIVITY-RELATED
AFFECT

PERSONAL
FACTORS
Biological
Psychological
Socio-cultural

INTERPERSONAL
INFLUENCES
(Family, Peers,
Providers); Norms,
Support, Models

COMMITMENT
TO A
PLAN OF ACTION

HEALTH
PROMOTING
BEHAVIOR

SITUATIONAL
INFLUENCES
Options
Demand Characteristics
Aesthetics

Revised Health Promotion Model

Figure 1. Pender's health promotion model.

HPM in the Literature

The HPM has been studied extensively in many countries since its publication by Nola Pender in 1982. Aqtam and Darawwad (2018) conducted an integrated literature review of the HPM and found that the model has been used in nursing practice, education, and research. From their literature review, the authors concluded that the model can be used to predict benefits and barriers in health-promoting behaviors, to help guide appropriate nursing interventions, and to discern relationships between variables and health-promoting behaviors (Aqtam & Darawwad, 2018).

HPM for exercise. Brannagan (2010) conducted a study to determine the relationships of self-efficacy, perceived exertion, stress, and demographic factors with physical activity in college freshmen aged 18 to 24 in southeast Louisiana. Information was collected about gender, age, height, weight, ethnicity, college major, participation in high school sports, seven-day activity recall, and perceived exertion. Path coefficients were used to determine the relationships between the variables. There was a statistically significant ($p < 0.05$) positive relationship between an individual's belief in their ability to stick to an exercise program and their level of activity. These findings are consistent with the hypothesis in the HPM that higher levels of self-efficacy have a positive relationship with the adoption of health-promoting behaviors.

A descriptive study by Nevins et al. (2019) was used to explore strategies to improve the exercise and hydration habits of undergraduate nursing students in the central coast of California. An 8-week intervention was implemented using email reminders about exercise and hydration at the start of the study, and then again during weeks four and six. Surveys were administered before and after the eight-week study.

Water intake increased and was statistically significant ($p = 0.05$). An increase in the amount of exercise did occur, although it was not statistically significant ($p = 0.15$). Limitations of the study included small sample size and the short length of the study.

HPM for self-care. Nevins and Sherman (2016) examined undergraduate nursing student perspectives of self-care practices utilizing the HPM. The authors conducted a descriptive study on a sample of nursing students in a baccalaureate nursing program in the western United States, using a survey to determine the perceived self-care and complementary therapy practices used by these nursing students. The survey inquired about participants' perceptions of their overall health, diet, hydration, exercise, and use of complementary therapies such as acupuncture, massage, meditation, and yoga. The nursing students rated their overall health as being very good, but indicated the need to lose weight, improve their diet and hydration, increase exercise, and decrease stress. Having a better understanding of current self-care practices can help providers identify gaps in knowledge and tailor interventions on these deficiencies.

HPM in college-age obesity. The HPM is an excellent fit for the development of a technology-based intervention to promote weight loss in the college setting. Having a clear understanding of the individual characteristics and experiences and the health behavior-specific cognitions and affect will guide the development of the intervention. The students at this university are primarily Hispanic and African American, come from backgrounds of low socioeconomic status, and do not live on campus. This population has its own set of challenges with achieving weight loss and adopting healthy lifestyle choices. The technology-based intervention that is proposed in this project will provide

individualized strategies to incorporate the components seen in the adapted HPM in

Figure 2.

Individual Characteristics and Experiences

- **Prior Related Behavior:** prior attempts at weight loss, prior healthy lifestyle choices)
- **Personal Factors:** age, ethnicity, race, sex

Behavior-Specific Cognitions and Affect

- **Perceived Benefits:** being healthier, preventing disease, feeling better, improved self-esteem
- **Perceived Barriers:** lack of time/motivation/knowledge, stress, negative emotions, discouragment from not seeing results, financial contraints
- **Perceived Self-Efficacy:** self-confidence
- **Situational Influences:** limited access to healthy food, lack of time due to demands from school and work, eats food prepared by others

Behavioral Outcomes

- **Health-Promoting Behaviors:** increased exercise, increased water intake, increase in fruits/vegetables, decrease in empty calorie foods

Figure 2. Adapted HPM (based on Pender, 2011).

REVIEW OF THE LITERATURE

Overview

To support and frame this doctoral project, a review of the literature was conducted. The literature review served as the basis of the problem identification, the methods, and the evaluation to be utilized in the project. The purpose of this project was to address the problem of college-age obesity by initiating a technology-based intervention to promote weight loss and healthy lifestyle choices.

A literature search was performed utilizing the electronic databases of PubMed, CINAHL, and PsycINFO. The major terms that were used included obesity in college students, technology-based interventions for weight loss (including text messaging, social media and smartphone apps), self-efficacy in weight loss, perceived benefits to weight loss, perceived barriers to weight loss, healthy diet, physical activity, and lifestyle questionnaire tools. Where possible, the search was narrowed to college students, young adults, or emerging adults. The search was narrowed to sources published between January 2014 and April 2019. Articles were-limited to peer-reviewed journals written in the English language.

The literature review was organized into four categories: (a) obesity in college students, (b) technology-based interventions for weight loss, (c) perceived benefits and barriers to weight loss, and (d) self-efficacy in weight loss.

Obesity and Subsequent Risks in College-Age Students

Understanding the risk of future disease with obesity in the college-age population reinforced the need to implement interventions that promote weight management and the adoption of healthy eating and physical exercise. Not only do many

students start their college experience being overweight, they also tend to gain weight in their college years. Fedewa et al. (2014) conducted a systematic review and meta-analysis of weight gain among college students. The authors found that the average student weight gain was 1.55 kg, with a 1.17% increase in body fat with no differences between sexes. Moderate weight gain (>2.5kg to <10kg) in young adulthood (age 18 to 21) has been associated with obesity later in life (Zheng et al., 2017.) Both moderate weight gain and being obese in young adulthood have been linked to an increased risk of hypertension, premature cardiovascular disease, and all-cause mortality (Hirko et al., 2015; Zheng et al., 2017). Finally, Zheng et al. (2017) also found that moderate weight gain is associated with an increased risk of obesity-related cancers.

Technology-Based Interventions for Weight Loss

The use of technology-based interventions to guide weight loss efforts has been gaining popularity, especially in the last 10 to 20 years. The effectiveness of these interventions has been studied in several recent studies. As most college students have access to the internet, use social media, and also own a smartphone (Perrin, 2015), technology-based interventions appeared to be a natural fit for this population.

In the young adult/college student population, studies that evaluated text messaging as an intervention for weight loss were the most prevalent. Keating and McCurry (2018), Stephens, Yager, and Allen (2017), and Napolitano, Hayes, Bennett, Ives, and Foster (2013) all conducted studies that used text messaging as an intervention. Social media was evaluated by West et al. (2016) and Napolitano et al. (2013). Godino et al. (2016) used a combination of social media, smartphone apps, emails, and blogs. Although the studies varied in the type and duration of the interventions, the results all

showed either weight loss or an improvement in weight control behaviors. Statistically,

significant weight loss was found in the studies by Napolitano et al. (2013), Godino et al.

(2016), and Stephens et al. (2017). The study by Keating and McCurry (2018) saw

weight loss after the intervention, although not at a statistically significant level. West et

al. (2016) found no weight loss, but did observe an increase in weight control behaviors

such as a decrease in calorie, fat and carbohydrate consumption, and an increase in

exercise. One of the common limitations in these studies was homogenous samples, with

a majority of the studies having many more females and Caucasian participants.

Similar results have been seen in studies of the general adult population. Both

Fischer et al. (2016) and Donaldson, Fallows, and Morris (2014) found statistically

significant weight loss with a text messaging intervention. A systematic review by

Levine, Savirimuthu, Squires, Nicholson, and Jay (2014) evaluated 16 randomized

control trials that utilized technology-based interventions in a primary care setting, with

weight loss as the primary outcome. Weight loss was found in 75% of the studies. Of

note, interventions that employed software guided by providers (86%) and feedback from

personnel (85%) led to significant weight loss.

Another systematic review examined technology-based interventions in minority

populations (Bennett et al., 2014). The authors were only able to find six studies that met

the inclusion criteria of at least 50% of their participants being racial/ethnic minorities.

More than half of these studies reported statistically significant weight loss after a

technology-based intervention.

Perceived Benefits and Barriers to Weight Loss

To develop a successful personalized intervention to help college students lose weight, one must understand what the most common perceived benefits and barriers are in regard to weight loss. There was a paucity of literature regarding the perceived benefits and barriers of weight loss specific within the college-age population. Research on this topic was found to be more readily available for the adult population in general.

Perceived Benefits

A qualitative study by Corsino et al. (2016) found that male participants ranked being healthier and preventing disease as their main motivators for losing weight. The women participants ranked feeling better and improving their self-esteem as their main perceived benefits. McVay, Yancy, Bennett, Jung, and Voils (2018) found that facilitators for adults initiating behavioral weight-loss interventions include affordability, scheduling compatibility, anticipated effectiveness of the intervention, and presence of social support.

Perceived Barriers

Johnson and Annesi (2018) found in their qualitative study with young adults, that the most common perceived barriers to weight loss were lack of time, lack of motivation, poor eating habits, stress, negative emotions, influence of significant others, being discouraged from not seeing results, financial constraints, and lack of knowledge of what to eat. Similar findings were found in studies with other adult populations (Burgess, Hassmen, & Pumpa, 2017; Corsino et al., 2016).

Self-Efficacy in Weight Loss/Healthy Behaviors

Increased self-efficacy was correlated with a positive influence on health promotion behaviors such as maintaining a healthy weight, eating a balanced diet, and engaging in physical activity (Murdaugh et al., 2019). Khodaveisi, Omidi, Farokhi, and Soltanian (2017) conducted a study aimed at improving nutritional behavior in a sample of Iranian women. Education and counseling were given to the intervention group about the benefits of healthy diet behaviors, practical skills to promote the behaviors, barriers and ways to overcome them, and measures to promote self-efficacy. Mean scores were significantly improved after the intervention for nutritional behavior, perceived benefits, perceived self-efficacy, commitment to action, interpersonal and situational influences, behavior-related affect, and perceived barriers ($p < 0.001$). Brannagan (2010) found that there was a positive correlation with the self-efficacy that one could adhere to an exercise program and their level of activity ($p<0.05$).

Conclusion

The goal of this DNP project was to provide and evaluate a technology-based intervention to aid college students in weight loss, to improve their dietary choices, and to increase their physical activity. There was a limited amount of research evidence that supported the use of technology-based interventions in this specific population. To help guide the development of this intervention, it was imperative to understand the applicable HPM components to this project of self-efficacy, perceived benefits, and perceived barriers. A review of the literature of these components helped direct the intervention to help promote self-efficacy and perceived benefits and to decrease barriers to weight loss.

METHODS

Introduction

The purpose of this DNP project was to develop a technology-based intervention for use with college students to improve health-promoting behaviors, encourage weight loss, and decrease the risk of obesity-related illness in this population. The HPM was used to guide this intervention. This evidence-based practice project with pre/post-measures served as a pilot program to evaluate the feasibility and effectiveness of using technology to improve the nutritional and physical activity behaviors in the college population.

Ethical Considerations

With any type of study or intervention, ethical issues must be considered. With an increase in physical activity, there are always risks involved. To help mitigate these risks, any student who had an initial blood pressure >130/80 was required to have a full physical exam by one of the medical providers at the SHC before being cleared to increase their physical activity.

The subject of weight loss can be difficult for some individuals. Although weight loss was a variable in this study, the main focus of the intervention was on the behavioral change of adopting a more health-promoting lifestyle. The hope was that small, incremental changes in behavior may lead to weight loss over time. To prevent any self-esteem issues, the program participants were self-identified as wanting to change their behavior; no students were referred by SHC staff to participate.

Institutional review board (IRB) approval from both CSUDH and California State University, Los Angeles was secured before the initiation of this project. After a student

volunteered to participate in the program, he or she was asked to come in for an initial office visit with the investigator at the SHC. Informed consent included the nature and purpose of the program, a detailed description of the intervention, potential risks and benefits, and procedures for ensuring privacy and confidentiality. Students were assured that participation in the program was entirely voluntary and that they could withdraw from the program at any time. The informed consent document has been included (Appendix A).

All the data collected were kept securely in a locked box, and the only individual who had access was the primary investigator. There was no identifying information (names, birth dates, phone numbers, email addresses, street addresses) on the forms. The HipaaBridge app, which is compliant with the Health Insurance Portability and Accountability Act (HIPAA), was utilized to keep text conversations secure. The participants used Instagram Direct, a social media platform that allows a group to be private from all other Instagram users. By the design of Instagram Direct, only those in the private group were permitted to view any information or comments. The participants were informed that their identity would be known by others in the group, but not by any other users of Instagram. If a participant wanted to remain anonymous, they had the option of creating a "fake profile" and using a false name. Messaging was done within the platform of Instagram and not through personal email.

Setting

The setting for this project was CSUDH, an urban university located in the city of Carson that serves the greater Los Angeles area and the South Bay region (CSUDH, 2019). The enrollment at CSUDH was 15,741 students at the time of this study, with

most of the students being either of Hispanic/Latino descent (61.6%) or Black/African American descent (11.44%). Females made up 64.1% of the population and males 35.9%. The average age of the undergraduate student was 24 years (CSUDH, 2019). The SHC is located on the campus and provides many health services including routine physicals, women's health, sexually transmitted disease testing, care for acute and chronic illness, and psychosocial health.

Sample

Recruitment for this program was done via posters displayed in the SHC and around campus (Appendix B), and by a mass campus email message to faculty and staff. Faculty and staff were asked to pass on information about the study to their students as they saw fit. Interested students were encouraged to contact the investigator by email for additional information about the program. The recruitment period was four weeks in duration. The goal was to have 30 to 40 students enrolled in the program initially, knowing that attrition would most likely occur. As an incentive, participants were to be given a $5 Starbucks gift card at the initial visit, and again at both the 4- and 8-week visits.

At the initial visit, project participant eligibility was determined. Eligibility requirements included being between the ages of 18 and 29 years, having a BMI > 25, being able to read and write English, and owning a smartphone that could receive text messages and access Instagram.   Students would be excluded if they were currently enrolled in another structured weight loss program, were taking weight loss medications, or had Type 1 or Type 2 diabetes. If a student was found to have an elevated blood pressure of >130/80, they were required to have a full physical (free of charge) and

clearance from one of the medical providers in order to be able to participate in the program.

Physiologic Measures

The weight of each student was measured in pounds and on the same calibrated scale for all visits. Students were weighed in their street clothes (removing any heavy jackets or sweatshirts) and without shoes. Their height (in inches) was measured using the same scale. A BMI was to be calculated utilizing Quetelet's index. Blood pressure was measured manually using the appropriately sized blood pressure cuff. Finally, each student's weight and blood pressure were measured twice and then averaged, with the mean value then recorded.

Instruments

The Health Promoting Lifestyle Profile II (HPLP II) instrument that was administered consists of six subscales to measure the components of health promotion: health responsibility, physical activity, nutrition, interpersonal relationships, spiritual growth, and stress management (Murdaugh et al., 2019). This instrument has been widely used in adolescent and young adult intervention studies on weight loss (Murdaugh et al., 2019). The instrument contains 52 questions that are answered by options on a Likert scale and is available in both English and Spanish (Appendix C; Walker, Sechrist, & Pender, 1995). Scoring is done by calculating a mean of the participant's responses to all 52 items. Items are scored as: Never = 1, Sometimes = 2, Often = 3, and Routinely = 4. The six subscale scores can also be calculated with a mean of the total of each subscale's items (Walker et al., 1995). The HPLP II has been shown to have construct reliability and validity (Walker & Hill-Polerecky, 1996; Walker, Sechrist, & Pender,

1987). Permission via email was granted by Dr. Nola Pender to use and adapt the HPLP II instrument for use in this study (Appendix D).

The Benefits/Barriers Tool (B/B) was developed by the investigator to assess the success of the intervention in increasing the participants' perceived benefits of adopting a healthier lifestyle and decreasing the perceived barriers (Appendix E). The items on the tool were constructed from a review of the literature on perceived benefits and barriers.

Program satisfaction was assessed with an investigator-developed satisfaction scale containing eight items (Appendix F). This program satisfaction survey was sent out via Survey Monkey. Six of the items were on a Likert-type scale in which each item was to be individually ranked. Participants were also given the opportunity to answer two open-ended questions to provide additional feedback.

Procedure

The SHC staff received an overview of the program in April of 2019. Although the investigator was responsible for all of the data collection and implementation of the program, the staff were made aware of the purpose and implementation of the program. The staff education consisted of the purpose and nature of the program, the student eligibility criteria, the text messaging and social media intervention, and the data to be collected. The staff was reminded that participation by the student was entirely voluntary and that students could withdraw from the program at any time. The confidentiality of student data was also reviewed.

After a student was assessed to have met the eligibility criteria, the student was asked to fill out a form with demographic data (age, sex, race/ethnicity) and assigned an identifying number (Appendix G). Height, weight, and blood pressure were measured as

described previously (Appendix H). Students were then asked to complete the HPLP II and the B/B forms. After each participant completed these forms, the forms were put in a securely locked box. The investigator was the only individual who had the combination code to this box.

Four forms were used for data collection: the demographic data form, the data collection form, the HPLP II form and the B/B form. Each participant was assigned a random number. The participant's name and number were recorded on an Excel spreadsheet and kept secure on the password-protected personal laptop of the investigator. No identifying information was included on any of the forms.

The participants were asked to download the HipaaBridge app on their smartphones and were invited to the Instagram Direct private social media group. After week four of the program, the participants returned to the SHC for weight, BMI, and blood pressure measurements. Upon conclusion of the 8-week program, the participants were to return to the SHC for a final measurement of their weight, BMI, and blood pressure and were asked to fill out the HPLP II and B/B forms again.

Social Media Intervention

The students enrolled in the program were sent an invitation to join a support group via Instagram Direct. Only those invited by the investigator were able to view what was shared in that group. Twice a week, content was posted by the investigator for the group. Content included a variety of topics, including nutritional information (dietary recommendations, portion control, strategies for eating out, recipes, meal planning) and

physical activity tips (Appendix I). Suggestions on how to overcome barriers and motivation to change behavior were included. The students were encouraged to reach out to each other for ideas and support in improving lifestyle choices. Students could also post questions for the program coordinator. All information posted on Instagram was consistent with the dietary recommendations of the United States Department of Agriculture (USDA, 2019) and the physical activity recommendations of the United States Department of Health and Human Services (HHS, 2018).

Text Messaging Intervention

After informed consent was obtained, the student received text messaging support and coaching from the investigator twice a week. To ensure conversations were kept confidential and private, the HipaaBridge app was used for all text-messaging communication between the investigator and the participants. These texts included a check-in with the student to inquire about their efforts to improve their nutritional intake and physical activity. Students were advised that the text messages should only be about lifestyle behaviors.

If at any time a student reported having any new physical symptoms or emotional complaints, they were to be instructed to go to the SHC for a health evaluation by one of the medical providers or counselors. Text messaging was done during SHC business hours when possible, so students could immediately go to the SHC if needed. If a student mentioned a physical or emotional issue after hours, they were referred to an urgent care clinic or emergency department.

Data Management and Analysis

Data were collected during Week 1, Week 4, and Week 8, with the recording of each student's weight, BMI and blood pressure. At Week 1 and 8, the HPLP II and the B/B were additionally administered in person, scored and documented. Each participant was assigned an identifying number, and only this number was used on the data collection forms to protect the anonymity of the participants. No identifying data were to be written on any of the forms. At the end of the program, an anonymous satisfaction survey was sent via email by the investigator, using Survey Monkey.

An Excel spreadsheet was kept by the investigator with the name of the participants and their specific identifying number. The Excel spreadsheet was stored on the password-protected personal laptop of the program coordinator. All of the data collection forms were kept in a locked box with the only combination known by the program coordinator, and will be kept for a total of three years.

Timeline for the Project

The process for application for IRB approval began in late May 2019. After IRB approval was obtained, recruitment for participants started at the beginning of the fall semester for CSUDH students (in late August 2019). The recruitment period lasted for two weeks. Immediately after the recruitment period ended, the 8-week program was commenced and then was completed by the middle of December, before the participants' final exams. Data analysis and evaluation of the program began in January 2020. The final paper, poster, and presentation were completed by April 2020 before Dissemination Day at California State University-Fullerton.

RESULTS

Overview

A total of 10 students initially enrolled in the program. At the conclusion of the enrollment period, one student did not meet the BMI criteria, and two students were unable to continue in the program due to scheduling conflicts. Their data were not included in the analysis of results. A total of seven students completed the entire program, with six of them being female and one being male. The age range of the students was 18 to 26, with a mean age of 22. Five of the students identify as Hispanic/Latino, one as Black/African American, and one as mixed ethnicity (Hispanic/Latino, Black/African American and Middle Eastern). Given the study's small sample size, the results from this project utilized a descriptive statistics approach.

Weight and BMI

Four of the seven participants lost weight, with the largest amount of weight loss at 16.2 pounds and the smallest amount of weight loss at 3.0 pounds. The other three students gained weight with a range of weight gain of 2.3 pounds to 4 pounds. The mean weight change was a decrease of 3.1 pounds (Table 1). For the students who lost weight, the range of decrease in BMI was from 0.8 to 3.2. For the students who gained weight, the range of increase in BMI was from 0.4 to 0.7. The mean change in BMI was a decrease of 0.6 (Table 2).

Table 1

Change in Weight

Participant #	Weight #1 Initial	Weight #2 Week 4	Weight #3 Week 8	Change in Weight
1	136.5	129.5	120.3	-16.2

2	152.3	156.0	155.7	+3.4
3	164.1	160.1	161.1	-3.0
4	166.5	164.5	160.2	-6.3
5	276.1	275.0	270.3	-5.8
6	254.0	253.0	258.0	+4.0
7	243.0	246.9	245.3	+2.3
				Mean Change in Weight= -3.1 lbs

Table 2

Change in BMI

Participant #	BMI #1 Initial	BM1 #2 Week 4	BMI #3 Week 5	Change in BMI
1	25.1	23.8	21.9	-3.2
2	26.9	27.6	27.6	+0.7
3	29	28.3	28.3	-0.5
4	32.6	32.2	32.2	-1.4
5	34.5	34.4	34.4	-0.8
6	42.3	42.1	42.1	+0.6
7	43.0	43.7	43.7	+0.46
				Mean Change in BMI= -0.6

Blood Pressure

The mean pre-intervention systolic blood pressure of the participants was 116.14 and the post-intervention mean systolic blood pressure was 111.86, with a mean decrease of 4.28. Mean pre-intervention diastolic blood pressure was 73.0, and post-intervention mean diastolic blood pressure was 72.71, with a mean decrease of 0.29.

Health Promoting Lifestyle Profile II

Scoring was done by calculating a mean of the participant's responses to all 52 items. Items were scored as: Never = 1, Sometimes = 2, Often = 3, and Routinely = 4. An improvement in their mean HPLP II score was observed: 15.1 points (Table 3). The score for each of the six subscales (Health Responsibility, Physical Activity, Nutrition, Spiritual Growth, Interpersonal Relations, Stress Management) was also calculated. The subscales with the corresponding profile items are shown in Table 4.

Table 3

Health Promoting Lifestyle Profile Total Scores

Participant #	Pre-Intervention Score	Post-Intervention Score	Change in Score
1	100	110	+10
2	133	127	-5
3	106	122	+16
4	125	112	-13
5	113	154	+41
6	93	115	+22
7	113	148	+35
			Mean change in score=+15.1

Table 4

Health Promoting Lifestyle Profile II Subscales Items

Subscales	Items
Health Responsibility	3, 9, 15, 21, 27, 33, 39, 45, 51
Physical Activity	4, 10, 16, 22, 28, 34, 40, 46
Nutrition	2, 8, 14, 20, 26, 32, 38, 44, 50
Spiritual Growth	6, 12, 18, 24, 30, 36, 42, 48, 52
Interpersonal Relations	1, 7, 13, 19, 25, 31, 37, 43, 49
Stress Management	5, 11, 17, 23, 29, 35, 41, 42

The mean improvement in the score of each subscale is shown in Table 5. Each of the subscales' scores had an improvement after the Instagram and text messaging intervention. The subscales that had largest amount of improvement were Nutrition and Health Responsibility, followed by Physical Activity, Stress Management, Spiritual Growth, and Interpersonal Relations.

Table 5

Change in Health Promoting Lifestyle Profile II Score for Subscales

Participant #	Health Responsibility	Physical Activity	Nutrition	Spiritual Growth	Interpersonal Relations	Stress Management
1	+3	0	+3	+5	-1	+6
2	+1	0	-2	+1	-5	0
3	+4	+6	+7	-3	-1	+3
4	+4	+2	+4	+2	-1	-3
5	+12	-2	+9	+8	+3	+8
6	+4	+3	+7	+3	+4	+1
7	+8	+11	+10	-2	+2	+5
Mean Change	+5.14	+2.86	+5.43	+2.0	+0.14	+2.86

Benefits and Barriers Tool

The B/B Tool was developed by the investigator with the goal of increasing

students' perceptions of the benefits of adopting a healthy lifestyle and decreasing the

perceptions of barriers that can impede efforts to improve their healthy habits. The

highest possible score on this tool was 50, and the lowest possible score was 10. For

items that addressed perceptions of benefits (Items 2, 3, 4, 6, 10), the scoring was as

follows: Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, and Strongly Disagree

= 1. The items that addressed perceptions of barriers (Items 1, 5, 7, 8, 9) were reversely

scored: Strongly Agree = 1, Agree = 2, Neutral = 3, Disagree = 4, and Strongly Disagree

= 1. Five of the participants had improvements in their overall B/B score, one score

stayed the same, and one participant had a decrease in their score. The mean

improvement in score was 6.4 (Table 6).

Table 6

Benefits and Barriers Tool Scores

Participant #	Pre-Intervention Score	Post-Intervention Score	Change in Score
1	31	31	0
2	30	40	+10
3	29	42	+13
4	29	38	+11
5	29	38	+7
6	35	33	-2
7	34	40	6
			Mean Change in Score=+6.43

Program Satisfaction Survey

Four of the seven participants returned the anonymous program satisfaction

survey that was delivered by email, via Survey Monkey. The scoring was calculated as

follows: Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, and Strongly Disagree

= 1, with the highest possible score a 5 and lower possible score a 1. The results are

shown in Table 7.

Participants were also given the opportunity to answer two open-ended questions to

provide additional feedback. The first open-ended question was, "Is there anything you

disliked about the program?" The responses were, "Nope, loved it," "not at all," "a bit

inactive from other students," and "I would've liked to meet in person too." The second

open-ended question was "What could make the program better?" The responses to this

question were, "more time," "needs more involvement and events to motivate us," "more

activities," and "I think meeting in person optionally would've been cool too. The people who wanted to could meet among themselves and go out and give support in person."

Table 7

Results of Program Satisfaction Survey

	Average Score
I feel that I'm healthier after participating in this program.	4 out of 5
I would recommend this program to other students.	4 out of 5
I found the text messaging support to be helpful.	4 out of 5
I found the information posted on Instagram to be helpful.	4 out of 5
I found the text messaging app easy to use.	2.5 out of 5
I found support from other students in the Instagram group.	1.5 out of 5

Participant Comments

During the in-person visits at the SHC and during text-messaging communications, the investigator asked informal open-ended questions with regards to changing lifestyle behaviors. Some of the questions asked about changes they were able to make, what they learned in the program that week that was helpful, what benefits they experienced with changes they made, and what struggles they had that week.

Lifestyle changes. Some of the comments heard from the students about changes they were able to make included, "I am trying to walk 30 minutes a day now," "I am drinking more water," "I have started bringing my snacks to school with me so I can eat healthier;" "I am not eating as much fast food as before," "I'm trying to cook more at home," and "I am trying to eat more fruits and vegetables every day."

Helpful information. The answers regarding what information they had learned that was helpful included, "I didn't know you could break your exercise into smaller amounts of time. I always thought you had to exercise for an hour for it to be helpful,"

"I've learned to make better choices when eating on campus," "I didn't realize that stress and lack of sleep could cause me to gain weight," "I didn't realize that my coffee drinks had so many calories," and "I realize that I can have a bad day with food, but get back on track the next day and still lose weight."

Benefits. When the students were asked what benefits had they experienced with their lifestyle changes, the comments included, "I feel so much better," "I have more energy," "I am sleeping better," and "My clothes are fitting better."

Challenges. The majority of the comments the students made about struggles with changing lifestyle behaviors had to do with lack of time and stress. Comments included, "I had a crazy week with school and work and I couldn't focus on my diet and exercise," "I was doing good until midterms and then I just got too busy," "I was too busy to cook or shop for snacks this week," and "Over Thanksgiving I just ate too much."

DISCUSSION

Investigating the feasibility of implementing a technology-based intervention to both educate and encourage college students to make healthier lifestyle choices produced some encouraging results. Despite the short duration of the program of only eight weeks, four of the seven students demonstrated weight loss and a decrease in BMI. There was also an overall mean decrease in both systolic and diastolic blood pressure. Five of the seven participants improved their HPLP II score with a mean improvement of 15.1 points, with a mean increase in all of the health promotion subscales. The scores on the B/B tool also showed an overall increase in perceived benefits of adopting a healthier lifestyle.

Text Messaging Intervention

The HipaaBridge text messaging app was used for communication between the participants and the investigator and had a dual purpose. The first purpose was to keep the information that was shared between the participant and the investigator private and protected in accordance with HIPAA regulations. Secondly, with the use of this app, the personal cell phone number of the investigator could be kept confidential.

The satisfaction score with regards to the ease of using the HipaaBridge app was 2.5 on a 5-point scale. It would have been helpful to discover what difficulty the students had with using the app or what they did not like about the app.

Although engagement was not specifically tracked during this project, the students were engaged with the text messages. Every student responded to each text that this investigator sent.

Social Media Intervention

The social media intervention was done through Instagram Direct, a private group within the Instagram platform. Twice weekly, health information was posted on Instagram Direct. The participants were encouraged to post comments or questions and to reach out to other students for conversation or support. There was some engagement on Instagram from the students during the program, but less than expected. One student put out a message to the group asking if anyone would be interested in getting together for a walk or a run, but there was no response from the other participants. Three of the four participants who completed the program satisfaction survey mentioned that they would have liked to have met in person and have more activities as a group. In the future, adding an optional in-person group meetings could be considered to potentially increase engagement among the participants. The fact that the participants expressed the desire to

meet in person was a surprise to the investigator, as the thought had been that students were too busy to meet in person and were likely to prefer communicating only through technology. That did not appear to be the case for this group of college students.

Cost

The overall cost of implementing this project was quite low. The investigator was able to use an available exam room, blood pressure cuff, and weight scale at the SHC at no cost. The HipaaBridge text messaging app was free to use and having an Instagram account had no associated costs. The educational materials posted on Instagram were created using Microsoft PowerPoint, which the investigator already owned. The only costs incurred were $125 for the Starbucks gift card incentives, and a printing cost of approximately $50 for recruitment flyers and study instruments.

Limitations

The most significant limitation to this DNP project was the small number of participants. The goal was to have at least 30 participants in the project, but this investigator was only able to recruit seven students. A small sample increases the likelihood of making a Type II error, which assumes a hypothesis is correct when an alternate hypothesis could be true. The study's was not sample size was too small to confirm that the technology-based intervention was linked to the students' weight loss, blood pressure, HPLP II and B/B scores.

To further strengthen the rigor of this project, the use of a control group that received the usual SHC treatment for obesity (a counseling session with either one of the physicians, nurse practitioners, or health educator) could have been used as comparison. The participation of only one male in the study was also a limitation. With only one male

participant, it is impossible to apply the project's findings to both male and female students.

Another limitation to this project was the short duration for implementation of the intervention. The timing of the project was limited due to the students' academic calendar. Recruitment could not start until students were on campus in late August, which is when their fall semester began. To complete the project prior to the onset of their fall semester final exams week and holiday break, the duration of the intervention was only eight weeks. One of the comments from the students from the program satisfaction survey was that "more time" would have made the program better. Although the primary goal for this project was to encourage students to make small, incremental lifestyle changes, a longer intervention may have resulted in a larger amount of weight loss.

An additional concern about the project was that the investigator did all of the data collection. The medical director of the SHC requested that no staff be asked to do any data collection, as it would take them away from their regular duties. It might have strengthened the study to have someone other than the investigator obtains the weight and blood pressure of the students, in order to avoid any potential and unintentional bias.

Need for Future Research

There is a deficit of research on the self-efficacy, perceived benefits, and perceived barriers to adopting healthier lifestyle habits in the college student age group. Additionally, most of the available research about utilizing technology-based interventions has primarily been done on female, Caucasian students. More research is especially needed using technology-based interventions to change lifestyle behaviors

among males and ethnic minority groups. Additional research examining the continuance over time of lifestyle changes should be also be considered.

Nursing Practice Implications

This project demonstrated that a technology-based intervention is an economical and easy way to provide health information and support for lifestyle changes to a group of students in a college setting. Once the curriculum for the program has been researched and developed, posting the information on social media takes minimal time. This program could be administered by physicians, advanced practice nurses, registered nurses, or health educators. The text messaging intervention is more time consuming, due to the fact that the texting was done with each individual student and not by group. The option of in-person group meetings should be considered in the future to give the participants a chance to meet each other and make a connection, in hopes that they could offer each other encouragement during the program. This investigator hopes to improve and expand this program in the future at CSUDH's SHC.

There is often not enough time during routine office visits to adequately educate and provide support to those students wishing to make lifestyle changes. The implementation of a technology-based intervention to affect lifestyle changes might ease some of the burden on the physicians, nurse practitioners, or physician assistants who are attempting to address the complex issue of obesity and other lifestyle management issues during the short time allotted for patient visits. This type of program might also be able to provide the ongoing support that is needed to ensure healthy lifestyle changes in the college student population continues long after the initial intervention.

REFERENCES

Aqtam, I., & Darawwad, M. (2018). Health promotion model: An integrative literature review. *Open Journal of Nursing, 8*(7), 485–503. https://doi.org/10.4236/ojn.2018.87037

Bennett, G. G., Steinberg, D. M., Stoute, C., Lanpher, M., Lane, I., Askew, S., . . . Baskin, M. L. (2014). Electronic health (eHealth) interventions for weight management among racial/ethnic minority adults: A systematic review. *Obesity Reviews, 15*(4), 146–158. https://doi.org/10.1111/obr.12218

Bonnel, W., & Smith, K. V. (2014). *Proposal writing for nursing capstones and clinical projects*. New York, NY: Springer.

Brannagan, K. (2010). The role of exercise self-efficacy, perceived exertion, event-related stress, and demographic factors in predicting physical activity among college freshmen. *Health Education Journal, 70*(4), 365–373. https://doi.org/10.1177/0017896910387315

Burgess, E., Hassmen, P., & Pumpa, K. L. (2017). Determinants of adherence to lifestyle intervention in adults with obesity: A systematic review. *Clinical Obesity, 7*(3), 123–135. https://doi.org/10.1111/cob.12183

California State University-Dominguez Hills. (2019). *2018/2019 fact sheet.* Retrieved from https://www.csudh.edu/Assets/csudh-sites/ucpa/docs/CSUDH-Facts-07.18.pdf

Centers for Disease Control and Prevention. (2018a). *Adult obesity causes and consequences.* Retrieved from https://www.cdc.gov/obesity/adult/causes.html

Centers for Disease Control and Prevention. (2018b). *Adult obesity facts.* Retrieved from https://www.cdc.gov/obesity/data/adult.html

Centers for Disease Control and Prevention. (2018c). *Defining adult overweight and obesity.* Retrieved from https://www.cdc.gov/obesity/adult/defining.html

Corsino, L., Chinea, F. M., Ard, J. D., Voils, C. I., Rocha-Goldberg, M., & Svetkey, L. P. (2016). Perception of obesity in the Latino population: Implications for weight loss clinical trials. *Association of Black Nursing Faculty, 27*(3), 58–63.

Curry, S. J., Krist, A. H., Owens, D. K., Barry, M. J., Caughey, A. B., Davidson, K. W., . . . Wong, J. B., & the U.S. Preventive Services Task Force. (2018). Behavioral weight loss interventions to prevent obesity-related morbidity and mortality in adults: U.S. Preventive Services Task Force recommendation statement. *Journal of the American Medical Association, 320*(11), 1163–1171. https://doi.org/10.1001/jama.2018.13022

Donaldson, E. L., Fallows, S., & Morris, M. (2014). A text message based weight management intervention for overweight adults. *Journal of Human Nutrition and Dietetics, 27*(2), 90–97. https://doi.org/10.1111/jhn.12096

Dowd, J. B., & Zajacova, A. (2014). Long-term obesity and cardiovascular, inflammatory, and metabolic risk in U. S. adults. *American Journal of Preventive Medicine, 46*(6), 578–584. https://doi.org/10.1016/j.amepre.2014.01.016

Fedewa, M. V., Das, B. M., Evans, E. M., & Dishman, R. K. (2014). Change in weight and adiposity in college students: A systematic review and meta-analysis. *American Journal of Preventive Medicine, 47*(5), 641–652. https://doi.org/10.1016/j.amepre.2014.07.035

Fischer, H. H., Fischer, I. P., Pereira, R. I., Furniss, A. L., Rozwadowski, J. M., Moore, S. L., . . . Havranek, E. P. (2016). Text message support for weight loss in patients with pre diabetes: A randomized clinical trial. *Diabetes Care, 39*(8), 1364–1370. https://doi.org/10.2337/dc15-2137

Gaal, I. (2017). *BMI survey of CSUDH SHC patients*. Carson, CA: California State University-Dominguez Hills.

Godino, J. G., Merchant, G., Norman, G. J., Donohue, M. C., Marshall, S. J., Fowler, J. H., . . . Patrick, K. (2016). Using social and mobile tools for weight loss in overweight and obese young adults (Project SMART): A 2 year, parallel-group, randomised, controlled trial. *The Lancet. Diabetes & Endocrinology, 4*(9), 747–755. https://doi.org/10.1016/S2213-8587(16)30105-X

Hales, C. M., Carroll, M. D., Fryar, C. D., & Ogden, C. L. (2017). Prevalence of obesity among adults and youth: United States, 2015-2016. *NCHS Data Brief, 288*, 1–8.

Hirko, K. A., Kantor, E. D., Cohen, S. S., Blot, W. J., Stampfer, M. J., & Signorello, L.
B. (2015). Body mass index in early adulthood, obesity trajectory, and premature
mortality. *American Journal of Epidemiology, 182*(5), 441–450.
https://doi.org/10.1093/aje/kwv084

Johnson, P. H., & Annesi, J. J. (2018). Factors related to weight gain/loss among
emerging adults with obesity. *American Journal of Health Behavior, 42*(3), 3–16.
https://doi.org/10.5993/AJHB.42.3.1

Keating, S. R., & McCurry, M. (2018). Text messaging as an intervention for weight loss
in emerging adults. *Journal of the American Association of Nurse Practitioners*;
Advance online publication. https://doi.org/10.1097/JXX.0000000000000176

Khodaveisi, M., Omidi, A., Farokhi, S., & Soltanian, A. R. (2017). The effect of Pender's
health promotion model in improving the nutritional behavior of overweight and
obese women. *International Journal of Community Based Nursing and
Midwifery, 5*(2, Suppl 1), 165–174. https://doi.org/10.1136/bmjopen-2016-
015415.131

Kozak, A. T., Buscemi, J., Hawkins, M. A., Wang, M. L., Breland, J. Y., Ross, K. M., &
Kommu, A. (2017). Technology-based interventions for weight management:
Current randomized controlled trial evidence and future directions. *Journal of
Behavioral Medicine, 40*(1), 99–111. https://doi.org/10.1007/s10865-016-9805-z

Levine, D. M., Savarimuthu, S., Squires, A., Nicholson, J., & Jay, M. (2014).
Technology-assisted weight loss interventions in primary care: A systematic
review. *Journal of General Internal Medicine, 30*(1), 107-117.
doi:10.1007/s11606-014-2987-6

McVay, M. A., Yancy, W. S., Jr., Bennett, G. G., Jung, S., & Voils, C. I. (2018).

    Perceived barriers and facilitators of initiation of behavioral weight loss

    interventions among adults with obesity: A qualitative study. *BioMed Central*

    Public Health, 18(1), 854–864. https://doi.org/10.1186/s12889-018-5795-9

Murdaugh, C. L., Parson, M. A., & Pender, N. J. (2019). *Health promotion in nursing*

    practice. New York, NY: Pearson.

Napolitano, M. A., Hayes, S., Bennett, G. G., Ives, A. K., & Foster, G. D. (2013). Using

    Facebook and text messaging to deliver a weight loss program to college students.

    Obesity (Silver Spring, Md.), 21(1), 25–31. https://doi.org/10.1002/oby.20232

Nevins, C., Sherman, J., Canchola, K., Ihrig, K., Steinfeld, B., & Wagner, W. (2019).

    Influencing exercise and hydration self-care practices of baccalaureate nursing

    students. *Journal of Holistic Nursing, 37*(2), 140–147.

    https://doi.org/10.1177/0898010118792781

Nevins, C. M., & Sherman, J. (2016). Self-care practices of baccalaureate nursing

    students. *Journal of Holistic Nursing, 34*(2), 185–192.

    https://doi.org/10.1177/0898010115596432

Pender, N. J. (2011). *The health promotion model manual.* Retrieved from

    https://deepblue.lib.umich.edu/bitstream/handle/2027.42/85350/HEALTH_PROM

    OTION_MANUAL_Rev_5-2011.pdf?sequence=1&isAllowed=y

Perrin, A. (2015). Social networking usage: 2005-2015. Retrieved from

    http://www.pewinternet.org/2018/03/01/social-media-use-in-2018/

Petiprin, A. (2016). *Health promotion model.* Retrieved from http://nursing-

    theory.org/theories-and-models/pender-health-promotion-model.php

Stephens, J. D., Yager, A. M., & Allen, J. (2017). Smartphone technology and text

    messaging for weight loss in young adults: A randomized controlled trial. *The*

    Journal of Cardiovascular Nursing, 32(1), 39–46.

    https://doi.org/10.1097/JCN.0000000000000307

Swanson, W. M. (2016). An opportunity to combat obesity lies in the at-risk college

    population. *Journal of the American Association of Nurse Practitioners, 28*, 196–

    203.

United States Department of Agriculture (2019). *Dietary guidelines for Americans 2015-*

    2020. Retrieved from https://www.choosemyplate.gov

United States Department of Health and Human Services. (2018). *Physical activity*

    guidelines for Americans, 2nd edition. Retrieved from https/www.health.gov

Walker, S. N., & Hill-Polerecky, D. M. (1996). Psychometric evaluation of the health-

    promoting lifestyle profile II. Unpublished manuscript, University of Nebraska

    Medical Center.

Walker, S. N., Sechrist, K. R., & Pender, N. J. (1987). The health-promoting lifestyle

    profile: Development and psychometric characteristics. *Nursing Research, 36*(2),

    76–81. https://doi.org/10.1097/00006199-198703000-00002

Walker, S. N., Sechrist, K. R. & Pender, N. J. (1995). Health promotion model -

    Instruments to measure health promoting lifestyle: Health-Promoting Lifestyle

    Profile [HPLP II] (Adult Version). Retrieved from http://deepblue.lib.umich.edu

West, D. S., Monroe, C. M., Turner-McGrievy, G., Sundstrom, B., Larsen, C., Magradey, K., . . . Brandt, H. M. (2016). A technology-mediated behavioral weight gain prevention intervention for college students: Controlled, quasi-experimental study. *Journal of Medical Internet Research, 18*(6), e133. https://doi.org/10.2196/jmir.5474

Zheng, Y., Manson, J. E., Yuan, C., Liang, M. H., Grodstein, F., Stampfer, M. J., . . . Hu, F. B. (2017). Associations of weight gain from early to middle adulthood with major health outcomes later in life. *Journal of the American Medical Association, 318*(3), 255–269. https://doi.org/10.1001/jama.2017.709

APPENDIX A

California State University, Dominguez Hills

Consent to Act as a Research Subject

A Technology-Based Intervention to Address Obesity in College Students

Key Information: You are being invited to participate in a research study. Participation is completely voluntary. The purpose of the study is to find out if text messaging support and use of social media can help you eat healthier and get more physical activity. The study will take a total of about 20 minutes per week plus three visits to the Student Health Center which will last for about 30-45 minutes each. Risks and/or discomforts to you will be as follows: The risks of the study are minimal. You will be evaluated at the beginning of the program to make sure it is safe for you to change your diet and increase your physical activity. The benefits to you can include eating a healthier diet, getting more physical activity, and weight loss which can improve your overall health. The results from the study may help other college students adopt a healthier lifestyle.

Investigators: Christina Campbell, a family nurse practitioner at the CSUDH Student Health Center will be the principal investigator for this study. She is a doctoral nursing student at California State University, Fullerton. Her address is 1000 E. Victoria Street, Carson, CA 90747. Her phone number is 310-243-3629. Her email address is ccampbell@csudh.edu

Christina has one academic supervisor and one clinical supervisor for this study:

Jean O'Neil, DNP, RN, FNP-BC, Assistant Professor of Nursing, AGACNP Option Coordinator
      Patricia A. Chin School of Nursing
      California State University, Los Angeles
      5151 State University Drive, Los Angeles, CA 90032
      (T) 323-343-4700, (F) 323-343-6454

Irina Gaal, MD, Chief of Medical Services
      CSUDH Student Health Center
      1000 E. Victoria ST, Carson, CA 90747
      (T) 310-243-3629

Purpose of the Study: The purpose of study is to determine the effectiveness of using text messaging and social media in improving health behaviors in college students. The goal is to enroll 30-40 students in this study. To be eligible to participate in the study, you must be between the ages of 18 and 29 and have a BMI of over 25. BMI is a calculation based on your height and weight and tells us if you are overweight. You must be able to read and write English. You must have access to a smartphone that can receive text messages. Texting fees may apply, depending on your plan. You must have access to the

internet to be able to join a private group on Instagram. You will not be able to participate if you have diabetes (either Type I or II), are taking any medications to help you lose weight, are pregnant, or are enrolled in another weight loss program such as Weight Watchers. If your blood pressure at the initial visit is over 130/80, you will be offered a visit with a healthcare provider at the Student Health Center to make sure it is safe for you to change your eating habits or increase your physical activity.

Description of the Study: This program will last 8 weeks. You will come into California State University-Dominguez Hills Student Health Center for an initial evaluation of your blood pressure, height, weight, and be asked to fill out a questionnaire about your current nutrition and physical activity practices and another questionnaire about what helps or gets in the way of healthy eating and physical activity. You will receive text messages from a Student Health Center staff member twice a week through a free secure app to provide support and information in improving your health behaviors. Data charges may apply. You will also be asked to join a private Instagram group to receive tips on nutrition, physical activity, and how to overcome common barriers to improving your health. Within this Instagram group, you will have access to other students in the program for support. If you do not want others to know your name in the Instagram group, you are welcome to make up a "fake" name. You will also be asked to come into the Student Health Center after being in the program for four weeks to check your blood pressure and weight. At the end of the program, your blood pressure and weight will be measured again at the Student Health Center, and you will be given another questionnaire to ask about your nutrition and physical activity. Also, after the end of the program, you will be sent a confidential survey by email to ask about your satisfaction with the program.

Risks or Discomforts: The risks of the study are minimal. You will be evaluated at the beginning of the program to make sure it is safe for you to change your diet and increase your physical activity. Discussions about weight can sometimes be uncomfortable or upsetting. The investigator will try to make these discussions positive and supportive. However, if you feel uncomfortable, you may discontinue participation at any time, either temporarily or permanently, and it will not affect your relationship with the researcher, the Student Health Center, or the university.

Benefits of the Study: We hope by participating in this program that you may learn information so that you can improve your health by eating better and being more physically active. There is no guarantee, however, that you will receive any benefits from participating in this study.

Confidentiality: All of the data collected will be kept in strictest confidence. All forms will be kept in a locked file box in the personal possession of the investigator. The forms will be assigned an identifying number but will not have your name, date of birth, address, email address, or phone number. All data will be kept on an Excel worksheet and will be password protected. This data will be on the personal laptop computer belonging to the investigator which will be also password protected. Confidentiality will be maintained to the extent allowed by law. If you mention suicidal thoughts or the

intention to harm others, the investigator will be required to report such information to the appropriate authorities. A secure text messaging app will be used to ensure confidentiality of all messages. If you would like to keep your identity anonymous on Instagram Direct, you may use a fake name.

Incentives to Participate: You will be given a $5 gift card to Starbucks at the initial visit then again at the 4- and 8-week visits to thank you for your participation in the study.

Voluntary Nature of Participation: Participation in this study is voluntary. Your choice of whether or not to participate will not influence your future relations with California State University, Dominguez Hills, California State University, Fullerton, and California State University-Los Angeles. If you decide to participate, you are free to withdraw your consent and to stop your participation at any time without penalty or loss of benefits to which you are entitled.

Questions about the Study: If you have any questions about this study or your rights as a participant, you may call the investigator Christina Campbell, 310-243-3629, or the Institutional Review Board for the Protection of Human Subjects at CSUDH, 310-243-3756.

Your signature below indicates that you have read the information in this document and have had a chance to ask any questions you may have about the study. Your signature also indicates that you agree to be in the study and have been told that you can change your mind and withdraw your consent at any time. You have been given a copy of this consent form. You have been told that by signing this consent form you are not giving up any of your legal rights.

Name of Participant (please print) _____

Signature of Participant _____

Date_____

APPENDIX B

Recruitment Flyer

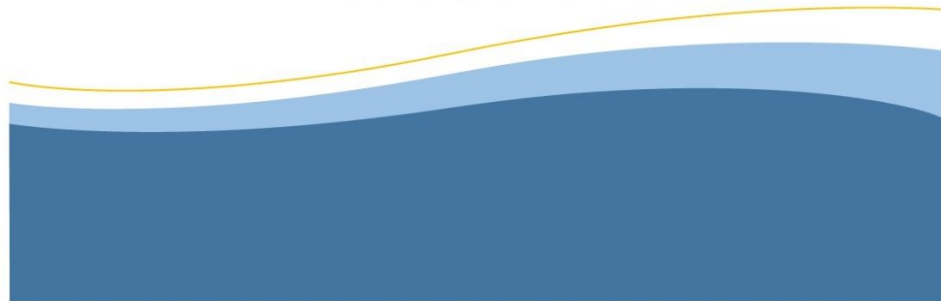**CSUDH Students: Want to eat better, exercise more (and maybe lose a little weight)?!?**

*Join a FREE 8-week study at the Student Health Center that offers personalized coaching with text messaging and social media!

If you are interested email Chris Campbell at ccampbell@csudh.edu

All eligible participants receive a total of $15 in Starbucks gift cards

APPENDIX C

Health Promoting Lifestyle Profile II (Adult Version)

DIRECTIONS: This questionnaire contains statements about your *present* way of life or personal habits. Please respond to each item as accurately as possible, and try not to skip any item. Indicate the frequency with which you engage in each behavior by checking the appropriate box:

	Never	Sometimes	Often	Routinely
1. Discuss my problems and concerns with people close to me.				
2. Choose a diet low in fat, saturated fat, and cholesterol.				
3. Report any unusual signs or symptoms to a physician or other health professional.				
4. Follow a planned exercise program.				
5. Get enough sleep.				
6. Feel I am growing and changing in positive ways.				
7. Praise other people easily for their achievements.				
8. Limit use of sugars and food containing sugar (sweets).				
9. Read articles or watch videos on social media about improving health.				
10. Exercise vigorously for 20 or more minutes at least three times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber).				
11. Take time for relaxation each day.				
12. Believe that my life has purpose.				
13. Maintain meaningful and fulfilling relationships with others.				
14. Eat 6 servings of grains (half of which are whole grains). Example of whole grains: whole wheat bread, rye bread, oatmeal, popcorn, brown rice, whole wheat pasta, whole wheat tortillas.				
15. Question health professionals in order to understand their instructions.				
16. Take part in light to moderate physical activity (such as sustained walking) for 30-40 minutes on 5 or more days a week.				
17. Accept those things in my life which I cannot change.				
18. I look forward to the future.				
19. Spend time with close friends.				
20. Eat 2 cups of fruit each day.				

21. Get a second opinion when I question my health care provider's advice.				
22. Take part in leisure-time (recreational) physical activities (such as swimming, dancing, cycling).				
23. Concentrate on pleasant thoughts at bedtime.				
24. Feel content and at peace with myself.				
25. Find it easy to show concern, love, and warmth to others.				
26. Eat 2 and a half cups of vegetables each day.				
27. Discuss my health concerns with health professionals.				
28. Do stretching exercises at least 3 times per week.				
29. Use specific methods to control my stress.				
30. Work toward long-term goals in my life.				
31. Touch and am touched by people I care about.				
32. Eat 3 cups of dairy each day (milk, calcium-fortified soy milk, or cheese)				
33. Inspect my body at least monthly for physical changes/danger signs.				
34. Get exercise during usual daily activities (such as walking during lunch, using stairs instead of elevators, parking car away from my destination and walking).				
35. Balance time between work and play.				
36. Find each day interesting and challenging.				
37. Find ways to meet my needs for intimacy.				
38. Eat 5 and a half ounces of protein a day (meat, poultry, seafood, eggs, nuts/seeds, beans)				
39. Ask for information from health professionals about how to take good care of myself.				
40. Check my pulse rate when exercising.				
41. Practice relaxation or meditation for 15-20 minutes daily.				

42. Am aware of what is important to me in life.				
43. Get support from a network of caring people.				
44. Read labels to identify nutrients, fats, sodium content in packaged food.				
45. Attend educational programs on personal health care.				
46. Reach my target heart rate when exercising.				
47. Pace myself to prevent tiredness.				
48. Feel connected with some force greater than myself.				
49. Settle conflicts with others through discussion and compromise.				
50. Eat breakfast.				
51. Seek guidance or counseling when necessary.				
52. Expose myself to new experiences and challenges.				

(Walker, Sechrist, & Pender, 1995)

Adapted with permission from Dr. Nola Pender

APPENDIX D

Permission to use HPM and HPLP II

Nola Pender
<npender@umich.edu>   Fri, Mar 1, 2019, 3:55 PM

Hi Christina:

You have my permission to use the Health Promotion Model for your technology-based intervention. You may also want to check the University of Michigan Website that has the most information on the model and related instruments.

http://deepblue.lib.umich.edu

Good luck with your project.

Wishing you good health,

Nola Pender

Nola Pender <npender@umich.edu>   Thu, Apr 25, 2019, 12:04 PM

Dear Christina:

You have my permission to use the HPLP II in your project and publish results including sample items. Yes, please change the items to be consistent with current recommendations. All the researchers who developed the instrument are retired. Therefore no updating will be done unfortunately.

Thank you for making the instrument current for your use. I wish you success.

Nola Pender

APPENDIX E

Healthy Lifestyles Benefits and Barriers Tool

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Question	1	2	3	4	5

1	I find it hard to find time to exercise and eat healthy					
2	Getting enough exercise and eating well will make me healthier					
3	I will have more energy if I eat better and exercise more					
4	My stress will be less if I get enough exercise and eat better					
5	I don't know what to eat for a healthy diet					
6	I will decrease my risk for high blood pressure, diabetes and high cholesterol if I exercise more and eat better					
7	I am too stressed to exercise and eat a healthy diet					
8	My friends don't exercise or eat healthy and it makes it harder for me to					
9	It is difficult to find healthy food options on campus					
10	My self-esteem would be improved if I ate better and exercised more					

APPENDIX F

Program Satisfaction Survey (given via Survey Monkey)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel that I'm healthier after participating in this program.					
I would recommend this					

program to other students.					
I found the text messaging support to be helpful.					
I found the information posted on Instagram to be helpful.					
I found the text messaging app easy to use.					
I found support from other students in the Instagram group.					

Is there anything that you disliked about the program?

_____

_

What would make this program better?

_____

_

APPENDIX G

Demographic Data Form

Participant number: _____

Age: _____

Sex: _____

Race/Ethnicity:

      ☐ Hispanic or Latino

      ☐ Black or African American

      ☐ White

      ☐ Asian/Pacific Islander

☐   Native American or American Indian

☐ Other

APPENDIX H

Data Collection Form

Participant number: _____

Height: _____ feet _____ inches

Weight:

      #1 _____lbs

      #2 _____lbs

      Mean: _____

BMI: _____

Blood Pressure:

      #1 _____/ _____

      #2 _____/ _____

      Mean: _____/ _____

Score on the HPLP II: _____

Score on the Benefits/Barriers Tool: _____

APPENDIX I

List of Topics for Instagram Posting

<u>**Week 1**</u>
- Welcome to the Program
- Physical Activity: How to get Started

<u>**Week 2**</u>
- Easy, Healthy Snacks
- Healthy Options when Eating on Campus

<u>**Week 3**</u>
- Managing Stress
- Ways to Stay Motivated

<u>**Week 4**</u>
- Easy Healthy Dinner Recipes
- Healthy Options When Eating Out

<u>**Week 5**</u>
- Time Management and Sleep
- Mindful Eating

<u>**Week 6**</u>
- Social Support for a Healthy Lifestyle
- Empty Calories

<u>**Week 7**</u>
- Eating Your Favorite Foods
- How to Make Thanksgiving More Healthy

<u>**Week 8**</u>
- Meal Make-Overs
- Program Wrap-Up