

Healthy Body Weight Collaboration Project for Obesity Management

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Author Note

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She has no known conflict of interest to disclose

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Abstract

Objective: Obesity is the fifth leading cause of global death and is preventable. It affects all body systems and causes major chronic illnesses such as diabetes, heart diseases, stroke, and some cancers. The goal of this transtheoretical stages of changes (TSOC) theory-based project are as follows: To educate the participants of the project to be aware of obesity and its complications; motivate them to use community resources, and improve their body mass indexes (BMI), waist circumference (WC), motivation, quality of life (QOL) and lifestyle.

Methods: Twenty-three participants were recruited in a primary care clinic. Six participants dropped out during the project. All the randomly selected participants who met the criteria of obesity signed written informed consent and were provided a 4-digit code to maintain anonymity. Participants were motivated and educated using a handout, two pre-and post-project in-person nursing visits, and five telemedicine weekly nursing follow-ups visits. Pre- and post-surveys collected during in-person visits include data such as weight, BMI, WC, demographic data, comorbidities, lifestyle, motivation, QOL, TSOC, and utilization of community resources.

Results: Descriptive analysis and paired t-test is done utilizing Intellectus statistics software to measure the outcome. The results show improvement in dietary choices, physical activity, motivation, QOL, use of community resources, decrease in BMI, and WC. In paired t tests, results show clinical and statistical significance in BMI, WC, MOT and clinical significance in QOL. There was increase in the revenue at the project site due to reimbursement of the services provided for the patients.

Conclusion: The results are expected to develop practice change in preventing and treating obesity. More evidence-based projects and studies with large sample size are needed to develop improvement in the knowledge base of providers and current practice.

Keywords: Obesity, BMI, Nursing follow-up

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Obesity is considered a serious problem that is affecting the overall health of people worldwide leading to poor health outcomes and quality of life. Due to obesity, the prognosis of many disease processes is poor thereby leading to a rise in the mortality and morbidity rates. The good news is obesity is a reversible risk factor and can be controlled. With lifestyle modifications including dietary measures and physical activity, these rates can be reduced. Primary care clinicians play a vital role in preventive services, therefore, can contribute greatly to reduce the incidence of obesity and associated complications.

Problem Statement

Obesity is a national epidemic and its prevalence in adults is 42.4% including both men and women (Center of Disease Control and Prevention [CDC], 2020). It can contribute to a multitude of health problems that include all body systems leading to symptoms or diseases such as breathlessness, gallbladder disease, infertility, pancreatitis, myocardial infarction, diabetes, stroke, depression, fatty liver, and low immunity (Science Reference Guide, n.d). Physical inactivity secondary to sedentary living, high caloric intake, and lack of knowledge about the complications of obesity are major causes of obesity. Irregularity in leptin production, use of antidepressants, oral contraceptives, steroids, hypothyroidism, and low socio-economic factors such as neighborhoods with poor access to healthy foods and a place to exercise can also play a role in contributing to obesity (Akpeli, 2021). Obesity is often not attended to until a complication from it arises. It is important for primary care providers to educate and inform people in the community that obesity itself is a problem and it can cause a cascade of other health issues if left unaddressed. In 2016, there were 1.9 million overweight adults with Body Mass Index (BMI) greater than or equal to 25 and 650 million who adults with a BMI of 30 or above (World Health Organization [WHO], n.d). In the United States (U.S.), in adults over 20 years of age, the obesity rate is 42.4% and the

overweight rate is 73.6% in 2017-2018 (CDC, 2021). San Antonio is reported the second fattest city in Texas and 19th in the country with 65.7% of the adult population overweight or obese (CDC, n.d)

Purpose and Rationale

Obesity is a risk factor for complex health problems leading to high mortality and morbidity rate. Obesity is ranked fifth as the leading risk for deaths worldwide. The death rate every year due to obesity is 2.8 million (European Association for the Study of Obesity [EASO], 2020). WHO estimates 21% of cases of ischemic heart disease, 23% of stroke, 58% of type 2 diabetes, and 39 % of hypertension, joint, and infertility problems are obesity-related (Obesity Prevention Source [OPS], 2016; EASO, 2020). In addition to these health problems, obesity is also contributing to economic burden in United States. The United States spent more than 480 billion on obesity and obesity-related health concerns which includes direct and indirect costs (OPS, 2016). Direct costs are resulting from inpatient and outpatient services (OPS, 2016). Indirect costs are associated with lost days of work such as short-term absences, long term disability, high premium life insurance, and lower wages (OPS, 2016; U.S. National Library of Medicine, n.d). Obesity is preventable and therefore it needs to be addressed in the form of various local and national initiatives to make healthy weight a norm. The purpose of this paper is to critically appraise research that will contribute to clinical practice decisions and synthesize relevant data to create a practice change supporting weight loss in an at-risk population.

Background and Significance

Preventive services for obesity and obesity-related conditions can boost the overall quality of life of the patient and reduce the economic burden to the country. Obesity can be prevented when the genetic, developmental, environmental, and behavioral aspects of

obesity are understood. Primary care providers can improve the quantity and quality of life by aggressively treating dyslipidemia, high blood pressure, and type 2 diabetes as commonly co-occurring diseases directly related to obesity.

Overweight and Obese Adults

In the United States, 42.4% and 65.7% of the adult population are obese or overweight, respectively (CDC, 2020). Obesity is more prevalent in rural counties (34.2%) than urban counties (28.7%) (CDC, 2020). There are wide differences in the prevalence of obesity between the northern and southern regions of the United States. (Panuganti, 2020; CDC, 2020). Obese individuals have a BMI of 30 and above and overweight individuals have a BMI of 25 and above. When there is an imbalance between energy intake and expenditure, obesity results. Obesity rates are highest among African, Mexican, and Native Americans in comparison to any other ethnic groups (Hu et al., 2015). Adults who have reduced physical activity, insomnia and high caloric intake with decreased energy metabolism can develop obesity (Kushner & Ryan, 2014; Panuganti, 2020). It is also studied that psychological reasons, genetic abnormalities, endocrine disorders, and some medications can lead to obesity (Kushner & Ryan, 2014; Panuganti, 2020). Occupations such as transportation/material moving motor vehicle operations, police and firefighters have a high prevalence of obesity in the United States. Children from single-parent families or children with no siblings are more prone to obesity than children with two parents and siblings in the home (Chen & Escarce, 2010). Childhood obesity progresses into adult obesity if not controlled.

Evidence-based Interventions to Target Weight Loss

Patient education using various evidence-based strategies and community resources can reduce the obesity rates. If there is a pre-existing condition that is leading to obesity, patient education can help in preventing the chronic illness with early detection and management. Repeated education and motivation can help patients to stay committed throughout the course of

the treatment plan. Obesity can be managed by utilizing best practice strategies recommended by various health organizations. Depending on the need of the patient, the treatment plan varies. It is necessary to utilize the available tools to identify the problem causing obesity and develop a patient-specific plan of care. As the financial cost of obesity is substantially high, it can affect the individual financially along with the above discussed health effects (OPS, 2016).

Physical activity should accompany lifestyle modification of goal setting, problem-solving, leisure-time physical activity, and activities while commuting, including a minimum of 150 to 300 minutes of moderate physical activity per week or 75 to 150 minutes of vigorous physical activity (Niemi et al., 2020, Nicklas et al., 2014; Sullivan & Lachman, 2017; Sani et al., 2016). Special considerations can be made for patients with orthopedic, or cardio-pulmonary risk but exercise is important for overall health part of a focused behavioral weight loss program (Niemi et al., 2020). Utilizing smartwatches and phones, pedometers, and heart rate monitors can be used for tracking patients' exercise, and motion (Lee et al., 2018; Holzmann & Holzapfel, 2019; Henriksen et al., 2018; Sullivan & Lachman, 2017). Using the Transtheoretical Model Stages of Change (TTM SOC) can be a useful tool for lifestyle modification. A combination of TTM SOC along with dietary modification and physical activity showed some weight loss among participants (Tuah et al., 2011; de Freitas et al., 2020; Mason et al., 2019). Self-regulatory theory can be implemented with a self-monitoring intervention such as measuring spontaneous physical activities thus enhancing the maintenance of health (Nicklas et al., 2014; Annesi, 2018; Annesi et al., 2015). Participating in weight loss activities can concurrently provide the patient with the psychological benefits of boosted self-esteem, reduced depressive symptoms, improved body image, and enhanced quality of life (Lasikiewicz et al., 2014;

Sani et al., 2016; Edshteyn et al., 2016). Research shows that group-based lifestyle modification including activities such as self-monitoring, cognitive-behavioral sessions, exercise, and dietary change through seminars and group sessions were effective in achieving targeted weight loss improving self-efficacy, social support, and quality of life (Sani et al., 2016; Jamal et al., 2016; Edshteyn et al., 2016).

The cornerstone for lifestyle modification for obesity management according to various studies includes a combination of diet, physical activity, and behavior therapy (Niemi et al., 2020, Nicklas et al., 2014; Sullivan & Lachman, 2017; Sani et al., 2016; Wadden et al., 2013). Behavioral strategies for weight loss are setting an achievable goal, recording the weight, food intake, step counts, and participating in the group and individual sessions to maintain commitment (Painter et al., 2017). For best results, brisk walking for at least 30 minutes/day (i.e., 180 minutes/week) is recommended (Wadden et al., 2013; Niemi et al., 2020, Nicklas et al., 2014; Sullivan & Lachman, 2017; Sani et al., 2016). Dietary modification for weight loss includes developing a diet plan that reduces the caloric intake of the patients by 500 to 1000kcal/day by decreasing their meal portions, snacks, including low calorie, low-fat diet, and intermittent fasting (Tuah et al., 2011; de Freitas et al., 2020; Sani et al., 2016; Jamal et al., 2016; Wadden et al., 2013; Jenkins et al., 2017). In some studies, healthcare providers also prescribed medications to curb the appetite, increase satiation, or block the absorption of fat for patients who are obese with polyphagia using phentermine and sibutramine (Wadden et al., 2013; Tak & Lee, 2021). However, patients with psychiatric illnesses are not eligible for this medication as it can cause recurrent psychosis, anxiety, and agitation (Tak & Lee, 2021). Moreover, these medications are expensive and need close follow-up due to the high risk for abuse and cardiovascular risk (Wadden et al., 2013; Tak & Lee, 2021).

Multidisciplinary approaches can be used for obesity management to include a registered

nurse (RN) or licensed practical nurses (LPNs), psychologist, and dieticians who are trained to provide behavioral counseling and follow up (in-person or technology-based such as email, phone call, or text messaging) to develop commitment and compliance and facilitate quarterly healthcare provider follow-up (Wadden et al., 2013; Fitzpatrick et al., 2016; Forgione et al., 2018; Block et al., 2015; Beleigoli et al., 2019).

Current Standard of Care in Obesity

Many clinicians are not aware that behavioral counseling using intensive behavioral therapy with structured visits over 12 months are reimbursed for Medicare patients through the Centers for Medicare and Medicaid Services (CMS) (Batsis et al., 2014; Fitzpatrick et al., 2016). There are barriers to attaining these interventions for most individuals due to a lack of time, resources, and knowledge among the staff, physicians, and patients (Edshteyn et al., 2016; Wadden et al., 2013). There is a fear of embarrassing or upsetting a patient when asking about weight loss (Mazza et al., 2019). Stigma, cost of private sector services, lack of trust between practitioners and patients are some of the other barriers in implementing the recommended guidelines for obesity management. Services provided by auxiliary staff such as phone or virtual follow-up are not reimbursed therefore it is not provided in most primary care settings. In one study it was found that auxiliary staff services can be billed “incident to” primary care provider (PCP) especially if they participate and refer the patients to a YMCA Program (Fitzpatrick et al., 2016). Applications such as Weight Watchers, Noom, My Fitness Pal, and other technology enhanced applications are expensive and therefore primary care clinicians need to develop cost effective methods to manage obesity such as utilizing community resources (Fitzpatrick et al., 2016; Edshteyn et al., 2016). If patients are interested in these more costly interventions, it could be suggested to the patients who are ready to pay as the results

are promising for effective weight loss (Patel et al., 2019).

Long-term Effects of Weight Loss

Long-term weight management is no easy task due to the high possibility of failure of patients to stay committed and regain weight. The long-term effects of a 5- 10 % weight reduction includes reduced risk factors, and diseases related to obesity, reduction of mortality and morbidity rates, reduced incidences of psychological disorders, and improved quality of life (Wirth et al., 2014; Gunnarsson et al., 2016; Rogers & Lemstra, 2016). Long-term effects also include reduced insulin resistance, controlled hypertension, increased high-density lipoprotein (HDL) and decreased low-density lipoprotein (LDL), improved triglycerides, improved diastolic function, and reduced risk of arrhythmias (Brown et al., 2015; Ryan & Yockey, 2017). Providing patient-centered, holistic care, high quality, and cost-effective care can improve the clinical outcomes and patient satisfaction, and trust between the practitioners and patients. A holistic, safe, and patient-centered approach can aid considerably in helping patients attain weight loss (Fastenau et al., 2019). If applying the TTM of care to interventions selected, action or maintenance stage of TTM of change can be the first step to long-term weight maintenance.

Internal Evidence

In a primary care clinic in central Texas, a majority of patients were found to be obese or overweight. Staff report engaging with patients in weight loss-promoting behaviors to be challenging. Quarterly follow-up appointments are scheduled for routine chronic disease management alone, and obesity may not be addressed on a regular basis especially if the patient has another acute problem that needs attention. In addition to patient-centered priorities at these appointments, the weight issue may not be discussed in a limited time appointment of 15 to 30 minutes. Clinicians reports lack of time, educational resources, and tools for obesity management to be a barrier to weight loss discussions. Some patients are not interested in discussing obesity or

weight reduction. Only patients expressing concern about making unhealthy food choices may get referred to a nutritionist. If patients keep a log of step counts, or dietary intake record, these are not routinely reviewed during follow-up appointments which demotivates the patient to continue the practice. Motivational Interviewing (MI) is very important in building trust and helps motivate patients to change behaviors (Rodriguez-Cristobal et al., 2017). MI is not practiced at the clinic due to lack of time, therefore, building trust is challenging and patients may not discuss embarrassing issues or concerns related to obesity. The clinicians report concerns that reviewing a logbook for all patients is not practical in a limited appointed time.

PICO Question

The literature review led to the development of the PICO question. In adult obese patients in an outpatient primary care clinic (P), how does a comprehensive plan to include physical activity, dietary modification, and self-monitoring practices combined with weekly technology-based nursing follow-ups (I), compared to standard practice (three months follow up appointment alone) (C) affect BMI, and motivation (O)?

Quality of Living (QoL) is an important long-term outcome that can be considered. The primary care clinic would support the interventions as it is intended to manage obesity. Obesity management with patient education will improve the patient condition, knowledge, and positive attitude among patients and clinicians and prevent a decline in patient condition. Application of TTM SOC can help visualize the transformation of patients progressing from pre-contemplation to contemplation, contemplation to preparation, preparation to action, and action to maintenance stage of change (Tuah et al., 2011; de Freitas et al., 2020).

Search Strategy

An exhaustive search to answer the PICOT question was completed through the databases available through the Arizona State University Library. The electronic databases accessed were PsycINFO, PubMed, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Academic Search Premier. The yields from these databases were relevant and applicable to the topic of lifestyle modification for obesity management. Outdated and nonapplicable studies were rejected.

Inclusion Criteria, Exclusion Criteria, and Limitations

Most studies included were published within five years but there is one from 2013. Wadden et al (2013) discussed the quarterly follow-up done by physicians and mentioned the use of auxiliary staff including RNs and LPNs to make a non-physician follow-up to help patients be compliant and committed to the plan as a current practice. This information is vital information on the topic and therefore was included. Criteria for inclusion and exclusion were the same for all the databases accessed. Limitations were set from 2011 to 2021, and the adult population that is above 19 years preferably and English language. Many studies with childhood obesity were excluded and articles older than 2014 were excluded except for the aforementioned. Most of the studies were completed in the United States. The studies that were promoted as a product for future implementation were excluded as there was no data of support if the product helped in achieving the goal.

Keyword Selection

Keywords were derived from the PICOT question and the intended population, intervention, health outcomes, and the yielded information from the advance searches. The initial search keywords were *obese, lifestyle modification, BMI*. These keywords drew research studies in thousands. The keywords were made very specific as this is a largely studied topic, such as *obesity, lifestyle modification, weight loss; obesity, low-calorie diet, BMI; obesity, weight loss, motivation*

or self-esteem, or motivation. The filters were adjusted to the adult population. An appointment with the librarian was helpful in learning an easy way to obtain larger relevant yields. This search strategy helped in retrieving a more relevant and desirable number of yields.

Search Yield

A search from PubMed with the keywords obese, lifestyle modification, and BMI with filters yielded 118 research studies. The database CINAHL Plus yielded 307 with the keywords obese, lifestyle modification, weight loss. The Academic Search Premier yielded 200 with the keywords *obese, lifestyle modification, BMI*. Yields were also obtained for the various other outcomes such as weight change, motivation, self-esteem, self-worth, self-regulatory activities, behavior modifications and nursing follow-up, technology-based follow-up, and self-monitoring methods with all the databases. The database Psych Info yielded 200 studies with the keywords *obesity, lifestyle modification, weight loss*. A practice policy statement was included as it supported a comprehensive approach for the management of obesity (Edshteyn et al.,2016). Various guidelines mentioned in the policy statement were pertinent to the PICO. After applying rapid critical appraisal (RCA) using Melnyk and Fineout-Overholt (2019) tools for RCA, ten high-quality studies were included in this body of evidence.

Critical Appraisal & Synthesis of Evidence

To determine the strength and the quality of the studies included, rapid critical appraisal process was utilized (Fineout-Overholt, 2019). Most of the studies were Level II with two studies of Level III Evidence (LOE) (see Appendix A1 and A2). Many studies were conducted over 12 to 24 months as the effect of weight loss programs may take longer to show on the blood lab results and the various measurement tools used. Higher LOE

studies were utilized to support the PICO. The sample population from all studies were homogenous and included adults 18 years or older. The studies are included showing a variety of races and cultural inclusion (see Appendix A, Table A2).

Most of the studies took place in clinic settings across United States. Two studies were international studies. There is one study that implemented online interventions with the help of an application. All the studies included physical activity and nutrition training with the help of education or live sessions (see Appendix A, Table A2). All studies measured weight loss and Body Mass Index. Four studies measured behavior change by including improved lifestyles such as dietary modification, physical activity and home monitoring with self-reporting during follow-up or weekly motivation sessions. Some studies did not report the self-monitoring behavior among the patient, but the data of step count and dietary change was obtained from the patient.

Self-monitoring was seen in most of the studies included as the data measured shows behavior change. The interventions included in the studies showed improvement in weight loss, Body Mass Index, self-monitoring, physical activity, dietary change, and health-related quality of life (see Appendix A, Table A2). Some studies also measured other factors that can improve with the help of weight loss intervention such as blood pressure, fasting blood sugar, lipid profile, and biomarkers. These measurements also help in monitoring obese patients from progressing into metabolic syndrome.

Conclusions from the Evidence

Obesity can be tackled by comprehensive lifestyle modification including physical activity, nutrition, and motivational behavioral therapy. From the review of the evidence, it is understood that there is weight loss and improvement in BMI when patients are trained and educated about physical activity and dietary modifications. Staying committed to the weight loss plan needs motivation which can be generated with the help of weekly auxiliary staff reminders, follow up or

feedback. Motivation for weight loss can be obtained through a support system or buddy system. Training can be provided on self-regulatory or self-monitoring habits such as dietary logging, step counts, journaling, Blood Pressure (BP) logging, blood sugar logging, weight logging, and waist circumference, depending on the data needed by the clinician.

Theory Application

Long-term behavior change for obesity prevention and management involves adaptation and the decision to change a lifestyle or behavior that may not be spontaneous. Therefore, the Stages of Change Theory, that assess an individual's readiness to change is considered (Behavioural Change Models, n.d). The Stages of Change Theory posits that an individual progresses through five stages in successful behavior change (See Appendix B Figure B1). Precontemplation stage is when the individual does not recognize his/her lifestyle as a problem leading to obesity and is not interested to change. The contemplation stage is when an individual acknowledges the problematic behavior or lifestyle leading to obesity and is thinking about changing their lifestyle. The preparation stage is when the individual is completely aware of the positives of change in the problematic lifestyle leading to obesity and are determined to change. The action stage is when the change happens. The patient will review the benefits of staying committed to the plan. Positive reinforcement can act as motivation. The maintenance stage is when the patient practices the healthier lifestyle and intends to maintain the behavior change to manage obesity. It is necessary for the caregivers to acknowledge these stages of change and plan the care depending on the stage of change the patient currently is in and provide interventions to prevent possible relapse at all stages of change.

Implementation Framework

The implementation framework chosen to guide the application of the synthesized

evidence is the Iowa Model of Evidence-based Practice (See Appendix B Figure B2). This model was developed by Marita G. Titler, Ph.D., RN, FAAN, Director Nursing Research (The Iowa Model Revised: Evidence-based practice to promote excellence in Health Care, 2021). This model was selected to articulate the evidence-based knowledge base obtained from the literature review. It also guides the implementation in a systematic manner into clinical practice. As per the model, there are the problem- and knowledge-focused triggers that lead to the question of obesity among the adult population as a priority for the selected project site. Problem-focused triggers are the risk management data, poor outcomes among the patients, financial burden led to the identification of the clinical problem- obesity. It was identified that most of the chronic illnesses were secondary to obesity. Knowledge-focused triggers were evidenced-based data extracted from the literature review and comparing the current practice with the guidelines. It was identified that obesity is indeed a priority for the project site to improve the poor outcomes of the patients under the care of the project site. As per the model, a team will be formed after assembling the literature that supports lifestyle modification and weekly nursing follow-up. Critiquing and synthesis of strong research data supports the evidence-based interventions that are intended for implementation. After a sufficient research base is developed change in practice will be piloted based on the evidenced-based practice guidelines. Practice will also be based on theory and expert opinion. If the change is appropriate for adoption in practice, then it can be instituted. The outcome caused due to the change in practice will be monitored. The results of the project will be published to improve the awareness among the providers and others involved in patient care in obesity management. Monitoring the outcome will proceed again to further analysis of any other problems which will again have the problem-focused and knowledge-based triggers. This model allows continuous quality improvement in patient care.

Ethical Consideration and Human Subject Protection

The Institutional Review Board approval was granted on the October 15, 2021. The project participants signed a written consent after being informed about the project goal, benefits, risks, confidentiality, and compensation. Consent took place at primary care internal medicine clinic during a regularly scheduled patient appointment. Eligible patients were encouraged to participate in the project while their participation was voluntary. The participants could withdraw from the project participation anytime during the project implementation. Participants' privacy was maintained throughout the project. An identity list was created to link the patient's name with phone number, email address, and self-selected identity number. This list was stored at the office in a safe location to maintain confidentiality and was separated from the participant's survey. This list was only accessed by the Co-Primary Investigator (Co-PI). The patient's unique id number consisted of the last two digits of their birth year and the last two digits of their phone number. This unique number was on their pre-and post-project surveys. All the copies of the project tools were placed in a secure cabinet on the project site. After entering the data in the Intellectus Statistical Software for analysis, paper copies were shredded. The data entered on the Intellectus Software were protected by password on the Co-Primary Investigator (Co-PI)'s computer and were accessible only to primary and co-investigators. All patient identifiers were deleted to maintain HIPPA compliance throughout the process after the project implementation. The responses to the pre and post-project surveys and the questionnaires were kept confidential and were then linked using a 4-digit unique numeric identifier that was selected.

Description of Population and Setting

Inclusion Criteria

The participants included in the project were 18years or older with a BMI of 30 or greater, who report no exercise or less than two exercise sessions a week and a diet that includes high fat

and high carbohydrates in their meals. The participants were proficient in writing, reading, and speaking English, and received care at the clinic.

Exclusion Criteria

Individuals with BMI less than 30, and who were not proficient in reading, writing, and talking English were excluded. Participants who were unable to be in person for the first and the last appointments were excluded as it would affect the data collection.

Setting and Population Description

The clinic is an internal medicine primary care clinic that has three physicians; one among them is the owner, one office manager, four nurse practitioners, two physical assistants four clerks two phlebotomists, and two patient assistants. They have nine patient rooms, one medication and storage, one doctor's area, one vital signs room, one height, and weight room, one phlebotomist procedure room and office room, one office manager room, front desk area, meeting and break room, and one large waiting area. This clinic assesses, diagnoses, and treats all chronic illnesses and refers the patient to a specialist if needed. Most of the patients who come to the clinic have a BMI greater than 25 thereby qualified as overweight and obese. Some patients are working from home and retired therefore living a sedentary lifestyle. Participants also express that they lack motivation and follow-up that can help improve their lifestyle. All the physicians in the clinic are also hospitalists at the nearest hospital and they follow up with their patients at their clinic.

Project Description with Timeline

The project process was divided into four phases. Phase 1 was the pre-intervention phase where the clinic staff were educated for 60 minutes about the background and the significance of controlling obesity, proposed evidenced-based intervention, patient recruitment process, surveys, and tools used in the pre-and post intervention, project timeline, and staff expectations. Staff-specific education was provided such as front desk staff and the staff that takes the vital signs were

educated about providing the flyers and identifying the eligible patients and informing the Co-PI about the patient's arrival. The providers were educated about the flyer, one-page education handout, documentation of the obesity counseling, and triggering the ICD codes and CPT codes for reimbursement of the provided services.

Project phase 2 was the intervention phase. In this phase, Co-PI will use the recruitment flyer to inform eligible patients about the project at an in-person office visit and ask if they are willing to participate. If interested, an informed written consent letter will be provided to the participants by the Co-PI. The consented participants completed the pre-intervention surveys such as: Demographic; Medical Co-morbidities and Lifestyle; Weight Loss History and Motivation; Transtheoretical Model of Change Questionnaire (TMCQ); and the World Health Organization (WHO-BREF) Quality of Life Assessment questionnaire. The 6-items demographic survey helped in understanding the demographic data of the participants. The 9-items Medical Co-morbidities and Lifestyle Survey helped the providers to understand the patient medical history and current lifestyle practices of the project participants. The 5-items Weight Loss History and Motivation Survey helped the providers to understand the participants' previous attempts at weight loss and helped to develop a comprehensive patient-specific weight loss plan. It also helped the providers to understand the motivation level of the participants. The 15-items Transtheoretical Model of Change Questionnaire (TMCQ) helped in measuring participants' readiness to change behaviors and stage of change. The 12-items World Health Organization (WHO-BREF) Quality of Life Assessment questionnaire helped the providers to assess the quality of life of the participants before the intervention.

The participants were educated throughout the project implementation from week one to seven. In the initial study in-person visit, written consent was signed followed by the completion of all questionnaires. Patients were provided the educational one-page handout and nominal gifts to

develop self-regulation and promote project participation. Co-PI provided the participants with a list of local resources for nutrition and physical activity for participant review and access. Pre-assessment objective data such as weight, height, and waist circumference was collected, and body mass index was calculated in the initial visit for baseline data. These objective data were reported by the participants to the Co-PI along with weekly step counts and waist circumference for tailored education and coaching purposes only to provide motivation and develop self-regulatory skills. On recruitment, patients were provided with a pedometer to check step counts daily and measuring tape to check waist circumference weekly. They were provided disinfecting wipes for wiping down the stationary exercise units in the parks before use, and a protein shake bottle for hydration and protein intake.

The participants were provided six weekly nursing follow-up telephonic sessions (to engage in the following topics such as goal setting and motivation; healthy lifestyle practices, self-regulation; accessing local resources (Get Fit San Antonio, Foodbank, YMCA, city parks and recreation services); tracking and logging physical activity (step count) and waist circumference measurement every week for self-awareness and coaching purposes and seeking support from family/friends.

The final week included the closing visit which was an in-person visit. During this visit, Co-PI reviewed the patient progress by assessing the weight, body mass index, waist circumference, motivation score, quality of life, and resources accessed by the participants for participant education and coaching. During this visit, the patient filled out the same surveys from the pre-intervention phase except for the demographic survey. They filled out an additional community resources survey that assessed what all community resources were accessed and how many nursing follow-up telephonic visits they attended.

In project phase 3 which is the data analysis phase, all the data collected from the participants were analyzed. Intellectus Statistical Software was used to analyze the data collected. Descriptive statistics and Paired t-test were performed for data analysis.

In the project phase, 4 dissemination of findings was done with a one-hour meeting with project site staff to review project findings, the significance of project outcomes, and recommendations for practice change and sustainability were made. A detailed analysis of project findings was produced to share with clinic staff and the leadership team of Arizona State University.

The final oral project presentation was done, and the DNP project paper was published in the ASU repository to disseminate the findings as part of the DNP degree requirements.

Budget and Funding

The participants were encouraged to use the free community resources such as parks, exercise outdoor stations in the parks, free recipes from the food bank, free on-demand at-home exercise videos from YMCA, and group exercises from the Get fit SA website. Each participant was provided a protein shake bottle, antibacterial wipe, a measuring tape, and a pedometer at a cost of approximately ten dollars per participant. The foodbank class resources were emailed to the patients on their email address. The copies of 75 flyers, 25 consent forms, 25 pre-surveys, 25 post-survey, and 25 education pamphlets cost \$125 dollars. No grants or funding were received for the project and these costs were paid by the (Co-PI).

Results

Descriptive Statistics were run for demographic data, pre and post-intervention medical comorbidities, stress management, and lifestyle. The most frequently observed category of the race was white ($n = 12$, 70.59%), the majority of participants were non-Hispanic ($n = 15$, 88.24%) and

60 years or older ($n = 10$, 58.82%). Over half of the participants were ($n = 9$, 52.94%), college graduates ($n = 11$, 64.71, and married ($n = 11$, 64.71%).

The most common medical co-morbidity among the participants in the pre-survey and the post-survey was hypertension ($n = 11$, 64.71%) and participants used hobbies to manage stress ($n = 9$, 52.94%) and family support system ($n = 11$, 64.71%).

The participants stated their current health status was their primary motivation factor to participate in the project ($n = 14$, 82.35%). All the participants who participated in the project felt the need to lose more weight ($n = 17$, 100.00%).

In the pre-survey and post-survey, most participants slept for 5-7 hours in a day ($n = 12$, 70.59%). Behaviorally, most participants drank 1-2 caffeinated drinks daily ($n = 9$, 52.94%). The majority (82.35%) never smoked nor consumed alcohol.

The participants self-reported multiple factors as triggering factors for weight gain. Participants reported work ($n=7$, 41.18%), habits ($n = 13$, 76.47%), lack of physical exercise, and health conditions as triggering factors for weight gain.

In the post-intervention survey, participants ($n = 12$, 70.59%) reported a decrease in their size of clothing and all the participants reported their eagerness to lose more weight to reach their goal ($n = 17$, 100.00%).

As per the Transtheoretical Stage of Change tool all the participants were in the preparation stage as they scored more than 40 in the pre-survey. Their scores showed that all the participants ($n=17$, 100%) in the preparation stage shows determination to take action to combat obesity.

Cronbach's Alpha: Reliability Test for Quality of Life (QOL)

This test was done for the pre-WHO-BREF quality of life (QOL) scale and the post-WHO-BREF QOL scale as the questions were selected that were specific to obesity and the reliability of the tool was checked. The Cronbach's alpha coefficient was evaluated using the guidelines

suggested by George and Mallery (2018) where $> .9$ excellent, $> .8$ good, $> .7$ acceptable, $> .6$ questionable, $> .5$ poor, and $\leq .5$ unacceptable. The items for PRE-WHO-BREF QOL had a Cronbach's alpha coefficient of .75, indicating acceptable reliability. The items for POST-WHO-BREF-QOL had a Cronbach's alpha coefficient of .81, indicating good reliability.

Two-Tailed Paired Samples *t*-Test

This test was conducted for comparing the pre and post weight, BMI, and waist circumference. The result of the two-tailed paired samples *t*-test showed significance based on an alpha value of .05, $t(16) = 4.52$, $p < .001$. The mean of pre-intervention weight was significantly higher than the mean of post-intervention weight. The results are presented in Table 1. A bar plot of the means is presented in Figure 1.

Cohen's $d = (230.18 - 236.87)/46.355286 = 0.14432$ (Effect Size Calculator Cohen's D for T-Test, n.d). This is considered as small effect size as its around 0.2 (Kim & Mallory, 2014)

Table 1

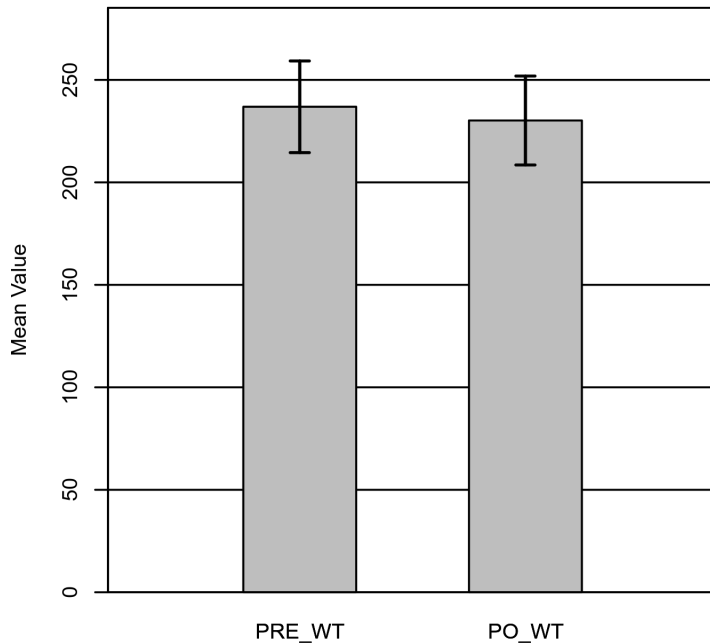
Two-Tailed Paired Samples t-Test for the Difference Between pre-intervention weight (PRE_WT) and Post intervention (PO_WT)

PRE_WT		PO_WT		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
236.87	47.05	230.18	45.65	4.52	< .001	0.14

Note. N = 17. Degrees of Freedom for the *t*-statistic = 16. *d* represents Cohen's *d*.

Figure 1

The means of PRE_WT and PO_WT



A two-tailed paired samples t -test was conducted to examine whether the mean difference between pre-intervention BMI (PRE_BMI) and post-intervention (PO_BMI) was significantly different from zero.

The result of the two-tailed paired samples t -test showed significance based on an alpha value of .05, $t(16) = 4.56$, $p < .001$. The mean of PRE_BMI was significantly higher than the mean of PO_BMI. The results are presented in Table 2. A bar plot of the means is presented in Figure 2.

Cohen's $d = (35.3 - 36.27)/5.270085 = 0.184058$. (Effect Size Calculator Cohen's D for T-Test, n.d). This is considered small effect size as its around 0.2 (Kim & Mallory, 2014)

Table 2

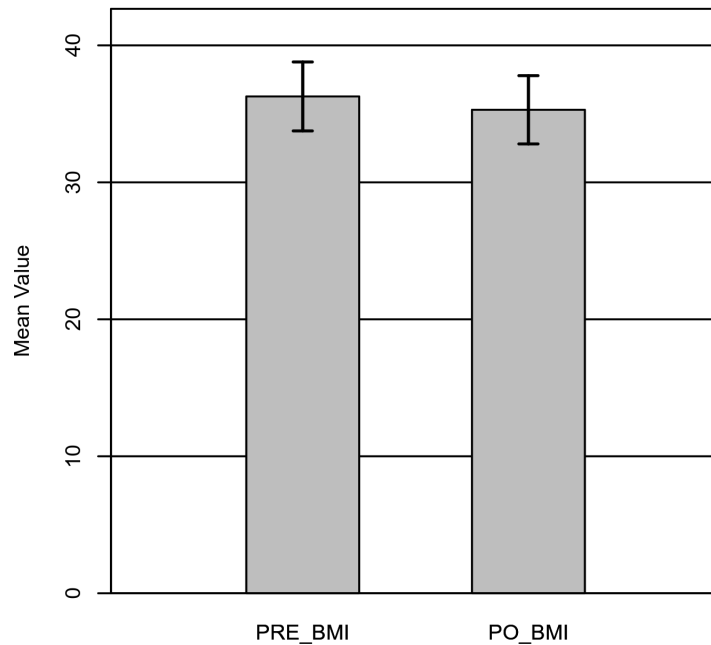
Two-Tailed Paired Samples t -Test for the Difference Between PRE_BMI and PO_BMI

PRE_BMI		PO_BMI		t	p	d
M	SD	M	SD			
36.27	5.30	35.30	5.24	4.56	< .001	0.18

Note. N = 17. Degrees of Freedom for the t -statistic = 16. d represents Cohen's d .

Figure 2

The means of PRE_BMI and PO_BMI



A two-tailed paired samples *t*-test was conducted to examine whether the mean difference between pre-intervention waist circumference (PRE_WT_CIR) and post-intervention waist circumference (PO_WC) was significantly different from zero.

The result of the two-tailed paired samples *t*-test showed significance based on an alpha value of .05, $t(16) = 6.22$, $p < .001$. The mean of PRE_WT_CIR was significantly higher than the mean of PO_WC. The results are presented in Table 3. A bar plot of the means is presented in Figure 3.

Cohen's $d = (43.93 - 45.59) / 5.865053 = 0.283032$. (Effect Size Calculator Cohen's D for T-Test, n.d). This is considered a medium effect size as the value is around 0.5 (Kim & Mallory, 2014)

Table 3

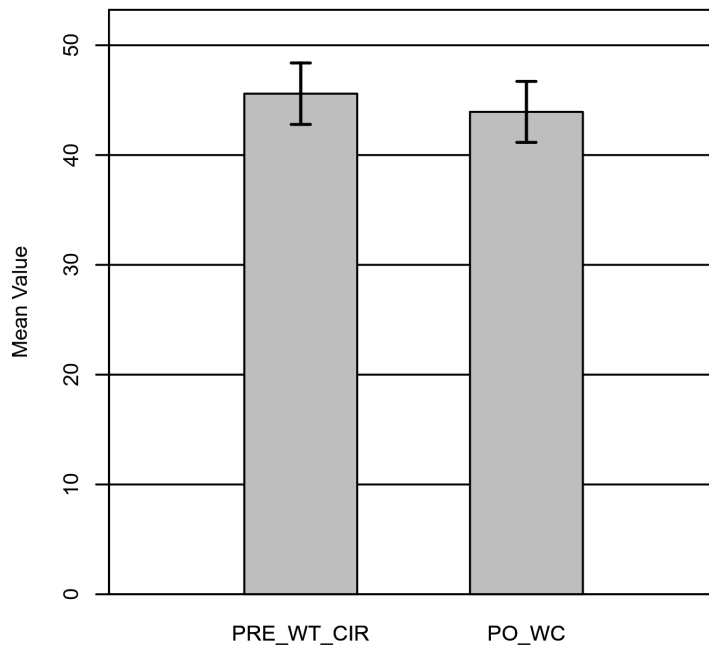
Two-Tailed Paired Samples t-Test for the Difference Between PRE_WT_CIR and PO_WC

PRE_WT_CIR		PO_WC		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
45.59	5.89	43.93	5.84	6.22	< .001	0.28

Note. N = 17. Degrees of Freedom for the *t*-statistic = 16. *d* represents Cohen's *d*.

Figure 3

The means of PRE_WT_CIR and PO_WC



A two-tailed paired samples *t*-test was conducted to examine whether the mean difference between pre-intervention motivation score (PRE_MOT_SCR) and post-intervention motivation score (PO_MOT_SCOR) was significantly different from zero.

The result of the two-tailed paired samples *t*-test was significant based on an alpha value of .05, $t(16) = -2.91$, $p = .010$. The mean of pre-intervention motivation score was significantly lower than the mean of post-intervention motivation score. The results are presented in Table 4. A bar plot of the means is presented in Figure 4.

Cohen's $d = (8.24 - 7) / 1.979899 = 0.626295$ (Effect Size Calculator Cohen's D for T-Test, n.d).

Table 4

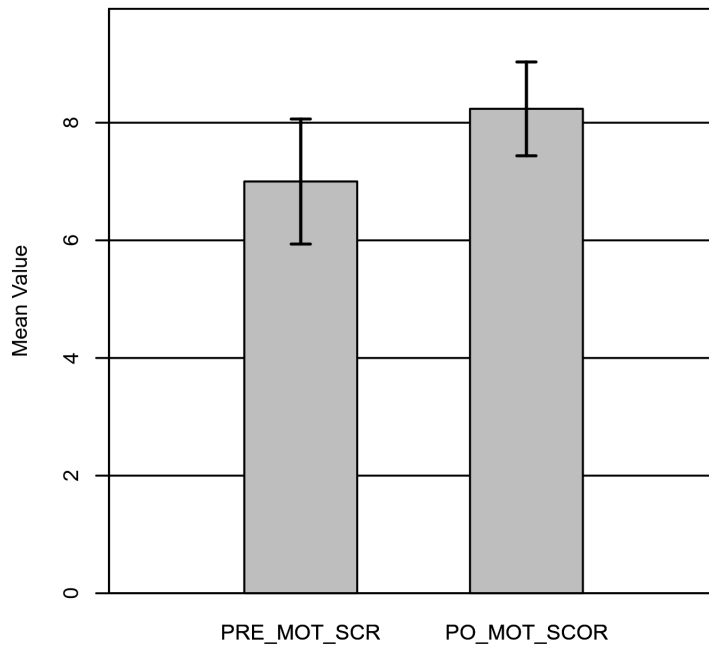
Two-Tailed Paired Samples t-Test for the Difference Between PRE_MOT_SCR and PO_MOT_SCOR

PRE_MOT_SCR		PO_MOT_SCOR		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
7.00	2.24	8.24	1.68	-2.91	.010	0.62

Note. N = 17. Degrees of Freedom for the *t*-statistic = 16. *d* represents Cohen's *d*.

Figure 4

The means of PRE_MOT_SCR and PO_MOT_SCOR



A two-tailed paired samples *t*-test was conducted to examine the mean difference between pre-intervention QOL total score (PRE_WHO_TS) and post-intervention QOL total score (POST_WHO_TS) significantly different from zero.

The result of the two-tailed paired samples *t*-test was not significant based on an alpha value of .05, $t(16) = -1.55$, $p = .140$. The results are presented in Table 5. A bar plot of the means is presented in Figure 5.

Cohen's $d = (44.65 - 43.12)/4.822717 = 0.317249$. (Effect Size Calculator Cohen's D for T-Test, n.d). This value is considered medium effect size as it is around 0.5 (Kim & Mallory, 2014)

Table 5

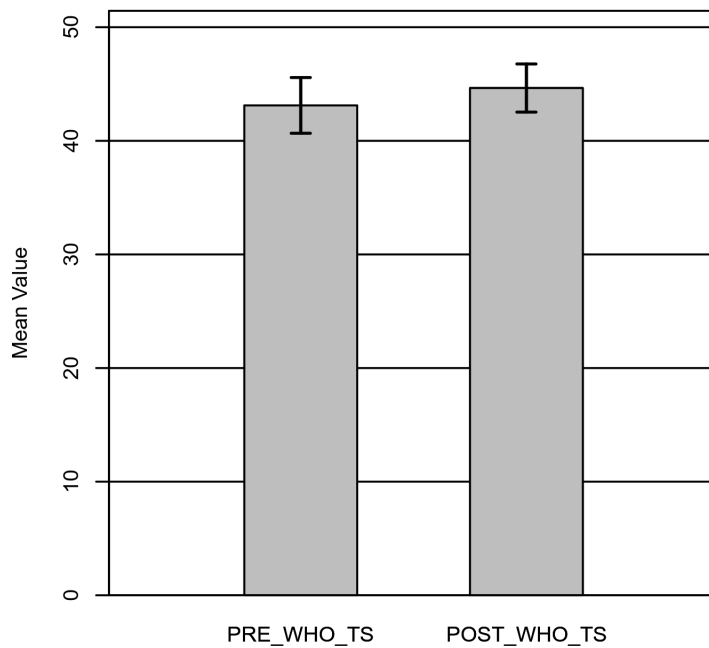
Two-Tailed Paired Samples t-Test for the Difference Between PRE_WHO_TS and POST_WHO_TS

PRE_WHO_TS		POST_WHO_TS		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
43.12	5.16	44.65	4.46	-1.55	.140	0.31

Note. N = 17. Degrees of Freedom for the *t*-statistic = 16. *d* represents Cohen's *d*.

Figure 5

The means of PRE_WHO_TS and POST_WHO_TS



Descriptive Statistics were done for the survey to understand the use of community resources after the project implementation. It was identified how many participants utilized resources from the foodbank, physical exercise resources such as the Get Fit San Antonio website link, YMCA at home exercises website link, nursing follow-up visits, and developed self-regulatory activities such as checking step count, waist circumference, and weight.

All the participants ($n = 17$, 100.00%) utilized the food bank resources website link for free recipes. Seven participants (41.18%) utilized the website link for YMCA for at-home free exercises, one participant (5.88%) used the Get fit San Antonio website link for accessing group exercises and one participant (5.88%) used both YMCA and GetFit San Antonio. Fourteen participants (82.35%) followed up with the nurse every week of the project implementation (7 visits), and six participants maintained six nursing follow-up visits. Fifteen participants (88.24%) developed self-regulatory activities such as checking step count, waist circumference and checking weight daily. Two participants (11.76%) developed self-regulatory activities of checking themselves weekly.

Fisher's Exact Test

A Fisher's exact test was conducted to examine whether pre-intervention exercise days per week (PRE_EX_DYS_WK) and post-intervention pre-week (PO_EX_DYS_WK) were independent. Fisher's Exact Test $p=.09$, $p<.10$, suggesting that the variables (PRE_EX_DYS_WK) and PO_EX_DYS_WK are related. This project is similar to an exploratory pilot study to generate a hypothesis.

Impact of the Project

In obesity management, the interventions provided by the clinicians need to be an ongoing source of support, guidance, and accountability for behavior change for the patients. The lifestyle modifications are not easy and need commitment to the plan without relapse. The providers at the

site were motivated to encourage the patients and provide obesity counseling and charge the patients for their service for reimbursement. There was increased motivation to use the one-page handout because it was possible to provide obesity counseling within the appointed time. As per the synthesized data from the studies, weight loss, the decline in BMI towards normal, development of self-efficacy, and self-regulatory behaviors in eating and exercising can be achieved (see Appendix A, Table A2). In the nursing follow-up telephonic visits, the notes on the Electronic Health Record (EHR) helped the clinicians to review the barriers and needs of the patients which saved time during provider-patient encounter.

Healthy Body Weight Collaboration project is an evidence-based practice project that substantiates the evidence that education on physical activity, nutrition and self-regulation practices, and access to free community resources with weekly nursing telephonic and quarterly provider follow-up visits help the patients to reduce weight. On the following weekly visits, patient-specific education and obesity counseling were provided and for training reason, step counts, waist circumference and weight were asked to help the patient generate the habit of logging these variables. Self-regulatory practices helped patients to be aware of themselves and weekly nursing telephonic follow-up helped in motivating the patients to stay committed to the plan. The long-term effects on the patients are improved health related QoL, and blood lab results related to other chronic conditions can be seen over the period with sustained lifestyle modification.

All the patients who participated were in the preparation stage of change. The dietary choices of the patients improved from eating high-calorie food to low-calorie food in most of the participants. Most of the participants were able to make healthy choices on Thanksgiving Day and were aware that they need to burn the extra calories gained. The patients were able to discuss their barriers to stay committed to the plan, the nurse was able to provide links to healthy and delicious food recipes from the foodbank and free community group exercise links were used. One of the

participants stated that *“I am glad that I decided to participate in this project because it helped me stay on track”*; Another participant stated, *“I would love to keep doing this project as I can feel I have already lost weight in 3 weeks. Thank you for that handout and links”*.

The system or the office manager in the site were encouraged to participate in the project when they realized that there is reimbursement available for the obesity management services and that there are many free community services. The providers were educated about the need for documentation to obtain the reimbursement. The site was able to successfully obtain the reimbursement for the two in-person nursing visits and the five-nursing telephonic follow-up visits. After the project implementation, the providers and the staff realized that the Healthy Body Weight Collaboration project helped in saving appointment time and to obtain reimbursement for the service which raised revenue for the office. It boosted the motivation of the staff and the patients to sustain the project intervention.

This compilation of obesity management interventions can be used as evidence to develop a sustainable weight loss and health management program for primary care clinicians. The results of the projects will help in developing practice change and existing policy improvement.

Discussion

Obesity is a national epidemic, and it is reversible. Four out of ten adults in America are obese and therefore are at risk of major chronic illnesses such as diabetes, heart diseases, mental illness, and cancer. Obesity is causing a national economic burden with direct and indirect costs. There are rising obesity rates in the country because of lack of knowledge, sedentary lifestyle, and poor food choices. Many patients are unable to access obesity management services because of a lack of awareness about free community resources. The quarterly appointment with the primary care provider may not include obesity counseling because of a lack of interest or motivation and short appointment time. The providers on site were not aware of the available free community

resources, performing nursing obesity counseling under the provider's supervision, and CPT codes that can be used for reimbursement for obesity counseling.

The project was implemented with the education of the staff and the eligible, consented patients. The project implementation was possible because of a team that was adaptive to change. Some barriers to the project implementation were cold weather during the implementation phase of the project which was not conducive to outdoor physical activities for some patients. The COVID 19 impact made some patients hesitate in participating in group physical activities and attending the final in-person follow visit. There was an attrition rate of 26 % due to the loss of six participants out of the initially recruited 23 participants. The project focused on assessing the patients in the pre- and post-intervention. implementation of the project. Weekly nursing telephonic appointments helped in providing patient-specific education with goal setting and motivation to improve the dietary choice, physical activity, and improving self-regulation with the help of resources and nominal gifts provided at the time of recruitment. The use of weekly nursing appointments for frequent motivation and patient-specific education along with quarterly healthcare visits showed significant improvement in motivation, BMI, waist circumference, self-regulation skills, use of resources, lifestyle behaviors, QOL, and dietary choices in the descriptive statistics and paired t-tests. Ongoing participant behavior change/weight loss, improved quality of patient-provider encounter time, and increased revenue are the factors that support project sustainability. Using community resources, self-regulation, and timely follow-up with the patients for boosting motivation is evidenced based practice which improves the quality of care and patient-provider satisfaction.

Future Recommendations

It is recommended to practice the weekly nursing follow-up along with the quarterly provider visits to improve the obesity rates as it is an evidence-based approach. Providers are

recommended to learn about the community they serve and the free community resources that are available to improve the patients' lifestyle. When the patients are provided free resources, there is an increased chance of utilization because it does not contribute to financial strain of the family unit. Obesity management is not just the responsibility of the primary care providers, but it is a team responsibility. This team may include a nurse, dietary counselor, nutritionist, and psychologist for goal setting and positive reinforcement, and so on as per the needs of the patient. The rising rate of obesity rate needs to be controlled as it causes many other chronic problems related to it. It is not something that can only be taken care of at a personal level by exercising and making healthy food choices, but the community needs legislative support to attain healthy living. Research on how price influences consumption should be cited in policy suggestions aiming at making healthy food more affordable or raising the cost of unhealthy food. Research on using telemedicine appointments to follow up with primary care providers to prevent obesity should be taken into consideration to provide obesity prevention services as a financially feasible preventive service. Assuming the role of primary care providers it is our responsibility to propose the policy change based on the facts and evidence. Quality improvement projects like the Healthy Body Weight Collaboration project conducted in healthcare should be encouraged by the local government by providing funds to develop innovation in current practice. It is necessary to explore multidisciplinary approaches to prevent obesity and develop quality improvement projects to promote continuous motivation and education for healthcare teams and patients. Implementing the Healthy Body Weight Collaboration project with large sample size and for a longer duration will be beneficial for quality improvement in healthcare as the data can be used for improving the current existing healthcare policies regarding obesity management.

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Appendix A

Evaluation and Synthesis Tables

Table A1

Evaluation of Quantitative Studies

Citation	Theory/ conceptual Framework	Design/Method	Sample/Setting	Major Variables & definition	Measurement/ Instrumentation	Data Analysis	Findings	Level of Evidence/ quality of Evidence/ Application
Annesi, (2018) Effects of self-regulatory skill usage on weight management behaviours: Mediating effects	SE Theory	Design: Quantitative: Quasi Experimental Design Method: Goal setting processes, review of behavioral goals, performance feedback, setting graded tasks, Barrier identification, relapse prevention	Sample: N= 209 Class 1 obesity= 43, class 2 obesity= 70 Class 3 Obesity= 48 Non- Obese= 48 Setting: YMCA in the metropolitan region. Inclusion:	IV: Self regulation activities DV1: PA DV2: Eating DV3: SR for PA and eating DV4: SE DV5: Behavioral changes Self Regulatory treatment was delivered across the groups 15 hours in 45 to 60	10 dedicated items on questionnaire for PA and eating. Exercise SE scale SE for eating : 20 items of Weight Efficacy Lifestyle Questionnaire	Regression analyses SPSS Statistics version 22 incorporating the PROCESS version 2 macroinstruction software Models 4 and 59 for	DV1: F(3, 205) = 2.44, p = .067 DV2: F(2, 158) = 1.04, p = .357 Over 6 months: DV3: F(3, 205) = 5.15, p = .002, g2 p = .07; PA behaviour, F(3, 205) = 4.72, p = .003, g2 p = .07; DV4: Exercise SE, F(3, 205) = 2.93, p = .034, g2 p = .04; SR for eating, F(2, 158) = 3.85, p = .023, g2	LOE:III Strength: Bias- corrected and accelerated bootstrapping method with 20000 resampling of data was used. Promotion of goal setting and self

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of induced self-efficacy changes in non-obese through morbidly obese women Funding : Not mentioned Bias: Not Mentioned Place: Georgia, USA Bias: demogra		methods, self talk, control over behavioural prompts, time management and behavioral contracting; dissociation from discomfort, and adjusting PA amounts to induce positive post-session feelings Purpose: enable the contrast of CBT induced changes in PA and eating related SR and SE and their associated behaviors based on category of obesity; evaluation of how interrelations of psychological factors affect behavioral	Obese patients	mins segments over 4 to 6 months. PA was supported with both individual and group meetings of 8 to 15 participants. Nutrition support: class format for 8 to 20 participants.	Behavior change: Godin Shephard Leisure Time Physical Activity Questionnaire Acceleromete recordings Tread mill tests Block food frequency Questionnaire and other comprehensive , lengthier food recalls BMI,Digital Weighing Scales Stadiometers	statistical analyses. Mixed Model repeated measures analyses of variance	p = .05; fruit/vegetable intake, F(2, 158) = 7.26, p = .001, g ² p = .08; and SE for controlled eating, F(2, 158) = 3.80, p = .025, g ² p = .05. DV5: PA behavior, b = 0.03, SE = .01, 95% CI [0.001, 0.048]; changes in exercise SE predicting PA behavior, b = 0.02, SE = .01, 95% CI [0.004, 0.034]	regulatory skill development Large sample Weakness: Psychosocial aspect was hypothesized and not measured; variables such as self-concept was not considered. Conclusion: Changes in SR and SE foster changes in weight-loss behaviors.

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phic data of the samples were not mentioned. Women were included: gender bias.		changes and appraisal of whether initial BMI affects such relationships.						
Annesi et al., 2015 Changes in self-efficacy for exercise and improved nutrition fostered by increased self-regulation among adults	SCT	Design: RCT Cognitive-behavioral support methods (a) goal-setting, (b) progress feedback, (c) cognitive restructuring, (d) relapse prevention, (e) addressing cues and prompts for exercise, (f) dissociation from discomfort, and	N= 274 YMCA in the metropolitan region. Attrition n:16 SE Group; n = 138 SR Group; n = 136 Inclusion criteria: Participations were: (a) < and equal to 21 years, (b) BMI > and equal to 35<50 kg/m2 ,	IV: Exercise and nutritional support promoting SR and SE (Treatment) DV1: SR DV2: SE DV3: Exercise and Eating Behaviors Treatment: Exercise support: All participants received exercise support 6 sessions of 45 to 60 mins over 6 months Nutritional support: 2	Validated scale for self-regulation Exercise Self-Efficacy Scale Weight Efficacy Lifestyle Scale Godin Shephard Leisure-Time Physical Activity Questionnaire VO2 max and body	ANOVAs Regression analyses dependent t tests	DV1: SR for exercise, F = 189.39, p<. 001. SR for eating, F = 165.69, p<.001 Exercise SE, F = 16.99, p<.001 DV2: SE for eating, F = 93.83, p<.001 SE exercise volume, F = 179.45, p<.001 SE :fruit/vegetable intake, F = 137.92, p<.001 DV3: SE change over 6 months by	LOE: II Strength: Bias- corrected and accelerated bootstrapping method with 20000 resampling of data was used. Larger sample size Computer based randomization used

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with obesity Funding : Not mentioned Place : Southeast region of US Bias : Bias Corrected		(e) behavioral contracting. Purpose : to examine whether significant relationships between exercise and eating-related SR and SE are present for Obese group	and (c) no regular exercise (< equal to 2 sessions/week) (d) signed informed consent	sessions of 60 mins from month 2 to month 4.	fat assessments Food frequency questionnaires		change in exercise-related SR over the initial 3 months $R^2 = .15$, $F(2, 271) = 23.22$, $p < .001$. SE for eating over 6 months by change in eating-related SR over the initial 3 months $R^2 = .37$, $F(2, 271) = 81.87$, $p < .001$	Weakness : measure for eating, which was limited to fruit and vegetable consumption Conclusion : Changes in SR and SE foster changes in weight-loss behaviours.
Mason et al., 2019 Eating behaviors and weight loss outcomes	SE and SRT	RCT Purpose : To study the effects of separate and combined dietary WL and exercise	N : 439 women Eligibility : 50 to 75 years women $BMI \geq 25$ kg/m ² if Asian-American ≥ 23.0 kg/m ² ; < 100 min/week	IV : WLP Weight loss Program DV1 : Restraint eating DV2 : Uncontrolled eating	Food logs, activity log, HR, weekly weigh ins, session attendance. WC	SAS software version 9.4	DV1 : + 60.6%, $p < 0.001$ vs. control DV2 : (- 24.3%, $p < 0.001$ vs. control) DV3 : (- 31.7%, $p < 0.001$ vs. control)	LOE:II Strength helped in improving eating behaviors Weakness : Limited to

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<p>in a 12-month randomized trial of diet and/or exercise intervention in postmenopausal women.</p> <p>Funding : NIH/NCI CCSG, NCI at the NIH &BCRF</p> <p>Place: Seattle, WA</p> <p>Bias: female Gender</p>		<p>interventions on Eating Behavior To examine the effect of Baseline eating behavior on diet and/or intervention adherence, WL outcomes Post-Menopausal Women who participated in 12-month RCT compared the effects of dietary WL and exercise</p>	<p>of moderate PA; Post-Menopausal Women; not taking MHT for the past 3 months; no history of a diagnosed, Eating disorder, Breast cancer, Heart disease ,Diabetes Mellitus, FG<126 mg/dL; non-smoking; \leq 2 alcohol drinks/day; able to attend diet/EI; and a NETT</p> <p>Setting: Fred Hutchinson Cancer Research Center. Out of 438 participants 398 Post-Menopausal Women participated in</p>	<p>DV3: Emotional Eating DV4: Binge Eating DV5: Weight DV6: Body Composition DV7: Stress, anxiety and symptoms of depression] lifestyle behaviors including smoking status dietary intake WLP: 1. DWLI 2. EI 3. Combined DWLI+EI 4. Control</p>	<p>Body composition: DXA whole body scan, BMI Eating behavior scores: self-reported questionnaires, revised 18-item Three Factor Eating Questionnaire 120-item self-administered food frequency questionnaire 7 day average pedometer DSC Depression and anxiety: BSI- 18</p>		<p>DV4: (- 23.7%, $p=0.005$ vs. control) DV5 1: DWLI: - 8.5% ($p < 0.001$) DV5 2: EI: - 8.5% ($p < 0.001$) DV5 3: DWLI+EI: - 10.8% ($p < 0.001$) DV5 4: Control: - 0.8% among controls No meaningful change in Perceived stress anxiety, depression and Social Support (results not published)</p>	<p>only Post-Menopausal Women 50-75 years Conclusion: May not be generalizable with all population groups but can help the Post-Menopausal Women</p>

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			completing questionnaires and physical examination		Perceived Stress scale Medical Outcomes Study Social Support Survey			
Rodriguez-Cristobal et al., (2017): Effectiveness of a motivational intervention on overweight/obese patients in the primary healthcare: A CRT Bias: No	SE and SRT	CRT Purpose: Assess whether a : motivational group intervention was more effective than an ITI on WL and its maintenance, in overweight and obese patients	N: 864 Setting: Multicentre BHA Patient Included: Age: 30 to 70 years BMI >25 Both genders Registered in MH Signed written consent. Exclude patients were bedridden, severe sensorial disorders, demented.	IV: Group motivational intervention DV1: Weight Loss DV2: Cardiovascular risk factor APOB/APOA1 Triglycerides Hypertension Group motivational intervention: Basic Health Area (24 cluster) Intervention Group: (12 clusters) n: 400: received nursing	1.Wt: Weigh scale 2.WC: measuring tape 3.BMI: Kg/m ² 4.Lab analyses: Cholesterol, Triglycerides, high-density lipoproteins, Low-density lipoproteins 8.APOA1 9.APOB 10. APOB-100/APOA1 11. Blood pressure Blood lab test	Mean Deviation, Standard deviation, Proportions, Bi-variant technique, Chi-Square, mixed linear model, intra-cluster correlation coefficient	Randomized 77.19% women and 22.81% men. At 12 months f/u: Control group: lost mean wt1.3 Kg Intervention group: lost mean weight 1.8Kg (p=0.09) At 24 months f/u: Control group: lost mean weight 1Kg Intervention group: lost mean weight 2.5Kg	LOE: II Strength: Large sample size Long term assessment with 12, 24 months f/u. Limitation: results on WC was missing, there was no change in HTN Conclusion: Motivational intervention definitely can be used as an adjunctive

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bias identified, as efforts to avoid bias Computerized randomization, overburdening on one nursing staff was avoided. Place: Barcelona Spain Funding: Fondo de Investigaciones Sanitarias de la Seguridad Social				staff motivation every 15 days once fortnightly: weeks 1 to 12, monthly: week 13 to 32 for lifestyle changes. Control n: 446 (12 clusters): usual care with 3 month physician visit and education on lifestyle changes and PA.	Blood pressure cuff		(statistically Significant $p=0.04$) Triglycerides: ($p<0.0001$) apoB-100: ($p<0.05$) apoA1 ($p<0.001$; $p<0.05$) apoB/apoA1 ratio ($p<0.01$; $p<0.001$)	therapy in obesity management

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Rogers et al.,2016: Improving health-related quality of life through an evidence-based obesity reduction program: The healthy weights initiative Funding : Public Health Agency of Canada Place: Moose Jaw, Saskatch	SE and SRT	Quasi Experimental Purpose: to determine the impact of the HWI on HRQL determine the adjusted RF for lack of improvement from baseline to f/u on the overall score of the Medical Outcomes Study (SF-36)	N: 290 participants in Long term care Inclusion: BMI> or equal to 30 Who passed the medical screen (blood pressure, blood sugar, and blood cholesterol) to participate in the program 230 participants completed the program	ID: HWI DV1: HRQL DV2: Self-esteem DV3: Depression, DV4: Demographics, presence of comorbidities, and smoking status HWI: group-based programming: 12 Weeks: 5 group exercise sessions / wk,1 dietary session / wk,1 CBT After 12 weeks: 1 group exercise sessions / 12 week; Buddy attending with the patient Then after 24 weeks, medical screen is repeated	SF-36 score: 36-Item Short-Form Health Survey (SF-36):measured, PF, pain, GH, vitality, SF, , and emotional well being Beck Depression Inventory II: depression	SPSS 22.0 Logistic regression paired samples t-tests one-way analysis of variance chi- square test	84.5% participants improved HDRL 70% improvement in HRQL in smokers 86.9% % improvement in HRQL in non smokers 86.3% improvement in HRQL of patient who attended with buddy ; those who did not have buddy 95% CI 1.28–10.68; <i>P</i> =0.015 no statistically significant differences in overall SF-36 score	LOE: III Strength: Large sample size Limitation: theoretical framework was not used. One year results are not available. Results from the medical screen was not discussed, depression screen was not discussed. Conclusion: strong social support with GBP helps in improving HRQL

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ewan, Canada Bias: female gender								
Beavers et al.,2018 Effect of exercise modality during weight loss on bone health in older adults with obesity and cardiovascular disease or metabolic syndrom	SCT	Design: RCT Purpose: to determine the ability of either aerobic or resistance training to counter weight-loss-associated bone loss in older adults	N: 187 67 years, 70%women, 64% white Multisite YMCAs Inclusion Criteria: Older adults with cardiovascular disease or metabolic syndrome and self-reported mobility disability, Written consent was signed	IV: Cooperative Lifestyle Intervention Program DV1: Baseline demographic & intervention process information DV2: DXA-acquired measures DV3: Biomarkers of bone turnover DV4: CT acquired measures Cooperative Lifestyle Intervention Program: Computer based Randomization of samples into 3	Stadiometer certified digital scale Self report BMI Blood test total hip, the femoral neck, lumbar spine, and TBS of the lumbar spine: DXA procollagen type 1 N-terminal propeptide & CTX done with ELISAs CT-acquired hip and spine volumetric BMD (vBMD),	Descriptive statistics mixed model Secondary analyses general linear model	DV1: Average age was 66.9 4.8 years, 70% were women, 32% were African American, and over half (56%) reported postsecondary education. Average BMI was 34.5 3.7 kg/m2. WL plus exercise groups over the 18-month lost significant weight [mean (95% CI): WL + RT: 10.1 (12.0 to 8.2) kg and WL + AT: 9.9 (11.8 to 7.9) kg versus WL: 5.7 (7.9 to 3.8) kg; both p < 0.01]. DV2: DXA-acquired	LOE: II Strength: Use of tables for clarity. Weakness: Data for DV3 and DV4 are not shown Conclusion: WL-induced bone loss, so that safe and effective strategies can be designed to preserve all aspects of bone health in this population

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<p>e: A randomized controlled trial</p> <p>Funding: National Institutes of Health/National Heart, Lung and Blood Institute</p> <p>Place: Forsyth County, North Carolina, USA</p> <p>Bias: Gender, Age</p>				<p>intervention group for 18 months</p> <p>Dietary induced WL(20% to 25% protein, 25% to 0% fat, and 45% to 55% carbohydrate, Calcium & vit D)</p> <p>WL+ Aerobic training (4 days/week; 45 mins /day)</p> <p>WL+ Resistance training then 30-month assessment visit; 4 days/week, 45 mins/day</p>	cortical thickness, and bone strength: CT		<p>measure; however, total hip BMD was reduced by roughly 2% in all groups at 18 months [WL: 0.023 (0.033 to 0.014) g/cm² ; WL+ AT: 0.027 (0.036 to 0.018) g/cm² ; WL+ RT: 0.025 (0.034 to 0.016) g/cm²].</p> <p>DV3: unchanged over time or by group (data not shown)</p> <p>DV4: Further adjustment for differential group WL over 18 months did not materially alter CT results (data not shown)</p>	
Block et al., 2015 Diabetes	Learning theory,	Design: RCT Purpose: The aim was to evaluate	N: 339	IV: Alive PD program	Detailed initial questionnaire on current	Intention-to-treat analyses	At 6 months: FG in the intervention group	LOE: II

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Citation	Theory/conceptual Framework	Design/Method	Sample/Setting	Major Variables & definition	Measurement/Instrumentation	Data Analysis	Findings	Level of Evidence/quality of Evidence/Application
prevention and weight loss with a fully automated behavioral intervention by email, web, and mobile phone: Randomized controlled trial among persons with prediabetes. Funding : National Institute	SCT, Theory of planned behavior, behavioral economics	the effectiveness of a fully automated algorithm-driven behavioral intervention for diabetes prevention, Alive-PD, delivered via the Web, Internet, mobile phone, and automated phone calls.	n1: 163: Intervention group n2:176: 6-month wait-list usual-care control group Inclusion Criteria: aged between 30 and 69 years with a BMI of at least 27 kg/m ² (BMI >25 kg/m ² for Asian participants) [20], spoke English, were not taking diabetes medications, had access to email and Internet, and had either FG or HbA1c in the prediabetes range (glucose: 100-125 mg/dL;	DV1: FG level DV2: HbA1c DV3: Weight loss DV4: BMI DV5: Metabolic syndrome: Blood pressure, triglycerides, HDL, abdominal obesity, dysglycemia. Alive PD: recommends multiple weekly personally relevant small-step goals. increased PA and improved dietary habits each week, and occasional psychosocial goals. The system provides tools for tracking weight,	dietary and activity habits, demographic data Blood lab test BMI formula Weighing scale Weight circumference tape BP cuff		(mean -0.41 mmol/L, 95% CI -0.44 to -0.12) than in the control group (mean -0.21 mmol/L, 95% CI -0.15 to -0.10; P HbA1c: intervention versus the control group (mean -0.26%, 95% CI -0.27 to -0.24 vs mean -0.18%, 95% CI -0.19 to -0.16; P<.001) Intervention group lost a mean 3.26 kg compared to 1.26 kg in the control group (P<.001) Mean BMI was reduced by 1.05 kg/m ² , and 0.39 kg/m ² the intervention and control groups, respectively (P<.001)	Strength: Randomization cost-effective intervention Large sample size Weakness: limited reach for those who do not have Internet access or who are not technologically proficient. Conclusion: Alive-PD represent one of those strategies, with the potential of serving large numbers of persons at risk of progression to diabetes and weight loss.

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Citation	Theory/ conceptual Framework	Design/Method	Sample/Setting	Major Variables & definition	Measurement/ Instrumentation	Data Analysis	Findings	Level of Evidence/ quality of Evidence/ Application
of Nursing Research of the National Institutes of Health Place: Northern California Bias: Patient who know English were only included in the study.			HbA1c: 5.7%-6.4%) Setting: Palo Alto Medical Foundation (PAMF)	eating, and physical activity; weekly health information on diabetes and strategies for preventing it; quizzes; social support through virtual teams and a participant messaging system; feedback on reported diet and activity and on success or failure of goal achievement; weekly reminders.			WC in the intervention group was 4.56 cm (95% CI -4.69 to -4.43) compared to 2.22 cm (95% CI -2.36 to -2.09) in the control group (P<.001) TG/HDL was significantly reduced in the intervention group and increase was seen in the control group	
de Freitas et al., 2020. The transtheoretical model is	TTM theory	Design: RCT Purpose: To evaluate the effect of intervention performed	N: Of 294 individuals who were screened, 89 were eligible, and 86 consented to participate	IV: Free physical exercise and nutrition education DV1: Sociodemographic, economic (age,	Face to face interview pre and post intervention. Measuring tape	SPSS Statistics for Windows, version 17.0 Diet Win® Professional version 2.0	There was a difference between groups of - 1.4 kg (CI95%: - 2.5; - 0.3) in body weight after the intervention. About	LOE: II Strength: Beneficial to low-income Beneficial changes in the anthropometri

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Citation	Theory/ conceptual Framework	Design/Method	Sample/Setting	Major Variables & definition	Measurement/ Instrumentation	Data Analysis	Findings	Level of Evidence/ quality of Evidence/ Application
<p>an effective weight management intervention: A randomized controlled trial</p> <p>Funding: Conselho Nacional de Desenvolvimento Científico e Tecnológico</p> <p>Place: Brazil</p> <p>Bias: Only women were</p>		<p>according to the stages of change of the transtheoretical model (TTM) for weight management.</p>	<p>Setting: Programa Academia da Saúde (PAS)</p> <p>31.4% of attrition in control group (33.3% of attrition) in the intervention group</p> <p>Inclusion criteria: female, and obese adult (individuals aged 20 to 59 years and body mass index - BMI ≥ 30 kg/m²) or overweight elderly (individuals aged 60 years or over and BMI ≥ 27 kg/m²)</p>	<p>income, education, occupation), and health information, self-health perception, body satisfaction, dietary behaviors, food intake.</p> <p>DV2: Anthropometry</p> <p>DV3: Biochemical parameters</p> <p>DV4: Stage of Change</p> <p>IV: free physical exercise and nutrition education</p> <p>Physical exercise three times weekly and collective food and nutrition actions once per month. The nutrition actions</p>	<p>Weighting scale</p> <p>Blood test for biochemical tests: glucose, adiponectin, resistin serum levels</p> <p>Weight Loss Behavior-Stage of Change Scale</p>	<p>Shapiro-Wilk test independent sample t-test, chi-square, and Fisher's exact paired Student t, Wilcoxon, and McNemar tests</p> <p>An alysis of covariance (ANCOVA)</p> <p>Intention-to-treat analysis</p>	<p>97% of women in the IG reported benefits of the intervention and presented positive changes in diet, biochemical markers, and anthropometry. The IG showed better body mass index, resistine, and blood glucose results compared to the CG during follow-up</p>	<p>measurements, diet changes, and biochemical parameters</p> <p>Weakness: Adherence to nutritional guidelines was not evaluated</p> <p>Few men were included</p> <p>Conclusion: TTM-based intervention for weight control in this scenario was effective and shows the relevance of these strategies in PHC for weight control.</p>

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Citation	Theory/ conceptual Framework	Design/Method	Sample/Setting	Major Variables & definition	Measurement/ Instrumentation	Data Analysis	Findings	Level of Evidence/ quality of Evidence/ Application
considered				include collective health education and workshops, lasting an average of 30 min TTM was used with health education to foster a reflexive, proactive problem-solving, and participatory approach				
Patel et al., 2019. Comparing self-monitoring strategies for weight loss in a smartphone app: Randomized	SE and SR Theory	Design: RCT Purpose: to examine a novel behavioral weight loss intervention that aims to attenuate the decline in dietary self-monitoring engagement.	N=105 n: 5 : ineligible Setting: interventions with the help of app. Inclusion Criteria: Aged 21-65 years; body mass index, BMI, 25-45 kg/m ² , interested in losing weight,	IV: Goal Tracker DV1: WL and height and BMI DV2: Percentage of action plan Socio- economic status, demographic, type of smart phone type in the pre intervention phase	Calibrated weighing scale, stadiometer, BMI formula. objective Qualtrics survey data 3-month survey 7-point scale	G*Power 3.1.9.2. descriptive statistics Person chi-square test Fisher exact tests intent-to-treat analyses	In intent- to-treat analyses, there was no difference in weight change at 3 months between the Sequential arm (mean -2.7 kg, 95% CI -3.9 to -1.5) and either the App-Only arm (-2.4 kg, -3.7 to -1.2; P=.78) or the Simultaneous	LOE:II Strength: Power analysis done Analyses of simultaneous and sequential self-monitoring approach Weakness: Did not have control arm

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Citation	Theory/ conceptual Framework	Design/Method	Sample/Setting	Major Variables & definition	Measurement/ Instrumentation	Data Analysis	Findings	Level of Evidence/ quality of Evidence/ Application
controlled trial Funding: The Graduate School at Duke University Place: central North Carolina Bias: response bias on self report			have an iPhone or Android smartphone, email address, access to a bathroom scale, and written English fluency, willing to download the mobile app on their phone	Goal tracker compares the 3 stand alone weight loss interventions: Simultaneous self monitoring arm, sequential arm, an App only arm		linear mixed modeling SAS 9.4 PROC MIXED Wilcoxon Mann-Whitney U tests (if 2 arms) and the Kruskal-Wallis tests (if 3 arms) Spearman rank correlation coefficients	arm (-2.8 kg, -4.0 to -1.5; P=.72 self-monitoring engagement was high and that greater frequency of self-monitoring was related to greater weight loss	without intervention therefore there is underestimation of treatment effects Conclusion: In the Goal Tracker trial, all 3 versions of the intervention produced weight loss and had high self-monitoring engagement
Rosas et al., 2015 The Effectiveness of Two Community-Based Weight	SCT and the TTM	RCT Purpose: To evaluate the effectiveness of a case-management (CM) intervention with and without community health	N=20 n: 41: usual care group n: 84 assigned CM group n:82 CM+CHW	IV: Vivamos Activos Fair Oaks (VAFO) clinical trial DV1: Weight loss DV2: BMI	Questionnaire anthropometric, clinical, behavioral, and sociodemographic information.	Generalized estimating equations using intent-to-treat	Weight change at 24 months. At 6 months, mean weight loss in the CM+CHW arm was 2.1 kg (95% CI 2.8 to 1.3) or 2% of	LOE:II Strength: Blinding of the research assistants Weakness: All participants did not attend

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Citation	Theory/ conceptual Framework	Design/Method	Sample/Setting	Major Variables & definition	Measurement/ Instrumentation	Data Analysis	Findings	Level of Evidence/ quality of Evidence/ Application
Loss Strategies among Obese, Low-Income US Latinos Funding: y National Heart, Lung, and Blood Institute grant Place: San Mateo County, CA, Bias: Only Latinos		workers (CHWs) for weight loss	Setting: Fair Oaks Clinic Inclusion Criteria: BMI of 30 to 60 and one or more coronary heart disease risk factors (eg, SBP 130 to 200 mm Hg, diastolic blood pressure 80 to 105 mm Hg, total cholesterol >180 mg/dL, low-density lipoprotein cholesterol >120 mg/dL ,high-density lipoprotein cholesterol 150 mg/dL, HbA1c 6.0% to 11.5%, FG 95 to 400 mg/dL, or	The CM+CHW (n=82) and CM (n=84) interventions were compared with each other and with UC (n=41). Both included an intensive 12-month phase followed by 12 months of maintenance. The CM+CHW group received home visits	BMI calculation Detec to scale wall-mounted stadiometer anthropometric measures Blood pressure: automated Welch Allyn Spot Lipids, glucose, glycated hemoglobin, and C-reactive protein were measured in a fasting blood sample. Step count: pedometer		baseline weight (95% CI 1% to 2%) compared with 1.6 kg (95% CI 2.4 to 0.7; % weight change, 2%, 1%, and 3%) in CM and 0.9 kg (95% CI 1.8 to 0.1; % weight change, 1%, 0%, and 2%) in UC. By 12 and 24 months, differences narrowed and CM+CHW was no longer statistically distinct. Men achieved greater weight loss than women in all groups at each time point (P<0.05). At 6 months, men in the CM+CHW arm lost more weight (4.4 kg; 95% CI 6.0 to 2.7) compared with	all planned intervention activities Conclusion: incorporation of CHWs may help promote initial weight loss, especially among men

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Citation	Theory/ conceptual Framework	Design/Method	Sample/Setting	Major Variables & definition	Measurement/ Instrumentation	Data Analysis	Findings	Level of Evidence/ quality of Evidence/ Application
were included			diagnosis of type 2 diabetes)				UC (0.4 kg; 95% CI 2.4 to 1.5)	

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Table A2*Synthesis Table*

Author	Annesi	Annesi et al.	Beavers et al.	Block et al.	De Freitas et al.	Rosas et al.	Patel et al.	Mason et al.	Rodriguez et al.	Rogers et al.
Year	2018	2015	2018	2015	2020	2015	2019	2019	2017	2016
Design	QE	RCT	RCT	CRT	QE	RCT	RCT	RCT	CRT	RCT
Theory	SE	SCT	SCT	SCT, Learning & Theory of planned behavior, behavioral economics	TTM	SCT & TTM	SE & SR	SE & SR	SE & SR	SE and SRT
N=	209	274	187	339	86	207	105	439	864	290
Setting	YMCA metropolitan region	YMCA metropolitan region	Multisite YMCAs	Palo Alto Medical Foundation (PAMF)	Programa Academia da Saude	Fair Oaks Clinic	Online App	Fred Hutchinson Cancer Research Center	Multicentre BHA	Long term care
IV	SR activities	SE &SR Activities	CLIP	Alive PD programme	PA &diet Education	VAFO	Goal Tracker	WLP	GMI	HWI
DV	PA Eating SE Behavior change	SR SE Behavior change	WL Biomarkers of bone turnovers DXA acquired measures	FBG WL BMI Lipid Profile	Anthropometry WL Biochemical parameters Behavior change	WL BMI	WL, height, BMI	Eating Weight,BMI Stress PA Dexa whole body scan	WL BMI Cardiovascular risk: lipid profile,BP	HRQL
Intervention										
PA	+	+	+	+	+	+	+	+	+	+
Nutrition	+	+	+	+	+	+	+	+	+	+
M	+	+		+					+	+
BS or SS				+						
Home Visits						+				+
Self Monitoring	+	+	+	+				+		
Measurements	SE &SR Behaviors Eating PA	SE &SR Behaviors Eating PA	WL BMI BMD	WL BMI FBS HBA1c Lipid Profile	WL FBS BMI Behavior change	Weight Step count Lipid panel FBS BP	Weight BMI	Eating Behaviors WL Stress Step counts	Weight WC BMI Lipid panel BP	HRQL WL

Key: BMI:Body Mass Index, BS: Buddy support, CRT: Clustered Randomized Trial, FBS: Fasting Blood sugar, GMI: Group Motivational Intervention, M : Motivation, PA: Physical Activities, RCT: Randomized Controlled trial, SE: Self Efficacy, SCT: Social Cognitive Theory SR: Self-Regulation ,SS:Social Support, TTM: Transtheoretical Model Of Change, QE: Quasi Experimental, Vivamos Activos Fair Oaks (VAFO), WLP: Weight Loss Programme, WL: Weight Loss

				BP		BMI				
Outcomes										
Weight loss			↓	↓		↓			↓	
Self Monitoring	↑	↑	↓	↓		↓	↑		↓	
BMI Behavior Change	↑	↑			↑			↑		↑
HRQL										
LOE	III	II	II	II	II	II	II	II	II	III

Key:TTM: Transtheoretical Model Of Change,WL: Weight LossFBS: Fasting Blood sugarBMI:Body Mass IndexQE: Quasi ExperimentalRCT: Randomized Controlled trialCRT: Clustered Randomized TrialSE: Self Efficacy
 SCT: Social Cognitive TheorySR: Self-Regulation
 GMI: Group Motivational Intervention
 PA: Physical ActivitiesM : Motivation,BMDSS:Social Support
 WLP: Weight Loss ProgrammeBuddy support:BSVivamos Activos Fair Oaks (VAFO)

Appendix B: Surveys

Healthy Body Weight Collaboration Project Pre-Intervention Surveys Demographic Survey

Instructions: The following questions are designed to understand the demographic data of the project participants. Please mark the best response for you.

What is your age range?

- 18-19
- 20-29
- 30-39
- 40-49
- 50-59
- ≥ 60

How do you identify?

- Woman
- Man
- Transgender
- Non-binary/non-conforming
- Prefer not to respond

What is your Race? (if more than one, circle all that apply)

- American Indian or Alaska Native
- Asian
- Black or African American
- White/Caucasian
- Native Hawaiian or Other Pacific Islander

What is your Ethnicity?

- Hispanic
- Non-Hispanic

Highest level of Education?

- Less than a high school diploma
- High school graduate, diploma or the equivalent (GED)
- Some College
- College Graduate

What is your Marital Status?

- Single, never married
- Married or domestic partnership

ID Number: _____
(Last two digit of birth year, last two digits of phone number)

- Widowed
- Divorced or separated

Medical Co-morbidities and Lifestyle Survey.

Instructions: This survey will help the health team to understand your medical history and current lifestyle practices to tailor the intervention to your goals and needs. Please circle the best responses.

Medical Conditions. Circle if you have any of the following:

- Hypertension/High blood pressure
- Hyperlipidemia/ High Cholesterol
- Osteoarthritis
- Type 2 diabetes mellitus
- Asthma and or Obstructive Sleep apnea
- Thyroid problems
- Ischemic heart disease
- Fatty liver

How many hours of sleep do you normally get?

- 1-4 hours
- 5-7 hours
- More than 8 hours

Number of caffeinated drinks in a day:

- None
- 1-2
- 3-4
- More than 5

Smoking History:

- Never smoked
- Former smoker
- Current smoker: How many _____ a day/ _____ a week/ _____ a month

Alcohol Use:

- Do you drink alcohol? Yes No
- If Yes, how many drinks _____ a day/ _____ a week/ _____ a month

How do you manage stress?

- Meditation/ Mindfulness exercise
- Medication
- Hobbies

ID Number: _____
(Last two digit of birth year, last two digits of phone number)

- Family /Other support system
- Physical exercise
- None of the above. Any Other: _____

How many times per week do you typically exercise?

- I do not exercise regularly
- Exercise 1-3 days/week
- Exercise > 3days/week

List your top three typical daily eating choice of food

- Breakfast _____, _____, _____
- Lunch _____, _____, _____
- Dinner _____, _____, _____

What do you think triggered your weight gain?

- Work/school stress
- Marriage /family stress Family
- Poor eating habits habits
- Previous pregnancy
- Unable to exercise, lack of physical activity
- Health-related
- Other

Weight Loss History and Motivation Survey

Instructions: This survey will help the health team to understand your previous attempts to lose weight and help to develop a comprehensive weight loss plan for you. It will also help the providers to understand your personal motivation to help you reach your goals.

Have you attempted to lose weight in the past?

Yes / No

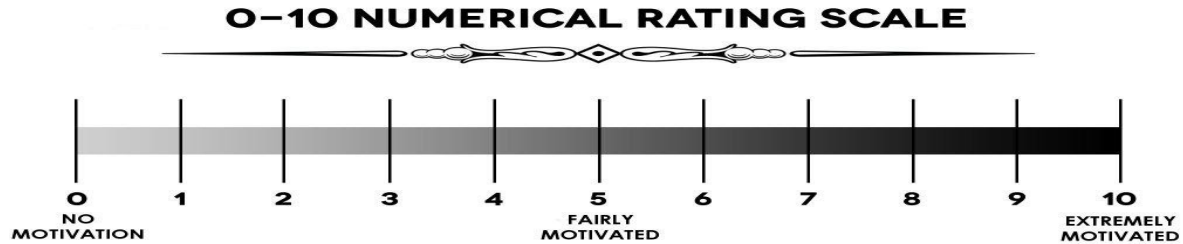
Was the past attempt successful? Yes / No

- If yes, how many pounds did you lose? _____
- If past attempt was not successful, what do you think was lacking?

How do you feel about your weight?

- I am comfortable with my present weight
- I would like to lose a few pounds
- I feel I have a significant amount of weight to lose (more than 10lbs)

Motivation score. How motivated are you today to lose weight?
(Mark your response on the ruler below)



What is your motivation to lose weight?

- Better health/ fitness Health
- Better shape Shape
- To boost confidence
- Family/ Support system
- Other _____

Quality of Life Assessment

This assessment asks how you feel about your quality of life, health, or other areas of your life.

Instructions: Please answer all the questions. If you are unsure about which response to give to a question, please circle the answer that appears most appropriate. This can often be your first response.

		Very poor	Poor	Neither poor nor good	Good	Very good
1	How would you rate your quality of life?	1	2	3	4	5
		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2	How satisfied are you with your health?	1	2	3	4	5
		Not at all	A little	A moderate amount	Very much	An extreme amount
3	To what extent do you feel that	1	2	3	4	5

ID Number: _____
(Last two digit of birth year, last two digits of phone number)

	physical pain prevents you from doing what you need to do?					
4	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
5	How much do you enjoy life?	1	2	3	4	5
6	To what extent do you feel your life to be meaningful?	1	2	3	4	5
7	How well are you able to concentrate?	1	2	3	4	5
8	How safe do you feel in your daily life?	1	2	3	4	5
9	How healthy is your physical environment?	1	2	3	4	5
		Not at all	A little	Moderately	Mostly	Completely
10	Do you have enough energy for everyday life?	1	2	3	4	5
11	Are you able to accept your bodily appearance?	1	2	3	4	5
12	Do you have enough money to meet your needs?	1	2	3	4	5

Monitoring: (Office use Only)
Current Weight
Body Mass Index
Waist circumference

Healthy Body Weight Collaboration Project Post-Intervention Surveys

Instructions:

By completing the post-intervention surveys, your health team will better understand your experience during the project and provide you with assessment data to continue your personalized plan for healthy weight. Please complete all questions to the best of your ability.

Medical Co-morbidities and Lifestyle Survey.

Medical Conditions. Circle if you have any of the following:

- Hypertension/High blood pressure
- Hyperlipidemia/ High Cholesterol
- Osteoarthritis
- Asthma and or Obstructive Sleep apnea
- Thyroid problems
- Ischemic heart disease
- Fatty liver
- Type 2 diabetes mellitus

How many hours of sleep do you normally get?

- 1-4 hours
- 5-7 hours
- 8 or more hours

Number of caffeinated drinks in a day:

- None
- 1-2
- 3-4
- More than 5

Smoking History:

- Never smoked
- Former smoker
- Current smoker: How many _____ a day/ _____ a week/ _____ a month

Alcohol Use:

- Do you drink alcohol? Yes No
- If Yes, how many drinks _____ a day/ _____ a week/ _____ a month

How do you manage stress?

- Meditation/ Mindfulness exercise
- Medication
- Hobbies
- Family /Other support system

ID Number: _____
(Last two digit of birth year, last two digits of phone number)

- Physical exercise
- None of the above. Any Other:

How many times per week do you typically exercise?

- I do not exercise regularly
- Exercise 1-3 days/week
- Exercise > 3 days/week

List your top three typical daily eating choice of food

- Breakfast _____, _____, _____
- Lunch _____, _____, _____
- Dinner _____, _____, _____

What do you think triggered your weight gain?

- Work/school stress
- Previous pregnancy
- Health-related
- Marriage /family stress
- Unable to exercise, lack of physical activity
- Other
- Poor eating habits

Since participating in the program, have you experienced a change in the size of clothing used?

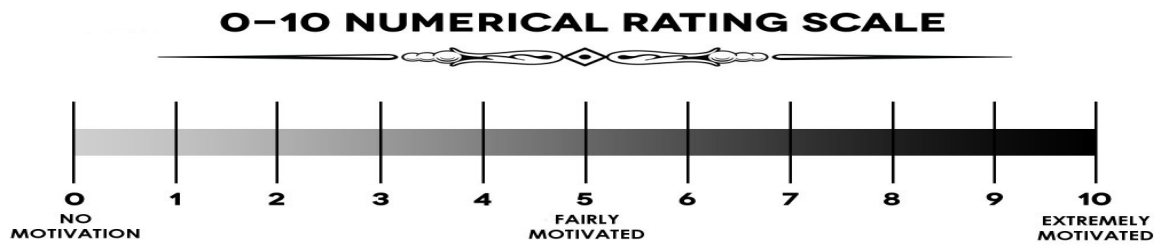
- Yes No
- If Yes, Is this an increase or decrease in size? Increase / Decrease

Weight Loss History and Motivation Survey

How do you feel now about your weight?

- I am comfortable with my present weight
- I would like to lose a few pounds
- I feel I have a significant amount of weight to lose (more than 10lbs)

Motivation score. How motivated are you today to continue your efforts to lose weight?
(circle your response on the ruler below)



Since participating in the program, what is your current motivation to lose weight?

- Better health/ fitness
- Better shape
- To boost confidence
- Family/ Support system
- Other _____

Quality of Life Assessment

This assessment asks how you feel now about your quality of life, health, or other areas of your life.

Instructions: Please answer all the questions. If you are unsure about which response to give to a question, please circle the answer that appears most appropriate. This can often be your first response.

		Very poor	Poor	Neither poor nor good	Good	Very good
1	How would you rate your quality of life?	1	2	3	4	5
		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2	How satisfied are you with your health?	1	2	3	4	5
		Not at all	A little	A moderate amount	Very much	An extreme amount
3	To what extent do you feel that physical pain prevents you from doing what you need to do?	1	2	3	4	5
4	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
5	How much do you enjoy life?	1	2	3	4	5
6	To what extent do you feel your life to be meaningful?	1	2	3	4	5
7	How well are you able to concentrate?	1	2	3	4	5
8	How safe do you feel in your daily life?	1	2	3	4	5
9	How healthy is your physical environment?	1	2	3	4	5
		Not at all	A little	Moderately	Mostly	Completely
10	Do you have enough energy for everyday life?	1	2	3	4	5
11	Are you able to accept your bodily appearance?	1	2	3	4	5
12	Do you have enough money to meet your needs?	1	2	3	4	5

Community Resources

Instructions:

These questions identify community resources you used during the project. This will help the health team understand which were most valuable and accessible to you. Please answer the following questions regarding your participation in the program.

I attended weekly Foodbank class:

-
- 6 sessions
- 3 to 5 sessions
- ≤ 2 sessions

I used the following resources for physical activity:

- Get Fit SA
- YMCA
- Other (specify):

I attended scheduled weekly follow up visits:

- 8 sessions
- 6- 7 sessions
- 4-5 sessions
- 2-3 sessions
- 1 session

I practiced the self-regulatory and monitoring techniques

- Daily
- Weekly
- Monthly

Monitoring: (Office use Only)
Current Weight
Body Mass Index
Waist circumference