UNIVERSITY OF CALIFORNIA

Los Angeles

Evaluation of a Remote Weight Management Program for Women with Obesity at Risk for Cardiovascular Disease

A dissertation submitted in partial satisfaction of the

requirements for the degree

Doctor of Nursing Practice

by

Simona Campa

2023

ABSTRACT OF THE DISSERTATION

Evaluation of a Remote Weight Management Program for Women with Obesity at Risk for Cardiovascular Disease

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Doctor of Nursing Practice

University of California, Los Angeles, 2023

Professor Holli A. DeVon, Chair

Background: Obesity is a chronic, progressive, and relapsing health condition that increases the risk of numerous obesity-related health conditions, yet management is challenging. **Objectives:** To test a personalized weight management program in the outpatient cardiology clinics at a large academic center in Southern California. **Methods:** Women were recruited with a body mass index (BMI) over 30 kg/m^2 and at least one cardiovascular disease (CVD) risk factor. Participants were followed biweekly for eight weeks. The project leader met twice on Zoom with each participant to provide counseling on the Mediterranean diet (MedDiet) and to establish goals and evaluate progress using motivational interviewing (MI). Between these first

and last virtual visits, booster emails were sent by the project leader every two weeks to collect weights and waist circumferences (WC). A digital-based weight-tracking application, a smart scale, and a smart tape measure were used to track anthropometric measurements. Participants' satisfaction scores were collected using an existing survey. The primary outcomes and benchmarks for this project were to achieve a clinically significant goal of weight reduction of at least 5-10% and at least 2.5 inches reduction in WC from baseline. Participants' satisfaction (secondary outcome) with the program' of at least 90% was the secondary goal of this project. **Results:** Twenty-six participants completed the program and demonstrated a significant reduction for mean change in weight (lbs) ($M=6.38 \pm 6.62$; $p < 0.001$), and for mean change in WC (in) ($M=3.02 \pm 1.64$; $p < 0.001$). The mean weight loss percent was 3.16 % ± 2.94 and mean change in BMI was 1.07 ± 1.03. Ninety-two percent of participants (n=24) answered, "strongly agree" or "agree" with the quality of care received through the weight management program. Overall, 22 participants lost weight and had a decreased BMI, two stayed the same, and two gained weight and increased BMI. Only one participant had no change in WC. **Conclusion:** While participants did not meet the goal of 5-10 % weight loss from baseline, this virtual weight management program successfully helped the majority of participants significantly reduce their weight and WC with access to lifestyle modifications, behavioral counseling, and novel self-monitoring technology.

The dissertation of Simona Campa is approved.

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This scholarly project is dedicated to my husband and constant support, Gregory Kyle Cochrane, who propelled my pursuit to advance my career in Nursing.

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ACKNOWLEDGEMENTS

I would like to acknowledge Holli A. DeVon, PhD, RN, FAAN, FAHA for her tremendous support and guidance to refine and to finalize the project and this manuscript. I also would like to acknowledge the dissertation committee – Nancy A. Pike, PhD, RN, FAAN; Mary Rezk-Hanna, PhD, FAHA; and Jian Li, MD, PhD– for reviewing the manuscript and providing their invaluable suggestions. Noel Bairey-Merz's, MD, MACC, FAHA guidance and encouragement helped me focus on the goals of my professional development.

Lastly, I would like to acknowledge the wonderful UCLA DNP team – Nancy Jo Bush, DNP, RN, MA, AOCN, FAAN, Theresa Brown, DNP, RN, ACNP-BC, AACC, FAANP, and Soo Kwon – who always supported and guided their students.

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Traditional and Nontraditional Risk Factors for Cardiovascular Disease. The Virtual Women's Health Expo, July 2021

Common Misconceptions About Dietary Supplements. Wear Red Day Event, Cedars-Sinai Medical Center, Los Angeles, February 2021

The Heart Truth: Cardiac Complications of Obesity. CA ACC CVT Section, 5th Annual Symposium, Westin Pasadena, February 2020

Fighting the Lady-killer with Prevention. New Updates in Women's Cardiovascular Health, Health Net Live Webinar, February 2020

CHAPTER ONE: INTRODUCTION

Obesity is a chronic, relapsing, and preventable health condition that has become a significant public health concern since the 1990s and spread rapidly across the United States (U.S.), costing the healthcare system close to $147 billion annually (Centers for Disease Control and Prevention [CDC], 2022). Although obesity affects men and women of all ages, obesity is more prevalent among women when compared to men. Guidance on obesity screening and weight management is essential to minimize the potential obesity-related complications affecting women's health (Drozdz et al., 2021; Tauqeer et al., 2018). Currently, in the U.S., 41.5 % of adult women are considered obese by BMI, and by 2030 the projections show that close to 80.0% of women will be obese (Wang et al., 2020). Such individuals are highly vulnerable to potentially morbid sequelae such as CVD, type 2 diabetes mellitus, dyslipidemia, and hypertension (Okati-Aliabad et al., 2022; Powell-Wiley, 2021). Minimal changes in weight of only 5% can lead to significant health benefits (Tijssen et al., 2021). Reductions in WC can also have health benefits, given that excess abdominal fat in women (WC≥ 88 cm) increases the risk of type 2 diabetes fivefold (Solbrig et al., 2019).

Although chronic obesity poses serious health, societal, and cost burdens, effective patient-centered interventions are lacking. Healthcare providers aim to focus on prevention, yet obesity screening and discussing behavioral lifestyle changes are not done routinely during busy cardiology appointments. Most individuals do not consider themselves obese and do not understand what a BMI is and how it is calculated (Post et al., 2015). As a result, achieving and maintaining weight loss continues to remain elusive for most patients (Arnold et al., 2019; Ciemins et al., 2021). Even though a 5-10 % weight loss has been shown to have a clinically significant correlation with CVD risk reduction, there are only a few comprehensive virtual

weight management programs (Tijssen et al., 2021). Emerging research supports the feasibility of expanding telemedicine appointments and smart technology to provide personalized weight management, increase access to care, and reduce the costs associated with obesity (Kahan et al., 2022). Establishing a remote weight management program (RWMP) with a behavioral change intervention that combines MI with MedDiet counseling and a technology-based intervention via a telemedicine platform can reduce barriers to care and weight, thus reducing the CVD burden.

Current weight management programs may minimally emphasize maintaining motivation after achieving the initial weight goal. Motivational interviewing techniques applied to chronic obesity management show favorable results in motivating patients to maintain long-term weight loss. This counseling method involves elicitation of an individual's incentives for change and developing targeted plans for a sustainable commitment (Draxten et al., 2016). At each step, the healthcare provider is available to guide and support patients as needed. These interventions may therefore be a practical approach to support weight loss without weight cycling (Solbrig et al., 2019). By incorporating novel technology-based interventions and cost-effective telemedicine platforms for weight counseling, the doctorally-prepared nurse can demonstrate innovative solutions for chronic health conditions to bridge gaps in care while positively impacting patients' overall health status (Lucci, 2020). This scholarly project aims to evaluate an evidence-based practice (EBP) change that focuses on weight management with lifestyle interventions. Counseling on dietary changes with MI via a remote program aimed to improve participants' weight and BMI, reduce WC, and improve overall participants’ satisfaction to determine the effectiveness of the proposed intervention.

Problem Statement

Poor management of obesity can have devastating health effects and financial burdens on individuals and healthcare systems (Cawley et al., 2021). Obese adults in the U.S. incur higher annual medical care costs by $2,505 or 100% compared to those with average weight. These cost burdens increase significantly depending on the class of obesity, from 68.4% for Class 1 (BMI 30.0-34.9 kg/m^2) to 233.6% for Class 3 (BMI> 40 kg/m^2) (Cawley et al., 2021; Ward et al., 2019). An elevated BMI > 40 kg/m^2 increases the overall mortality risk and can lead to an 8–10-year decrease in life expectancy (Gils Contreras et al., 2020). Sex-specific research on obesity has been increasing steadily, yet it is not routinely translated into clinical practice. Women are twice as likely to be obese and have a twofold higher risk of mortality when compared to obese men (Kapoor et al., 2021). Prior work such as The Framingham Heart Study evaluating obesity found that the risk of coronary artery disease increased by 64% in obese women compared with 46% in obese men (Wilson et al., 2002). Even though a 5 to 10% reduction in weight was associated with significant improvement in CVD and metabolic syndrome risk factors at one year, more considerable weight losses had more significant benefits (Wing et al., 2011). Prior work by Han et al. (1997) also demonstrated that 5-10 cm (1.96-3.93 inches) waistline reduction in women with a BMI of 25-50 kg/m^2 or WC of 72-133 cm could be used as a guideline to achieve a realistic weight loss target with a high probability of cardiovascular health benefits. Even though addressing obesity in women is a complex public health challenge due to specific sex differences, such as hormonal variations throughout a woman's life, providers fail to address lifestyle changes during routine appointments (Kim, 2020; Tsai et al., 2014; Walker et al., 2018).

The American Medical Association (AMA) recognizes obesity as a disease. Most individuals who perceive obesity as a lifestyle choice still think it is their responsibility to seek

medical help. Of those who seek help, only 55% get a formal diagnosis of obesity (Kaplan et al., 2018). Such patients are often reassured and given too little information on the heightened risk of adverse CVD outcomes associated with obesity and how weight loss can decrease this added risk. Nevertheless, most patients prefer that providers discuss nutrition during routine appointments since they are confused by frequent dietary advice and "special diets" promoted by the media (Helland & Nordbotten, 2021).

Health care providers' involvement in weight management is essential since weight management counseling practices vary tremendously from provider to provider due to time constraints. These discussions are needed in the context of provider-patient risk counseling. Prior work evaluating current practices and attitudes toward obesity found that only a few providers provide obesity counseling consistent with the U.S. Preventive Services Task Force (USPSTF) guidelines (Barnes & Ivezaj, 2015; Petrin et al., 2017). In addition to time constraints, providers' lack of formal education regarding diet is another barrier to successful weight management (Walker et al., 2018). Considerable evidence documents that poor results in weight loss reflect not only providers' failure to initiate or counsel patients regarding lifestyle interventions but also patients' failure to adhere to weight loss strategies due to the high cost of obesity medications, environmental factors, and access to care (Kim, 2020). Women with obesity face unique logistical barriers in seeking weight management. Barriers such as prioritizing children’s meal preferences and not having access to adequate places to exercise can impair long term success (Lim et al., 2019).

While a 5-10 % weight loss is closely linked with cardiometabolic changes, there is no consensus or standardization of care of obesity management in the outpatient cardiology clinics within the Heart Institute at a large hospital in Southern California (Johnson et al., 2019; Powell-

Wiley et al., 2021; Tijssen et al., 2021). The first line of obesity management relies on a foundation of lifestyle modifications. When comparing current evidence for best practices and reviewing the gap analysis, the cardiology departments rarely initiate lifestyle counseling during routine consultation visits. The providers refer close to 30-50% of obese patients to obesity specialists for further surgical or medical management. Many bariatric surgeons require patients to adhere to a structured lifestyle modification program before considering weight loss surgery (Brazil & Finucane, 2021). Such patients report low satisfaction with these referrals. They prefer to defer surgical or pharmacological interventions since they are frequently overwhelmed by delays in care due to insurance denials that can further exacerbate obesity. Patients also report feeling less likely to adhere to bariatric surgeons' recommendations that focus on surgical treatment or medication management rather than lifestyle interventions (Brazil & Finucane, 2021). Given the increased burden of obesity on women and the economic role they play in society, obtaining stakeholders' support is imperative to manage the obesity epidemic to avoid the direct and indirect economic burdens associated with obesity. These data suggested an opportunity for improvement in the current care model. The purpose of this scholarly project was to: (a) implement a virtual weight management program that focused on lifestyle changes to improve patients' access to weight loss interventions, and (b) optimize weight management tailored to the individual's needs to provide continuity of care and increase patients' satisfaction and decrease patients' long-term health risks through education, counseling, and follow-up at consistent intervals.

CHAPTER TWO: THEORETICAL FRAMEWORK

Doctorally-prepared nurses may impact patients' lives by employing Nola Pender's Health Promotion Model as a framework for care delivery (HPM) (Pender et al., 2015). Pender's

model has been successfully used in numerous obesity-related interventions. Within this model, optimal health is viewed as an activity directed toward actualizing patients' potential through self-care and goal-directed behavior (Pender et al., 2015). Pender's assumptions that patients seek to regulate their behavior and environment are essential for behavior change and correlate with this project. These values provide the framework for this scholarly project. Since the participants volunteered to interact with the project leader, they sought to reconfigure their person-environment patterns and lifestyle habits to lose weight. Consistent with the HPM, given that participants sought to regulate their behavior, the provider used MI to increase healthy behaviors. Assessing patients' understanding and readiness to lose weight was essential to increase motivation to improve overall health. Without an incentive for losing weight, the patients were expected to experience a relapse in healthy eating and return to previous lifestyle choices.

Considerable evidence now documents that MI can increase a patient's incentive to make behavioral changes and has shown beneficial results in weight loss studies (Thabault et al., 2016). This counseling technique includes asking open-ended questions while using empathy, reflective listening, and acceptance (Draxten et al., 2016). When patients feel the provider cares about them and is invested in their overall well-being, they will be more receptive to change (Barnes & Ivezaj, 2015; Draxten et al., 2016; Thabault et al., 2016). As patients' understanding of lifestyle modifications is fundamental to the treatment plan, establishing a trusting relationship with the patient was imperative to promote behavior change (Giese & Cook, 2014; Pender et al., 2015; Tomiyama et al., 2018). Trust was especially pertinent to MI and the specialty of preventive cardiology and weight management since it involved vulnerable lifestyle disclosures. In an era where a culture of weight stigma is prevalent, the healthcare provider aimed to adjust and maintain harmony with the patient's environment to achieve optimal health. The patient's

perceived benefits, commitment to a plan, barriers, and self-efficacy were also considered. The proposed project, implementing an advanced practice registered nurse (APRN)-led program, aligned with Nola Pender's model that looks at health from a holistic perspective focusing on clinical prevention and population health. The role of APRNs in health promotion and prevention is now more critical than ever, given the current healthcare system's existing challenges and disparities (Butts & Rich, 2018).

CHAPTER THREE: REVIEW OF LITERATURE

The literature search focused on women with obesity at risk for CVD, outpatient weight management, the role of telemedicine, and novel digital-based technology for weight tracking. PubMed and Google Scholar databases were used to conduct the literature search. Keywords used for the literature search included obesity in women, cardiometabolic syndrome, waist circumference, body mass index, outpatient weight management, lifestyle interventions Mediterranean diet, motivational interviewing, nurse practitioner, and telehealth. The best-yielding combinations leading to pertinent results of interest for the studied population were the following: (“*women” OR “obesity in women“) AND (“cardiometabolic syndrome” OR “MetS”) AND (“waist circumference” OR “WC”) AND (“body mass index” OR “BMI”) AND (“outpatient” OR” outpatient management”) AND “lifestyle interventions” AND (“Mediterranean diet” OR “MedDiet”) AND (“motivational interviewing” OR “MI”) AND (“advanced practice registered nurse” OR “APRN” OR “nurse practitioner”) AND (“telemedicine OR” telehealth”).* The PubMed search was limited to full-text articles published between 2017 and 2022, and forty-eight articles were identified. Limiting the search to articles between 2017 and 2022 ensured a review of the most current clinical practice management guidelines for obesity. Seven articles most clearly addressing outpatient obesity management in

women at risk for CVD and the role of telemedicine and novel digital-based technology for weight loss were selected (see Table of Evidence).

Telemedicine's Role in Weight Management

A randomized controlled trial by Johnson et al. (2019**)** assessed if health coaching provided via videoconferencing effectively changed behaviors related to physical activity and reduced weight or metabolic markers in adults with an elevated BMI. A total of 30 individuals with a BMI ≥30 kg/m^2 were enrolled in one of the following groups: in-person, videoconference, or control group. The participants received smart weight scales and wireless watches synced with their smartphones. The data was wirelessly uploaded to a Health Insurance Portability and Accountability Act (HIPPA)-compliant database and recorded in patients' charts. A multidisciplinary team that included a registered dietitian, medical physician, and exercise physiologist provided individualized health coaching. Patients' data were uploaded throughout the 12-week intervention. Weight changes, hemoglobin A1c, glucose, and within- and between-group changes, were analyzed. Weight loss and steps per day were analyzed using analyses of covariance. More weight loss was seen in the videoconferencing group ($p < 0.05$) (8.23 ± 4.5 kg; 7.7%) when compared to the in-person group (3.2 ± 2.6 kg; 3.4%) and respectively for the control group (2.9 ± 3.9 kg; 3.3%). The investigators concluded that lifestyle coaching provided by a multidisciplinary team of providers via telemedicine could lead to favorable changes in weight loss. These novel devices are in their infancy and would need further exploration and validation amongst diverse patient populations.

Wireless Activity Trackers and Smart Scales

A randomized controlled trial by Alencar et al. (2020) examined if adherence to a remote monitoring device promoted a healthy rate of weight loss (1-2 lbs) per week over 12 weeks. The

program incorporated weekly health coaching via videoconferencing with a dietitian and monthly monitoring with the physician (intervention group) versus self-guided, no-intervention (control group). A total of 25 obese individuals (13 women, 12 men) were assigned to the intervention group (n= 13) or the no-intervention group (n= 12). Both groups had baseline and final visits with the physician and dietitian to determine goals and review progress. Program-related content incorporated educational material from the Telehealth Enabled Approach to Multidisciplinary care module. The individuals were given wireless activity trackers and smart scales that transmitted data to the research team. Data were analyzed using independent t-tests and $\chi 2$ tests. The researchers found that the intervention group had a greater adherence to the remote monitoring devices (92% ± 10% vs. 75% ± 15% smart scale [$p < 0.05$]) and (80% ± 14% vs. 49% ± 15% activity tracker [$p < 0.05$]). The weekly rate of weight loss was also higher for the intervention group (−0.74 ± 1.8 kg vs. 0.18 ± 1.8 kg ($p < 0.05$). The investigators concluded that weight management counseling via telehealth has the potential to effectively increase participants' adherence to novel technology-based weight tracking devices and promote weight loss.

Motivational Interviewing

Even though the projections show that by 2030 one in two adults will have obesity, Reims and Ernst (2016) argue that providers continue to struggle to speak with patients about weight constructively. Weight counseling using MI emerged as a more practical approach in weight-loss interventions, especially beneficial to those individuals with an increased risk of CVD (Lee et al., 2016; Reims & Ernst, 2016; Ward et al., 2019). A randomized controlled trial by Kouwenhoven-Pasmooij et al. (2018) evaluated if lifestyle interventions using MI promoted weight loss for individuals with increased CVD risk. The investigators included 491 participants

from various work units (hospital, military, and police) randomized into two groups. The participants randomized to the limited intervention received advice with a web-based Health Risk Assessment (n = 213; 9 clusters), while the participants in the extensive intervention (n = 271; 8 clusters) received physician-led coaching using MI to guide weight loss. The primary outcome looked at self-rated health, while secondary outcomes observed changes in weight, BMI, work efficacy, and healthy behaviors. Data was collected at 6- and 12-month follow-up appointments. The results showed that the extensive intervention group was not much different from the limited intervention group for BMI (- 0.81; 95% CI; -1.87-0.26), self-rated health (4.3%; 95% CI; -5.3-12.8), and body weight (- 2.16; 95% CI; -5.49-1.17). In a within-group analysis, the authors found that the body weight (- 3.1 kg; 95% CI; -2.0 to - 4.3) for the extensive intervention group was significantly reduced, while the weight remained unchanged for the limited intervention group (+ 0.2 kg; 95% CI; -1.4 to 1.8).

Although optimizing personalized weight management by blending an APRN-led educational intervention with MI seems promising, little is known about whether these interventions work synergistically to increase weight loss. There remains a gap in knowledge regarding the long-term effects, cost, and insurance coverage of telemedicine counseling for patients with a BMI $\geq$ 30 kg/m^2. It is inferred that the telemedicine platform can offer an ideal opportunity for improved access to care and provide patients with behavioral and clinical care, two critical elements of obesity management.

Motivational Interviewing as Behavioral Approach to Weight Loss

Another single-center, two-arm, single-blind randomized controlled trial by Solbrig et al. (2019) assessed if using a theoretically informed MI technique with functional imagery training can impact body weight, BMI, and waistline compared with MI. Functional imagery training

included personalized mental imagery to anticipate behaviors, mentally test out solutions from prior successes, and anticipate obstacles. The investigators hypothesized that imagery interferes with cravings when temptations occur. Inclusion criteria included age > 18 y/o, BMI ≥25 kg/m², while exclusion criteria included pregnancy, eating disorders, and inability to complete baseline assessments. A sample of 141 participants was included from March to May 2016 at the University of Plymouth. The active interventions included: functional imagery training (n=58) or MI (n =63). The researchers concluded that less than four hours of functional imagery training led to more significant weight loss over six months (and persisted to 12 months) than MI alone. The investigators demonstrated that a personalized, behavioral weight-loss program could be an effective, scalable solution to achieving clinically significant weight loss and can reduce the long-term complications associated with obesity.

Waist Circumference

Awareness of appropriate screening tools for central or abdominal obesity has been slowly increasing, given that most recent analyses have linked visceral obesity to a considerable effect on CVD morbidity and mortality (Bosomworth, 2019). In support of this hypothesis, a more critical perspective of the BMI measuring tool is warranted, given that its limitations challenge its reliability as a proxy for 'healthy body weight.” A cross-sectional study by Goh et al. (2014) analyzed which measurements of central or general obesity better predicted the CVD risk in women without heart disease, type 2 diabetes, or stroke. The study included 4487 women from the National Heart Foundation (NHF) Risk Factor Prevalence Study while excluding women receiving medications to decrease CVD risk. Cross-sectional patient data was collected, and 10-year risk of CVD was calculated from the Framingham Risk Score Model. Waist circumference and waist-to-hip ratio measurements showed a better correlation with CVD risk

than BMI alone and were demonstrated to be independent predictors of CVD risk. Similar findings have been observed by Jayedi et al. (2020), who evaluated the association of multiple indicators of central obesity, including WC, with the risk of all-cause mortality. The latter study provides the most definitive data that WC is positively associated with a higher risk of all-cause mortality.

Mediterranean Diet

A growing concern for healthcare providers is that most patients who are obese still lack the understanding of what diets and lifestyle modifications to make to minimize the complications associated with obesity (Hruby & Hu, 2015). Evidence shows that lifestyle interventions consisting of behavioral therapy and nutritional and exercise counseling are associated with clinically significant weight loss**.** The literature unambiguously supports that MedDiet can provide a significant response to decreasing the burden of obesity and subsequent CVD through weight loss (Bendall et al., 2018; Burguera et al., 2015; Dohener et al., 2020; Franquesa et al., 2019; Salas-Salvado et al., 2016). No other dietary pattern has been studied as extensively as the MedDiet and showed such favorable CVD effects. Its adaptability to various geographic settings allows providers to tailor nutrition counseling to each individual's characteristics and cultural preferences (Martínez-González et al., 2019). The American Heart Association (AHA) also encourages adherence to the MedDiet to reduce risk factors such as obesity, type 2 diabetes, dyslipidemia, and hypertension and prevent heart disease and stroke (AHA, 2020). A recent randomized controlled trial assessed if adherence to the MedDiet and physical activity after bariatric surgery mediated changes in BMI, weight, quality of life, and food tolerance (Gils-Contreras et al., 2020). A total of 78 morbidly obese individuals who underwent bariatric surgery were followed for one year after surgery. Data were collected at

baseline and quarterly for 12 months after surgery. Patients with increased adherence to the MedDiet achieved a clinically significant higher percentage of weight loss, (37.6%; 35.5-39.8), when compared to those who decreased adherence or plateaued during follow-up, (34.1%; 31.8-36.5; p = 0.036). The investigators concluded that after bariatric surgery, morbidly obese individuals showed more weight loss if they adhered to the MedDiet; however, physical activity was not associated with weight loss or improved quality of life compared to the MedDiet alone.

Synthesis of Literature Review

Expanding telemedicine appointments can increase access to care and reduce the costs associated with obesity since these interventions show success in helping patients lose weight (Kahan et al., 2022). Virtual appointments should not be viewed as a replacement for in-person visits per se; instead, as a current model of care delivery that augments the current healthcare system to better serve those at risk. To change the course of obesity, healthcare providers must fundamentally change their perspectives and incorporate novel therapies and cost-effective platforms with weight management counseling provided by a multidisciplinary team**.**

CHAPTER FOUR: METHODS

Project Design

This scholarly project included a single-cohort, single-center, descriptive design that utilized a quasi-experimental method in the outpatient cardiology clinics within the Heart Institute at a large hospital in Southern California. The project received approval from the Cedars-Sinai Medical Center (CSMC) and the University of California, Los Angeles (UCLA) Institutional Review Boards (IRB), as it met the definition of human subject research (IRB # STUDY00002292). It also required clinical trial registration (NCT05635097).

Outcome Measures

The primary outcome was to investigate if a weight loss intervention that combined MedDiet counseling with MI leads to increased weight loss and decreased WC over eight weeks. A secondary outcome evaluated participants' satisfaction with the weight management program.

Sample and Setting

Thirty participants were enrolled, approximately 15 participants per month from January 16, 2023, to March 16, 2023. Inclusion criteria were: (a) women with a BMI ≥30 kg/m2, (b) 18 years or older, (c) English-speaking with current access to a smartphone, and (d) at least one CVD risk factor (family history of heart disease, type 2 diabetes, pre-diabetes, sleep apnea, dyslipidemia, cigarette smoking, inactivity, preeclampsia, gestational diabetes, hypertension, gestational hypertension, preterm birth, rheumatological diseases, premature menopause). Exclusion criteria included (a) taking obesity medications or enrolled in a weight management program, (b) pregnant or breast-feeding, (c) BMI < 30 kg/m2, (d) losing>3 kg or changing exercise patterns six months prior, (e) eating disorders, (f) uncontrolled hypertension or psychological disorders, (g) obesity-related surgery within the past six months. Once the inclusion criteria were met, the participants were selected, emphasizing enrolling a diverse group of participants representative of the institution's population. Given that the selection process could have threatened the internal validity of the project, healthcare providers' referrals and participants' self-referrals to the program were required to minimize this threat and optimize participation rates. The project was conducted on a virtual platform. Participants were recruited from the outpatient cardiology clinics within the heart institute at a large non-profit teaching hospital located in Los Angeles, California.

Instruments

A formal remote APRN-led weight management program was evaluated using a digital-based tracking application paired with a smart scale and tape measure to record anthropometric measurements (body weight, WC). The primary communication technologies were the REDCap and Zoom platforms. Renpho's smart body fat scale and tape measure are health applications that sync with fitness applications such as Apple Health, MyFitnessPal, Fitbit, and Samsung Health. The Renpho Bluetooth-enabled smart scale and smart tape devices allowed participants to sync with the Renpho application to automatically upload data such as weight and WC to their phones. The smart scale used auto-calibration and sensors that computed weight in increments of 0.2 lbs with a 400 lbs capacity. The smart tape had an easy-lock hook function that ensured accurate readings. The tape allowed patients to measure their waist, either inches or centimeters, according to their preference. These devices allowed participants to connect with smartphone applications, save data, and track progress. These applications did not synchronize with the organization's electronic medical record (C-S Link, an iteration of Epic) (Renpho, n.d). The scholarly project's leader reviewed participants' self-reported weights (lbs) and WC (in) fortnightly. Participants received the smart scale and smart tape complimentary once the project ended.

A centralized messaging platform, REDCap, was used as a communication channel because it encrypted participant information on the REDCap server. This platform allowed the scholarly project's leader to communicate with participants and send personalized alerts and reminders on a predetermined schedule. Barry et al. (2019) argued that leveraging technology in studies can enhance communication and engage participants while facilitating data collection. The participants were asked to complete a post-participation satisfaction survey that included a

5- point ("strongly agree," "agree," "neutral," "disagree: "to "strongly disagree") Likert-style scale. The survey included validated questions from the 12-item Short Answer Questions (SAQ) developed by Lohnberg et al. (2021). The modified survey used six questions applicable to this project to assess satisfaction with the program. Six questions were excluded because they were not relevant to the project aims. Revising the survey could have affected the validity of the instrument.

Recruitment

The scholarly project's leader created flyers that were posted in the heart institute within the institution targeting different specialty cardiologists. These flyers were given to healthcare providers and ancillary staff and posted in medical offices, waiting rooms, and exam rooms with details about the project between October 2022 and December 2022 (see Appendix A & G). The healthcare staff working in the institute referred potential participants if they met the eligibility criteria. The staff received the project's cover letters, recruitment scripts, and the project leader's contact information to give to interested individuals. If the scholarly project's leader was available in the office, interested candidates could have discussed the project in a 5-10 minute in-person meeting (see Appendix B).

Intervention

The scholarly project's leader obtained consent via email after a consent discussion (via phone, zoom, or in person) with each participant after eligibility was confirmed based on the pre-screening script (see Appendix B). The Zoom link was sent to all participants via email or text 48-72 hours before their appointment with instructions on logging in. Each participant met virtually on Zoom with the project leader and received 1:1 counseling on pairing the Repnho smart scale and tape measure with the Renpho application. The expectations of the weight

management program were explained in detail during the first session, which lasted one hour or less (session one= week zero). The weight loss goal was to reach at least 1-2 lbs per week, as the Centers for Disease Control and Prevention (CDC) (2022) recommends. The hypothesis is that people who gradually lose weight are more successful at keeping it off (CDC, 2022).

Data Collection

Participants loaded anthropometric measures such as height, weight (lbs), BMI, and WC (in) during the first session in the Renpho application after they synced their smartphones with the scale and tape measure. To measure central obesity, the participants measured their waistline at the level of the umbilicus (belly button) while standing and placing the smart tape measure around the middle waist, just above the hip bones, with the tape horizontal around the waist. The measurement was taken after they breathed out (CDC, 2022). Measuring the mid-abdominal section better defines central obesity and identifies and predicts metabolic diseases than measuring the waist at the iliac crest, particularly in women (Ma et al., 2013). The scholarly project's leader also included these measurements in REDCap (see Appendix F). To account for scale variability, the scholarly project leader calibrated the scales before giving them to the participants. Participants were asked to weigh themselves at the same time in the morning after fasting for at least 8 hours, remove shoes and jackets, and empty their pockets before each weigh-in. Daily self-weighing showed favorable weight loss outcomes and maintenance (Steinberg et al., 2013). Since the cornerstone of behavioral weight loss approaches is self-monitoring, increasing body weight awareness leads to weight loss (Vuorinen et al., 2021).

The scholarly project's leader used educational materials from the AHA to educate patients about dietary modifications based on the MedDiet and how to keep a food diary log. These educational materials were emailed to each participant 24 hours before the visit. To

promote adherence to the MedDiet, participants received a QR code to the AHA website for examples of a menu to identify healthy and unhealthy habits. Participants were encouraged to track the times they ate, food choices, portion sizes, and behavior with each meal/snack in a food diary. They were encouraged to review the food diary at the end of each day and make changes based on the MedDiet recommendations (AHA, 2020).

A scripted motivational interviewing method that incorporated the 5 A's model (Assess, Advise, Agree, Assist, and Arrange) was used during the initial visit (session one= week zero) to promote behavioral change (Sherson et al., 2014; Sturgiss & Van Weel, 2017). The script was guided by the 5 A's model of obesity management in primary care, developed by the Society of Behavioral Medicine (Sherson et al., 2014) (see Appendix C). This framework was used to discuss weight and assess each participant's health risk and readiness to change (Assess), counsel on specific behavioral changes (Advise), agree on specific weight loss goals (Agree), assist with potential barriers using MI (Assist), and arrange a follow-up appointment (Arrange) (Welzel et al., 2018). Medicare and the Agency for Healthcare Research and Quality (AHRQ) strongly recommend using MI and the 5 A's model for behavioral lifestyle counseling for weight management to increase patient motivation and likelihood to change (AHRQ, 2014).

During the final session (session two= week eight), the same structure as session one was followed (final intake of the exact anthropometric measurements), and a similar MI script was followed to assess motivation, review progress, successes/failures, barriers, the importance of change, and determine additional subgoals (see Appendix C). Each participant was sent a scripted booster text or email every two weeks (weeks two, four, and six) (see Appendix D).

The participants were asked to text a screenshot of the most recent weight and waist measurements in the Renpho application. These data were recorded in REDCap. The participants

could have opted for a 5–10-minute telephone call from the project leader to ask additional clarifying questions regarding the MedDiet, weight loss, or the Renpho smart scale and tape. Prior work evaluating provider-patient relationships found that telephone callbacks increased participants' motivation to adhere to a suggested intervention **(**Guss et al., 2014). When patients feel the healthcare provider cares about them and is invested in their overall well-being, they will be more receptive to change (Hall & Kahan, 2018). If a visit/measurements check-ins were not possible due to scheduling conflicts, these were rescheduled up to 24-48 hours after the missed appointment. During the first visit, the participants were asked to complete a demographic survey to establish participants' characteristics (see Appendix E). During the final visit, the participants were asked to complete a satisfaction survey (see Appendix J).

If participants completed two counseling sessions with the NP and sent three sets of anthropometric measurements (weight and WC) at weeks two, four, and six (via email), they were considered to have completed the entire program. The scholarly project's leader contacted patients via instant messaging/email/telephone if the participants missed their appointments or failed to follow the project's guidelines. Three attempts were made to make contact within 48 hrs. If unable to reach the participant, the project leader sought to enroll another participant to meet enrollment targets.

Projected Outcomes

The primary outcomes and benchmarks for this eight-week scholarly project were to achieve a clinically significant reduction in weight of at least 5-10% and at least 2.5 in reduction in WC from baseline, given that overweight patients who reduce their weight by 5% have been shown to have improvements in metabolic function in many tissues (Wing et al., 2011). Participants' satisfaction was analyzed through post-participation surveys, displaying questions

using a Likert-scale. Specifically, participants' satisfaction (secondary outcome) with the quality of the program of at least 90% was the secondary goal of this project (question 1).

Data Analysis

At the end of eight weeks, descriptive statistics, such as frequencies, means, medians, and percentages were performed to analyze patient characteristics, satisfaction, and weight and waist changes. Paired t-test was used to compare the means of the pre-and post-intervention groups. A p-value < 0.05 was considered statistically significant. All statistical analyses were conducted using IBM SPSS Statistics (Version 27) software. Patient satisfaction scores for the overall virtual program quality were collected and shown as percentages (0-100%).

CHAPTER FIVE: RESULTS

Demographic Characteristics

Table 1 summarizes the sample baseline demographic characteristics. Of the 30 participants included in the weight loss program, three dropped out after signing the consent due to health information privacy concerns and technical difficulties with using the Bluetooth-enabled smart scale and tape. One participant dropped out before week four due to health concerns unrelated to the project (26/30, 86.6% retention rate). Of the 26 participants who completed the project, 19 (73.2 %) were White, 3 (11.5 %) were Hispanic, 3 (11.5 %) were Black, and 1 (3.8 %) identified as Other (more than one race). All participants were over 18, with a mean age of 54 (54 ± 13.35; range 27 to 82 years).

All participants had a BMI of 30 or greater with at least one CVD risk factor and tried to lose weight without significant success to lose weight by following different diet plans. The participants reported having the following CVD risk factors: dyslipidemia, hypertension, or both 12 (46.1 %); type 2 diabetes mellitus, pre-diabetes, or both 6 (26.9 %); sleep apnea 1 (3.8 %); or

family history of heart disease, 13 (50 %). None of the participants took weight loss supplements or medications during the project. All participants were ready to lose weight based on the stages of the Change Model of the Transtheoretical Model. While 17 (65.4 %) were in the action stage (changed their behavior within six months prior), 7 (26.9 %) were in the preparation stage (ready to take action within the next 30 days), and 2 (7.7 %) were in the contemplation stage (intended to start healthy behavior in the next six months).

Table 1: *Demographic Characteristics of Participants*

Characteristics	**n (%)**
Age	
Mean ± SD	54.0 + 13.35
Gender	
Female	26 (100 %)
Marital Status	
Single	3 (11.5%)
Married	21 (80.8%)
Divorced	1 (3.8 %)
Widowed	1 (3.8 %)
Race	
White	19 (73.2 %)
Black	3 (11.5 %)
Hispanic	3 (11.5 %)
Two or more races	1 (3.8 %)
Stages of Change Model	
Action	17 (65.4 %)
Preparation	7 (26.9 %)
Contemplation	2 (7.7 %)
Current exercise regimen frequency	
Daily or almost daily	4 (15.4 %)
3-5 times weekly	4 (15.4 %)
1-2 times weekly	11 (42.3 %)
Several times month	3 (11.5 %)
Less than once monthly	4 (15.4 %)

Note. n = number of participants; % = percentage of participants. SD is standard deviation.

Outcomes

The weight, WC, and BMI were obtained from all 26 participants during the initial visit by the scholarly project's leader. The benchmarks were defined as a 5-10 % reduction in weight per participant from baseline, a decrease in WC of at least 2.5 in from baseline, and at least 90 % of participants' satisfaction with the quality of the program (question 1). The results were significant for mean reduction in weight in lbs (6.38± 6.62) and mean change in WC (inches) (3.02± 1.64). The mean change in weight loss did not meet the benchmark of a 5-10% weight reduction. The mean weight loss percent was 3.16 % ± 2.94, respectively the mean change for the BMI was 1.07 ± 1.03 (see Table 2). Overall, 22 participants lost weight and had a decreased BMI, two stayed the same, and two gained weight and increased BMI. Only one participant had no change in WC (see Table 2).

Table 2: ***Pre- and Post-Participants Biometrics (n=26)***

Variable	**Pre-Intervention**	**Post-Intervention**	**Pre-Post**	***p*- value**
Weight, lbs, mean (SD)	205.5 (35.21)	199.2 (35.69)	6.38 (6.62)	< 0.0001
WC, in., mean (SD)	42.3 (4.79)	39.3 (4.74)	3.02 (1.64)	< 0.0001
BMI, mean (SD)	34.3 (4.44)	33.2 (4.53)	1.07 (1.03)	< 0.0001

Note: p values were determined by paired t-test.

The participants met the benchmark of losing at least 2.5 inches in WC (mean = 3.02), although one participant did not lose any inches in WC. These results suggest that WC should be routinely measured as a "vital sign" in practice as it provides additive information for predicting CVD morbidity and mortality risk. While weight loss reeducations were statistically significant

($p<0.0001$; post- vs. pre-intervention), participants did not meet the goal of 5-10 % weight loss from baseline. The participants lost a mean of 3.2 (2.9) % of their initial body weight and a mean of 6.4 (6.6) lbs from baseline over eight weeks. Also, as illustrated in Table 3, 24 (92.3 %) answered "strongly agree" and "agree" with the quality of care received through the program. These results met the 90 % benchmark of participants' satisfaction with the quality of care received through the remote weight management program.

Table 3: ***Participants' Satisfaction Scores***

Question	**Post-Intervention**	**n (%)**
1. Satisfaction with the quality of care received through this program	Strongly Agree 18 (69.2 %) Agree 6 (23.1%) Neutral 2 (7.7%)	24 (92.3 %)
2. Satisfaction with the recommendations made by the Nurse Practitioner	Strongly Agree 20 (76.9%) Agree 6 (23.1%)	26 (100 %)
3. Preferred virtual visits over in-person appointments for weight management counseling	Strongly Agree 15 (57.7%) Agree 5 (19.2 %) Neutral 5 (19.2 %) Strongly Disagree 1 (3.8 %)	20 (76.9 %)
4. Length of time between appointments was reasonable	Strongly Agree 14 (53.8 %) Agree 10 (38.5%) Disagree 2 (7.7%)	20 (92.3 %)
5. Virtual visits are as good as in-person visits	Strongly Agree 14 (53.8 %) Agree 7 (26.9 %) Neutral 2 (15.4 %) Disagree 1 (3.8%)	21 (80.7 %)

6. Satisfaction with the time commitment of this program	Strongly Agree 17 (65.4 %) Agree 4 (15.4 %) Neutral 3 (11.5 %) Disagree 2 (7.7 %)	21 (80.8 %)

Based on the data analysis, the majority of participants were satisfied with the quality of care received through the virtual program (92.3 %; n=24) and recommendations made by the APRN (100 %; n=26). Most participants preferred virtual visits over in-person appointments for weight management counseling (76.9 %; n=20) and reported that virtual visits are as good as in-person visits (80.7 %; n=21) (see Table 4). This data supports the argument that the flexibility and scalability of virtual weight counseling may be a more feasible alternative to in-person visits.

CHAPTER SIX: DISCUSSION

The key finding of this scholarly project was that a virtual weight management program led to a statistically significant reduction in weight, BMI, WC and resulted in participants' satisfaction in a sample of women with obesity and risks for CVD. The findings are essential for two reasons: (1) utilizing a behavioral change intervention with MI and MedDiet counseling via a telemedicine platform can provide a synergistic support for weight loss, and (2) personalized weight management utilizing digital health technologies to track various health indicators via a virtual platform can decrease patients' weight, BMI, and WC through education, counseling, and follow-up at consistent intervals. Self-monitoring can improve individuals' accountability since it allows for greater awareness leading to greater self-control, self-efficacy, and self-initiated reinforcement (Steinberg et al., 2013).

The retention rate to this virtual weight management program was 86.6 %, while the overall adherence rate for weight loss interventions in the literature is 60.5% (Lemstra et al., 2016). After reviewing the current literature, most weight loss interventions' timelines (in-person

or virtual) are over 12 weeks (Alencar et al.,2020; Johnson et al.,2019; Solbrig et al.,2019). We hypothesize that the rate of weight loss and high adherence rates for this eight weeks intervention could be explained by the program's short duration. Current evidence supports that effective weight loss strategies are required to reduce the prevalence of overweight and obesity; however, the effectiveness of current weight loss interventions and duration is variable (Williams et al., 2015).

There is a gap in knowledge regarding the long-term effects, cost, and insurance coverage of telemedicine counseling for obesity management. The findings of this project support the argument that telemedicine platforms and novel technology-based tracking tools can offer an ideal opportunity for improved access to care and provide patients with behavioral and clinical care, two critical elements of obesity management. The potential for remote weight management programs and novel digital-based platforms for weight-tracking to evolve into a more integrated approach at a health-system level in treating obesity requires additional research. An implication for future practice is for healthcare providers to partner with technology companies to improve data collection from patients and devices and integrate data into actionable care to ensure access and equity. As trusted and highly competent professionals, APRNs are well-positioned to provide cost-effective lifestyle modification counseling while achieving necessary patient-care outcomes (Kendall-Gallagher & Breslin, 2013).

Future research and awareness of appropriate screening tools for central or abdominal obesity are needed, given that visceral obesity has a considerable effect on CVD morbidity and mortality and WC measurement showed a better correlation with CVD risk than BMI alone and was demonstrated to be independent predictors of CVD risk (Bosomworth, 2019; Goh et al., 2014). Future research is also needed in testing this program in a larger sample with a more

diverse population, including a lower socioeconomic status in non-English speaking participants and tracking sustained outcomes or continued weight loss after the eight weeks intervention.

Limitations

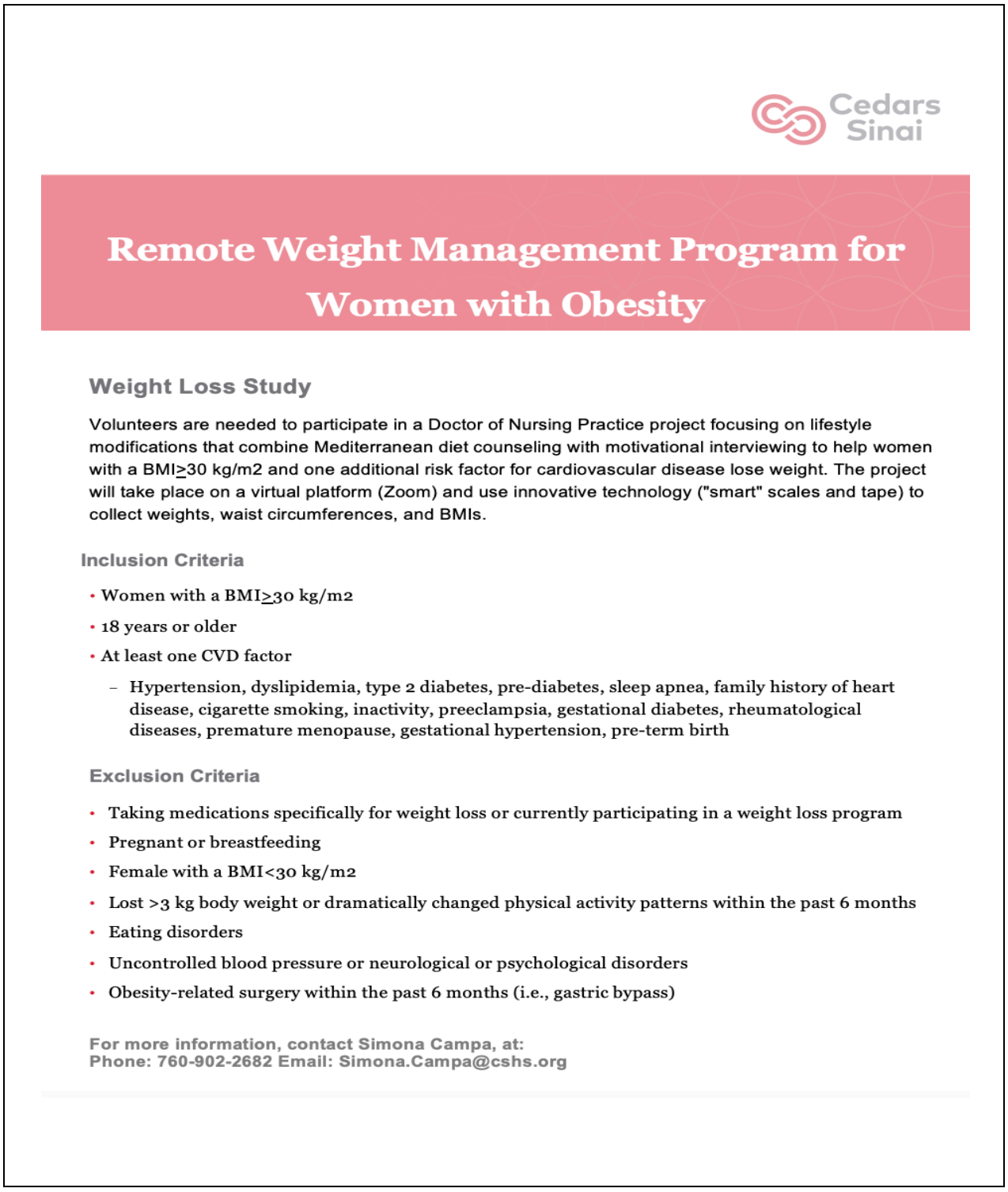
The design strategy for this scholarly project had some limitations. This was a convenience sample of women, predominantly white, English speaking, with access to care at a highly ranked tertiary care medical center so findings may not be generalizable to all women participating in remote weight loss programs. In addition, participants had to be facile with the use of telehealth modalities and electronic applications. Traditional and novel digital-based self-reported instruments such as food logs, weights, and WC self-measurements are prone to inaccuracies.

CONCLUSION

This scholarly project demonstrated that a remote weight loss program that utilizes a self-monitoring digital-based, smart phone application to track various health indicators is a feasible alternative to traditional scales and measuring tapes. Combining novel digital-based interventions for weight loss with personalized online health coaching can provide synergistic support to participants, produce weight loss, and promote accessibility and satisfaction in women with obesity at risk for CVD.

APPENDICES

Appendix A: Flyer with Project's Information



Cedars Sinai

Remote Weight Management Program for Women with Obesity

Weight Loss Study

Volunteers are needed to participate in a Doctor of Nursing Practice project focusing on lifestyle modifications that combine Mediterranean diet counseling with motivational interviewing to help women with a BMI≥30 kg/m2 and one additional risk factor for cardiovascular disease lose weight. The project will take place on a virtual platform (Zoom) and use innovative technology ("smart" scales and tape) to collect weights, waist circumferences, and BMIs.

Inclusion Criteria

- Women with a BMI≥30 kg/m2
- 18 years or older
- At least one CVD factor
  - Hypertension, dyslipidemia, type 2 diabetes, pre-diabetes, sleep apnea, family history of heart disease, cigarette smoking, inactivity, preeclampsia, gestational diabetes, rheumatological diseases, premature menopause, gestational hypertension, pre-term birth

Exclusion Criteria

- Taking medications specifically for weight loss or currently participating in a weight loss program
- Pregnant or breastfeeding
- Female with a BMI<30 kg/m2
- Lost >3 kg body weight or dramatically changed physical activity patterns within the past 6 months
- Eating disorders
- Uncontrolled blood pressure or neurological or psychological disorders
- Obesity-related surgery within the past 6 months (i.e., gastric bypass)

For more information, contact Simona Campa, at:
Phone: 760-902-2682 Email: Simona.Campa@cshs.org

Appendix B: Participants' Pre-Screening Script

Pre-Screening Script

Remote Weight Management Program for Women Obesity

My name is _____. Thank you for expressing interest in our project. The purpose of this project is to assess if counseling on a Mediterranean diet combined with motivational interviewing improves participants' weight, reduces waist circumference, and improves satisfaction with care provided by me via a virtual platform (Zoom).

May I ask you a few questions to see if you are eligible?

- *If "no":* Thank you for your time. Please contact us if you have any more questions.
- *If "yes":* The information you give us will be kept confidential. We will give your data a code. This code is used rather than your name. This way, your data will no longer be identifiable except to the project team. This coded record will be kept until the project is complete and closed. Participation is voluntary. You do not have to answer these questions. You can stop at any time.

Screening Questions:

1. What is your DOB?
2. What is your height?
3. What is your weight and waist circumference?
4. Do you have any of the following: hypertension, dyslipidemia, type 2 diabetes, pre-diabetes, sleep apnea, family history of heart disease, cigarette smoking, inactivity, preeclampsia, gestational diabetes, rheumatological diseases, premature menopause, gestational hypertension, pre-term birth
5. Are you currently taking medications for weight loss or currently participating in a weight loss program?
6. Are you pregnant or breastfeeding?
7. Do you have an eating disorder?
8. Have you lost >3kg body weight or dramatically changed physical activity in the past 6 months?
9. Do you have uncontrolled blood pressure, neurological disorders, or psychological disorders?
10. Have you had obesity related surgery in the last 6 months?

If ineligible: I'm sorry, but you do not meet the criteria necessary to take part in this project. The information you gave will be de-identified and not used for the project. Thank you for your time. Please let me know if you have any other questions.

If eligible: Based on the questions I have asked, it appears you would be eligible for our project. I'll ask for your contact information now to help us schedule your first visit. Would you like to move forward with participation?

If "no": Thank you for your time. Please contact us if you have any more questions.

If "yes": Collect the information be

Name: _____
Phone number: _____
Scheduling: _____

Do you have any questions?

If you have any further questions between now and the time of your visit, please give us a call at 760-902-2682.

Appendix C: Initial and Final Motivational Interviewing Scripts

1) How do you feel about your current weight**? (Ask)**
2) How confident are you that you can lose weight, rated on a scale of 1 to 5, with 5 being very confident? **(Assess)**
3) Based on our best evidence, it is recommended that you lose about (…) pounds to lower your cardiovascular disease risk **(Advise)**
4) A realistic goal for you would be to lose about (…) pounds in the next 2 months. If you lose about 1-2 pounds a week, you will be successful. What do you think about that plan? **(Agree)**
5) What might get in the way of your plan to adhere to a Mediterranean style of eating? How do you think you can keep on track with your goal in the face of these obstacles? **(Assist)**
6) I will schedule a reminder (text) to see how you are doing every 2 weeks **(Arrange)**

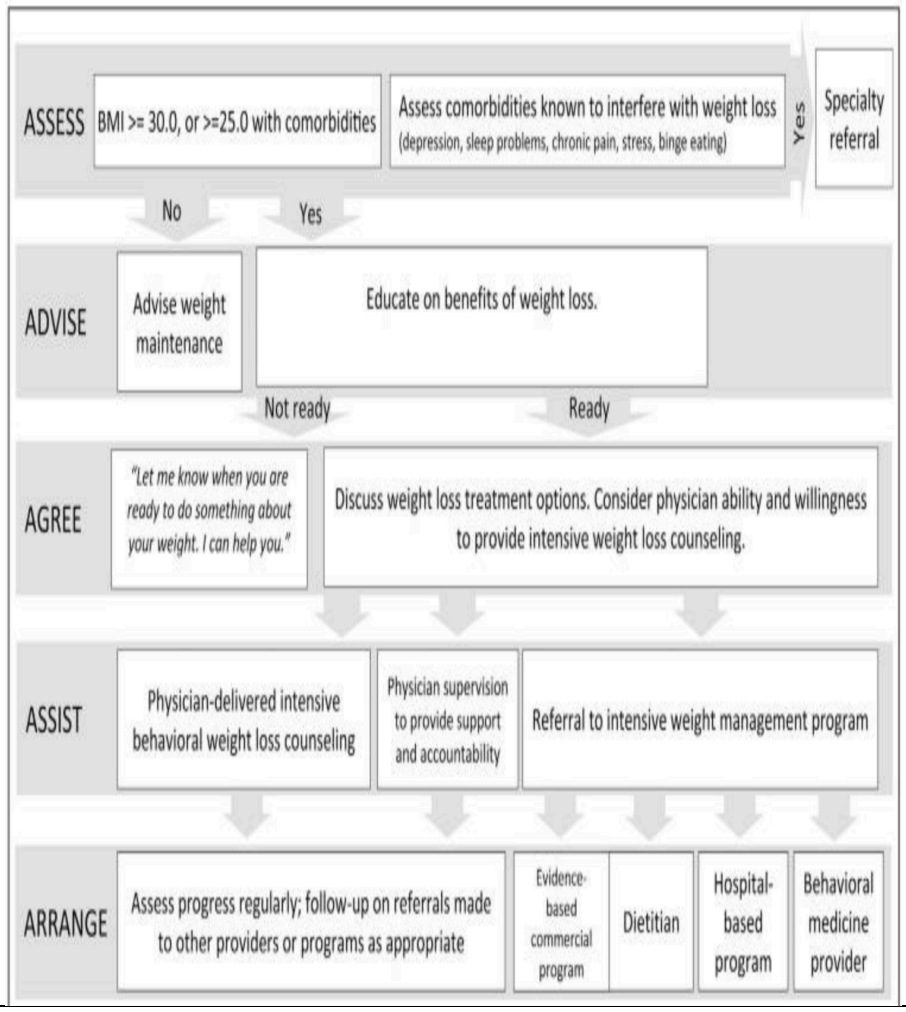
Final Motivational Interviewing Script

1) How do you feel about your current weight**? (Ask)**
2) How confident are you that you can continue to lose weight, rated on a scale of 1 to 5, with 5 being very confident? **(Assess)**
3) It is recommended that you lose another (…) pounds to lower your cardiovascular disease risk **(Advise)**
4) A realistic goal for you would be to lose about (…) pounds in the next (…) months. The goal is to lose about 1-2 pounds a week. What do you think about that plan? **(Agree)**
5) What might get in the way of your plan to adhere to a Mediterranean style of eating? How do you think you can keep on track with your goal in the face of these obstacles? **(Assist)**
6) I would suggest scheduling an appointment with your primary care physician in 2-3 months to reassess your goals **(Arrange)**

Note: Adapted from 5 A's model from Tables 1 (Sherson et al., 2014 & Fitzpatrick et al., 2016)

Flow chart for 5 A's model of obesity management in primary care

(Table 1: Fitzpatrick et al., 2016)



Examples for the 5 A's framework

(Table 1: Sherson et al., 2014)

USPSTF[a]	Alternative 1[b]	Alternative 2[c]	Definition[e]	Examples
Assess	Ask	Ask	Ask about (or assess) behavioural health risks	'How do you feel about your current weight?'
			Ask about weight, nutrition and/or physical activity habits	'Tell me what you do for exercise.'
	Assess		Assess patient readiness to make behavioural changes	'What is your confidence you could lose weight, rated on a scale of 1 to 5, with 5 being very confident?'
		Assess	Assess BMI, waist circumference and obesity stage	'Your BMI is 32, which is considered Stage I obesity.'
			Assess the effects of weight on psychosocial factors and 'root causes' of obesity.	'Did you have issues with overeating before you were diagnosed with depression?'
Advise	Advise	Advise	Give clear, specific and personalized behaviour change advice, including information about personal health harms and benefits	'I think you need to lose about 25 pounds to lower your cholesterol and blood pressure. If you do this, you may be able to avoid taking medication every day.'
				'Since you mentioned that knee pain is keeping you from exercise, I suggest that you aim to do 30 minutes of low-impact exercise like walking, biking, or swimming at least 5 days a week.'
Agree		Agree	Collaboratively select appropriate treatment goals and methods based on the patient's interest in and willingness to change the behaviour	'I believe a realistic goal for you would be to lose about 20 pounds in the next 6 months. You would need to lose about 1 pound a week. What do you think about that plan?'
Assist	Assist	Assist [d]	Aid the patient in achieving agreed-upon goals by acquiring the skills, confidence and social/environmental supports for behavioural change, supplemented with adjunctive medical treatments when appropriate (e.g. pharmacotherapy)	'What might get in the way of your plan to exercise three times a week? How do you think you can keep on track with your goal in the face of these obstacles?'
				'How do you think your family could support you in eating better? How could you approach them about being supportive?'
Arrange	Arrange		Schedule follow-up contacts (in person or by telephone) to provide on-going assistance/support and to adjust the treatment plan as needed, including referral to more intensive or specialized treatment	'I would like you to call me in 2 weeks to let me know how our weight loss plan is going.'
				'I will schedule an appointment for you to see our registered dietitian next month.'
				'Here is information on low cost group physical activity classes at the YMCA near your house.'

Appendix D: Scripted Booster Text Messages

Hi, [insert name]. This is Simona Campa, DNP project leader for the weight loss program that you are currently enrolled in. It was a pleasure speaking with you a few weeks ago. I am checking in with you to obtain your weight and weight circumference from today. Please let me know if you have additional questions and would like to set up a quick call. Thank you so much for your time and I am looking forward to hearing from you!

Best,

Simona, Project Leader

Appendix E: Patient Demographic Data

1) What is your current age? __

___

2) What is your race? Please circle one

A) Asian/Indian subcontinent
B) Black
C) Hispanic
D) Native American
E) Pacific Islander
F) Two or more races
G) White
H) Other

3) What is your educational background? Please circle one

A) < 12th grade
B) High school
C) College
D) Associate degree
E) Bachelor's degree
F) Post-graduate degree

4) What is your marital status? Please circle one

A) Single, never married
B) Married or Domestic Partnership
C) Widowed
D) Divorced

Appendix F: Data Collection Worksheet

Data Collection Worksheet (Anthropometric Measurements)

Participants	Initial weight	Height	Initial BMI	Initial WC	Self-reported weight via text message #1	Self-reported weight via text message #2	Self-reported weight via text message #3	Post Weight	Post BMI	Post WC
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Mean Initial Weight										
Total Initial Weight										
Mean Post Weight										
Total Post Weight										
Weight Lost										
Inches Lost										

Note.

This is an example data collection form. BMI = Body Mass Index; WC = Waist circumference; lbs. = Pounds.

Appendix G: Gantt Chart and Timeline

Remote Weight Managment Program for Women with Obesity

Cedars Sinai Medical Center

Simona Campa

TASK	ASSIGNED TO	PROGRESS	START	END
August 2022 - June 2023				
Meet with Noel Bairey-Merz MD, develop referral process	Simona and Noel Bairey-Merz	100%	8/1/22	8/8/22
Establish committee and hold meetings with other cardiology teams	Simona	100%	8/2/22	8/12/22
Meet with cardiology team members: Janet Wei MD and cardiology fellows	Simona	100%	8/5/22	8/12/22
Apply for CSMC and UCLA IRB	Simona	30%	10/2/22	10/30/22
November-December Recruits 20 per month x 2 months	Simona	0%	11/1/22	12/31/22
First visits with 40 patients (8 pts per day x 5 days)	Simona	0%	1/2/23	1/16/23
Text boosters to all 40 patients	Simona	0%	2/2/23	2/16/23
Final visit with all 40 patients (8 pts per day x 5 days)	Simona	0%	3/2/23	4/2/23
Finalize data collection	Simona	0%	4/2/23	4/16/23
Collect and analyze data and meet with committee	Simona	0%	4/17/23	4/30/23
April - May 2023				
Finalize data of all 40 participants, including statistical analyses and comparisons	Simona/Committee	0%	5/1/23	5/17/23
Ongoing				
PDCA Cycle	Simona	0%	1/2/23	6/1/23

Appendix H: Cover Letter

Cedars Sinai

Address Location [PI]
Suite 0000
Los Angeles, CA 00000
cedars-sinai.org

Date

Name [Patient]
Address
City, State, ZIP code

Dear Participant,

In addition to the medical care provided at Cedars-Sinai, we conduct research to learn how to better prevent, diagnose and treat illness, with the ultimate goal of improving health.
As a nurse practitioner in the Women's Heart Center at Cedars-Sinai pursuing a Doctor of Nursing Practice Degree at UCLA, I am conducting a project, titled Remote Weight Management Program for Women with Obesity. The purpose of the project is to assess if counseling on the Mediterranean diet combined with motivational interviewing via a telemedicine platform (Zoom) while using smart technology ("smart" scales and tape) improves weight loss, reduces waist circumference, and improves satisfaction with the care provided by me. I am inviting you to take part in this project.

Participation is completely voluntary. Your decision to be part of the project will not affect your medical care at Cedars-Sinai. A member of the project team may contact you to find out if you are interested in learning more about this program.

If you are eligible and decide to be part of the project, you will be asked to participate in two virtual one hour sessions at the beginning and end of the project. There will also be text messaging with the Nurse Practitioner for check-ins at 2, 4, 6 weeks to provide most recent weight, BMI, and waist circumference measurements. The first session will include collection of measurements such as weight,height, BMI, waist circumference, counseling and a review of a brochure on the Meditarranean diet, and discussion of a weight loss plan specifically designed for your needs. The study duration is 8 weeks total. If you decide to participate and later change your mind, you may withdraw from the project at any time.

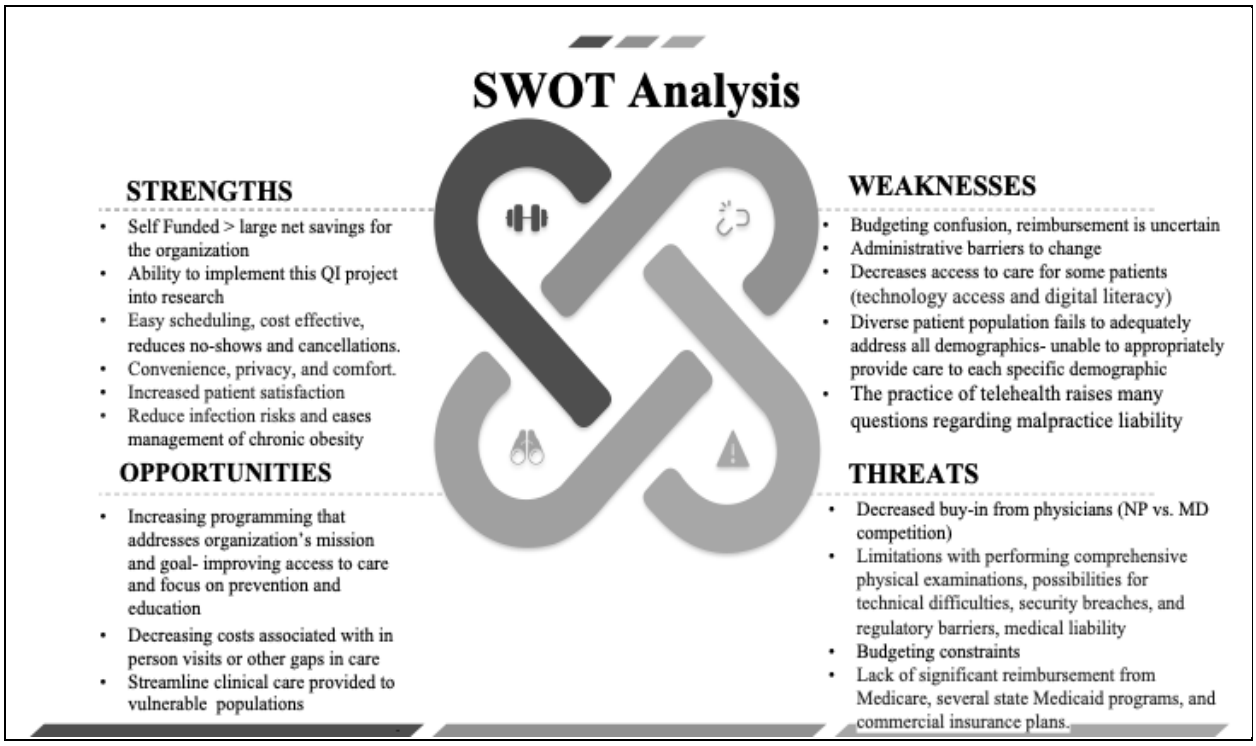
The project will be conducted remotely via Zoom. For more information about this project, please contact Simona Campa by email at Simona.Campa@cshs.org or contact us by phone at 760-902-2682 to learn more about our team and research at Cedars-Sinai.

Sincerely,

[use or omit space as needed for physical signature]

First Last Name
Title
Department

Appendix I: SWOT Analysis

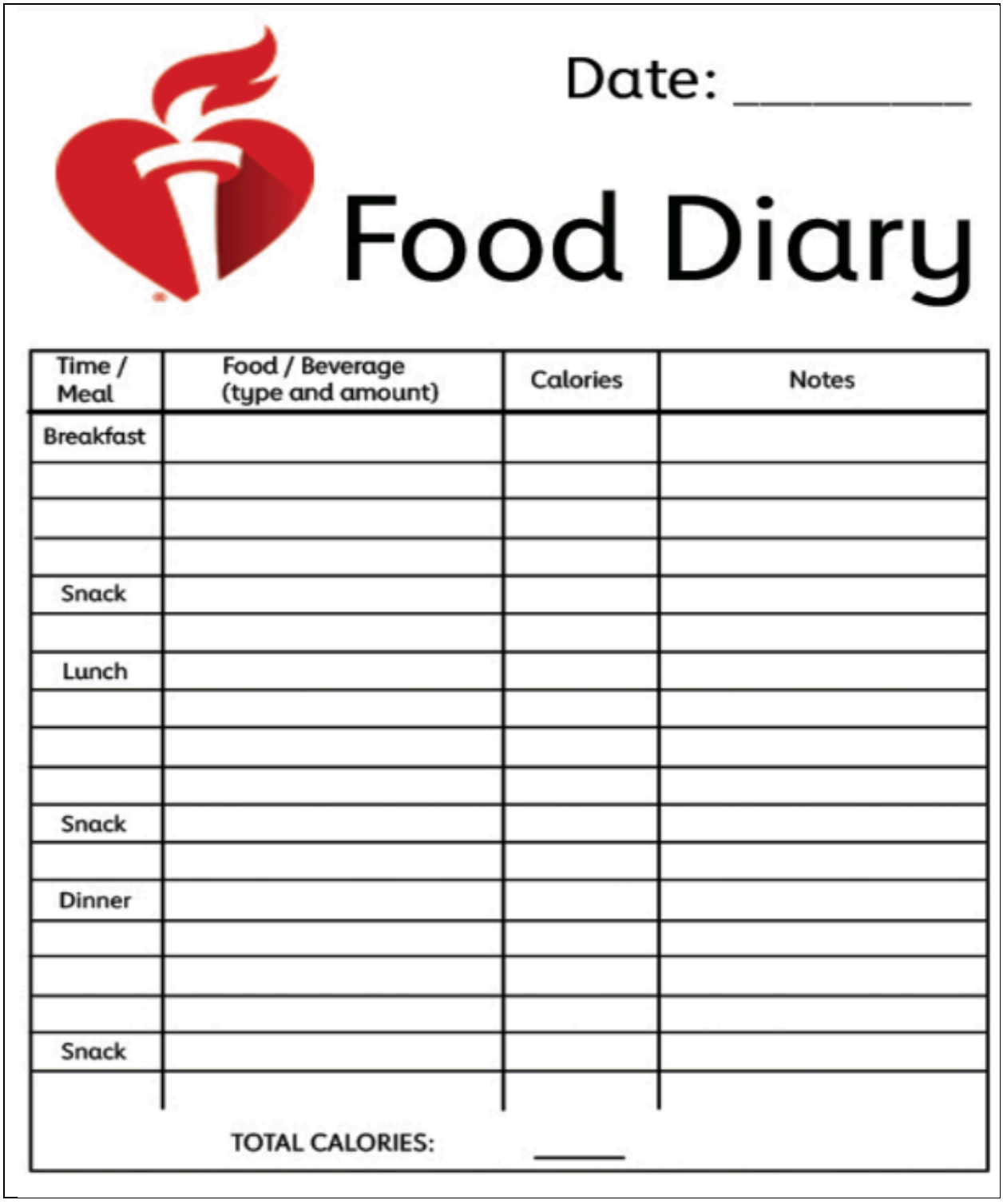


Appendix J: Participants Satisfaction Survey

1. I am satisfied with the quality of care received through this program
a. [] Strongly agree b. [] Agree c. [] Neutral d. [] Disagree e. [] Strongly disagree
2. I am satisfied with the recommendations made by the Nurse Practitioner
a. [] Strongly agree b. [] Agree c. [] Neutral d. [] Disagree e. [] Strongly disagree
3. I prefer virtual visits over in-person appointments for weight management counseling
a. [] Strongly agree b. [] Agree c. [] Neutral d. [] Disagree e. [] Strongly disagree
4. The length of time between appointments was reasonable
a. [] Strongly agree b. [] Agree c. [] Neutral d. [] Disagree e. [] Strongly disagree
5. Virtual visits are as good as in-person visits
a. [] Strongly agree b. [] Agree c. [] Neutral d. [] Disagree e. [] Strongly disagree
6. I feel satisfied with the time commitment of this program
a. [] Strongly agree b. [] Agree c. [] Neutral d. [] Disagree e. [] Strongly disagree

Note: Adapted from the 12-item Short Answer Questions (SAQ) developed by Lohnberg et al. (2021)

Appendix K: Food Diary Log



Date: _____

Food Diary

Time / Meal	Food / Beverage (type and amount)	Calories	Notes
Breakfast			
Snack			
Lunch			
Snack			
Dinner			
Snack			

TOTAL CALORIES: _____

Note: Downloaded from the AHA (2018)

Appendix L: Mediterranean Diet Educational Tool

✓ More vegetables, whole grains, beans, nuts, fruits, and legumes ✓ Eat lean meats from fish and chicken ✓ Healthy fats (olive oil, avocados)
EAT MORE of these: ✓ *EAT fruits, vegetables, whole grains, nuts, and legumes* ✓ *EAT fresh foods grown locally* ✓ *Use OLIVE OIL as the main source of fat*
EAT LESS of these: • *Cheese & Yogurt – low to moderate amounts (Daily)* • *Fish and Poultry – Low to moderate amounts (Few times a week)* • *Red meat – Small amounts, infrequent (Once a week)* • *Sugar or honey – only a few times each week (Rare)*
Helpful Tips: ✓ Be Mindful about food CHOICES and PORTIONS ✓ Drink More WATER ✓ AVOID packaged foods
The American Heart Association encourages: • Adherence to the Mediterranean Diet to reduce risk factors such as Obesity, Type 2 Diabetes, Dyslipidemia, and Hypertension and prevent heart disease and stroke
Scan with your phone camera – for more on the Mediterranean Diet →


Note: Tool created from *What is the Mediterranean Diet?* from AHA (2020)

TABLE OF EVIDENCE

Author, Year	Purpose	Sample & Setting	Methods, Design, Interventions, Measures	Results	Discussion, Limitations
Alencar, M., Johnson, K., Gray, V., Mullur, R., Gutierrez, E., & Dionico, P. (2020). Telehealth-based health coaching increases health device adherence and rate of weight loss in obese participants. *Telemedicine Journal and E-Health*, *26*(3), 365–368. https://doi.org/10.1089/tmj.2019.0017	**Primary Outcomes:** -If live weekly health coaching promotes adherence to a remote monitoring device and promotes a healthy rate of weight loss (1-2 pounds) per week.	**Sample:** -25 obese individuals (13 women and 12 men) assigned to intervention group with coaching (n= 13) or the control group, self-guided (n= 12). **Inclusion criteria:** - BMI ≥30 kg/m^2, stable weight, and access to an Apple iPhone® **Exclusion criteria:** -Tobacco use, diabetes mellitus, serious medical condition, taking weight loss medication, or concurrent enrollment in a weight loss program **Setting:** -California State University, Long Beach	-12 weeks medically monitored intervention -Weekly coaching (30 min each x 12) with a dietician and monthly monitoring with the physician for 10 min vs. self-guided, no-intervention. -All participants received a tracker (Withings® Activité Pop) and smart scale (Body+) and had access to HIPAA secure platform American Well® (Amwell®) to collect data and videoconference with the research team. -Weekly weights and daily accelerometer step counts were uploaded wirelessly via Bluetooth in the application. Real-time data access. -Both groups were single blinded and guided to follow the recommended diet and increase steps to 10,000/day. Both groups had baseline and final visits with the physician and dietician to establish care goals and review progress. -Educational materials were used from the Telehealth Enabled Approach to Multidisciplinary care curriculum. **Statistical Analysis:** -Independent t-tests and $\chi 2$ tests via SPSS. Data were presented as average ± SD ($p < 0.05$)	-The intervention group had a greater adherence to the remote monitoring devices (92% ± 10% vs. 75% ± 15% smart scale [$p < 0.05$]) and (80% ± 14% vs. 49% ± 15% activity tracker [$p < 0.05$]). -The weekly rate of weight loss was higher for the intervention group vs. no intervention (−0.74 ± 1.8 kg vs. 0.18 ± 1.8 kg ($p < 0.05$).	-Telehealth health coaching for weight management might effectively increase remote device adherence and promote weight loss -Smart health devices can provide a unique opportunity for the healthcare provider to observe individual behavior, from a clinician and individual standpoint. -The synergistic effect of combining smart devices with health coaching is enhanced and can produce favorable weight loss **Limitations:** -Limited data on long-term benefit, small sample

Note: BMI= body mass index, CI = confidence interval, SD = standard deviation, SPSS= *Statistical Package for the Social Sciences*

Author, Year	Purpose	Sample & Setting	Methods, Design, Interventions, Measures	Results	Discussion, Limitations
Gils Contreras, A., Bonada Sanjaume, A., Becerra-Tomás, N., & Salas-Salvadó, J. (2020). Adherence to Mediterranean diet or physical activity after bariatric surgery and its effects on weight loss, quality of life, and food tolerance. *Obesity Surgery*, *30*(2), 687–696. https://doi.org/10.1007/s11695-019-04242-3	**Primary Outcomes:** - If adherence to the MedDiet and physical activity after bariatric surgery mediates changes in an individual's BMI, weight, quality of life, and food tolerance **Inclusion criteria:** -18- 66 years, BMI ≥ 35 kg/m^2, pending laparoscopic bariatric surgery with obesity comorbidities such as a) diabetes, hypertension, hyperlipidemia, and sleep apnea OR (b) BMI ≥ 40 kg/m^2, and failed conservative treatment **Exclusion criteria:** -BMI < 35 kg/m^2, pregnant or breast-feeding, severe systemic disease, on insulin, coagulation problems, eating disorders, or severe psychiatric conditions	**Sample:** -78 morbidly obese individuals who underwent bariatric surgery were followed up for one year after surgery (n=78) **Setting:** -University Hospital Sant Joan de Reus, Spain	-Randomized controlled trial -Assessments at baseline and every 3 months for 12 months after surgery. Educational brochures with general dietary recommendations were provided -At 1-month post-surgery, personalized advice, and recommendations to eat a healthy diet -Adherence to MedDiet (using a validated 14-point method called Mediterranean Diet Adherence Screener (MEDAS) and physical activity (using the International Physical Activity Questionnaire-Short Form-IPAQ-SF) was measured 3 weeks before bariatric surgery (baseline) and every 3 months thereafter - Physical activity calculated in METs min/week. -Adherence to MedDiet was assessed by either an increase or a reduction or maintenance of adherence at 12 months after surgery (compared to baseline) -Weight, quality of life, and food tolerance recorded at baseline, 3, 6, 9, and 12 months after surgery. -Height was determined using a stadiometer, weight was measured by bioelectrical impedance, while fasting, with light clothes and no shoes. **Statistical analysis:** Kolmogorov-Smirnov test, paired t test, and ANCOVA were used (significance set at $p \leq 0.05$ with SPSS 20)	-Adherence to MedDiet had a clinically significant higher mean of the total percentage of weight loss, 37.6% (35.5-39.8), when compared to those who decreased or maintained their adherence during follow-up, 34.1% (31.8-36.5) ($p = 0.036$)	-After bariatric surgery, obese individuals showed more weight loss if they adhered to the MedDiet -Physical activity was not statistically significant

Note: BMI= body mass index, MedDiet= Mediterranean diet, METs =metabolic equivalents, SPSS= *Statistical Package for the Social Sciences*

Author, Year	Purpose	Sample & Setting	Methods, Design, Interventions, Measures	Results	Discussion, Limitations
Kouwenhoven-Pasmooij, T. A., Robroek, S., Kraaijenhagen, R. A., Helmhout, P. H., Nieboer, D., Burdorf, A., & Myriam Hunink, M. G. (2018). Effectiveness of the blended-care lifestyle intervention 'Perfect Fit': A cluster randomized trial in employees at risk for cardiovascular diseases. *BMC Public Health*, *18*(1), 766. https://doi.org/10.1186/s12889-018-5633-0	-If workplace web-based lifestyle interventions using MI improve weight for those with an increased CVD risk -If the intervention improved work productivity **Primary outcome:** self-rated health **Secondary outcomes**: weight, BMI, work efficacy, and health behaviors	**Sample:** - n=491, >40 y/o, from the military (9 clusters), the police (3 clusters), and the hospital (5 clusters) **Inclusion criteria:** 1) angina or heart attack in first degree relatives 2) not meeting the Dutch activity recommendations for moderate exercise (5 x a week for at least 30 min) 3) cigarette smoking 4) self-reported diabetes or glucose ≥ 11.1 mmol/l. 5) obesity 6) hypertension or on antihypertensive therapy 7) dyslipidemia - Having at least 1 of the inclusion criteria determined an elevated risk for CVD **Setting:** -Netherlands	-Multicenter cluster randomized controlled trial -Screening: short web-based questionnaire, labs, and anthropometric data collection -The limited intervention (control): personalized online feedback and an electronic newsletter on healthy lifestyle (sent every 2 to 3 months). -The extensive intervention group: 7 individual coaching sessions with MI with the MD (4 by telephone and 3 face-to-face). MI techniques included asking open questions, supporting, and reflecting. -All MDs received 3 days of training in MI and 3 follow-up coaching sessions of 4 hours -Data collected at 6- and 12-months follow-up **Statistical Analysis**: -Chi-Square tests and ANOVA-tests for continuous variable were used/ Data were analyzed using SPSS	-At the end of 12 months, the extensive intervention was not statistically different from the control group for BMI (- 0.81; 95%CI -1.87-0.26), body weight (- 2.16; 95% CI -5.49-1.17), and self-rated health (4.3%; 95% CI -5.3-12.8), - In a within-group analysis, for the extensive intervention group, the weight (- 3.1 kg; 95% CI -2.0 to - 4.3) was reduced, while it remained unchanged for the control group (+ 0.2 kg; 95% CI -1.4 to 1.8). -Both randomized groups increased work productivity and activity -Excessive alcohol consumption decreased at 12 months.	-The investigators concluded that the within the group analysis revealed that the weight reduced significantly. - MI could help providers successfully manage weight. **-Limitations** -Did not include a non-intervention group

Note: BMI= body mass index, CI= confidence interval, CVD= cardiovascular disease, MI= Motivational interviewing, MD =Medical doctor, SPSS= *Statistical Package for the Social Sciences*

Author, Year	Purpose	Sample & Setting	Methods, Design, Interventions, Measures	Results	Discussion, Limitations
Johnson, K. E., Alencar, M. K., Coakley, K. E., Swift, D. L., Cole, N. H., Mermier, C. M., Kravitz, L., Amorim, F. T., & Gibson, A. L. (2019). Telemedicine-based health coaching is effective for inducing weight loss and improving metabolic markers. *Telemedicine Journal and E-health: The Official Journal of the American Telemedicine Association*, *25*(2), 85–92. https://doi.org/10.1089/tmj.2018.0002	**Primary Outcomes:** -If coaching via video OR in-person changes activity behaviors and reduces weight and metabolic markers in adults with a BMI ≥30 kg/m2 **Inclusion criteria:** - BMI ≥30 kg/m2, English speaking, <396 pounds, <7,000 steps/day, owning a smartphone, and able to attend appointments **Exclusion criteria** -Use of weight loss medications or supplements, diabetes, lost >3 kg or changes in physical activity patterns 6 months prior, uncontrolled blood pressure, eating disorders, psychological disorders, obesity-related surgery, or cancer	**Sample:** - n= 30, in-person (n= 10), videoconference (n=10), or control group (n= 10) **Setting:** -University of New Mexico	- Randomized controlled trial - Smart scales and wireless watches synced with participants smartphones -Data was wirelessly uploaded to a secure database and recorded in patients' charts -A multidisciplinary team including a dietitian, MD, and exercise physiologist provided individualized health coaching -Patients' data (fasting blood glucose, insulin, HbA1c, daily steps, and weekly weights) was uploaded for 12-week -Weight changes, HbA1c, glucose, insulin resistance, within- and between-group changes, were analyzed **Statistical Analysis**: -Separate within- and between-group ANOVAs for baseline data were applied - p <0.05	-More weight loss observed in the video group ($p < 0.05$) (8.23 ± 4.5 kg; 7.7%) vs. in-person group (3.2 ± 2.6 kg; 3.4%) vs. the control group (2.9 ± 3.9 kg; 3.3%). -By week 4, the steps per day in the video group were significantly higher than in the control group at weeks 6, 8, 9, and 11 ($p \leq 0.05$). -No differences found in insulin, glucose, or HbA1C within- or between groups -The videoconference group noted a decreased insulin resistance ($p \leq 0.05$).	-Multidisciplinary team coaching via telemedicine could lead to beneficial changes in weight, steps per day, and insulin resistance vs. in-person or no intervention. -A videoconferencing approach to weight management may be an economical approach to promoting healthy behavioral changes in obese adults **Limitations:** -Short length and small sample size -The Withings accelerometer is not validated in literature -Assumed similarity in step tracking for all 3 groups -No blinding of team members

Note: BMI= body mass index, HgbA1C= hemoglobin A1C, MD =Medical doctor

Author, Year	Purpose	Sample & Setting	Methods, Design, Interventions, Measures	Results	Discussion, Interpretation, Limitation of Findings
Solbrig, L., Whalley, B., Kavanagh, D. J., May, J., Parkin, T., Jones, R., & Andrade, J. (2019). Functional imagery training versus motivational interviewing for weight loss: A randomized controlled trial of brief individual interventions for overweight and obesity. *International Journal of Obesity (2005)*, *43*(4), 883–894. https://doi.org/10.1038/s41366-018-0122-1	**Primary Outcomes:** -If using a theoretically informed MI with functional imagery training has an impact on weight, BMI, and waistline compared with contact-and time-matched MI **Secondary outcome:** - quality of life **Inclusion criteria:** - > 18 y/o and BMI ≥25 kg/m² **Exclusion criteria** -Pregnancy, eating disorder, inability to complete assessments	**Sample:** - n=141, March - May 2016, advertised in a local newspaper -2 interventions: functional imagery training (n=58) or MI (n =63) **Setting:** -University of Plymouth campus (U.K.)	-Single-center, two arm, single blind randomized controlled trial -6 months intervention and 6 months follow-up -Quality of life measured using the 1-item Global Quality of Life Scale -2 interventions: functional imagery training or MI **-Session 1**: in-person, after collection of baseline data (1 hr. long). Both groups discussed goals, past successes with weight, commitment, and potential barriers. Only the functional imagery training group-included imagery exercises using the 'Goal in Mind" application **-Session 2**: telephone call, 1 week later (35 min). Same themes from Session 1 **-Booster phone calls** (5-15 min) every 2 weeks for 3 months and monthly until 6 months post baseline to review progress and set additional subgoals -Scripts to guide MI and functional imagery training were developed to ensure consistency **Statistical Analysis**: -Bayesian estimation procedure	- Less than 4 hours of functional imagery training led to more weight loss over 6 months (and persisted to 12 months) vs. MI alone	-Statistically significant differences between MI and functional imagery training groups at both follow-ups -Functional imagery training improved weight and WC -At month 6, the quality of life was statistically significant between both groups **Limitations:** -Did not assess participants' dietary knowledge or level of activity prior to the study

Note: BMI= body mass index, MI= Motivational interviewing, WC= waist circumference

REFERENCES

Alencar, M., Johnson, K., Gray, V., Mullur, R., Gutierrez, E., & Dionico, P. (2020). Telehealth-based health coaching increases-health device adherence and rate of weight loss in obese participants. *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, *26*(3), 365–368. https://doi.org/10.1089/tmj.2019.0017

Agency for Healthcare Research and Quality (AHRQ) (2014). *Integrating primary care practices and community-based resources to manage obesity.* https://www.ahrq.gov/ncepcr/tools/obesity/obpcp3.html

American Heart Association (AHA) (2018). *Food diary. How to keep track of what you eat.* https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics/food-diary-how-to-keep-track-of-what-you-eat.

American Heart Association (AHA) (2020). *What is the Mediterranean Diet?* https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics/mediterranean-diet

Arnold, A., Holmes, E., & Rosenthal, M. (2019). Building a patient-centered weight management program: A mixed methods project to obtain patients' information needs and ideas for program structure. *Pharmacy 7*(4), 165. https://doi.org/10.3390/pharmacy7040165

Barnes, R. D., & Ivezaj, V. (2015). A systematic review of motivational interviewing for weight loss among adults in primary care. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity*, *16*(4), 304–318. https://doi.org/10.1111/obr.12264

Bendall, C. L., Mayr, H. L., Opie, R. S., Bes-Rastrollo, M., Itsiopoulos, C., & Thomas, C. J. (2018). Central obesity and the Mediterranean diet: A systematic review of intervention trials. *Critical Reviews in Food Science and Nutrition*, *58*(18), 3070–3084. https://doi.org/10.1080/10408398.2017.1351917

Bosomworth, N. J. (2019). Normal-weight central obesity: Unique hazard of the toxic waist. *Canadian Family Physician Medicine, 65*(6), 399–408. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6738397/

Brazil, J., & Finucane, F. (2021). Structured lifestyle modification prior to bariatric surgery: How much is enough? *Obesity Surgery*, *31*(10), 4585–4591. https://doi.org/10.1007/s11695-021-05573

Burguera, B., Jesús Tur, J., Escudero, A. J., Alos, M., Pagán, A., Cortés, B., González, X. F., & Soriano, J. B. (2015). An intensive lifestyle intervention is an effective treatment of morbid obesity: The TRAMOMTANA study: A two-year randomized controlled clinical trial. *International Journal of Endocrinology*, *20*(15*)*, 19-4696. https://doi.org/10.1155/2015/194696

Butts, J. B., & Rich, K. L. (2018). *Philosophies and theories for advanced nursing practice.* (3rd ed.). Jones and Bartlett Learning.

Cawley, J., Biener, A., Meyerhoefer, C., Ding, Y., Zvenyach, T., Smolarz, B. G., & Ramasamy, A. (2021). Direct medical costs of obesity in the United States and the most populous states. *Journal of Managed Care & Specialty Pharmacy*, *27*(3), 354–366. https://doi.org/10.18553/jmcp.2021.20410

Centers for Disease Control and Prevention. (2022). *Overweight and obesity: Adult obesity facts*. https://www.cdc.gov/obesity/data/adult/html

Ciemins, E., Joshi, V., Horn, D., Nadglowski, J., Ramasamy, A., & Cuddeback, J. (2021). Measuring what matters: Beyond quality performance measures in caring for adults with obesity. *Population Health Management*, *24*(4), 482–491. https://doi.org/10.1089/pop.2020.0109

Doehner, W., Gerstein, H. C., Ried, J., Jung, H., Asbrand, C., Hess, S., & Anker, S. D. (2020). Obesity and weight loss are inversely related to mortality and cardiovascular outcome in prediabetes and type 2 diabetes: Data from the origin trial. *European Heart Journal*, *41*(28), 2668–2677. https://doi.org/10.1093/eurheartj/ehaa293

Draxten, M., Flattum, C., & Fulkerson, J. (2016). An example of how to supplement goal setting to promote behavior change for families using motivational interviewing. *Health Communication*, (*3)*1, 1276-1283. http://dx.doi.org/10.1080/10410236.2015.1062975

Drozdz, D., Alvarez-Pitti, J., Wójcik, M., Borghi, C., Gabbianelli, R., Mazur, A., Herceg-Čavrak, V., Lopez-Valcarcel, B. G., Brzeziński, M., Lurbe, E., & Wühl, E. (2021). Obesity and cardiometabolic risk factors: From childhood to adulthood. *Nutrients*, *13*(11), 4176. https://doi.org/10.3390/nu13114176

Fitzpatrick, S. L., Wischenka, D., Appelhans, B. M., Pbert, L., Wang, M., Wilson, D. K., & Pagoto, S. L. (2016). An evidence-based guide for obesity treatment in primary care. *American Journal of Medicine*, 129(1), 1-7. https://doi.org/10.1016/j.amjmed.2015.07.015

Franquesa, M., Pujol-Busquets, G., García-Fernández, E., Rico, L., Shamirian-Pulido, L., Aguilar-Martínez, A., Medina, F. X., Serra-Majem, L., & Bach-Faig, A. (2019). Mediterranean diet and cardiodiabesity: A systematic review through evidence-based

answers to key clinical questions. *Nutrients*, *11*(3), 655. https://doi.org/10.3390/nu11030655

Giese, K. K., & Cook, P. F. (2014). Reducing obesity among employees of a manufacturing plant: Translating the diabetes prevention program to the workplace. *Workplace Health & Safety*, *62*(4), 136–141. https://doi.org/10.1177/216507991406200402

Gils-Contreras, A., Bonada Sanjaume, A., Becerra-Tomás, N., & Salas-Salvadó, J. (2020). Adherence to Mediterranean diet or physical activity after bariatric surgery and its effects on weight loss, quality of life, and food tolerance. *Obesity Surgery*, *30*(2), 687–696. https://doi.org/10.1007/s11695-019-04242-3

Goh, L. G., Dhaliwal, S. S., Welborn, T. A., Lee, A. H., & Della, P. R. (2014). Anthropometric measurements of general and central obesity and the prediction of cardiovascular disease risk in women: A cross-sectional study. *British Medical Journal Open*, *4*(2), 4-138. https://doi.org/10.1136/bmjopen-2013-004138

Guss, D., Gray, S., & Castillo, E. M. (2014). The impact of patient telephone call after discharge on likelihood to recommend in an academic emergency department. *The Journal of Emergency Medicine, (4)*6, 560-566. http://dx.doi.org/10.1016/j.jemermed.2013.11.067

Hall, K. D., & Kahan, S. (2018). Maintenance of lost weight and long-term management of obesity. *The Medical Clinics of North America*, *102*(1), 183–197. https://doi.org/10.1016/j.mcna.2017.08.012

Han, T. S., Richmond, P., Avenell, A., & Lean, M. E. (1997). Waist circumference reduction and cardiovascular benefits during weight loss in women. *International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity*, *21*(2), 127–134. https://doi.org/10.1038/sj.ijo.0800377

Helland, M. H., & Nordbotten, G. L. (2021). Dietary changes, motivators, and barriers affecting diet and physical activity among overweight and obese: A mixed methods approach. *International Journal of Environmental Research and Public Health*, *18*(20), 10582. https://doi.org/10.3390/ijerph182010582

Hruby, A., & Hu, F. B. (2015). The epidemiology of obesity: A big picture. *Pharmacology Economics*, *33*(7), 673–689. https://doi.org/10.1007/s40273-014-0243

Jayedi, A., Soltani, S., Zargar, M. S., Khan, T. A., & Shab-Bidar, S. (2020). Central fatness and risk of all-cause mortality: A systematic review and dose-response meta-analysis of 72 prospective cohort studies. *British Medical Journal*, (*3)*70, 3-324. https://doi.org/10.1136/bmj.m3324

Johnson, K. E., Alencar, M. K., Coakley, K. E., Swift, D. L., Cole, N. H., Mermier, C. M., Kravitz, L., Amorim, F. T., & Gibson, A. L. (2019). Telemedicine-based health coaching is effective for inducing weight loss and improving metabolic markers. *Telemedicine Journal and E-health*, *25*(2), 85–92. https://doi.org/10.1089/tmj.2018.0002

Kahan, S., Look, M., & Fitch, A. (2022). The benefit of telemedicine in obesity care. *Obesity*, *30*(3), 577–586. https://doi.org/10.1002/oby.23382

Kaplan, L. M., Golden, A., Jinnett, K., Kolotkin, R. L., Kyle, T. K., Look, M., Nadglowski, J., O'Neil, P. M., Parry, T., Tomaszewski, K. J., Stevenin, B., Lilleøre, S. K., & Dhurandhar, N. V. (2018). Perceptions of barriers to effective obesity care: Results from the national ACTION study. *Obesity, 26*(1), 61–69. https://doi.org/10.1002/oby.22054

Kapoor, N., Arora, S., & Kalra, S. (2021). Gender disparities in people living with obesity - An unchartered territory. *Journal of Mid-Life Health*, *12*(2), 103–107. https://doi.org/10.4103/jmh.jmh_48_21

Kendall-Gallagher, D., & Breslin, E. (2013). Developing DNP students as adaptive leaders: A key strategy in transforming health care. *Journal of Professional Nursing*, *29*(5), 259–263. https://doi.org/10.1016/j.profnurs.2013.06.009

Kim, T. N. (2020). Barriers to obesity management: Patient and physician factors. *Journal of Obesity & Metabolic Syndrome*, *29*(4), 244–247. https://doi.org/10.7570/jomes20124

Kouwenhoven-Pasmooij, T. A., Robroek, S., Kraaijenhagen, R. A., Helmhout, P. H., Nieboer, D., Burdorf, A., & Myriam Hunink, M. G. (2018). Effectiveness of the blended-care lifestyle intervention 'Perfect Fit': A cluster randomized trial in employees at risk for cardiovascular diseases. *Biomedical Central Public Health*, *18*(1), 766. https://doi.org/10.1186/s12889-018-5633-0

Lee, W. W., Choi, K. C., Yum, R. W., Yu, D. S., & Chair, S. Y. (2016). Effectiveness of motivational interviewing on lifestyle modification and health outcomes of clients at risk or diagnosed with cardiovascular diseases: A systematic review. *International Journal of Nursing Studies*, (*5*)3, 331–341. https://doi.org/10.1016/j.ijnurstu.2015.09.010

Lemstra, M., Bird, Y., Nwankwo, C., Rogers, M., & Moraros, J. (2016). Weight loss intervention adherence and factors promoting adherence: A meta-analysis. *Patient Preference and Adherence*, *10*, 1547–1559. https://doi.org/10.2147/PPA.S103649

Lim, S., Smith, C. A., Costello, M. F., MacMillan, F., Moran, L., & Ee, C. (2019). Barriers and facilitators to weight management in overweight and obese women living in Australia with PCOS: A qualitative study. *Biomedical Central Endocrine Disorders*, *19*(1), 106. https://doi.org/10.1186/s12902-019-0434-8.

Lohnberg, J. A., Salcido, L., Frayne, S., Mahtani, N., Bates, C., Hauser, M. E., & Breland, J. Y. (2021). Rapid conversion to virtual obesity care in COVID-19: Impact on patient care,

interdisciplinary collaboration, and training. *Obesity Science & Practice*, *8*(1), 131–136. https://doi.org/10.1002/osp4.550

Lucci, A. (2020). A reflection on the Doctor of Nursing practice (DNP). *Insight: The Journal of the American Society of Ophthalmic Registered Nurses, 41(1)*: 27-29. http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=5&sid=5ad0902a-f030-4719-b693-db8ebb718387%40sessionmgr4008.

Ma, W. Y., Yang, C. Y., Shih, S. R., Hsieh, H. J., Hung, C. S., Chiu, F. C., Lin, M. S., Liu, P. H., Hua, C. H., Hsein, Y. C., Chuang, L. M., Lin, J. W., Wei, J. N., & Li, H. Y. (2013). Measurement of waist circumference: Midabdominal or iliac crest? *Diabetes Care*, *36*(6), 1660–1666. https://doi.org/10.2337/dc12-1452

Martínez-González, M. A., Gea, A., & Ruiz-Canela, M. (2019). The Mediterranean Diet and cardiovascular health. *Circulation Research*, *124*(5), 779–798. https://doi.org/10.1161/CIRCRESAHA.118.313348

Okati-Aliabad, H., Ansari-Moghaddam, A., Kargar, S., & Jabbari, N. (2022). Prevalence of obesity and overweight among adults in the Middle East countries from 2000 to 2020: A systematic review and meta-analysis. *Journal of Obesity*, (*2)*22, 807-4837. https://doi.org/10.1155/2022/8074837

Pender, N., Murdaugh, C., and Parsons, M.A. (2015). *Health promotion in nursing practice.* (7th ed.). Pearson Education Inc.

Petrin, C., Kahan, S., Turner, M., Gallagher, C., & Dietz, W. H. (2017). Current attitudes and practices of obesity counseling by health care providers. *Obesity Research & Clinical Practice*, *11*(3), 352–359. https://doi.org/10.1016/j.orcp.2016.08.005

Post, R. E., Mendiratta, M., Haggerty, T., Bozek, A., Doyle, G., Xiang, J., & King, D. E. (2015). Patient understanding of body mass index (BMI) in primary care practices: A two-state practice-based research (PBR) collaboration. *Journal of the American Board of Family Medicine*, (*2)*8, 475-480. http://dx.doi.org/10.3122/jabfm.2015.04.140279

Powell-Wiley, T. M., Poirier, P., Burke, L. E., Després, J. P., Gordon-Larsen, P., Lavie, C. J., Lear, S. A., Ndumele, C. E., Neeland, I. J., Sanders, P., St-Onge, M. P., & American Heart Association Council on Lifestyle and Cardiometabolic Health; Council on Cardiovascular and Stroke Nursing; Council on Clinical Cardiology; Council on Epidemiology and Prevention; and Stroke Council (2021). Obesity and cardiovascular disease: A scientific statement from the American Heart Association. *Circulation*, *143*(21), 984–e1010. https://doi.org/10.1161/CIR.0000000000000973

Reims, K., & Ernst, D. (2016). Using motivational interviewing to promote healthy weight. *Family Practice Management*, *23*(5), 32–38. https://www.aafp.org/dam/brand/aafp/pubs/fpm/issues/2016/0900/p32.pdf

Renpho (n.d.). *Smart body scale*. https://renpho.com/pages/smart-body-scale

Salas-Salvadó, J., Guasch-Ferré, M., Lee, C. H., Estruch, R., Clish, C. B., & Ros, E. (2016) Protective effects of the Mediterranean diet on type 2 diabetes and metabolic syndrome. *The Journal of Nutrition*, *146*(4), 920S–927S. https://doi.org/10.3945/jn.115.218487

Sherson, E. A., Yakes Jimenez, E., & Katalanos, N. (2014). A review of the use of the 5 A's model for weight loss counseling: Differences between physician practice and patient demand. *Family Practice*, *31*(4), 389–398. https://doi.org/10.1093/fampra/cmu020

Solbrig, L., Whalley, B., Kavanagh, D. J., May, J., Parkin, T., Jones, R., & Andrade, J. (2019). Functional imagery training versus motivational interviewing for weight loss: A

randomized controlled trial of brief individual interventions for overweight and obesity. *International Journal of Obesity*, *43*(4), 883–894. https://doi.org/10.1038/s41366-018-0122-1

Steinberg, D. M., Tate, D. F., Bennett, G. G., Ennett, S., Samuel-Hodge, C., & Ward, D. S. (2013). The efficacy of a daily self-weighing weight loss intervention using smart scales and e-mail. *Obesity 21*(9), 1789–1797. https://doi.org/10.1002/oby.20396

Sturgiss, E., & van Weel, C. (2017). The 5 *A*s framework for obesity management: Do we need a more intricate model? *Canadian Family Physician*, *63*(7), 506–508. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5507219

Tauqeer, Z., Gomez, G., & Stanford, F. C. (2018). Obesity in women: Insights for the clinician. *Journal of Women's Health (2002)*, *27*(4), 444–457. https://doi.org/10.1089/jwh.2016.6196

Thabault, P. J., Burke, P. J., & Ades, P. A. (2016). Intensive behavioral treatment weight loss program in an adult primary care practice. *Journal of the American Association of Nurse Practitioners*, *28*, 249-257. http://dx.doi.org/10.1002/2327.6924.12319

Tijssen, A., Snaterse, M., Minneboo, M., Lachman, S., Scholte Op Reimer, W., Peters, R. J., & Jørstad, H. T. (2021). Weight management and determinants of weight change in patients with coronary artery disease. *Heart*, *107*(19), 1552–1559. https://doi.org/10.1136/heartjnl-2021-319224

Tomiyama, A. J., Carr, D., Granberg, E. M., Major, B., Robinson, E., Sutin, A. R., & Brewis, A. (2018). How and why weight stigma drives the obesity 'epidemic' and harms health. *Biomedical Central* Medicine, *16*(1), 123. https://doi.org/10.1186/s12916-018-1116-5

Tsai, Y.J., Wu, M.P., Hsu, Y.W. (2014) Emerging health problems among women: Inactivity, obesity, and metabolic syndrome. *Gynecology and Minimally Invasive Therapy*. *3*(1):12-1. https://doi.org/10.1016/j.gmit.2013.07.005

Vuorinen, A. L., Helander, E., Pietilä, J., & Korhonen, I. (2021). Frequency of self-weighing and weight change: Cohort study with 10,000 smart scale users. *Journal of Medical Internet Research*, *23*(6), e25529. https://doi.org/10.2196/25529

Walker, R. E., Kusch, J., Fink, J. T., Nelson, D. A., Morris, G., 3rd, Skalla, J., & Cisler, R. A. (2018). Facilitating factors and barriers to weight management in women: Physician perspectives. *Journal of Patient-Centered Research and Reviews*, *5*(1), 18–27. https://doi.org/10.17294/2330-0698.1495

Wang, Y., Beydoun, M. A., Min, J., Xue, H., Kaminsky, L. A., & Cheskin, L. J. (2020). Has the prevalence of overweight, obesity and central obesity leveled off in the United States? Trends, patterns, disparities, and future projections for the obesity epidemic. *International Journal of Epidemiology*, *49*(3), 810–823. https://doi.org/10.1093/ije/dyz273

Ward, Z. J., Bleich, S. N., Cradock, A. L., Barrett, J. L., Giles, C. M., Flax, C., Long, M. W., & Gortmaker, S. L. (2019). Projected U.S. state-level prevalence of adult obesity and severe obesity. *The New England Journal of Medicine*, *381*(25), 2440–2450. https://doi.org/10.1056/NEJMsa1909301

Welzel, F. D., Stein, J., Pabst, A., Luppa, M., Kersting, A., Blüher, M., Luck-Sikorski, C., König, H. H., & Riedel-Heller, S. G. (2018). Five A's counseling in weight management of obese patients in primary care: A cluster-randomized controlled trial (INTERACT). *Biomedical Central Family Practice*, *19*(1), 97. https://doi.org/10.1186/s12875-018-0785-7

Williams, R. L., Wood, L. G., Collins, C. E., & Callister, R. (2015). Effectiveness of weight loss interventions-Is there a difference between men and women: A systematic review. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity*, *16*(2), 171–186. https://doi.org/10.1111/obr.12241

Wilson, P. W., D'Agostino, R. B., Sullivan, L., Parise, H., & Kannel, W. B. (2002). Overweight and obesity as determinants of cardiovascular risk: The Framingham experience. *Archives of Internal Medicine*, *162*(16), 1867–1872. https://doi.org/10.1001/archinte.162.16.1867

Wing, R. R., Lang, W., Wadden, T. A., Safford, M., Knowler, W. C., Bertoni, A. G., Hill, J. O., Brancati, F. L., Peters, A., Wagenknecht, L., & Look AHEAD Research Group (2011). Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. *Diabetes Care*, *34*(7), 1481–1486. https://doi.org/10.2337/dc10-2415