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A Multimodal Intervention for Weight Loss in Primary Care

Amber Smith

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A MULTIMODAL INTERVENTION FOR WEIGHT LOSS IN PRIMARY CARE

by

AMBER SMITH

EVIDENCE-BASED PRACTICE PROJECT REPORT

Submitted to the College of Nursing and Health Professions

of Valparaiso University,

Valparaiso, Indiana

in partial fulfillment of the requirements

For the degree of

DOCTOR OF NURSING PRACTICE

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ACKNOWLEDGMENTS

There are so many people deserving of an acknowledgment for this project and for my success in this field. The first is personal nurse, my mother Sandra, who has inspired and encouraged me throughout my career.

The second is my Oma, Edith, who passed away when I was in Valparaiso’s accelerated nursing program. She was my biggest cheerleader, always telling me I was destined for greatness. Her love and spirit have pushed me forward.

The other two people who need an acknowledgment are the co-owners of the practice where this project took place. Unfortunately, this past semester, the provider of the clinic passed away suddenly. He always told the patients I would be Dr. Smith and that I was, wrongly, much smarter than him. He was a humble and inspiring Nurse Practitioner, who was passionate about patient-centered care and teaching students. He is deeply missed, and I hope I can take what he has taught me forward in my career.
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ABSTRACT

Obesity is a worsening pandemic that requires immediate action. It is recommended that primary care providers screen patients for obesity and provide multimodal behavioral interventions to their patients to treat and prevent obesity (USPSTF, 2018). The purpose of this evidenced-based practice (EBP) project is to implement a multimodal intervention for weight loss in adults within primary care. Five search engines were utilized, and 16 articles were ultimately selected as evidence. The evidence supported self-monitoring and close follow-up while in active weight loss. The Iowa Model for EBP to promote quality care was used as the framework to guide the project at a one-provider primary care clinic in Prescott, Arizona. This EBP project aimed to improve weight loss in participants through daily self-monitoring of caloric intake and physical activity via a smart phone application or paper entry. In-person and telephone follow-up alternated every two weeks for a timeframe of 12 weeks. Follow-up was provided by the nurse practitioner and the project leader. The intervention group consisted of seven participants and outcomes were measured as change in Body Mass Index (BMI). Data was collected preintervention and every four weeks until the end of the implementation period. The intervention group data was compared to change in BMI in the comparison group, which also consisted of seven participants. Key stakeholders included the nurse practitioner, medical assistant, the project leader, other students, as well as patients and their family members. To determine if implementation of the intervention was effective, a data analysis was completed. Implications for practice will be discussed.

Keywords: Obesity, weight management, primary care, self-monitoring
CHAPTER 1

INTRODUCTION

Background

Obesity in the United States of America (USA) continues to be a growing epidemic with more than one third of Americans classified as obese (Orringer et al., 2020). Rates have tripled within one generation and as they continue to skyrocket, there is little anticipation that it may slow down (Orringer et al., 2020; Wadden, Tronieri, and Butryn, 2020b). Obesity has been defined as a chronic disease that is strongly correlated to the development of many comorbidities including diabetes, cardiovascular disease such as hypertension and stroke, musculoskeletal disorders, gallstones, sleep apnea, mental illnesses and some cancers. These diseases then can lead to disability, decreased quality of life and health outcomes as well as increased health care expenditures (America’s Health Rankings, 2020; WHO, 2021; USPSTF, 2018). It is estimated that $350.85 billion was spent on obesity-related medical costs and decreased productivity per year as of 2013 (America’s Health Rankings, 2020). Leading causes of death related to obesity include ischemic heart disease, type 2 diabetes, respiratory diseases, and cancer (USPSTF, 2018). These conditions are linked to more deaths worldwide than mortality associated with being underweight (WHO, 2021).

It is known that obesity is a product of energy imbalance between an intake of calories and expenditure (WHO, 2021). It is measured as a ratio of height versus weight called body mass index (BMI). A BMI of 30 kg/m2 or greater is defined as obese, while being overweight is defined as a BMI of 25-29.9kg/m2 (America’s Health Rankings, 2020; Orringer et al., 2020; WHO, 2021; Wadden et al., 2020b). Energy intake and expenditure are both regulated through a gut-brain connection (Wadden, et al. 2020b). The goal of the human body is to maintain weight and store surplus energy in the event of food scarcity. This system tracks long and short-term energy needs and changes (Wadden, et al. 2020b). However, although many developed nations
no longer worry about food scarcity, food options and modern technology have overwhelmed the regulatory system. As a result, globally there are more people who are overweight and obese than those that are underweight (Wadden, et al, 2020b; WHO, 2021).

Cultural shifts have also played a role in giving rise to an obesity pandemic. With processed food being less expensive, healthy options are not always chosen or available (Wadden et al., 2020b). High caloric foods have been increasingly consumed worldwide (Wadden et al., 2020b; WHO, 2021). In addition, more individuals are choosing to receive food from restaurants rather than preparing it at home. To add to this, these food choices are often higher in calories due to increased portion sizes. The hustle of culture has fueled this. Busy lifestyles have demanded more convenient food options and less time for physical activity (Wadden et al., 2020b). Workplaces have become increasingly sedentary, especially as new technologies are introduced and society becomes more digital (Wadden et al., 2020b; WHO, 2021). Urbanization and changes in transportation modes have also contributed to the obesity rate (WHO, 2021). This increase in energy intake and decreased expenditure are the result of environmental and societal changes, with lack of supportive policies to combat these changes (WHO, 2021).

Primary care providers play a vital role in combating the obesity pandemic, as primary care offices are often the first line of care for many individuals. With the high prevalence of obesity, providers are called on to screen patients and begin conversations on education and management. USPSTF (2018) recommended that after screening all adults, primary care clinicians should offer multicomponent behavioral interventions to decrease caloric intake and increase energy expenditure. However, with many clinical problems to focus on as well as mixed information on weight loss, providers may not receive adequate education on how to best approach their patients. Healthy People 2030 has recognized this need and have advocated to increase obesity care. Not only do their goals aim to reduce adult (ages 20 and older) obesity
from 38.6% to 36%, but also to increase health care visit counseling on obesity from 24.8% to 32.6% (America’s Health Rankings, 2020).

Data Supporting Need for the Project

Outlined below are data collected explaining the need of the project. Global, national, regional, and state data as well as clinical agency data are discussed.

Global, National, Regional, and State Data

According to WHO, obesity has tripled worldwide since 1975 (2021). There are over 1.9 billion adults (18 years and older) who qualify as overweight or obese (WHO, 2021). Unfortunately, this issue does not stop across borders. Within the U.S., obesity has escalated by 11.9% from 2000 to 2019 (America’s Health Rankings, 2020). All 50 states had more than a 20% prevalence of adult obesity as of 2018 (Orringer et al., 2020). In addition, one in 13 states had a morbidly obese rate of a BMI higher than 40 (USPSTF, 2018). As these rates soar nationally, it has been no surprise that they have been increasing locally in the state of Arizona as well.

Obesity in Arizona has been a long-standing issue that continues to be on the rise. With a 19% increase between 1993 and 2013, Arizona had the largest surge of obesity in the nation (Arizona Department of Health Services, 2014). It was estimated that one in four adults were obese while over 60% of the population was either obese or overweight (Arizona Department of Health Services, 2014). Unfortunately, more recent data showed that between 2000 and 2019 Arizona’s obesity rate has increased by 12.2% (America’s Health Rankings, 2020). This left a total estimated rate of obesity at 31.4% compared to the USA’s average of 31.9%. As of 2020, Arizona ranked as the 20th healthiest state in terms of obesity (America’s Health Rankings, 2020). In addition to this, data collected between 2008 and 2010 reflected that Yavapai county had a 60% overweight and obesity rate, which was consistent with the state average at the time (Arizona Department of Health Services, 2014). No further data of obesity rates in Yavapai county had been recorded. It was important to again note that obesity rates worldwide, nationwide and statewide have continued to increase each year. In conclusion, this data
suggested that Arizona, in addition to the nation and world as a whole, has not been the ideal picture of health. Therefore, every community should aim to make changes and combat the obesity pandemic.

The prevalence of obesity was greater in women than in men (America’s Health Rankings, 2020; Orringer et al., 2020; USPSTF, 2018). Between 2013-2014 over 40% of American women were obese in comparison to over 35% of men (Orringer et al., 2020). Obesity rates appeared to be slightly higher in minority groups such as non-Hispanic black women (57.2%), Hispanic women (46.2%), non-Hispanic black men (38%) and Hispanic men (37.9%) versus non-Hispanic white women (38.2%) and non-Hispanic white men (34.7%) (Orringer, et al., 2020; USPSTF, 2018). Arizona continues to have a strong Native American and Hispanic population. As of 2014, over 33.2% of natives reported being obese while 31.2% of Hispanic reported obesity (Arizona Department of Health Services, 2014).

Obesity has also been shown to be correlated to education and income levels. In Arizona, obesity occurred in 37.8% of those making less than $25,000 a year and 36.3% in those making less than $50,000 a year (America’s Health Rankings, 2020). Correlating with this, 37.9% of those with less than a high school diploma had obesity while college graduates had a rate of 28.1% (America’s Health Rankings, 2020).

The population in Yavapai county was approximately 51.1% female, 80.2% white non-mixed, 14.7% Hispanic or Latino, 2.3% mixed races, and 2.2% native (US Census Bureau, 2019). Median household income in Yavapai county was $52,421 with 12% considered to be in poverty. Majority of residents had completed a high school diploma (91%), however, only 25.9% of residents held a bachelor's degree or higher (US Census Bureau, 2019). Although ethnically the majority of residents were of white race and less prone to obesity than their minority counterparts, level of income and education may have played a role in the high rates of obesity.
Clinical Agency Data

Providing care to the obese patient has been a passion for the provider and staff at the Arizona clinic. The provider often saw patients looking to lose weight. In many instances, patients were prescribed the weight-loss drug Phentermine and were instructed to follow-up every 30 days to have their reassessment and obtain their prescription refill. Patients were counseled with basic weight loss education and through use of motivational interviewing, whereby the provider discussed with the patient and helped identify what triggers their poor eating choices or low physical activity levels. This sector of their practice has grown tremendously through word of mouth as well as local blog and news articles (C. Krugman, personal communication, June 3, 2021).

At the time, there was a high number of young and middle-aged Latino women within the surrounding areas that have sought out obesity therapy (C. Krugman, personal communication, June 3, 2021). Many of these patients came to the clinic through word of mouth as they were family members or friends of other patients. Although many patients visited specifically for weight loss, overweight and established patients are also identified during routine visits and assessed for readiness to discuss weight loss (C. Krugman, personal communication, June 3, 2021).

Purpose of the Evidence-Based Practice Project

The purpose of this evidence-based practice project is to implement a multimodal intervention for weight loss in adults within primary care. This was done by providing a protocol that includes a combination of behavioral modifications and increased follow-up. The project aimed to improve outcomes for patients and provide an intervention that can be utilized within the primary care setting.

PICOT Question

The project addressed the following PICOT question: “Will overweight and obese adults (P) benefit from alternating biweekly telephone and face-to-face meetings and tailored weight
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loss feedback based on self-monitoring (I) compared to having monthly face-to-face meetings and general education (C), in a way that will reduce body mass index (O) over 12 weeks (T)?

**EBP Project Description**

This EBP project took place at a nurse practitioner owned primary care clinic in Prescott, AZ. The goal was to improve weight loss in participants through daily self-monitoring of food intake and physical activity via a smartphone application or paper log and increased follow-up from every 30 days to every two weeks for a period of 12 weeks. A comparison group and an intervention group were created. All participants included those that had ICD codes R63.5 weight gain, E66.9 obesity, or E66.3 overweight included in their problem list and had a BMI over 25.

Those in the comparison group had to be seen in the clinic over a 12-week period that included three monthly face-to-face visits prior to May 21, 2021. They were provided with general weight loss education but were not instructed to participate in self-monitoring. Included participants in the intervention group were those who desired to participate in a weight loss regimen and had been seen in the clinic since May 2021. Excluded participants were those who did not have the ambition to lose weight and who had not been seen in the clinic since May 2021. Follow-up was provided by the nurse practitioner and the project leader. Follow-up sessions alternated between telephone counseling and in-person counseling sessions. The in-person counseling took place monthly, while telephone counseling took place in between visits at the two-week mark. Participants were recruited via email blast, through word of mouth, and through face-to-face clinic visits. All participants were assessed in an initial face-to-face visit.

Outcomes were measured through changes in BMI. The primary outcome was the change in BMI over 12 weeks in the intervention group compared to the comparison group. The secondary outcome was the change in BMI over 12 weeks within the comparison group.
CHAPTER 2

EBP MODEL AND REVIEW OF LITERATURE

Evidence-based Practice Model

A trusted EBP model is needed to provide a framework for project implementation. For this reason, the Iowa model for Evidence Based Practice was warranted.

Overview of EBP Model

The Iowa model has been used as a multi-step framework for implementation of evidence-based practice (Iowa Model Collaborative et al., 2017). It has been widely used and has been geared toward point-of-care clinicians. Eight steps are utilized within the model to promote practice change. Steps include identifying a trigger where change is warranted, determining if the problem is a priority, forming a team of interdisciplinary stakeholders, gathering and analyzing data related to practice change using the PICOT method, critiquing and synthesizing research, implementing a pilot program, and evaluating results (Iowa Model Collaborative et al., 2017). Therefore, the Iowa model for EBP was appropriate for this project and the plan for each step was outlined below.

The model identifies a trigger for practice change and then determines if the trigger is a priority of the organization. As stated above, obesity is a worldwide issue and primary care providers are often first line at identifying and managing this disease. Although the clinic viewed obesity therapy as a priority, best practice for obesity therapy in primary care was still to be determined. The goal of this project was to better align current practice with evidence-based practice (EBP). The model then identifies key stakeholders. Within the clinic, interdisciplinary stakeholders include the nurse practitioner and the medical assistant that were co-owners of the practice, as these were the only employees of the practice. Other stakeholders included the project leader and any nursing, medical assistant, and nurse practitioner students that may be learning within the clinic. Patients and their family members that were involved in the project may
be considered stakeholders as well. The next step in the Iowa EBP model was to form a PICOT question and conduct a literature search. The PICOT question for this project was stated above in Chapter 1. The reason for significant change of practice was identified via the exhaustive literature search. The literature was appraised and synthesized which was detailed in the following section. In the next step, best practices were to be implemented in a pilot program to determine the potential impact on outcomes. This information can be found in more detail in Chapter 3. Finally, in the evaluation stage, full practice adoption may be appropriate if the changes were determined to be feasible and produce results for patients. The literature search, evidence synthesis, and best practice changes were detailed below.

**Literature Search**

The literature search is a vital part of the EBP project. Thorough searches must be done in order to gather evidence on the topic. The literature search allows the project leader to discover the best practices, resulting in the intervention talked about in the PICOT question.

**Sources Examined for Relevant Evidence**

Five search engines were utilized, and final searches were based upon those that produced the most relevant research. Included search engines were CINAHL, JBI, Cochrane, TRIP, and PubMed. All searches were limited to the date range of 2016-present and further by English language.

Terms used for the CINAHL search were (MM obesity therapy) AND program* OR interven* OR strateg* OR plan OR guideline AND “primary care” OR “primary health care” OR “primary healthcare” OR “family medicine” AND adult*. The search was further limited with scholarly (peer-reviewed) journals and resulted in 59 results. Articles included from CINAHL totaled to three.

Terms searched in the Joanna Briggs Institute (JBI) were “weight loss” OR “weight reduction” AND program* OR interven*. This search produced 143 result and 3 articles were ultimately used.
In Cochrane, terms used were “weight loss” OR “weight reduction” AND program* OR interven*. The search was further limited by searching for reviews. There were 47 results available and one was utilized for the purposes of this project.

Turning research into practice (TRIP) was searched using (title: obesity). It was further limited by using guidelines, from USA. There was a total of 18 results and 3 pieces of evidence were picked.

Terms used for PubMed were (weight reduction [MeSH Terms]) AND (program* OR interven* OR stateg* OR plan OR guideline) AND (“primary care” OR “primary health care” OR “primary healthcare” OR “family medicine”) AND adult*. Limiters utilized were meta-analysis, review, systematic review, RCT. There were 124 results, and 3 pieces of evidence were found to be relevant.

With a total of 391 pieces of evidence, there were 369 pieces that were not duplicated. Some of the pieces of evidence chosen were found in multiple databases. After searching through titles and abstracts of articles, there were 66 pieces of evidence that were retrieved. Ultimately, 13 pieces of high-level evidence were chosen after reading through the full-text articles and applying exclusion criteria. These pieces were chosen based upon inclusion and exclusion criteria. Exclusion criteria consisted of articles that focused on perceptions, experiences, or other abstract concept; obesity screening guidelines; focused on results that were not weight reduction measures (blood pressure readings, lipid profiles, HgbA1C); articles that did not report any significant findings; articles where the main focus was on children or adolescents; and interventions that could not be performed in a primary care setting (bariatric surgery). Inclusion criteria included evidence that focused on weight loss measures such as weight, BMI, waist circumference and those focused on the adult population. Through citation chasing, there were ultimately 6 more articles found. Figure 1 is a PRISMA flow diagram that depicts the literature search and the narrowing of sources.
Levels of Evidence

Melynk & Fineout-Overholt's (2019) level of evidence model was used to level the evaluated evidence. Of those articles included, there were a total of 10 pieces of level one evidence and six pieces of level two evidence. Within level one evidence, there were three clinical practice guidelines (CPG), three evidenced-based summaries, two reviews of clinical practice guidelines and systematic reviews (SR), and two systematic reviews and meta-analyses (MA). All level two evidence consisted of randomized control trials (RCT). A full description of the literature search can be located in the evidence table in Appendix A.
Analysis and Appraisal of Relevant Evidence

Clinical practice guidelines were appraised using the AGREE II model. The AGREE II model was specifically designed to evaluate clinical practice guidelines, thus, the design was the best for addressing guideline quality. For systematic reviews and randomized controlled trials, the CASP checklist was used. CASP has separate checklists developed for systematic reviews and randomized controlled trials, which were used appropriately. The checklists have been widely used and were easy to understand, making appraising the evidence simple and efficient. A summary of the quality of each piece of evidence can be located in Table 1.

Table 1

Summary of Evidence

<table>
<thead>
<tr>
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<th>Database(s)</th>
<th>Level of Evidence/Type</th>
<th>Quality/Tool</th>
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<td>I/Summary</td>
<td>Strong/CASP</td>
</tr>
<tr>
<td>Minooe (2020)</td>
<td>JBI</td>
<td>I/Summary</td>
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</tr>
<tr>
<td>Pamaiahgari (2021)</td>
<td>JBI</td>
<td>I/Summary</td>
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<td>Good/CASP</td>
</tr>
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<td>Spring et al. (2020)</td>
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<td>II/Review</td>
<td>Good/CASP</td>
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<td>Good/CASP</td>
</tr>
<tr>
<td>Tang et al. (2016)</td>
<td>PubMed</td>
<td>I/SR/MA</td>
<td>Good/CASP</td>
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### Construction of Evidence-based Practice

The appraised literature was of high quality and consistent with standard clinical knowledge that weight loss is a product of combined diet and exercise modifications. It was in agreement that there should be an energy deficit, which is produced via reduced caloric intake or prolonged physical activity or both. However, poor compliance may be a long-term issue (Khanh-Dao, 2020). It has been shown that behavior modification strategies improve adherence to diet and exercise practices, which helps reduce weight, BMI, and waist circumference (Pamaiahgari, 2021; Semlitsch et al., 2019; USPSTF, 2018; VA & DoD, 2020). However, there were many avenues and theories on how to provide this support to patients. Various methods through RCTs have been examined and were summarized below. In addition, common themes on what has been included in behavioral therapy, at which frequency interventions should be delivered, and how interventions should be delivered were also discussed below. A brief overview of medication recommendations was also outlined.
Weight Management Methods

Bennett et al. (2018) did a 12-month digital weight loss program within a community health center. The intervention included an app-based self-monitoring program with tailored feedback, smart scale, dietician delivered counseling calls and clinician counseling via application generated recommendations. In the intervention group there was a 4.4kg ($p < 0.001$) weight loss at 6 months and 3.8kg ($p < 0.001$) at 12 months. More of the intervention group lost 5% or more of their weight at six months, (43% versus 6% ($p < 0.001$) and twelve months, (40% versus 17% ($p < 0.001$). It was found that those that completed 80% of the interventions of self-monitoring (-3.5kg), counseling (-3.0kg), and self-weighing days (-4.4kg) lost more weight than those who participated less ($p < 0.001$).

Eaton et al. (2016) also had a multi-intervention program where participants did a home-based intervention with telephone calls, tailored print materials, and DVDs focused on diet and physical activity. It was discovered that the enhanced intervention (EI) group produced more weight loss than the standard intervention (SI) group ($p < 0.001$). At 6 months, 37.2% of the EI had more than 5% weight loss versus 12.9%. At 12 months EI had 47.8% versus 11.6%. The EI group also reported an increase in physical activity over time ($p < 0.04$) at 95.7 minutes versus 68.3 minutes at six months and 126.1 versus 73.7 minutes at 12 months. Participants reported in personal interviews at the end of the study that they felt goal setting and monthly phone calls were the most helpful aspects of the intervention.

Weight loss was observed in Spring et al. (2017), where participants were assigned into one of three groups: standard (STND), technology (TECH) and self (SELF). STND and TECH each had eight in-person group treatment sessions while SELF did not have any. SELF and STND used paper diaries for self-monitoring, while TECH used a phone application. TECH and STND produced greater weight loss at 3 and 6-months than SELF (-5kg at 3 months and -5.7kg at 6 months versus -1.8kg at 3 months and -2.7kg at 6 months, ($p < 0.05$). STND had 59% of
Participants produce more than 5% of weight loss versus 34% for TECH (p < 0.05). Self-monitoring adherence was greater in TECH than STND (p < 0.001).

Subjects were assigned to one of three groups in the weight-loss study performed by Godino et al (2019). There was a control group, a tailored text message group, and a text message plus telephone coaching group. The text message only group was found to lose a mean of 1.68% in twelve months versus a mean of 3.63% with added coaching. The control group lost a mean of 0.61%. Results were significantly different between the telephone coaching plus text messages and control group (p < 0.003), but not between other groups.

There were many multi-intervention studies, which presented difficulty pulling out which interventions caused weight loss. Spring et al. (2020) saw this need and conducted a study to see which interventions were the most beneficial for weight loss with a goal on saving treatment cost. Participants were randomly assigned to 12 versus 24-coaching calls, primary care provider (PCP) reports, text messaging, meal replacements and buddy training. A mean average of 6.1kg of weight loss with 57.1% losing over 5% of weight was produced through 12 coaching calls, buddy training and PCP progress reports.

Finally, Wadden et al. (2020a) explored the Centers for Medicare and Medicaid Services (CMS)-based recommendations for IBT in a multi-center setting. Standard counseling versus counseling with the addition of a weight-loss drug was assessed. Both groups produced clinically meaningful weight loss with the placebo group producing a mean weight loss of 4% and the weight loss drug group producing a mean weight loss of 7.5%.

**Behavioral Therapy**

Behavioral therapy aims to improve lifestyle modifications of the patient in order to produce an energy deficit. Behavioral therapy should include goal setting, identifying barriers, stimulus control, self-monitoring, and should provide feedback and support from a trained interventionalist (Wadden et al., 2020b; USPSTF, 2018). Goal setting should yield specific and attainable goals that clearly identify the behavior and steps necessary to modify it (Wadden et
al., 2020b). Behavioral therapy within the appraised studies’ mostly included instruction, goal attainment, self-monitoring and feedback, which is consistent with various guidelines (Godino et al., 2019; Orringer et al., 2020; Paimaihagari, 2021; Schippers et al., 2017; Spring et al., 2017; Wadden et al., 2020b; USPSTF, 2018; VA & DoD, 2020). Motivational interviewing was another method that has demonstrated to be an effective communication mechanism in behavioral therapy (Paimaihagari, 2021; Minooee, 2021; Wadden et al, 2020b). Motivational interviewing is a method of conversation that looks at the patient's intrinsic motivation to facilitate behavior change (Minooee, 2021). This communication method may pair with more tangible mechanisms such as goal setting, self-monitoring, and provider feedback.

Guidelines suggested that feedback sessions provide continued education and reinforcement of recommendations for dietary and physical activity changes (Godino et al., 2019; Orringer et al., 2020; Paimaihagari, 2021; Semlitsch et al., 2019; Schippers et al., 2017; Spring et al., 2017; Wadden et al., 2020b; USPSTF, 2018; VA & DoD, 2020). Typical recommendations for reducing caloric intake were 1,200-1,500 kcal/day for women and 1,500-1,800 kcal/day for men (Wadden et al., 2020b). Discussion about adequate portion sizes and education on highly caloric food was suggested (Orringer et al., 2020). Some evidence showed low-carbohydrate and high-protein diets produced greater three- and six-month weight deficits (Wadden et al., 2020b; VA & DoD, 2020). But it was found that when matched by calorie to other diets, macronutrient content may not affect weight loss and thus, reducing caloric intake should be the most important nutrition method (Wadden et al., 2020b). In addition, physical activity prescription was typically 150-180 minutes per week of moderately vigorous activity, which may be broken up into 10-minute increments throughout the day (Khanh-Dao Le, 2021; Wadden et al., 2020). It was suggested that physical activity should take place on at least five days a week and sedentary time should be decreased (Orringer et al., 2020). Evidence suggested that they type of physical activity was less important that the amount. Aerobic, resistance, or an increase in
lifestyle physical activity could be considered, as they were all shown to be effective (VA & DoD, 2020).

**Self-monitoring.** Self-monitoring is an essential component of behavioral therapy (Semlitsch et al., 2019). Self-monitoring consists of documenting energy intake and output and has been shown to provide critical feedback about patient progress. In addition, it helped the interventionalists to provide reinforcement and to analyze barriers. Greater adherence with self-monitoring has been associated with higher amounts of weight loss (Khanh-Dao Le, 2020; Wadden et al., 2020b). Traditionally, paper logs have been utilized and but with the availability of technology, smartphone applications have been created to allow people to log their daily health habits. Wadden et al. (2020b) recommends using paper diaries or applications to monitor weekly weight in addition to daily food intake and physical activity. Spring et al. (2017) explored self-monitoring via paper journals and applications, and how they impacted weight loss. It was concluded that both avenues of documentation were effective at producing clinically significant weight loss. However, it was noted that there was greater adherence with self-monitoring with the smartphone application. These applications have been popular and can provide useful tools for self-monitoring, however, they should not replace follow-up sessions with a provider, rather they should enhance these sessions (Schippers et al., 2017; Wadden et al., 2020b).

**Frequency of Follow-up**

Follow-up was an important factor to consider regarding behavioral therapy and weight loss. It was suggested that regular follow-up was important and helps maintain compliance (Khanh-Dao Le, 2020). However, it has not always clear what the correct number or method of follow-up may be. Several studies have outlined various methods that have resulted in significant weight loss results. Wadden et al. (2020b) found that 14 or more in person or web-based sessions within a six-month period resulted in a 5-8% decrease in weight, while USPSTF (2018) suggests 12 or more sessions within a 12-month period. Schippers et al. (2017) found that a mix of delivery modes produced the greatest amount of weight loss. Modes included mobile phone
interventions, emails, phone calls and face-to-face meetings. Orringer et al. (2020) contends that follow-up should be based on risk factors and patient readiness, however, monthly follow-ups should be considered and also specialty referrals as appropriate. Khan-Dao Le (2020) recommended regular clinical visits, group meetings, telephone calls or emails to increase compliance with behavior modification but did not specify frequency of recommendation.

**Telephone sessions.** Many studies have reported data on telephone and in-person behavioral therapy with clinically significant results. Telephone counseling interventions have demonstrated comparable results to in-person counseling sessions (Wadden et al., 2020b; VA & DoD, 2020). Individual or group telephone interventions may be either an alternative or used in-conjunction to in-person interventions (VA & DoD, 2020). Evidence utilizing telephone sessions reported the sessions to be brief in nature, which may be beneficial for a busy primary care practice. Typical call sessions were reported to range from 5-15 minutes in length (Bennett et al, 2018; Godino et al., 2019; Spring et al., 2017; Wadden et al., 2020a).

There was more variability with frequency and number of coaching calls. For example, Bennett et al. (2018) delivered 18 calls over a year's period. Calls 1-4 were weekly, 5-10 were biweekly, and calls 11-18 were monthly. While Eaton et al. (2016) had monthly counseling calls over six months and then bimonthly for the next six months. Spring et al. (2020) did note that greater weight loss did not occur when participants had 24 calls versus 12 calls over a six-month period, suggesting that every two weeks may be sufficient. Godino et al., (2019) provided participants with two calls in the first month followed by monthly coaching for the remaining five months. Spring et al. (2017) provided participants with weekly calls from weeks 1-8 and monthly calls for months 3-6. Other interventions that were trialed along with coaching were weekly mail with print material (Eaton et al., 2016), interactive and tailored text messages (Godino, et al., 2019), peer support and regular progress reports to the provider (Spring et al., 2020), and Liraglutide 3.0m (Wadden et al., 2020a). All interventions were deemed to be effective when paired with telephone coaching sessions.
In-person sessions. Wadden et al. (2020a) provided participants with individual 15-minute in-person sessions, while Spring et al. (2017) hosted a 90-minute group setting. In other settings, time limits on face-to-face sessions were not discussed (Bennett et al., 2018; Eaton et al., 2016). While data on typical time in sessions is limited, it should be noted that CMS provides reimbursement for 15-minute sessions for weight loss (Wadden et al., 2020a).

There was also variability in frequency for in-person follow-up. Eaton et al. (2016) had participants meet face-to-face with their coach at the beginning of the study, six months into the study, and at the end of the 12-month intervention. Bennett et al. (2018), did not have specific requirements for in-person contact as this was not the main focus of their study. Rather, Bennett et al. (2018) retrospectively looked at how many times they had visited the provider. Providers were educated on the patients’ weight loss journey and informed to counsel them at any appointments they had. It was determined at the end of the study that subjects met face-to-face with their provider for a median of three times over the 12-month period of time. In contrast, Spring et al. (2017) had participants attend eight group sessions weekly for the first eight weeks of the 6-month intervention. Wadden et al. (2020a) provided weekly visits for the first month, every two weeks for months 2 to 6 and monthly from months 7 to 13. Tang et al. (2016) reviewed self-directed, internet-based weight loss techniques with one case of provider contact or less. The interventions lasted 3 to 6 months. It was determined that these interventions may produce modest weight loss up to 6-months, but may need to be supplemented by other interventions, such as more frequent follow-up, to achieve sustained and clinically meaningful weight loss.

Medications

Prior to starting a weight loss medication, weight loss treatment should heavily focus on lifestyle modifications. However, adding weight loss medication to intensive behavioral therapy may provide increases in initial weight loss (Orringer et al., 2020; Semlitsch et al., 2019; Wadden et al., 2020b; VA & DoD, 2020). This was supported by Wadden et al. (2020a) who added
liraglutide 3.0mg to intensive behavioral therapy and found enhanced weight reduction.

**Recommendation for Best Practice**

Based on the evidence synthesis, weight loss interventions that are intensive and multi-component in nature have greater results in weight reduction. Weight loss medication has been shown to enhance reduction in weight. However, medication should be used in conjunction with intensive behavioral therapy. While the clinic was providing weight loss medication and standard weight loss education, it was missing intensive weight loss interventions and systematic approaches for follow-up visits. Previous practice at the clinic included seeing patient in person every 30 days for prescription refill and reassessment. During visits there was a level of motivational interviewing that was performed, which was supported by the evidence to be a beneficial communication mechanism. There was little mention of goal setting, no mention of self-monitoring, and little tailored feedback during these sessions.

Regarding active treatment for weight loss, interventions took place between three and 12 months, with many recommendations aiming for at least six months. For the purposes of this intervention, the project lasted 12 weeks, or 3 months to best suit the needs of the clinic and project leader. Multi-component content included education on diet and physical activity as well as behavioral interventions, such as self-monitoring, to increase compliance with diet and physical activity recommendations. Self-monitoring included daily food intake and physical activity, as well as monthly weight monitoring. BMI has been the standard of care for measuring obesity. BMI was the outcome calculated throughout the intervention (Semlitsch et al., 2019). The use of paper journals or smartphone applications can suffice for documentation; however, smartphone applications can increase compliance with documentation. For this reason, the chosen intervention initially preferred self-monitoring on a free smartphone application.

Frequent follow-up was another essential intervention that was supported by the evidence. These sessions allow the interventionalist, or project leader, to provide feedback on the patient’s self-monitoring and provide much needed support. It was clear within the evidence
that follow-up can be delivered via telephone or in-person and can happen in individual or group settings. Fifteen-minute follow-up counseling sessions have shown to be beneficial whether in-person or via telephone. Frequency of follow-up may vary, but common themes were between every two weeks and every month. During active weight loss interventions follow-up was typically more frequent than in the weight loss maintenance phase. Based on these recommendations, follow-up included monthly in-person sessions and a telephone follow-up session in between at the two-week mark. Telephone follow-up may have reduced burden for participants within the project, since they did not actively need to come to the clinic. Follow-up sessions included instruction and education, goal attainment, self-monitoring review, as well as support and feedback.
CHAPTER 3
IMPLEMENTATION OF PRACTICE CHANGE

This pilot program was implemented at a primary care, nurse-practitioner owned clinic in Prescott, AZ. The clinic was treating patients aiming to lose weight prior to the start of the project. When patients arrived at the clinic, their vitals were taken by the provider or medical assistant (MA). This included their weight on a scale and height on a stadiometer. These numbers were used to calculate their BMI via the electronic medical record (EMR). Patients were also given a hand-held machine that estimated their body fat percentage. A level of motivational interviewing was performed at the clinic through the use of open-ended questions on current motivations to change. Patients were given basic diet and physical activity instructions verbally and barriers were discussed based on conversational flow. Patients had the option to choose if they would like to be on a weight loss medication and medication options were explained to the patient. The weight loss medications prescribed at the site have included Phentermine, sublingual Peptides and Semiglutide. The clinic has been offering Phentermine for over a year, however, has recently expanded to the other pharmaceutical options. Follow-up appointments occurred every 30 days for prescription refill if applicable, weight measurement, and to check in with the patient on how they believe their progress was going.

Based on the synthesized evidence, a need was determined to develop additional interventions focused on higher-intensity lifestyle changes. Patients were instructed to perform self-monitoring of daily caloric intake and energy expenditure through a free phone application. Face-to-face follow-up continued to be monthly with telephone counseling sessions at the two-week mark. Follow-up was provided by the nurse practitioner and the project leader. Weight loss progress was measured monthly, at the face-to-face follow-up appointments and documented in the EMR. Patients were instructed to come to the clinic dressed in something similar for their follow-up appointment and were scheduled around the same time of day at each face-to-face
appointment. This provided a more accurate measurement of recorded weight. This protocol occurred over a period of 12 weeks.

**Participants and Settings**

The provider performing the intervention was a nurse practitioner who had been practicing for three years. He co-owned the practice along with the office manager/medical assistant. The practice setting was a small primary care office that served patients 17 years and older. It was located in a small town in the mountains of northwestern Arizona.

There were two groups of included participants. All participants eligible must have had ICD codes R63.5 weight gain, E66.9 obesity, or E66.3 overweight included in their problem list. The first participant group, the comparison group, were those who were not actively included in the intervention. These participants were treated in the clinic prior to May 1, 2021. The second group, the intervention group, had all been seen in the clinic since May 1, 2021. These included participants were also those who had the motivation to lose weight and who had access to smartphone. Excluded participants were those who do not have the ambition to lose weight, those without the given ICD codes, patients that have uncontrolled comorbidities, those that were pregnant, and patients that had not visited the clinic since May 1, 2021. Furthermore, those who were temporary patients due to being enrolled in a local addiction rehabilitation program or those who had been removed as a patient from the clinic due to inappropriate behavior were excluded.

**Pre-Intervention Group Characteristics**

Demographic data was collected pre-intervention (Appendix B). Data included gender, age, race, level of education (LOE), and if the participant was taking weight loss medication or not. Seven individuals, 4 females and 3 males, aged 25 and older were in the comparison group. Four participants identified as Hispanic and three identified as Caucasian. In addition, five of the seven participants obtained a college degree, one completed some college, and one participant completed high school. All seven of the participants were on weight loss medication.
In the intervention group there were 7 participants aged 20 years and older which included 5 females and 2 males. Two patients identified as Caucasian, four identified as Hispanic and one identified as Asian-American. Three of the participants had a college degree, two had completed some college, and an additional two had completed high school. In addition, five out of seven participants were on weight-loss medication.

**Intervention**

Participants were recruited through review of the EMR. Eligible participants had ICD codes of R63.5 weight gain, E66.9 obesity, or E66.3 overweight included in their problem list and had been seen in the clinic since May 2021. Eligible names were discussed with the provider and input was given on who to contact based on the remaining criteria. Patients were reached out to in person at the clinic or via telephone or email to gauge interest level.

Patients were to meet with the clinician for a face-to-face appointment to check their current weight and assess motivation to change. Motivation to change was assessed by asking the participants if they were ready to make changes within the next 30 days. Those that were prepared to do so were asked to participate. During this initial visit, participants were asked to answer the following question, “why do you want to lose weight?”. This was referred to as their “why” answer. Participants were asked to write down this answer somewhere to refer back to it throughout the program. Initial education for each participant was kept simple, to increase physical activity and make healthier dietary choices. General education included aiming to participate in physical activity most days of the week for at least 30 minutes in duration and to choose whole foods, increase vegetable and fruit intake, and to eat at home more often.

Participants were emailed instructions on how to download the free smartphone application and a packet containing information for the intervention. As participants tracked their meals and physical activity the application translated it into daily caloric intake and energy expenditure. Since this intervention was not dependent on meeting a certain caloric standard, participants were not instructed to meet a certain caloric goal. However, since the application was able to
track this information, it was used to help create recommendations for lifestyle modifications. Through trial and error, some participants discovered it was difficult to log activity on the smartphone application. The project leader modified the intervention to allow for paper self-monitoring as well, which was stated in the literature review to have comparable results to smartphone application tracking. In these circumstances, calories were not utilized to create lifestyle modifications as paper logs did not have estimated caloric intakes and expenditures.

Face-to-face follow-up continued to be monthly with telephone counseling calls between these follow-up sessions at the two-week mark. Telephone follow-up appointments aimed to be around 15 minutes in duration and were conducted by the nurse practitioner and the project leader. The first point of conversation was to have the participant recite their “why” created at the beginning of the program. Participants were asked to bring in their monitoring logs to face-to-face appointments. The nurse practitioner and project leader asked each participant a series of questions regarding their progress. The first question was to assess compliance: “How many days in the last two weeks did you participate in self-monitoring and did you skip any meals or activities during those days?”. The second question was used to assess what has been going well: “How do you feel like you have progressed in the last two weeks?”. The third question aimed to assess barriers: “what do you feel like has been keeping you from reaching your goals?”. Biweekly, personalized goals were created based on the answers to these questions.

Face-to-face follow-up appointment followed the same format as the telephone sessions with a few additions. Participants were asked to bring their self-monitoring logs to these appointments. Logs were reviewed and discussed with participants. The nurse practitioner and project leader continued to reinforce general education to patients regarding increasing activity levels and good dietary choices. Education was tailored to participants logs, such as recommendations for changing current food choices. Weight loss progress, which was measured as BMI, was collected at the face-to-face follow-up appointments and charted in the EMR. To provide the most accurate scale reading, follow-up appointments were scheduled around the
same time of day and participants were instructed to come to the clinic in similar clothing each visit. This protocol occurred over a period of 12 weeks.

**Comparison**

As previously stated, lifestyle interventions were not emphasized as much as the evidence suggested and within the clinic, a systematic process was lacking. The evidence suggests a multimodal approach to weight loss in primary care, which includes self-monitoring and frequent follow-up. At the clinic, patients did not utilize self-monitoring and follow-up appointments only occurred every month. This gap between the evidence and practice drove the practice change.

**Outcomes**

The primary outcome of this project was the change in BMI at the end of 12 weeks in the intervention group compared to the comparison group. This outcome helped determine if BMI was significantly impacted by the new program in relation to current practice. The secondary outcome was the BMI from baseline to the end of each month within the intervention group. This outcome helped determine if the program made a significant difference in reducing BMI.

**Time**

Recruitment of participants and project interventions started between September 18 – October 4, 2021. Participants were followed for 12 weeks from their recruitment date. Recruitment continued until seven participants for the intervention group were identified. In order to fill the intervention group, the project leader continued to call potential participants and set up initial face-to-face meetings. The project leader also utilized this time to send follow-up emails with detailed instructions about the program and worked with office staff to schedule the monthly face-to-face appointments. The project leader scheduled telephone follow-up appointments with the participants via text and email. For the next 12 weeks, the project leader and nurse practitioner led these appointments and collected monthly BMI data in the EMR. The aim was to complete the project for all participants between December 11 – December 25, 2021. The EBP
was anticipated to be wrapped up during this time as it has been known holidays could inhibit progress and compliance through increased social events and traveling, which may lead to consuming higher caloric foods and less time for physical activity. A Gantt chart was created for an overview of tasks (Appendix C).

**Protection of Human Subjects**

The project leader had taken an ethics training course and had gained Institutional Review Board (IRB) approval for the project via the university. Approval was also gained from the project site. Patient safety was maintained through standard of care. Patient data was used only for the purpose of this project and patient identifiers were not shared. Patient data was only collected in the project site’s EMR. The EMR was only accessible by staff members and the project leader. Participant logs were kept by each individual participant and were only shown to and discussed by the nurse practitioner and project leader at the face-to-face appointments. Emails and texts between the project leader and participants did not contain patient data and were only used for the purposes of scheduling and sending out initial information about the program. Telephone sessions were conducted in a private space with only either the nurse practitioner or the project lead present. In order to further protect patient identifiers, patient data was moved from the EMR directly into the analysis spreadsheet, where patient data was assigned a participant number.
CHAPTER 4

FINDINGS

The purpose of the EBP project was to identify how implementing a multimodal intervention including behavioral interventions and biweekly follow up would have an impact on BMI. Findings for primary and secondary outcomes were outlined here. There was no statistical difference between the change in BMI of the intervention group versus comparison group at 12 weeks. It was also determined that there was a significant difference between the initial BMI of the comparison group and their BMI at 12 weeks. Further details were explained as followed.

Participants

A total of 14 participants, split between two groups, participated in the project. Seven individuals, four females and three males (Figure 2), aged 25 and older were in the comparison group. Five of the seven members of the comparison group obtained a college degree, one completed some college, and one member completed high school (Figure 3). Four members of the comparison group identified as Hispanic and three identified as Caucasian (Figure 4). All seven members of the comparison group were on weight loss medication (Figure 5).

In the intervention group there were seven members aged 20 years and older which included 5 females and 2 males (Figure 6). Three of the members of the intervention group obtained a college degree, two had completed some college, and an additional two members completed high school (Figure 7). Two members of the intervention group identified as Caucasian, four identified as Hispanic and one identified as Asian-American (Figure 8). Five out of seven members of the intervention group were prescribed weight-loss medication (Figure 9). Demographic data of both the intervention and comparison groups were shown below.
Figure 2

*Gender Within the Comparison Group*

Figure 3

*LOE Within the Comparison Group*
Figure 4

Race Within the Comparison Group

Figure 5

Weight Loss Medication Within the Comparison Group
Figure 6

*Gender Within the Intervention Group*

Figure 7

*LOE Within the Intervention Group*
Figure 8

Race Within the Intervention Group

Figure 9

Weight Loss Medication Within the Intervention Group
Changes in Outcomes

The project addressed the following PICOT question: “Will overweight and obese adults (P) benefit from alternating biweekly telephone and face-to-face meetings and tailored weight loss feedback based on self-monitoring (I) compared to having monthly face-to-face meetings and general education (C), in a way that will reduce body mass index (O) over 12 weeks (T)?”

Therefore, the primary outcome was the change in BMI over 12 weeks in the intervention group compared to the comparison group. The secondary outcome was the change in BMI over 12 weeks within the comparison group.

Statistical Testing and Significance

Changes in BMI were shown in both groups throughout 12 weeks. The statistical analysis of the EBP project was depicted below.

Findings

Tests were conducted to determine if independent variables were impactful on change in BMI. Change in BMI between time periods was also tested, as well as tests between the intervention and comparison groups.

Impact of Independent Variables on Change in BMI:

Education. An ANOVA was done to compare the dependent variable, change in BMI, to one independent variable that had multiple categories, education. The p-value was larger than 0.05 (p-value = 0.209), the null hypothesis was rejected. This suggested that there was not significant evidence to conclude that there was a statistical difference between each level of education’s change in BMI.

Race. An ANOVA was done to compare the dependent variable, change in BMI, to one independent variable that had multiple categories, race. The p-value was larger than 0.05 (p-value = 0.254), the null hypothesis was rejected. This suggested that there was not significant evidence to conclude that there was a statistical difference between each race’s change in BMI.
**Weight Loss Medication.** An independent $t$-test compared the means of two independent groups, those who took weight loss medicine and those who didn't, to determine if their outcomes were statistically different. The p-value was larger than 0.05 ($p$-value = 0.602), so the null hypothesis was rejected. This suggested that there was not significant evidence to conclude that there was a statistical difference between the change in BMI of those who took weight loss medication versus the change in BMI of those who did not take weight loss medication.

**Gender.** An independent $t$-test compared the means of two independent groups, males and females, to determine if their outcomes were statistically different. The p-value was larger than 0.05 ($p$-value = 0.497), so the null hypothesis was rejected. This suggested that there was not significant evidence to conclude that there was a statistical difference between the change in BMI of women versus the change in BMI of men.

**Age.** A regression was chosen for this independent variable since age is a quantitative variable. The R-value suggests that there was a weak positive relationship between age and the change in BMI. The p-value was larger than 0.05 ($p$-value =0.329) meaning the null hypothesis failed to be rejected. This suggested that there was not significant evidence to conclude that there was a statistical correlation between age and the change in BMI.

**Comparing BMIs Between Time Periods**

**Comparing baseline to one month, baseline to two months, baseline to three months.** When looking at the paired samples correlations, it was clear that each pair was highly correlated. After performing three matched paired $t$-tests, each pair had a 2-tailed p-value below 0.05 (baseline to one month is 0.005, baseline to two months is 0.001, and baseline to three months is 0.003). Due to small p-values, the null was rejected, meaning the data was statistically significant.
Table 2

*Match Paired t-test for Comparing BMIs Between Time Periods*

<table>
<thead>
<tr>
<th>Pair</th>
<th>Correlation</th>
<th>t-value</th>
<th>2-tailed p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline to 4 weeks</td>
<td>0.996</td>
<td>3.427</td>
<td>0.005</td>
</tr>
<tr>
<td>Baseline to 8 weeks</td>
<td>0.997</td>
<td>4.306</td>
<td>0.001</td>
</tr>
<tr>
<td>Baseline to 12 weeks</td>
<td>0.996</td>
<td>3.652</td>
<td>0.003</td>
</tr>
</tbody>
</table>

*Intervention Versus Comparison Group*

**Practical difference.** Before statistically testing the difference between the intervention group’s change in BMI versus the comparison group’s change in BMI, the averages of these two group’s overall change in BMI were taken (Table 3). It was noted that regardless of comparison group or intervention group, reductions in participant’s BMI were observed.

Table 3

*Overall change in BMI over 12 weeks*

<table>
<thead>
<tr>
<th>Group</th>
<th>Overall change (BMI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparison</td>
<td>-1.35</td>
</tr>
<tr>
<td>Intervention</td>
<td>-1.34</td>
</tr>
</tbody>
</table>

**Statistical difference.** An independent samples test was performed to calculate the statistical difference between the two groups’ change in BMI. The p-value was larger than 0.05
(p-value = 0.990), therefore, the null hypothesis was rejected. This suggested that there was not significant evidence to conclude that there was a statistical difference between the change in BMI of the intervention group versus the change in BMI of the comparison group.

**Table 4**

*Independent Samples Test for Statistical Difference in Overall BMI*

<table>
<thead>
<tr>
<th>Change in BMI</th>
<th>t-value</th>
<th>2-tailed p-value</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.35</td>
<td>0.013</td>
<td>0.990</td>
<td>-1.34</td>
</tr>
</tbody>
</table>

**Change in BMI across each month.** Figure 10 depicts the BMI of both groups over the course of three months (12 weeks). The intervention group had a steady decrease in BMI as time increased, while the comparison group had more fluctuation. The intervention group also had an overall lower average BMI regardless of time.

**Figure 10**

*Comparing BMI Between Groups Across Months*
CHAPTER 5

DISCUSSION

The section following will explain the findings of the project. The evidence of this project was compared to the evidence found in the literature. Strengths, limitations, sustainability of the project and relevance of the evidenced-based model was discussed. Finally, recommendations for future practice or projects were considered.

Explanation of Findings

The demographics of participants were used to calculate their effect on BMI. These demographics included age, gender, level of education, race, and if the participant was taking weight loss medication or not. The participants had a mean of age 35 years. The analysis showed that there was a positive weak relationship between age and BMI, however, it was unable to be considered statistically significant. Evidence showed that the prevalence of obesity has been greater in women than in men (America’s Health Rankings, 2020; Orringer et al., 2020; USPSTF, 2018). A little over two thirds of the participants were female (n=6), while one third was male (n=2). However, the findings of this intervention concluded that gender did not have a significant impact on BMI. BMI has been considered to be slightly higher in minority groups versus in the white population (Orringer, et al., 2020; USPSTF, 2018). When considering the race identification of the given population, race did not have a significant impact on BMI. Obesity has been also correlated to education and income (America’s Health Rankings, 2020). Although income wasn’t able to be assessed in this intervention, education was not shown to impact BMI significantly. The majority of the participants were on weight loss medications and it was shown that there was not a statistical difference in BMI between those taking the medication and those not taking weight loss medication. Therefore, it was determined that none of the demographics had a statistically significant impact on BMI change.
The change in BMI within the intervention group was calculated. Body mass index from baseline to one month (four week), baseline to two months (eight weeks), and baseline to three months (12 weeks) was compared. It was determined that there were significant differences between BMI at baseline and at the end of the three months. However, when comparing the overall change in BMI in the intervention group versus the comparison group, both groups had a similar change in BMI over three months. There was no statistically significant difference between the change in BMI over a three-month time period when comparing the intervention and comparison groups.

Khanh-Dae (2020) found that combined diet and exercise produced long-term weight loss. The intervention including regular clinical visits, group meetings, telephone calls, or emails. These methods could be compared to the two-week follow-up within this intervention. Frequent follow-up was also concluded as a worthwhile intervention throughout the literature (Spring et al., 2020; USPSTF, 2018; Wadden et al., 2020b). Several studies have shown telephone-delivered programs can be comparable to in-person treatment (Eaton et al., 2016; Godino et al., 2019; Wadden et al., 2020b). While more than half of the follow-up appointments in the intervention group were telehealth, the intervention group also had about double the amount of follow-up. Therefore, it was unclear if telehealth phone calls regarding weight loss were comparable in this intervention. It can be presumed that telephone follow-up and increased follow-up visits were not associated with increased BMI since both groups had a similar change.

Khanh-Dae (2020) also concluded while diet and exercise changes can reduce BMI, it was most effective when paired with other behavioral techniques. One specific behavioral therapy mentioned in the literature was motivational interviewing (Minooee, 2020; Pamaiahgari, 2021). Since the clinic was already participating in this, both the comparison group and intervention group received this counseling. This could be an explanation for the change in BMI was similar in both the comparison and intervention group.
Pamaiahgari (2021) also went on to say that psychological interventions were particularly effective when combined with dietary modifications and exercise strategies. One method for engaging in a multimodal intervention was through self-monitoring which was agreed upon throughout the literature (Bennett et al., 2018, Khanh-Dao Le 2020, Godino et al., 2019; Orringer et al., 2020; Paimaihagari, 2021; Semlitsch et al., 2019; Schippers et al., 2017; Spring et al., 2017; Wadden et al., 2020b; USPSTF, 2018; VA & DoD, 2020).

Orringer et al. (2020) and Wadden et al. (2020a) explained that weight loss medications can produce modest to moderate weight loss combined with behavioral modifications. Every participant within the comparison group was taking weight loss medication, while the intervention group was mixed. This may also account for a similar BMI change between the groups.

The time frame within the literature mentioned significant changes in BMI within the intervention groups when interventions were over at least six to twelve months (Bennett et al., 2018; Eaton et al., 2016; Spring et al., 2017; Sprint et al., 2020; Tang et al., 2016; USPSTF, 2018; Wadden et al., 2020b). This was not feasible for project implementation with the allotted time constraints for implementation. Findings may have been statistically significant had the intervention been implemented over a longer period of time. The evidence analyzed demonstrated that regular, frequent follow-up helped maintain compliance, with many studies having follow-up sessions between two and four weeks (Khanh-Dao Le, 2020; Orringer et al., 2020; USPSTF, 2018; Wadden et al., 2020b). There have been no set guidelines as to how often follow-up should occur. In addition, other investigators found that those who completed 80 percent or more of the expected self-monitoring episodes, counseling calls, self-weighing days, lost significantly more than those who did not complete this much (Bennett et al., 2018). Since measuring compliance had no standard tool, it was left out quantitatively and only discussed via follow-up appointments. However, had compliance been tracked in a quantitative measure through the three months, a difference between those that were more compliant versus those that were less compliant may have been observed.
Strengths and Limitations of the EBP Project

The EBP project was implemented successfully within the primary care clinic. The discussed findings may have been impacted by the strengths and limitations of the project. An overview of these strengths and limitations are outlined as followed.

Strengths

Participate retention rate was high for the project. There was one participant that dropped out of the intervention group, leaving the retention rate 85.7%. Patients were personable and responsive. When having follow-up conversations, many participants were honest about their habits and their participation level with self-monitoring. Staff at the clinic were very encouraging and responsive to the project and created an atmosphere of education and communication. In addition, the EMR was readily available for the project leader to input data and look up trends in BMI.

In addition to these strengths, the project was adaptable, and the project leader was readily available to answer questions. For example, the project started off by only using the smartphone application for self-monitoring. However, over time it was easier for some participants to use paper journals, which was previously shown in the evidence to be a comparable way to monitor (Spring et al., 2017; Wadden et al., 2020b). Therefore, both paper journals and application entries were allowed in the intervention. The project also provided more evidence regarding weight loss within primary care, showing that multiple interventions may be helping in reducing BMI.

Limitations

Although there were many strengths of the EBP project, limitations must be identified and discussed. One of the biggest limitations of the project size of the clinic and how it may have affected the number of the participants. Since the clinic was ran by one provider in the mountains of Arizona, sample size only consisted of 15 participants with one drop out, leaving 14 participants total between the two groups. The clinic was about 3 years old and may have had a
less established patient population than had the project been at a long-standing clinic. This small sample size may help explain why demographic data did not impact change in BMI. In addition, the population may not have been representative of primary care populations as a whole. For example, many of the participants were already on weight loss medication meaning this could skew the data. One could argue that if a participant has sought out weight loss medication, they may have more motivation than the general population. The intervention and comparison group could have been similar in motivation level, since each person in the comparison group was already placed on these medications. There was no way to tell what the comparison group was using outside of the weight loss medications to reach their goals. For example, these participants could have been participating in self-monitoring on their own as well. Lack of statistical significance in the intervention group could have been impacted by this, as well as small sample size.

Another limitation of this project was the length in intervention. Many studies showed that at least six months of intervention produced meaningful weight loss (Bennett et al., 2018; Eaton et al., 2016; Spring et al., 2017; Sprint et al., 2020; Tang et al., 2016; USPSTF, 2018; Wadden et al., 2020b). Due to time constraints and feasibility of the project, three months was decided upon for intervention length. Perhaps if the intervention was performed over a longer period of time, statistical significance may have been present.

**Sustainability**

Toward the end of the intervention, the clinic provider became sick and was in the hospital for months before passing away after the intervention was completed. Unfortunately, during this time the clinic was searching for a new provider and hiring a financial advisor to see if the practice could continue. Therefore, the project has not been sustainable. If this project were to be repeated it would be helpful to attempt it in a larger clinic with multiple providers who were passionate about weight loss in primary care. Perhaps greater participation and a longer duration for the intervention will back up the evidence and show that the intervention does make a
difference. The motivation of the comparison group could be better controlled for by having them take a before and after survey of methods they were using for weight loss. This may be performed by the project leader by having the comparison group in the clinic during the same time periods as the intervention group. Further, having the same number of participants on weight loss medication in each group should be contemplated. For example, whether that be all on the medicine, none on medicine, or a mixed group, may provide more comparable results.

In addition, further attention towards having every participant following up on a given schedule day or as close as possible would make tracking easier. If participants were unable to make it to the clinic for a personal reason, swapping out a telephone appointment for the face-to-face appointment may be considered as well. Having evidence-based physical activity and caloric goals for participants may be considered, as these may help participants reduce BMI more drastically.

Relevance for EBP Model

The eight steps found in the Iowa model were used as a guide for project implementation. Steps include identifying a trigger where change is warranted, determining if the problem is a priority, forming a team of interdisciplinary stakeholders, gathering and analyzing data related to practice change using the PICOT method, critiquing and synthesizing research, implementing a pilot program, and evaluating results (Iowa Model Collaborative et al., 2017).

The model identifies a trigger for practice change and then determines if the trigger is a priority of the organization. As stated above, obesity is a worldwide issue and primary care providers are often first provider many patients see, meaning they have the opportunity to identify and start to manage this disease. Although the clinic viewed obesity therapy as a priority, best practice for obesity therapy in primary care was still to be determined. The goal of this project was to better align current practice with evidence-based practice (EBP). The model then identified key stakeholders. Within the clinic, interdisciplinary stakeholders included the nurse practitioner and the medical assistant that were co-owners of the practice, as these were the only
employees of the practice. Other stakeholders included the project leader and any health care students that were learning within the clinic. Patients and their family members that were involved in the project were considered stakeholders as well. The next step in the Iowa EBP model was to form a PICOT question and conduct a literature search. The PICOT question for this project was stated above in Chapter 1. Reasons for significant change of practice were identified via the present literature search. The literature was appraised and synthesized. In the next step, best practices were to be implemented in a pilot program. This helped determine the potential impact on outcomes. Best practices were conferred from the evidence and implemented within the intervention. Finally, in the evaluation stage, the project leader should decide if full practice adoption would be appropriate. This would be based on if the changes were determined to be feasible and produced results for patients. This project was not further implemented at this site, which is discussed in the following sections. However, if the project had potential to continue, another step in the process may be necessary. Prior to implementation of full practice adoption, the last step in the model suggested that an evaluation of the intervention take place. In this step, changes should be made within the intervention and re-implemented. Although this intervention would not continue in the clinic, this EBP model was helpful for implementing this project

**Recommendations for the Future**

The future of the discipline of nursing should be geared toward evidence-based practice and preventative care. More research needs to take place regarding weight management within the primary care setting. Preventative care, such as behavioral techniques and lifestyle modifications may be mentioned in curriculums but should be emphasized further. This project has gathered evidence on why obesity treatment and prevention are important. It has also show how complex treating obesity can be. Due to its importance and complexity, it is in the best interest for health care providers and patients to prevent obesity and treat it early. In addition,
educational institutions should encourage nurses to participate in these preventative measures to reduce hypocrisy and so they can set examples for the general population.

**Research**

More primary studies targeting weight loss in the primary care setting can be beneficial. Participants should be studied before receiving weight loss medication and also while taking weight loss medication within the primary care setting. More research should determine the effects of these medications and behavioral interventions, such as goal-setting and self-monitoring. Recommendations for daily physical activity and dietary guidelines could be further assessed with these behavioral interventions within the primary care setting as well. Research should use various tools for self-monitoring and goal-setting such as different smartphone applications. In regard to self-monitoring, the logging can be generalized or specific. Specific self-monitoring may become time-consuming and complex, therefore, researching the effect on generalized versus specific self-monitoring would be beneficial. For example, when participants log their physical activity, a generalized input would say “30 minutes of interval training”, while a specific input may have each individual exercise complete with reps, sets, and amount of weight used.

In addition, specific intervals between follow-up appointments should be studied and recommendations by professional bodies should be made. These timeframe recommendations would provide further clarity for providers so they may offer programs that provide maximum results without participating in unnecessary or repetitive treatments. For example, within the current project it was found that the monthly follow-up demonstrated similar results compared to biweekly follow-up, but with less time spent. These options should be researched more thoroughly and should include information on telephone sessions versus face-to-face sessions as well. Recommendations should be set by professional bodies and should be geared toward those within the primary care setting.

**Education**
Education is key within the nursing profession. As stated above, involving students and seasoned nurses and providers in real life scenarios can help promote evidenced-based practice, safety, clarity, and compliance. Students are briefly educated on lifestyle modifications and behavioral interventions, however, there is opportunity to further this. For example, goal-setting or self-monitoring may be briefly talked about within the educational setting, but without explaining what they entail and practicing how to utilize these important tools, the student may not be learning. Examples of how learning can be furthered are through simulation labs and case studies.

The clinical setting also provides opportunity to practice these tools, however, current providers may not have been taught about them nor utilize them. It is vital that providers understand these behavioral intervention concepts in order to teach their patients how to use them. Therefore, continuing education through workshops and certificates may be sought out and utilized. Education on various tools patients can use, such as a smartphone application, may be helpful for the provider. Collaboration between professions and specialties should be encouraged too as those who work in dietary, exercise science, and obesity medicine may contribute knowledge to primary providers.

**Conclusion**

Obesity is a world-wide issue that has only become more prevalent in recent years (WHO, 2021). Primary care providers are in the perfect position to prevent, identify, and treat obesity early; however, treatment has proven to be complex and time-consuming. In addition, clinical education may not adequately focus on obesity prevention and treatment. This project offered evidence-based practice recommendations for the management of obesity that can be implemented within the primary care setting. Although statistical significance between the comparison group and intervention group was not demonstrated by this project, evidence does exist to support these interventions. Multimodal interventions such as self-monitoring and frequent follow-up have been shown to beneficially impact BMI, are appropriate tools for primary
care, and can sustainably be implemented into practices. This was further supported by the secondary outcome of this project, in which the intervention did help reduce BMI in the primary care setting over the course of 12 weeks. Perhaps with a larger population of participants or a longer study duration, the intervention would provide statistically significant results compared to previous practice. However, further research on weight management can help clarify which multimodal interventions may be the most beneficial and least time consuming within the primary care setting. Obesity management is a vital part of healthcare and remains complex. Primary care providers should consider self-monitoring and frequent follow-up as a part of the complex and important treatment of obesity.
REFERENCES

https://www.americashealthrankings.org/explore/annual/measure/Obesity/state/AZ


WHO (2021, June 9). Obesity and overweight. WHO. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight


https://www.census.gov/quickfacts/fact/table/yavapaicountyarizona

BIOGRAPHICAL MATERIAL

Ms. Smith is a current Doctor of Nursing Practice student at Valparaiso University on track to graduate in May 2022. She received her Bachelor of Science in Nursing from Valparaiso University’s accelerated program in 2018. At the time of graduation, she was inducted into Sigma Theta Tau International Honors Society of Nursing. Prior to her nursing career, she attended Grand Valley State University where she graduated with a baccalaureate degree in clinical exercise science. Ms. Smith has always been interested in health care but after pursuing a few avenues, she ultimately decided on nursing in hopes to make a personal impact on her patients. She has worked in various settings including medical-surgical, telemetry, progressive and intermediate care units, as well as an emergency room department. While she permanently resides in South Carolina, she has worked at ten different hospitals and one vaccination clinic across the United States, helping with the Covid-19 pandemic. Traveling to various parts of the country has allowed Ms. Smith to grow as a culturally competent provider. She has worked with various culturally diverse populations including those within the Indian Healthcare System, Guam, South Florida, and Hawaii. Ms. Smith plans to use her knowledge and gained skillset to provide health care to vulnerable populations. She hopes to advance the nursing profession through her interest in holistic health care and by educating patients about lifestyle changes. It is her goal that her patients would not only live long but live healthy and fruitful lives.
ACRONYM LIST

BMI: Body mass index
CPG: Clinical practice guideline
EBP: Evidenced-based practice
EMR: Electronic medical record
JBI: Joanna Briggs Institute
MA: Meta-analysis
RCT: Randomized control trial
SR: Systematic review
SELF: self
STND: standard
TECH: technology
TRIP: Turning research into practice
USA: United States of America
### Appendix A

**Evidence Table**

<table>
<thead>
<tr>
<th>Lead Author/ Year/Quality</th>
<th>Purpose/ Design/Sample</th>
<th>Interventions</th>
<th>Measurement/ Outcomes</th>
<th>Results/ Findings</th>
<th>Strengths/ Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level I Evidence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khanh-Dao Le (2020)</td>
<td>Summary</td>
<td>Best available evidence regarding long-term weight-loss maintenance of participant in structured weight-loss programs?</td>
<td>N/A</td>
<td>Combined diet and exercise produced long-term weight loss. Poor compliance is a long-term issue and active intervention including regular clinical visits, group meetings, telephone calls, or emails. Health weight loss and LT maintenance techniques are reduction in energy and fat intake, increased dietary fiber, regular physical activity (150 minutes), self-monitoring, and other behavioral techniques.</td>
<td>N/A</td>
</tr>
<tr>
<td>Minooee (2020)</td>
<td>Summary</td>
<td>Best available evidence regarding the effect of motivational interviewing on dietary and physical activity of overweight or obese adults?</td>
<td>N/A</td>
<td>Motivational interviewing should be considered as a strategy for achieving weight loss in overweight or obese adults</td>
<td>N/A</td>
</tr>
<tr>
<td>Pamaiahgar (2021)</td>
<td>Summary</td>
<td>Effectiveness of psychological interventions for people who are overweight and obese?</td>
<td>N/A</td>
<td>Obese or overweight people benefit from psychological interventions particularly behavioral and cognitive behavioral interventions, mindfulness-based strategies and MI. Particularly effective when combined with dietary modifications and exercise strategies.</td>
<td>N/A</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Study Type</td>
<td>Aim</td>
<td>N/A</td>
<td>Summary</td>
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<tr>
<td>Schippers et al. (2017)</td>
<td>Systematic review and meta-analysis</td>
<td>Aimed to discover whether interventions delivered via mobile phones reduce body weight and which intervention characteristics are associated with efficacy.</td>
<td>N/A</td>
<td>Interventions delivered via mobile phones produce a modest reduction in body weight when combined with other delivery modes. Delivering interventions with frequent and personal interactions may in particular benefit weight loss results.</td>
<td></td>
</tr>
<tr>
<td>Semlitsch et al. (2019)</td>
<td>Review</td>
<td>To provide the foundation for the development of a structured clinical pathway for overweight and obesity management in primary care</td>
<td>N/A</td>
<td>A multidisciplinary team should treat overweight and obesity as a chronic disease. Body mass index (BMI) should be used as a routine measure for diagnosis, and weight-related complications should be taken into account. A multifactorial, comprehensive lifestyle program that includes reduced calorie intake, increased physical activity, and measures to support behavioral change for at least 6 to 12 months is recommended. After weight reduction, long-term measures for weight maintenance are necessary.</td>
<td></td>
</tr>
<tr>
<td>Orringer et al. (2020)</td>
<td>CPG</td>
<td>Prevent obesity, guide weight management</td>
<td>N/A</td>
<td>Engage patient and family, provide education on self-management. Support, identify lifestyle changes, collaboratively set goals. PA at least 5x/week. Decrease sedentary time. Emphasize appropriate portion sizes, decrease high calorie foods and drinks including alcohol. Educate patients on inadequate sleep producing excess weight gain. Identify meds that contribute to weight gain. Weight loss meds can produce modest to moderate weight loss combined with behavioral modifications. Base follow-up on risk factors and readiness of patient and family to make changes, consider monthly contact by a member of a care team. Consider referrals. Record BMI and BP.</td>
<td></td>
</tr>
</tbody>
</table>
### USPSTF (2018)

| CPG | Behavioral and pharmacotherapy weight loss or maintenance that can be provided in or referred from a primary care setting. | N/A | Intensive, multicomponent behavioral interventions in adults with obesity can lead to clinically significant improvements in weight status. Behavior-based weight loss interventions are moderate benefit. Interventions included dietary changes and increased physical activity. Most interventions were 1-2 years and had 12 or more session in the first year. Behavioral interventions focused on problem solving to identify barriers, self-monitoring of weight, peer support, relapse prevention. Tools such as pedometers, food scales and exercise videos were also used. | N/A |

### VA & DoD (2020)

| CPG | To provide healthcare providers with a framework by which to evaluate, treat, and manage the individual needs and preferences of patients with overweight or obesity, thereby leading to improved clinical outcomes. | N/A | We recommend offering an in-person group or individual comprehensive lifestyle intervention that always includes behavioral, dietary, and physical activity components for patients with overweight or obesity.

There is insufficient evidence to recommend a specific number of sessions of a comprehensive lifestyle intervention for patients with overweight or obesity.

We suggest offering a comprehensive lifestyle intervention for weight maintenance to patients who have completed a comprehensive lifestyle intervention for weight loss.

We suggest offering an individual or group telephone delivered comprehensive lifestyle intervention for weight loss, either as an alternative to or in conjunction with an in-person intervention.

There is insufficient evidence for or against offering a comprehensive lifestyle intervention for weight loss that uses technology as its primary mode of delivery.

We suggest choosing one or more of the following as the physical activity component of a comprehensive lifestyle intervention: aerobic, resistance, and/or lifestyle physical activity. | N/A |
We recommend offering patients a dietary approach that contributes to a negative energy balance to achieve weight loss as the dietary component of a comprehensive lifestyle intervention.

We suggest meal replacement (for example portion-controlled shake, protein bar, or meal) as an option to achieve negative energy balance as a component of a comprehensive lifestyle intervention.

We suggest offering prescribed pharmacotherapy (specifically liraglutide, naltrexone/bupropion, orlistat, or phentermine/topiramate) for long-term weight loss in patients with a body mass index $\geq 30$ kg/m$^2$ and for those with a body mass index $\geq 27$ kg/m$^2$ who also have obesity-associated conditions, in conjunction with a comprehensive lifestyle intervention.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Methodology</th>
<th>Weight Loss Interventions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tang et al. (2016)</td>
<td>Systematic Review and Meta-analysis</td>
<td>Self-directed weight loss with one or less instance of professional contact.</td>
<td>Self-directed weight loss interventions can generate modest eight loss for up to 6 months but may need to be supplemented by other interventions to achieve sustained and clinically meaningful weight loss. Many were internet-based. Effective at 3 and 6 months. Cost-effective. Only review to focus on this topic. Small sample sizes and diverse studies reduce heterogeneity.</td>
</tr>
<tr>
<td>Wadden et al. (2020b)</td>
<td>Review</td>
<td>N/A</td>
<td>Cognitive and behavioral strategies to help facilitate satisfying low-calorie diet and increased physical activity. 14+ counseling sessions in 6 months shows 5-8% decrease in weight. In person individual or group interventions. Similarly, structured web-based interventions may also help. Low calorie (1200-1800) and 150+ minutes of moderately vigorous aerobic physical activity. Daily monitoring of food intake and physical activity via paper diaries or apps. Weekly monitoring of weight.</td>
</tr>
</tbody>
</table>
| Goal setting, problem solving, stimulus control. Regular feedback and support from a trained interventionalist.  
Macronutrients can vary as long as energy deficit is achieved. Many RCTs have revealed low carb, high protein diets have larger weight loss at 3 and 6 months. Lack of time for exercise, can do brief 10-minute bouts of activity. Physical activity alone provides minimal ST weight loss if not combined with caloric restriction. High levels of activity are critical for maintaining weight loss.  
Setting collaborative, specific goals that are attainable; self-monitoring (recording) of food and calorie intake, PA, body weight; more frequent self-monitoring is associated with greater weight loss and recording helps identify behavioral patterns. Reviewing records to evaluate progress provides accountability.  
Reinforcement and analyzing barriers. MI to support commitment to change. Apps can replace paper records and there is mixed evidence if they provide significantly more weight loss over paper records. However, they seem to provide greater adherence to tracking and more convenience. Apps may include MyFitnessPal, MyPlate, and Lose it! They also increase calorie estimate accuracy.  
Adding weight loss medications to high-intensity lifestyle modification substantially increases initial weight reduction, compared with lifestyle counseling alone. Several studies have shown |
telephone-delivered programs can be comparable to in-person treatment.

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Intervention Details</th>
<th>Outcomes</th>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bennett et al. (2018)</td>
<td>RTC</td>
<td>Application based self-monitoring of behavior change goals</td>
<td>Produced larger weight change at 6 months and 12 months. Intervention more likely to lose 5% or more of body weight. Those in the intervention group that completed 80% or more of expected self-monitoring episodes, counseling calls, self-weighing days, lost significantly more than those who did not complete this much. Digital obesity treatment integrated with health resources can produce clinically meaningful weight-loss outcomes.</td>
<td>Demonstrated weight loss; collaboration with dietician</td>
<td>Multicomponent; unable to determine which interventions made the biggest impact</td>
</tr>
<tr>
<td>Eaton et al. (2016)</td>
<td>RTC</td>
<td>24 months. Enhanced intervention or standard intervention. Both had 3 face-to-face meetings. EI had telephone counseling calls, tailored print materials, dvds focused on diet and PA.</td>
<td>Weight loss and PA minutes. At 6 months 37.2% had more than 5% weight loss and at 12 months 47.8%. No longer significant during maintenance phase at 18 months. Minutes per week at 6 months was 95.7 and 12 months was 126.1. 18 months was 103.7 and 24 months was 101.3.</td>
<td>Home-based, tailored lifestyle intervention in obese, sedentary primary care patients was effective in promoting weight loss and increased PA with peak effects at 12 months and waning at 24 months. Personalized interviews with participants post-intervention concluded that personalized goal setting and monthly phone calls were the most helpful.</td>
<td>One location, Rhode Island, but had 24 practices. EI and SI were located in same primary care setting which could result in contamination; Mostly female; PA was based on self-report.</td>
</tr>
<tr>
<td>Spring et al. (2020)</td>
<td>RTC</td>
<td>Remotely delivered, technology supported optimized weight</td>
<td>Weight loss</td>
<td>12 coaching calls, buddy training, PCP progress reports = 6.1kg and 57.1% losing more than 5% of body weight.</td>
<td>Did not test all possible interventions, costs were estimates, meal</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Intervention Comparison</td>
<td>Weight Loss Measures</td>
<td>Notes</td>
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<tr>
<td>Godino et al. (2019)</td>
<td>RTC</td>
<td>SMS only versus SMS plus coaching (5-10 minutes)</td>
<td>Mean percent weight loss preintervention to post intervention. Two groups, SMS only which provided no significant difference pre- and post-intervention and SMS plus coaching which provided significant difference.</td>
<td>SMS content that was tailored, personalized, interactive daily was most effective with 5-10 minutes of telephone coaching each month. Unblinded delivery of intervention and recruitment of predominantly female sample from a single site.</td>
<td></td>
</tr>
<tr>
<td>Spring et al. (2017)</td>
<td>RTC</td>
<td>Three 6-month weight loss treatments of STND, TECH, SELF. STND/TECH had 8 in person group treatment sessions and SELF/STND used paper diaries for self-monitoring while TECH used apps.</td>
<td>Weight loss (kg)</td>
<td>TECH and STND produced greater weight loss at 6 months than SELF. STND had 59% of participants lose more than 5% weight versus TECH 34%. Self-monitoring adherence was greater in TECH than STND. Paper and smartphone monitoring can produce meaningful weight loss. LT superiority is difficult to maintain. Enrollees were highly motivated; more dropout in SELF but should not affect treatment outcome; control condition was not inert both meaning may have underestimated the treatment effects.</td>
<td></td>
</tr>
<tr>
<td>Wadden et al. (2020a)</td>
<td>RTC</td>
<td>To study effects of CMS based IBT benefit alone versus with weight</td>
<td>Weight loss, 7.5% with liraglutide versus 4% with placebo.</td>
<td>CMS based IBT produced clinically meaningful weight loss at 56 weeks enhanced by addition of Liraglutide 3.0mg. First CMS study</td>
<td></td>
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<tr>
<td>loss medication. 56 weeks, multisite. 23 brief (15 minute) IBT counseling sessions.</td>
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</tbody>
</table>
APPENDIX B

Demographic Form

Please answer the following questions about yourself.

1. How old are you? ____________________

2. What is your sex?
   a. Male
   b. Female

3. What is the highest level of education that you have completed?
   a. Less than high school
   b. High school/GED
   d. Some college
   e. College degree

4. What is your race?
   a. African American
   b. Asian-Pacific Islander
   c. Caucasian
   d. Hispanic
   e. Native American
   d. Other
   f. Prefer not to answer

5. Are you currently on weight loss medication?
   a. Yes
   b. No
# APPENDIX C

Gantt Chart

<table>
<thead>
<tr>
<th>Recruitment</th>
<th>09/18/21</th>
<th>10/04/21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call participants</td>
<td>In Progress</td>
<td>09/18/21</td>
</tr>
<tr>
<td>Send out initial emails</td>
<td>In Progress</td>
<td>09/20/21</td>
</tr>
<tr>
<td>Schedule initial appointments</td>
<td>In Progress</td>
<td>09/20/21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implementation</th>
<th>10/06/21</th>
<th>12/25/21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze participant's input data</td>
<td>Not Started</td>
<td>10/06/21</td>
</tr>
<tr>
<td>Schedule follow ups</td>
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<td>10/06/21</td>
</tr>
<tr>
<td>Record participant data</td>
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<td>10/06/21</td>
</tr>
</tbody>
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