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Weight Management Program using MyFitnessPal© in a Rural Primary Care Setting

Taylor Rittman
University of Arkansas, Fayetteville

College of Education and Health Professions
Eleanor Mann School of Nursing

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The University of Arkansas
Eleanor Mann School of Nursing

DNP Chair: Dr. Callie Bradley

DNP Co-Chair: Dr. Marilou Shreve

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Abstract

Obesity is a growing health concern that is linked to the development of chronically debilitating physical and mental illnesses. Obesity is a result of a long-term positive imbalance between energy intake and energy expenditure. Evidence has shown more than one third of U.S. adults suffer from obesity. Primary care providers in the United States report being overburdened in treating obesity, citing a lack of time, structured approach, and structured resources. Furthermore, the disparities in obesity are even more prevalent in rural areas where older adults are the fastest growing part of the population at risk for this disease. Evidence indicates smart mobile applications such as MyFitnessPal© may have increased results of sustained long-term weight loss. The project occurred in a rural primary care clinic in West Fork, Arkansas, where current practice includes brief weight loss education, scarce resources, and minimal follow-up. The purpose of this project was to reduce the BMI in overweight and obese patients at a rural primary clinic through the implementation of a weight management program utilizing MyFitnessPal©. Utilizing a quasi-experimental design, the project resulted in weight loss, decrease in blood pressure, high satisfaction with the MyFitnessPal© application, and frequency of utilizing MyFitnessPal©. However, there was not a significant difference between the intervention and control groups in weight change or BMI (t=-.156; n=24: p=.877). Overall, the determined effectiveness of the MyFitnessPal© intervention was clinically and practically significant.

Keywords: weight loss, MyFitnessPal©, primary care, body mass index, obesity

Weight Management Program using MyFitnessPal© in a Rural Primary Care Setting

The purpose of this DNP quality improvement (QI) project designed to reduce the body mass index (BMI) in obesity patients at a rural primary clinic through the implementation of a weight management program utilizing MyFitnessPal©. Primary care providers in the United States report being overburdened in treating obesity, citing a lack of time, structured approach, and structured resources (Kahan, 2018). This project discusses current weight loss barriers and details the significance of improving weight management in a rural primary care setting. A review of literature was conducted to develop strategies to improve weight loss in the obesity population. Additionally, this project outlines the interventions, methodology, and outcomes following the implementation of a weight management program utilizing MyFitnessPal©. The effect of MyFitnessPal© on a weight management program was analyzed with paired t-tests and weight and BMI were decreased in the experimental group providing some evidence to support the use of MyFitnessPal© for weight management in a primary care setting.

Background & Significance

Prevalence

Obesity is a growing health concern linked to the development of chronically debilitating physical and mental illnesses affecting the general population (Kahan, 2018). Obesity is a result of a long-term positive imbalance between energy intake and energy expenditure (Zentenius et al., 2018). Body mass index (BMI) provides the most useful measure of overweight and obesity, as it is the same for both sexes and for all ages of adults. The World Health Organization (WHO) defines overweight as a BMI greater than or equal to 25, and obesity as a BMI greater than or equal to 30. According to WHO (2021), worldwide obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults aged 18 years and older were classified as overweight. Of

these, over 650 million adults were classified as obese (WHO, 2021). Maffetone et al. (2017) found that 39-49% of the world's population has overweight or obesity, equaling 2.8 to 3.5 billion people. The Centers for Disease Control and Prevention (CDC) (2021) cites more than one third of U.S. adults suffer from obesity. According to the U.S. Department of Health and Human Services and U.S. Department of Agriculture (USDHHS/USDA) (2015), 60% of women in the United States are overweight, with one third of the 60% classified as obese. The growing epidemic of obesity affects over 35% of adults ≥65 years in the United States (CDC, 2021). Statistics from 2017-2018 revealed there were 73.6% of adults in the United States classified as overweight or obese (CDC, 2018). According to the CDC, in 2020, 37.4% of Arkansas' adult population was obese, ranking the state at 48th in the United States. Rural communities often have sparse healthcare resources yet close knit communities and these close social networks may be helpful in disseminating evidence-based interventions (Batsis et al., 2017). In addition, rural communities also face workforce shortages and lack of specialized services, which has helped primary care clinicians recognize the importance of treating obesity. Rural communities, such as West Fork located in Northwest Arkansas need specialized interventions when implementing evidenced based weight management programs (Batsis et al., 2017).

Risk Factors

Modifiable Risk Factors. Weight management education and health promotion should address the contributing risk factors that lead to obesity. These risk factors can be categorized as modifiable or non-modifiable. Modifiable risk factors include unhealthy environments and unhealthy lifestyle habits. About 50% of all American adults, about 117 million individuals, have one or more preventable diseases due to poor quality eating patterns and physical inactivity (USDHHS/USDA, 2015). Unhealthy lifestyle habits that lead to obesity include: physical

inactivity, unhealthy diets, poor sleep, increased stress, and poor body weight perception.

Physical inactivity is a primary contributor to obesity that is modifiable at the individual level. The cause of physical inactivity has been linked with socio-demographic factors and environmental factors, which can occur simultaneously, making obesity a complex disease to treat (Hruby & Hu, 2015). Some environmental factors include: access to recreational parks and facilities, increased air pollution, street connectivity, green space, environmental obesogens, and food desserts (Gray et al., 2018). Causative factors for the adoption of sedentary lifestyles are technological advances, such as: computers, hand-held devices that save on labor, increased media use, limited access to exercise facilities, and limited time for physical activity (Popa et al., 2020). Overall, people with lower levels of education and lower incomes are more likely to be classified as overweight or obese (Kim & Knesebeck, 2018).

Good nutrition is essential for keeping Americans healthy across the lifespan. Adults who eat a healthier diet live longer and have a lower risk of obesity, heart disease, type 2 diabetes, and certain cancers. However, most Americans do not have a healthy diet (CDC, 2021). Specific nutrition factors that lead to weight gain are high calorie-dense foods, larger portion sizes, increased snacking, an increase in the consumption of high sugar beverages, and more meals being eaten outside the home, especially fast-food (American Heart Association, 2017). According to the CDC (2021), fewer than 1 in 10 adolescents and adults eat enough fruits and vegetables and 6 in 10 young people and 5 in 10 adults consume a sugary drink on a given day. Primary care providers must battle the promotion of fast, easy, cheap, unhealthy food choices (Popa et al., 2020).

With a lot of focus on the Internet and social media, there is a heavy influence on fad dieting online. A lot of online influence is cosmetic due to the pressure on body image. Current

popular fads and food trends are not science-proven and have failed to deliver the results while posing a health risk to individual health and well-being (Polivy & Heatherton, 2015). Potentially harmful weight loss measures that have been implemented by individuals, include: the use of laxatives, diuretics, supplements, induced vomiting, and prolonged fasting (Piernas et al., 2016).

Poor sleep is harmful to overall well-being and is often associated with obesity. Research has proven that decreased amounts of sleep leads to an increase in BMI (USDHHS/USDA, 2015). Associated factors with poor sleep that lead to obesity includes: poor diet quality, decreased insulin sensitivity, hyperglycemia, and prevalent cardio-metabolic risk factors (Gohil & Hannon, 2018). There is four sleep stages: one for rapid eye movement (REM) sleep and three that form non-REM sleep. These stages are based upon an analysis of brain activity during sleep, which shows distinct patterns that characterize each stage (NINDS, 2019).

REM sleep and obesity are linked, leading to decreased sleeping metabolic rate including endocrine changes associated with decreased leptin and increased ghrelin levels, promoting increased food consumption (Hager et al., 2016). Decreased REM sleep is observed in individuals with a shorter sleep duration (Hager et al., 2016). In a study performed by Luis et al. (2008), one less hour of REM sleep was associated with approximately two to three fold increased odds of being overweight. Furthermore, less sleep has been consistently linked with unhealthy dietary habits such as larger portion sizes, increased perceived hunger, higher calorie food choices, and increased intake of food and beverages with high sugar content (Hays et al., 2018). Sleep deprivation is associated with decreased insulin sensitivity by leading to alterations of the hormones including cortisol, ghrelin, leptin, growth hormone, and glucose tolerance. These hormonal changes cause alterations in energy regulation, unhealthy food choices, increased food consumption, decreased physical activity, and a possible reduction in non-

exercise activity (Felso et al., 2017).

According to the National Cancer Institute (2020), stress is defined as the body response to physical, mental, or emotional pressure. Stress may lead to feelings of frustration, anxiety, anger, or depression (National Cancer Institute, 2020). An increase in stress also leads to an increased amount of production of hormones such as cortisol, which controls our energy and hunger urges. Therefore, increased stress causes an increase in appetite, which leads to eating more and an increase in fat storage (USDHHS/USDA, 2015). Researchers have linked weight gain to stress, and according to survey performed by the American Psychological Association (2017), about one-fourth of Americans rate their stress level as 8 or more on a 10-point scale. Stress, the hormones it releases, and the effects of high-fat sugary foods push people toward overeating, giving truth to the phrase "stress eating" (Harvard Health Publishing, 2021).

Body image is a complex concept that embraces numerous components including feelings, attitudes, perceptions, and behavior towards one's body (Richard et al., 2016). An increasing number of studies indicate the importance of a healthy body image, particularly in association with eating disorders, but also in the context of mental health and depression. Depression is an important public health problem worldwide. Obese individuals are frequently exposed to stigma, which can lead to poor psychological outcomes, such as low self-esteem and depression (Jackson et al., 2014).

In the past, body image perceptions have been identified as an important factor determining dietary intake and weight control behaviors. For example, a study using the Youth Risk Behavior Survey data showed that adolescent males and females who perceived themselves as overweight had significantly greater risk of skipping breakfast, fasting, using diet pills, and purging to lose or control their weight, compared to those who perceived themselves as normal

weight. However, objectively overweight males and females who perceived themselves as normal weight were significantly less likely to engage in weight loss activities over the last year (Stein et al., 2019).

Non-modifiable Risk Factors. On the other hand, non-modifiable risk factors include age, family history, race/ethnicity, and birth factors (USDHHS/USDA, 2015).

Gaining weight is common as age increases because metabolism changes and individuals need to eat less. Also, height and muscles mass decreases with age. More than 1 in 3 people over 65 years of age have obesity, which can lead to sickness, physical disability, and early death (AANP, 2020). According to the CDC (2021), the age-adjusted prevalence of obesity was 42.4%, and the age-adjusted prevalence of severe obesity was 9.2% among adults aged 20 and over in the United States in 2017–2018. The obesity prevalence was 40.0% among adults aged 20 to 39 years, 44.8% among adults aged 40 to 59 years, and 42.8% among adults aged 60 and older. Adults aged 40–59 years had the highest prevalence of severe obesity (CDC, 2021).

Genes give the body instructions for responding to changes in its environment. According to the Office of Science in Action (2018), studies have compared obese and non-obese people for variation in genes that could influence behaviors that contribute to weight gain. These studies have identified variants in several genes that may contribute to obesity by increasing hunger and food intake. Therefore, the Office of Science in Action (2018) states it is important to consider genetic and environmental factors when looking at an explanation for obesity. Family health history reflects the effects of shared genetics and environment among close relatives.

Important contributors to race/ethnic differences in obesity prevalence in the U.S. include racial/ethnic discrimination, weight stigmatization, and disproportionate experience of psychosocial stressors (Cuevas et al., 2020). According to Peterson et al. (2019), combined data

for 2015 through 2017 found that non-Hispanic black adults had the highest prevalence of obesity overall, followed by Hispanic adults and non-Hispanic white adults. In 2015, self-reported obesity among non-Hispanic and African American adults was greater than 35% in more than half of the United States (Pernenkil et al., 2017). Key findings from a NHANES study revealed that non-Hispanic African American women have the highest prevalence at 54.8% and then Hispanic women at 50.6% (Hales et al., 2017). According to Byrd et al. (2018), rapid weight gain during infancy has been observed to influence African American children more than white children, which predicts increased future health complications for this group. Risk factors contributing to higher rates of obesity among Hispanics and non-Hispanic African Americans include: genetics, diet, physical activity, psychological factors, stress, income, and discrimination (Byrd et al., 2018). Overall, it is important to prevent and treat childhood obesity in the same capacity as adult obesity (Byrd et al., 2018).

Studies suggest that people are more likely to become obese later in life if they experienced: poor nutrition in utero, maternal smoking, maternal weight gain, high birth weight, maternal gestational diabetes, or formula feeding rather than breastfeeding. Nutrition and other lifestyle factors during several periods in the lifecycle before conception can have profound effects on an individual's weight at birth, during childhood, and on into adulthood. Therefore, it is important for mothers to strive for a healthy weight before and during pregnancy (Harvard T.H. Chan School of Public Health, 2016).

Chronic Conditions

Obesity is a significant risk factor for and contributor to increased morbidity and mortality, most importantly from cardiovascular disease and diabetes, but also from cancer and chronic diseases, including osteoarthritis, liver and kidney disease, sleep apnea, and depression

(CDC, 2021). The disparities in obesity are even more prevalent in rural areas where older adults are the fastest growing part of the population at risk for the disease (Batsis et al., 2017). Furthermore, the general prevalence of obesity has not decreased over the last 10 years and it has been found that 68% of obese adults in the United States have two or more of these cardiometabolic disorders (Vakil et al., 2016). Treatments include lifestyle changes, such as heart-healthy eating and increased physical activity, and Food and Drug Administration (FDA)-approved weight-loss medicines. For some people, surgery may be a treatment option (NHLBI, 2021).

Obesity directly and independently leads to the development of and cardiovascular disease and cardiovascular disease mortality. More recent data has shown that abdominal obesity is a defining risk marker for cardiovascular disease independent of BMI (Piche et al., 2018). In 2015, high BMI accounted for 4 million deaths with more than two-thirds caused by cardiovascular disease, even after accounting for smoking and ill health (Afshin et al., 2017). Lifestyle modification and weight loss improve both metabolic syndrome with associated systemic inflammation and endothelial dysfunction (Bassi et al., 2014).

The American Diabetes Association (2021) states there is strong and consistent evidence that obesity management can delay the progression from prediabetes to type 2 diabetes and is highly beneficial in the treatment of type 2 diabetes. In overweight and obesity patients with type 2 diabetes, modest and sustained weight loss has been shown to improve glycemic control and reduce the need for glucose-lowering medications (American Diabetes Association, 2021).

Economic Impact

The price of obesity has resulted in negative affects to the socioeconomic growth and healthcare costs of individuals across the U.S. According to the United States Department of

Health & Human Services (2017), obesity-related illness are estimated to carry an annual cost of $190.2 billion, with obese individuals having medical costs that are $1,429 more than those of normal weight. Annual nationwide productivity costs of obesity-related absenteeism range between $3.38 billion and $6.38 billion dollars (USDHHS, 2017).

Conclusion

Obesity continues to be a growing health concern that decreases the quality and length of life, and increases individual, national, and global healthcare costs (Kahan, 2018). Obesity increases the risk of several debilitating chronic conditions, including diabetes, cardiovascular disease, and some cancers (CDC, 2021). Many providers find it difficult to dedicate time to weight management and counseling. Additionally, in rural communities, providers face workforce shortages and lack of specialized services (Batsis et al., 2017). Both literature and guidelines have proven that weight loss can diminish some obesity-related risks. Popular treatments such as weight loss supplements, weight loss medications, and bariatric surgery have led to an increase in healthcare costs and are not proven to have effective long-term weight loss effects (Weiner et al., 2014). Evidence supports a quality improvement project aimed at addressing obesity in primary care through the implementation of mobile weight loss applications. Mobile weight loss applications, such as MyFitnessPal©, will help bridge the gap between providers and patients with weight management.

Problem Statement

The problem statement for this DNP Project was that adult patients diagnosed with obesity in a rural clinic setting do not have a structured weight loss program with ongoing follow-up, leading to unsuccessful weight loss. Obesity continues to be a serious public health issue in the United States (Hales et al., 2017). Research has shown that obesity increases risk for

the development of serious health conditions such as diabetes and cardiovascular disease (World Health Organization, 2020). After one-on-one interviews with the healthcare providers in a rural community in Northwest Arkansas, it was expressed they do not have an adequate amount of time to educate these patients about lifestyle changes to enforce sustained weight loss. Previously, efforts to decrease BMI in obese patients have led to no improvement of weight loss or regaining of weight that was initially lost leading to frustration and lack of follow-up by patients and providers. A structured approach to weight loss has yet to be established at this clinic.

Purpose Statement

The purpose statement for this DNP quality improvement project was to reduce the BMI of obese adult patients at a rural family clinic setting through the implementation of a structure weight management program utilizing MyFitnessPal©. It is expected that using a cost-free mobile application such as MyFitnessPal©, will decrease BMI and overall, this will lead to an adaptation of healthier lifestyle habits and improved patient outcomes. Patients will be educated on how to use MyFitnessPal© and the self-monitoring process. The goal of this innovation is to decrease the BMI of the experimental participants by 5-15% from their baseline BMI measured at the beginning of the project.

PICOT Question

For overweight and obese adult patients in a rural primary care setting (P), how does the initiation of MyFitnessPal© (I) compared to standard brief health education (C) affect the BMI of patients (O) after 12 weeks of implementation (T)?

Needs Assessment

Objective

The Needs Assessment was conducted to identify ways to identify a gap in weight management at a rural health clinic by decreasing BMI in overweight and obesity adult patients. The Needs Assessment identified the target group, the nature of the decisions, and the scope of the assessment. The need to ascertain the rural community of West Fork in Northwest Arkansas was founded because this region is experiencing high rates of obesity. The healthcare providers express the need for a structured approach for weight loss in West Fork, Arkansas. Currently, the isolation of these patients in a rural community has led to a lack of tools, resources, and education regarding weight loss. Rural communities have a decrease in resources making it hard for individuals to succeed. Further investigating more feasible and appropriate methods will help improve the overall weight management of this rural community.

Participants

The participants of this Needs Assessment include individuals who are identified as qualified professionals and key influencers. The qualified professionals and key influencers have helped identify the gap in care for the rural community and its only primary care clinic. During working hours, the small clinic in West Fork, Arkansas is operated day-to-day by the Advanced Registered Nurse Practitioner (APRN) and the registered nurse (RN). The target group included the APRN and the RN. The APRN is the main provider at this clinic and has served as the main provider at this clinic for the last two years since it has opened. The clinic's RN is in charge of working the front desk and helps the APRN carry out tasks for the patients. The clinic RN has 15 years of experience. One key influencer is the clinic's physician who provides support and collaboration with the APRN when needed. The APRN and MD collaborate on care of the patients seen in this community. The physician has 15 years of experience. Another key influencer is the remote office manager who helps make sure the clinic has everything they need

to provide care to patients and improve quality care. The office manager has 13 years of experience in this position.

Rationale and Purpose

Significant evidence shows there is a substantial population in need of weight loss in the rural primary care setting. Research has shown tailoring weight loss programs to patients can improve patient adherence (Abshire et al., 2020). Therefore, this Needs Assessment can help provide an understanding on what the most preferred modality is for healthcare providers to carry out a weight loss program for their patients. Through the collection and utilization of information gathered from the needs assessment, staff at the rural health clinic will achieve increased patient weight loss outcomes utilizing MyFitnessPal©.

Data Collection

The Needs Assessment collected the necessary information by conducting key informant interviews of those who provide direct care to the targeted population. While conducting interviews, open-ended questions were asked to determine the existing approach and concerns about weight loss interventions in the rural clinic setting. During questioning, conversations were guided based on the target population responses to illicit further information. Since there were only two key informants, an open-ended interview was selected to give the opportunity for further explanation and clarification.

Sample, Sample Size, Sample Procedure

Participants within the interviews were selected based on their influence in care and their communication experience with overweight and obese patients in the rural clinic setting. A purposive sample was selected for this open-ended interview because it is a type of nonprobability sampling in which people are sampled due their experience, knowledge, and

ability to provide unique and rich information of value to the study. A total of two interviews took place due to the small clinic size. Both interviews were approximately 20 minutes in length and completed between February 14, 2021 and February 17, 2021.

Implementation and Analysis

Each interview was conducted based on the importance of the RN and APRN roles in the clinic setting. Both interviews were conducted one-on-one via telephone communication using open-ended questions and discussion type questions. The interview topics included the communication between provider and patient, patient's feelings towards weight loss, current weight loss interventions, education, and current interactions between staff and patients.

Specific findings with the use of the open-ended interviews revealed both interviewees agreed that communication between the patient and the APRN are limited and/or rushed when it comes to weight loss education, intervention, and implementation. There was identification of a need for a more structured approach to weight loss interventions. When asked about a better way to implement weight loss interventions, the APRN and RN agreed there is a need for a feasible and convenient strategy. When asked about patient motivation towards weight loss, the APRN and RN stated a lot of patients verbalized how they want to lose weight but do not have the right tools to do so. During the interviews both providers mentioned that many patients have requested medications to lose weight instead of lifestyle changes.

The information collected from both interviews shows the need for further refinement of how the rural clinic approaches patients needing weight loss interventions. The lack of resources and tools for patients to lose weight has led to an increase in overall BMI in the rural community. By exploring new ways to help patients lose weight there will be an improvement in BMI.

According to Kahan (2019), the past half-century has seen an increase in global obesity rates, with 266 million men and 375 million women, now exceeding the weight threshold for obesity. The growing epidemic of obesity affects over 35% of adults 65 years of age in the United States (Stein, Trabbold, & Connelly, 2019). According to the Centers for Disease Control and Prevention (2020), in 2020, 37.4% of adult population was obese, while ranking Arkansas 48th in the United States.

Objectives and Aims

The aim for this DNP quality improvement project was to improve the BMI of overweight and obese adult patients with the utilization of the MyFitnessPal© application for 12 weeks within a rural clinic setting. Key recommendations state patients diagnosed with obesity trying to lose weight should aim to lose 1-2 pounds per week and a 10% decrease in BMI over the period of 6 months (USDHHS, 2019). Therefore, we aimed to improve the quality of weight loss by at least 5% from the patients' original weight by the end of the 12-week intervention. The objectives were as follows:

- To identify at least 30 overweight and obese patients qualifying for participation in the weight loss intervention
- To assess participants perceptions of weight loss
- To implement a weight loss program utilizing a mobile application
- To increase follow-up appointment attendance by patients regarding weight management
- To increase patients' BMI reduction in experimental group compared to the control group

Review of Literature

In order to gather background information about overweight patients in rural settings and MyFitnessPal©, a review of literature was conducted to find evidence-based information and

research articles using the following key words: *obesity, overweight, rural, primary care, weight loss, United States, and MyFitnessPal©*. A detailed search strategy was conducted with Dr. Tony Stankus utilizing the following databases: CINAHL, PubMed, Google Scholar and Web of Science. The initial search yielded 273 results and the inclusion criteria was limited to peer-reviewed articles and journals written between 2015-2020. The exclusion criteria included research more than five years old, studies with children less than eighteen years of age, and research that was not written in English. After the inclusion and exclusion criteria was applied to the search, there were 73 results and then 20 articles were chosen for this literature review.

The focus of this literature review was on weight management programs and their use in primary care. There was a general theme throughout the research, linking obesity and poor health outcomes as well as the lack of resources for primary care providers to intervene. Primary care providers are aware of the growing epidemic of obesity, but there is a lack of knowledge, time, and tools to effectively treat it (Bowen et al., 2018). Another barrier to the treatment of obesity includes the provider's perception that patients will not be willing or able to make lifestyle changes (American Academy of Family Physicians, 2013). Also, the patient's perception of his or her own motivation and ability to achieve weight loss plays a large role in weight loss success (Teixeria et al., 2012). Current guidelines and recommendations demonstrate there is plenty of information known about the treatment of obesity and its contributions to the development of chronic conditions (USHHS/USDA, 2015). Furthermore, this review of literature demonstrates there is a gap between the identification of obesity and knowing what steps are needed to educate and follow-up with patients.

Providers' Perceptions

Primary care providers play one of the largest roles in medical care in the United States (Kennedy et al., 2016). The USPSTF (2012) recommends that primary care providers offer comprehensive lifestyle interventions for obese patients. Additionally, CMS (2011) provides coverage for intensive behavioral therapy for obesity by a qualified primary care provider. Research has shown that a lot of patients and healthcare providers have both perceived that the best way to lose weight was to follow a specific meal plan including healthy choices such as fruits and vegetables, to exercise, and to track what you eat (Kennedy et al., 2016). Many healthcare providers feel that they cannot devote clinical time to weight management when faced with acute and chronic demands to manage disease states and illnesses stemming from diabetes, dyslipidemias, heart disease, and hypertension (Kennedy et al., 2016).

Motivation in Overweight and Obese Patients

Another important aspect to this project was gaining an understanding of how patient motivation effects weight loss success in primary care. Motivation for weight loss is not always present in overweight and obese patients (Sand et al., 2017). A meta-analysis of different weight-loss programs published found that no one program was significantly better than the others. Instead, success was related to how motivated people were to stick with the program of their choice (Johnston et al., 2014). In a study performed by O'Brien et al. (2017), data from weight loss intervention studies and telephone surveys indicate that the perception of obesity as a health risk and dissatisfaction with one's own appearance are the two main motivating factors for weight loss attempts in overweight and obese individuals. Therefore, it is important to understand patients' motivation for weight loss to identify those who are prepared, compared to those who are at risk of dropping out of the treatment (Teixeria et al., 2012).

According to the American College of Cardiology and the American Heart Association (ACC/AHA), assessing the readiness for weight loss is a key component to assess the patient's motivation. The provider can assess the patient's motivation by making sure they understand the concept of comprehensive lifestyle interventions. One way a provider can assess patient motivation or readiness for weight loss is by asking, "How prepared are you to make changes in your diet, to be more physically active, and to use behavior change strategies such as recording your weight and food intake?" (Jenson et al., 2014). If the patient is not ready to undergo comprehensive lifestyle interventions, providers must take the time to educate patients how this can be counterproductive (Jenson et al., 2014). Motivation was found to be an important factor for effective use of mobile applications and lifestyle modification, particularly given that the use of these applications required effort and organization, and that adherence is sometimes difficult to maintain (Ghelanie et al., 2020). MyFitnessPal©© has been shown to increase motivation and achieve positive results with individuals by identifying streaks in data recording and providing access to forums where individuals in the community can interact (Ghelanie et al., 2020).

Guidelines and Recommendations

There are many guidelines and recommendations published for the treatment of obesity. The ACC/AHA created an expert panel to develop national practice guidelines for the treatment of obesity (Jenson et al., 2014). This expert panel also included the collaboration with NHLBI and The Obesity Society which and further developed a treatment algorithm titled the *Chronic Disease Management Model for Primary Care of Patients With Overweight and Obesity,* See Appendix O. Overall, these national guidelines states all primary care providers are required to screen their patients for obesity by measuring height, weight, body mass index calculation, and waist circumference measurement screening (Jenson et al., 2014). Once the diagnosis is

established, providers must educate about and assess for risk of cardiovascular disease (CVD), type 2 diabetes, and the risk of mortality (Jenson et al., 2014). Then, after assessing for risk factors of CVD and other obesity-related comorbidities, the providers need to treat their patients for the comorbidities identified. After treating risk factors, assessing for the patient for readiness to implement lifestyle modifications for weight loss is important. Following a healthy dietary pattern with fewer calories is often the first step in trying to treat overweight and obesity (Jensen et al., 2014). If individuals decide to implement lifestyle modifications, providers should reassess weight loss at a follow-up appointment to determine if further interventions such as behavioral counseling, weight loss medications or bariatric surgery are needed (Jenson et al., 2014).

Dietary Recommendations

Dieting, for the most part, refers to a change in eating habits. To achieve weight loss, one of the major guidelines for treatment of obesity in adults is to focus on creating a new dietary pattern. In order to support new dietary patterns, a formation of a supportive environment should be included (USHHS/USDA, 2015). Recommendations for healthy dieting includes choosing minimally processed, whole foods-whole grains, vegetables, fruits, nuts, healthful sources of protein, and plant oils. Furthermore, it is recommended to limit sugared beverages, refined grains, potatoes, red and processed meats, and other highly processed foods, such as fast food (USHHS/USDA, 2015).

The current guidelines from the American Heart Association/American College of Cardiology Task Force on Practice Guidelines and The Obesity Society (2015) for management of overweight/obesity in adults does not recommend one specific diet for weight loss. A healthy dietary pattern can benefit all individuals regardless of age, race, or ethnicity, or current health

status (CDC, 2021). The *2015–2020 Dietary Guidelines for Americans* states that a healthy dietary pattern includes the following:

- An emphasis on fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products
- A variety of protein foods such as seafood, lean meats and poultry, eggs, legumes, soy products, nuts, and seeds.
- A low amount of saturated fats, trans fats, cholesterol, sodium, and added sugars
- Staying within your daily calorie needs (USHHS/USDA, 2015)

More specifically, in comprehensive lifestyle interventions, overweight and obese individuals are usually prescribed a diet designed to have an energy deficit of ≥500 kcal/d. This deficit often is achieved by prescribing 1200 to 1500 kcal/d for women and 1500 to 1800 kcal/d for men (Jenson et al., 2014).

Physical Activity Recommendations

For all individuals, physical activity is an essential and complementary companion to a healthy dietary pattern. The American Heart Association and the American College of Cardiology Task Force (2013) guidelines for the management of overweight and obesity in adults promote the important role of physical activity to prevent and treat overweight and obesity. The AHA (2017) recommends 40 minutes of moderate to vigorous activity three to four days a week to help control blood pressure and to improve blood cholesterol levels. For obesity patients, the recommended amount of aerobic physical activity is >150 minutes per week. Higher levels of physical activity are recommended to help maintain long-term weight loss, but simple steps to reduce sedentary behavior and time spent seated such as increasing time spent standing or walking throughout the day are also encouraged (Popa et al., 2020).

Self-Monitoring

According to the American Psychology Association (2020), self-monitoring is defined as a method used in behavioral management in which individuals keep a record of their behavior. Self-monitored is considered the cornerstone of behavioral weight loss treatment (Patel et al., 2019). Keeping a record of dietary intake, physical activity, and body weight allows an individual to track progress toward weight loss and make adjustments as needed (Patel et al., 2019). Numerous studies have shown that self-monitoring is positively related to weight loss. Specifically, the combination of high frequency plus high consistency of dietary self-monitoring improves long-term success in weight management (Peterson et al., 2014).

Behavioral Therapy

Behavior therapy is defined as an intervention usually provided with a structured behavior change program that includes regular self-monitoring of food intake, physical activity, and weight. These same behaviors are recommended to maintain lost weight, with the addition of frequent monitoring of body weight (Jenson et al., 2014). Behavior therapy is an essential component of a weight loss strategy, whether used alone or in combination with pharmacotherapy or bariatric surgery. The USPSTF (2015) found adequate evidence that intensive behavioral counseling interventions have moderate benefits for CVD risk in overweight or obese adults who are at increased risk for CVD, including decreases in blood pressure, lipid and fasting glucose levels, and BMI and increases in levels of physical activity. Interventions involved an average of 5 to 16 contacts over 9 to 12 months depending on their intensity (Lin et al., 2014). Most of the sessions are conducted in-person, and many included additional telephone contacts. Interventions generally focused on behavior change, feedback, problem-solving skills, and individualized care plans (Lin et al., 2014).

Weight Loss Medications

Other than lifestyle modifications, other popular treatments people attempt for weight management include weight loss supplements, weight loss medications and bariatric surgery. Dietary supplements don't require review or approval by the FDA before they are put on the market. Many weight loss supplements have ingredients that haven't been tested in combination with one another, and their combined effects are unknown (USDHHS, 2021). About 15% of the adults in the U.S. have used a weight loss dietary supplement at least once in their lives. Furthermore, on average, Americans spend 2.1 billion dollars a year on diet and weight loss pills (USDHHS, 2021).

Weight loss medications are meant to help people who have health problems related to overweight or obesity. Health care providers use BMI to help decide whether you might benefit from weight loss medications. Primary care providers may prescribe a medication to treat overweight or obesity if the patient has a BMI of 30 or greater, a BMI of 27 or greater, and an additional related diagnosis such as high blood pressure or type 2 diabetes (NIDDK, 2021). Medications do not replace physical activity or healthy eating habits as a way to lose weight. Studies show that weight loss medications work best when combined with lifestyle modifications. There are FDA-approved weight loss medications including: Contrave, Saxenda, Xenical, and Qsymia. These four weight loss medications work by decreasing appetite or increasing satiety levels. Expected annual costs for the diet pills included: $1,743 for Lorcaserin, $1,518 for Orlistat, and $1,336 for Qsymia (Duke University, 2016). A fifth weight loss medication was approved by the FDA in June of 2021, named Wegovy, used for those weight chronic weight gain with at least one weight-related co-existing condition. Wegovy is a weekly injection that costs an individual more than $1,300 a month out-of-pocket (Brody, 2021).

The ACC/AHA expert panel recommends that patients with a BMI over 30 or patients with a BMI greater than 27 with an additional obesity-related condition who are motivated to lose weight should be considered to weight loss medications to help them reach their target weight loss goal (Jenson et al., 2014). The medications this expert panel approves of all FDA approved medications after the potential risks of the medication have been considered. The rationale for the use of these medications are to help the patient adhere to a lower-calorie diet more consistently and to achieve sufficient weight loss (Jenson et al., 2014). Overall, weight loss medications should be reinforcing lifestyle changes and be an adjunct to comprehensive lifestyle interventions (Jenson et al., 2014).

Surgical Interventions

Weight loss surgery, also known as bariatric surgery, may be an option for adults who have a BMI of 40 or more or a BMI of 35 or more with a serious health problem linked to obesity. Weight loss surgery costs each individual anywhere from $20,000-$25,000 depending on what surgery is chosen and what the insurance plan is (National Institute of Diabetes and Digestive and Kidney Diseases, 2019). There is a risk undergoing surgery and weight loss surgery can also lead to many side effects than lead to additional procedures. (National Institute of Diabetes and Digestive and Kidney Diseases, 2019). In order to undergo weight loss surgery, providers assess if patients have been unable to lose weight or keep it off using nonsurgical methods such as lifestyle changes or medication (Bolling et al., 2019). Overall, there have been studies that have found weight loss surgery does not reduce overall healthcare costs in the long-term. Also, there is no evidence that any one type of surgery is more likely to reduce long-term healthcare costs (Weiner et al., 2014).

The prevalence of bariatric surgery continues to increase across the globe (Angrisani et al., 2017). There are three options for surgical intervention to treat obesity worldwide. These surgeries include the vertical sleeve gastrectomy (VSG), Roux-en-Y gastric bypass, and the adjustable gastric banding. The VSG is the most popular weight loss surgery worldwide and is estimated to account for nearly 50% of all operations (Angrisani et al., 2017). The VSG is performed by using a cutting or sealing tissue stapler to create a long stomach tube that resembles a "sleeve", irreversibly removing the greater curvature of the stomach (Angrisani et al., 2017). Studies typically report a weight loss of between 50% and 60% of excess body weight (Albaugh & Abumrad, 2018). RYGB is the second most popular weight loss surgery worldwide and is estimated to contribute to about 40% of bariatric operations (Angrisani et al., 2017). Surgically, RYGB is more challenging, as it involves creating a small stomach pouch that is connected to an end of the more distal small intestine, which creates a "Roux" limb. AGB is the least popular weight loss surgery and is estimated to be performed for 7% of bariatric operations (Angrisani et al., 2017). This banding operation involves placing an externally compressive device on the upper portion of the stomach, which can be inflated or deflated with a subcutaneous port, which allows the adjustment of gastric compression to limit stomach distention and food intake (Albaugh & Abumrad, 2018).

Although weight loss surgery is considered one of the most effective therapies for weight loss, it is also the most invasive with perioperative risk related to the operation itself, including general anesthesia and postoperative recovery (Inge et al., 2014). As weight loss surgery has continued to become more prevalent, there have been concerns raised about the perioperative safety of these surgeries (Inge et al., 2014).

Mobile Weight Loss Applications

Incorporating mainstream technology for obesity management is an innovative and cost-effective way to reach larger populations, thus increasing accessibility to health care (Bracken & Waite, 2020). Utilizing technology for self-monitoring dietary intake has been shown to produce greater adherence and less-pronounced declines in engagement than traditional paper-based tracking methods (Patel et al., 2019). Mobile health applications are increasing in popularity to assist in health behavior change and maintenance. In many cases, users wish not only to observe their behavior, but also to improve it. Activity tracking apps often aim to help their users do this, and the guidance they provide can take many forms, ranging from general advice and tips from experts, peer pressure from social networking features, reminders or notifications that ask the user to take a specific timely action, and enforcement of explicitly articulated goals (Gordon et al., 2019).

If a mobile weight loss application could have the same components as a face to face intervention, the benefit it offers is reduced contact time, which is potentially more cost-effective. Over time, studies have reported that the use of mobile weight loss applications is effective in many contexts and across several populations. For example, Patrick et al. (2009) reported that the use of a text message-based intervention in overweight adults resulted in a significant weight loss over the course of 16 weeks. In a study completed by Orsama et al. (2013), mobile weight loss applications are also shown to be effective in longer trials involving both disease and weight management in patients with type 2 diabetes. Furthermore, Ross & Wing (2016) found that using conventional tools, such as a reference book, a pedometer, or a paper-based booklet led to 15% of patients having at least 5% weight loss. But on the other hand, having mobile technology and telephone support tripled this proportion, resulting in 44% of patients achieving weight loss of 5% or more (Ross & Wing, 2016).

MyFitnessPal©

MyFitnessPal©© is the most popular commercial nutrition weight loss app, with more than 165 million users in 2016 (Jones, 2019). MyFitnessPal©© is characterized by its extensive and country-specific database of over 6 million food items and brands. This consumer app is user-friendly, contains a barcode scanner to rapidly add packed foods, and has both smartphone and web-based versions (Evenepoel et al., 2020). In addition, the basic version of MyFitnessPal© is freely available. In the United States, 83% of the dietitians who participated in a survey held at the Food and Nutrition Conference and Expo 2015 recommended the use of nutrition and health-related apps, with MyFitnessPal© and Fitbit mentioned the most (Sauceda et al., 2016). Furthermore, in a survey across the United Kingdom, Australia, Canada, New Zealand, and the United States, it was the most preferred mobile application for sports dietitians (Jospe et al., 2016).

The purpose of MyFitnessPal© is to help users better understand their behavior and to help promote self-monitoring based on dietary pattern recommendations (Gordon et al., 2019). For example, MyFitnessPal© encourages users to increase self-monitoring behavior by providing a platform where daily health behavior information is stored and can be later accessed to view progress made toward specific goals (Bracken & Waite, 2020). A recent study reported MyFitnessPal© and its role in helping adults with overweight or obesity lose a clinically significant amount of weight (Patel et al., 2019). Finding from Bracken & Waite (2020) suggest that higher levels of self-efficacy for healthy eating and greater use of MyFitnessPal© predicted greater goal achievement. The results from this study suggest that MyFitnessPal© may be the most helpful for those who find it more difficult to meet their nutrition-related goals. In one randomized control study named the “GoalTracker Trial,” some participants received a 12-week

weight loss intervention that involved using the MyFitnessPal© application each day for self-monitoring of diet and body weight, with weekly lessons, action plans and feedback. The results suggested that regardless of the order in which diet is tracked, using tailored goals and a commercial mobile app can produce clinically significant weight loss (Patel et al., 2019). According to Patel et al. (2020), self-monitoring is the strongest predictor of success in lifestyle interventions for obesity and is considered an essential component of weight loss treatment. Freely available products such as MyFitnessPal© allow individuals to have easy access to searchable food databases and digital self-monitoring with instant feedback (Brooks & Bennett, 2020).

Conclusion

In order for overweight and obese individuals to help lower the chances of developing chronic conditions, they must lose weight. Evidence suggests losing 5-10% of your body weight within the first six months of treatment (Jenson et al., 2014). Common treatments include healthy eating, physical activity, behavior counseling, self-monitoring, weight loss programs, prescription medications, and surgical interventions. Incorporating technology for the treatment of obesity is an innovative and cost-effective way to access larger populations (Bracken & Waite, 2020). Mobile weight loss applications, such as MyFitnessPal©, may be a logical option for those looking for a lower intensity approach who are willing and able to self-monitor. MyFitnessPal© can be effective with helping overweight and obese individuals implement lifestyle changes in order to achieve weight loss (Brooks & Bennett, 2020).

Theoretical Framework

Using theory models and framework to guide evidence based practice implementation will help to develop long-term maintenance and understanding (Birken et al., 2020). In order to

guide this project, the Theory of Planned Behavior (TPB) was used to predict and explain health behaviors that lead to weight loss (Horne et al., 2020). Primary care providers are the first line of defense for both primary and secondary obesity prevention efforts and must utilize proper tools such as the TPB to guide a structured approach. The TPB explains the relationships between certain constructs and the outcome; however, the outcome is behavior, which may be related but cannot always be maintained (Birken et al., 2020). The TPB has been used in a wide variety of settings to predict and explain human intentions and behavior (Hassan et al., 2021). The purpose of this quality improvement project was designed to improve weight loss in overweight and obese patients at a rural primary clinic. In order to guide this project, the TPB was used to explain the relationship between perceptions and barriers surrounding weight loss.

There are six key constructs in the TPB including: attitudes, behavior intention, subjective norms, social norms, perceived power, and perceived behavioral control. Behavior intent is the key component of the TPB and it explains why or why not a certain behavior change is achieved. Motivation, ability, and specific beliefs will influence behavioral achievement as well (LaMorte, 2019). The 6 key constructs of the TPB was evaluated using a questionnaire prior to and after the 12-week implementation of MyFitnessPal© in the rural primary care setting. The six key constructs that represent actual control over the behavior are explained as follows:

1) Attitudes - This refers to the degree to which a person has a favorable or unfavorable evaluation of the behavior of interest. It considers the outcomes of performing the behavior.
2) Behavioral intention - This refers to the motivational factors that influence a given behavior where the stronger the intention to perform the behavior, the more likely the behavior will be performed.

3) Subjective norms - This refers to the belief about whether most people approve or disapprove of the behavior. It relates to a person's beliefs about whether peers and people of importance to the person think he or she should engage in the behavior.
4) Social norms - This refers to the customary codes of behavior in a group or people or larger cultural context. Social norms are considered normative, or standard, in a group of people.
5) Perceived power - This refers to the perceived presence of factors that may facilitate or impede performance of a behavior. Perceived power contributes to a persons perceived behavioral control over each of those factors.
6) Perceived behavioral control - This refers to a perception of the ease or difficulty of performing the behavior of interest. Perceived behavioral control varies across situations and actions, which results in a person having varying perceptions of behavioral control depending on the situation (LaMorte, 2019).

The key constructs of the TPB was used to provide a theoretical explanation as to why participants may or may not be successful with weight loss. The six constructs of the TPB will be evaluated through questions addressed in the Weight Loss Questionnaire distributed prior to and after implementation of the 12-week weight loss program utilizing MyFitnessPal©. Research has proven the TPB has been applied to and used to predict certain health-related behaviors such as dieting and exercising (Lash et al., 2016). For example, a study performed by McConnon et al. (2012) found that with utilizing the TPB, perceived need to control weight predicts the behavior needed for weight maintenance. Overall, the TPB framework has been successful in understanding health-related behaviors and developing interventions aimed at modifying those

behaviors (Lash et al., 2016). The TPB was used was a guiding framework to explain the relationship between MyFitnessPal© and weight loss.

Methodology

Project Description

The DNP project was aimed to improve weight loss among obese and overweight patients at a rural clinic in Arkansas. The approach of this project was a quasi-experimental control trial with an experimental and control group. The participants in the experimental group received pre-intervention brief health education about lifestyle interventions, an introduction into MyFitnessPal©, and how to incorporate the MyFitnessPal© into their daily lives. The participants in the control group received the same brief health education that addressed weight loss interventions and lifestyle changes, without the MyFitnessPal© intervention. Each group participated in a pre-post Weight Loss Questionnaire and participated in a 12-week follow-up visit. This quasi-experimental design aided in evaluating whether the implementation of a mobile-based weight loss application, MyFitnessPal©, to better determine if the experimental group resulted in a statistically significant decrease in BMI, as compared to the control group.

Project Design

Utilizing MyFitnessPal© is a logical and feasible approach for weight management in obese and overweight patients in a rural primary care clinic setting. MyFitnessPal© can help patients learn how to implement healthy dietary changes while providing a structured form of follow-up for primary care providers (Laing et al., 2014). The project took place in at a rural primary care clinic located in Northwest Arkansas. The project began with a retrospective chart review to help determine the patients who qualified for the diagnosis of obesity or overweight in the last year. Overweight patients were defined as a BMI of 25-29.9 kg/m2 and obese patients

were defined as a BMI higher than 30 kg/m2. Once the patients who qualified for the project were identified, they received a phone call from myself utilizing the patient recruitment transcript via telephone. *See Appendix L.*

After completing patient recruitment, I obtained informed consent before beginning the initial appointment with all participants, which included the control group and the experimental group. The control group attended the initial appointment where they completed the Weight Loss Questionnaire and then had their height, weight, and blood pressure measured. During this appointment, the control group participants only received the standardized care for weight management at this clinic site. The standardized care included brief health education, which addressed dietary patterns, physical activity, and implementing new lifestyle modifications. *See Appendix M.* After the initial appointment was completed, the control group was scheduled for follow-up, 12 weeks later, as this was current clinic standard. At the follow-up appointment, the control group was re-administered the Weight Loss Questionnaire and their weight, height, and blood pressure was re-measured. The Weight Loss Questionnaire was not part of the standardized care for this clinic; but developed for this project for evaluation purposes.

On the other hand, the experimental group attended the initial appointment where they had their weight, height, and blood pressure measured and then they were provided with the Weight Loss Questionnaire. The experimental group received the same brief education that the control group received *See Appendix M.* Additional time was spent with the experimental group participants teaching them how to download and set-up the MyFitnessPal© app. Additionally, the experimental group was taught about how to use the application and was distributed a handout with additional information about MyFitnessPal© *See Appendix I.* The experimental group was instructed to self-log their dietary intake and weigh themselves once a week within

the app. I monitored the MyFitnessPal© self-logging and weekly weigh-ins of each participant in the experimental group by checking the person's utilization through the application. Furthermore, personalized follow-up messages were sent on the MyFitnessPal© application to each participant in the experimental group. The messages included advice, encouragement, motivation, or tips. The experimental group attended the follow-up appointment at the end of the 12-week implementation to re-assess weight, height, and blood pressure and were re-administered the Weight Loss Questionnaire.

Setting

The setting for this quality improvement project took place at a rural primary care setting in Northwest Arkansas. With over 25 rural clinics in Arkansas, this clinic employs one nurse and one APRN with 2 patient rooms and sees, on average, 15-20 patients a day. The clinic offers a variety of medical care services, including routine and school physicals and other preventive care services, Medicare annual wellness visits, DOT physicals, pediatric well visits, women's health visits, sports physicals, immunizations including flu and pneumonia vaccines, treatments of illnesses and injuries, and health screenings aimed at preventing disease. In addition, the clinic features an on-site laboratory for testing that's both convenient and thorough.

Study Population

The study population for this project consisted of 24 adult obese and overweight patients at a rural primary care clinic who gave consent to undergo the 12-week program implementation. Overweight was defined as a BMI over 25 and obese was defined as a BMI over 30. Patients who did not own a smart phone were excluded from the experimental group of 12 participants due to the inability to download MyFitnessPal©, and therefore, they were placed in the control

group of 12 participants. Patients who were younger than 18 years of age, non-English speaking, or did not have a diagnosis of overweight or obesity were excluded from this study.

Study Interventions

The primary intervention for this DNP Project was a health and fitness mobile application named MyFitnessPal©. MyFitnessPal© is a downloadable application for smart phone that allows individuals to self-monitor food and water intake, physical activity, periodical weigh-ins, and personalized weight goals. MyFitnessPal© stores all of this information on the application and can be accessed later by the individual and by those the individual has given access to. The experimental participants were given instructions on how to download the MyFitnessPal© app, setting up goals, and logging their initial weight. Experimental participants were also educated on how to log food into the app by scanning barcodes on packaged food or searching the MyFitnessPal© database to find foods. Throughout the self-monitoring process on MyFitnessPal©, participants were able to save certain meals they eat more frequently to save time. Furthermore, participants were educated how to access advice, tips and 24/7 support regarding diet, exercise, and staying motivated. During the initial appointment, all experimental groups participants were educated how to check the message feature on MyFitnessPal© as this was where the weekly intervention check-ins took place.

The experimental group and the control group both received brief health education based off of national guidelines and recommendations. This is the standardized approach at the clinical site. The brief general health education provided to both groups included discussion about setting SMART goals, exercising, or participating in activity for one hour a day, and improving dietary patterns. Education about healthy diet patterns included decreasing caloric intake while

increasing fruit, vegetable, and lean meat intake. Small steps to eliminate sugar, fast food, processed foods, and alcohol are the long-term goals of a healthy diet pattern. *See Appendix K.*

Lastly, the experimental group and the control group were distributed the Weight Loss Questionnaire before and after the 12-week implementation of the weight management program utilizing MyFitnessPal©. The Weight Loss Questionnaire was provided in paper format or via an anonymous link on Qualtrics to all participants included in the project before and after the 12-week program. The Weight Loss Questionnaire was guided by the TPB and consisted of questions evaluating the participants' attitudes, behavior intentions, subjective norms, social norms, perceived power, and perceived behavioral control.

Study Measures

Conceptual Definitions. The conceptual definition of *body mass index* refers to a screening tool used for overweight and obesity, which is calculated by a height-weight ratio. Weight that is higher than what is considered healthy for a given height is described as *overweight* or *obesity.* The conceptual definition for *obesity* can be defined as a complex disease involving an excessive amount of body fat and overweight as having more body fat than is optimal for health.

There are 6 key constructs of the Theory of Planned Behavior that I measured in the Weight Loss Questionnaire include: *attitudes, behavioral intention, subjective norms, social norms, perceived power*, and *perceived behavioral control*. The conceptual definition of *attitude* refers to the degree to which a person has favorable or unfavorable evaluation of a behavior. The conceptual definition of *behavioral intention* refers to the motivational factors that influence a given behavior where the stronger the intention to perform a behavior, the more likely a behavior will be performed. The conceptual definition of *subjective norm* refers to the belief about

whether most people approve or disapprove of a behavior. The conceptual definition of *social norm* refers to the customary codes of behavior in a group of people or larger cultural context. The conceptual definition of *perceived power* refers to the perceived presence of factors that may facilitate or impede performance of a certain behavior. The conceptual definition of *perceived behavioral control* refers to a perception of the ease or difficulty of performing the behavior of interest. *See Appendix J.*

The conceptual definition of *weight loss* refers to a reduction of the total body mass index. The conceptual definition of a m*obile weight loss application* refers to an application that calculates the number of calories consumed and compares them to the daily calorie goal, which is computed based on the user's current weight, goal weight, and desired rate of weight loss. An example of a mobile weight loss application is MyFitnessPal©. The conceptual definition of *MyFitnessPal©* is a health and fitness application used by individual to self-monitor health habits. The conceptual definition of *self-monitoring* refers to a method used in behavioral management in which individuals keep a record of their behavior. The conceptual definition of *motivation* refers to the general desire or willingness of someone to do something.

Operational Definitions. The operational definition of *body mass index* refers to a person's weight in kilograms divided by the square of height in meters. Body mass index will be measured at the initial appointment using the same scale and stadiometer. The operational definition of *overweight* and *obesity* in defined terms of body mass index. The operational definition of *overweight* is defined as a body mass index of 25-29.9 and the operational definition for *obesity* is defined as a body mass index of 30 or over.

There are 6 key constructs of the Theory of Planned Behavior that were measured in the Weight Loss Questionnaire included: *attitudes, behavioral intention, subjective norms, social*

norms, perceived power, and *perceived behavioral control*. The operational definition of *attitude* defined how the participant viewed managing their weight and was measured in question #1 of the Weight Loss Questionnaire. The operational definition of *behavioral intention* refers to the amount of motivation the participant has to lose weight and was measured in question #16 of the Weight Loss Questionnaire. The operational definition of *subjective norm* is defined as whether the participant believes their family or friends thinks they should lose weight and was assessed in questions #8, #9, and #10 of the Weight Loss Questionnaire. The operational definition of *social norm* is defined as what is considered standard in the participants group of family or friends and was measured in questions #2, #3, #4, #5, #6, and #7 of the Weight Loss Questionnaire. The operational definition of *perceived power* is defined as what factors the participant sees as barriers or facilitators to weight loss and was assessed in questions #11 and #12 in the Weight Loss Questionnaire. The operational definition of *perceived behavioral control* is defined as how the participants views the task of losing weight and was assessed in questions #11 and #12 in the Weight Loss Questionnaire. *See Appendix J.*

The operational definition of *weight loss* in this project is defined as a decrease in weight from the beginning of the implementation of MyFitnessPal© compared to afterwards. To measure weight loss of each patient, I measured each patient's weight on the same scale at the initial appointment and at the follow-up appointment. The operational definition of m*obile weight loss application* refers to the health and fitness application named MyFitnessPal©, which was the study intervention for this project. The operational definition of *MyFitnessPal©* is the mobile weight loss application that was implemented for the 12-weeks of the implementation phase of the project. The effectiveness of MyFitnessPal© was measured by BMI of the experimental group compared to the BMI of the control group before and after implementation

of the weight loss program. The operational definition of *self-monitoring* refers to the participants' ability to track dietary input weekly in the MyFitnessPal© application. The operational definition of *motivation* refers to the participants desire to lose weight that was assessed throughout the Weight Loss Questionnaire. *See Appendix J.*

Outcome Measures. The outcome measures for this DNP quality project evaluated the impact of the implemented evidence-based program change. The first outcome measure for this project was to identify patient populations that meet the clinical definition of overweight or obese. A retrospective chart review was performed at the clinical site to gather data on the number of patients who qualified as overweight and obese. The number of patients that qualified for the project was 39%. The percentage portrays the relevance of obesity in this community clinic. The second outcome measure was the implementation of a weight loss program utilizing a mobile application, MyFitnessPal© with the goal of reducing participants' BMI by 5%. This outcome measure was achieved through the implementation of a 12-week MyFitnessPal© program with pre and post measurement of BMI. The effectiveness of the program was determined by comparing experimental participants' average pre and post BMI reduction to the control group pre-and post BMI reduction and no statistical significance was found. Additionally, pre-post measurement of weight and blood pressure was obtained and compared. The third outcome measure of this DNP Project was to assess participants' perceptions surrounding weight loss. This was accomplished via the Weight Loss Questionnaire where concepts regarding attitudes, behavior intention, subjective norms, social norms, perceived power, and perceived behavioral control were assessed via a pre-post survey question among both the experimental and control group.

Process Measures. The process measures of this DNP project were used to explain the specific steps in the process that lead to each outcome measure. Initially, a retrospective chart review was performed at the clinic site. The time frame for the retrospective chart review was extended to patients with a recorded BMI above 25 over the last year. The number of patients that qualified for this project was monitored in case there were new eligible patients that qualified during the time the chart review was being performed.

To ensure the outcome measure of self-monitoring compliance was completed, the number of participants who completed diet self-monitoring accurately, by documenting three meals a day, on MyFitnessPal© will be monitored. The number of participants who completed weekly weight check-ins was also monitored.

Other process measures included the percentages of patients who completed the Weight Loss Questionnaire at the pre- and post- intervention with the goal of 75% of the patients would complete the Weight Loss Questionnaire at each point in time. Lastly, percentage of follow-up appointment attendance among experimental and control groups was tracked with a goal of 100% attendance between both groups for the initial and follow-up appointments. Follow-up appointments were monitored via PDSA cycles.

Balancing Measures. Balancing measures of this DNP project were used to evaluate both positive and negative effects of the implementation process. With the implementation of a phone-based intervention, there was a potential that increased phone usage and screen time, may negatively impact participants' wellbeing and daily activities. To assess this balancing measure, the post-intervention Weight Loss Questionnaire ascertained whether there was an increase in screen-time and impact on well-being and daily activities. The second project balancing measure assessed participants' satisfaction of the MyFitnessPal© application. The post-intervention

Weight Loss Questionnaire assessed patient satisfaction with regards to MyFitnessPal©, weekly weigh-ins, and weekly follow-up communication.

Benefits/Risks

Benefits of this DNP program included the implementation of an evidence-based practice intervention through the use of MyFitnessPal© to improve weight management. The benefits of MyFitnessPal© included increased patient knowledge of healthier lifestyle interventions, dietary patterns, and physical activity routines. There was minimal potential for emotional or psychological strain when I review weight management and MyFitnessPal© education with the patient. Providing a private atmosphere during the education process minimized the risk of these potential harms. There was no loss of the patient's privacy and confidentiality through data production and collection because precautions were taken. . There are no suspected economic risks of harm related to the study intervention.

Subject Recruitment

All of the subjects who were willing to participate in the DNP project were recruited using the script and then consented. All participants that meet inclusion criteria for utilization of MyFitnessPal© were consented by me or the clinic RN. The control group was also consented prior to the 12-week weight management program. I trained both the clinic RN and the clinic APRN prior to the project implementation.

Consent Procedures

This DNP quality improvement project obtained consent from all obese and overweight patients participating in this project. All patients that met inclusion criteria for utilization of MyFitnessPal© were consented prior to participation. *See Appendix for Informed Consent Form.*

Subject Costs and Compensation

Participants did not incur a cost or receive compensation for taking part in this project. MyFitnessPal© is a free mobile application available to download on smart phones. Compensation for participating in the project is not permitted and did not occur.

Implementation

Study Interventions

The implementation phase included a variety of interventions that focused on communication between myself and the participants in the Weight Management Program. The interventions were categorized by pre-implementation, implementation, and post-implementation phases. All interventions began December 21, 2021 after IRB approval was obtained from the University of Arkansas.

The primary intervention for this DNP Project was a health and fitness mobile application named MyFitnessPal©. MyFitnessPal© is a downloadable application for smartphones that allows individuals to self-monitor food and water intake, physical activity, periodical weigh-ins, and personalized weight goals. MyFitnessPal© stores all of this information on the application and can be accessed later by the individual and those the individual has given access to. The experimental participants were given instruction on how to download the MyFitnessPal© app, setting up goals, and logging their initial weight. Experimental participants were educated on how to log food into the app by scanning barcodes on packaged food or searching the MyFitnessPal© database to find foods. Furthermore, participants were educated how to access advice, tips and support 24/7 regarding diet, exercise, and staying motivated. During the initial appointment, all experimental groups participants were instructed on how to check the message feature on MyFitnessPal© as this is where the weekly intervention check-ins took place.

The experimental group and the control group both received brief health education based off of national guidelines and recommendations. This was the standardized approach at the clinical site. The brief general health education provided to both groups included discussions about setting SMART goals, exercising or participating in activity for one hour a day, and improving dietary patterns. Education about healthy diet patterns included decreasing caloric intake while increasing fruit, vegetable, and lean meat intake. Small steps to eliminate sugar, fast food, processed foods, and alcohol are the long-term goals of a healthy diet pattern. *See Appendix K.*

Lastly, the experimental group and the control group were distributed the Weight Loss Questionnaire before and after the 12-week implementation of MyFitnessPal©. The Weight Loss Questionnaire was provided in paper format or via an anonymous link on Qualtrics to all participants included in the project before and after the 12-week program. The Weight Loss Questionnaire was guided by the TPB and consisted of questions evaluating the participants' attitudes, behavior intentions, subjective norms, social norms, perceived power, and perceived behavioral control.

Pre-Implementation Phase

The University of Arkansas's Eleanor Mann School of Nursing Doctoral Committee approved the proposal on September 16, 2021. Following approval, the proposal was submitted to the Institutional Review Board (IRB) to the University of Arkansas. On December 8, 2021 the University of Arkansas IRB approved the project proposal for implementation. Inter-professional teams were integrated into the project during the pre-implementation phase to prepare for the implementation of the Weight Management Program utilizing MyFitnessPal©©. The

communication team consisted of the clinic RN and the clinic APRN of the rural primary care clinic. The members of the interdisciplinary team include the clinic RN and the clinic APRN.

Initially, this RN met with the key stakeholders and reviewed the components of the weight management program prior to the implementation of this DNP project. The clinic RN and the clinic APRN were both briefed on the process of the Weight Management Program and were educated that the beginning of the project would include a retrospective chart review to determine which patients qualified for the program. The retrospective chart reviews were conducted on the clinic's electronic health system including patients meeting qualifications over the last year. The data collected included patient names, medical record numbers, BMI, and phone numbers of individuals designated to give patient medical information.

Following the collection of data, 61 individuals that qualified were called via telephone, and the research project was explained in detail. 24 patients agreed to participate, and then an initial appointment was scheduled and the Weight Loss Questionnaire and consent form was sent through an anonymous link via Qualtrics through text or email. The Weight Loss Questionnaire assesses the attitudes, behaviors and motivation towards weight loss based on the Theory of Planned Behavior using a 5-point Linkert scale (Horne et al., 2020). The Weight Loss Questionnaire can be found in *Appendix N.* The Informed Consent for the control group and the experimental group can be found in *Appendices I and J.* The scripted consent detailed the aim and objectives of this project in order to obtain a signed consent from overweight and obese patients participating in this project. During the pre-implementation phase, I constructed a script as a reference for the delivery of the standardized health education to be provided for both groups. The Brief Health Education outline can be found in *Appendix M*. During the first appointment, I provided standardized education using evidence-based measures and materials

regarding weight management and healthy lifestyle intervention recommendations. During the pre-implementation phase, follow-up emails and phone calls were made to patients who agreed to participate but failed to arrive at the initial appointment or complete the online Weight Loss Questionnaire and Informed Consent. Those phone calls were made throughout the month of December and January on the day of missed appointments and then a follow-up 3-5 days later if there was no answer.

Lastly, I created an Excel codebook. The codebook consists of information to help collect data from the chart reviews, demographic information and compile project results.

Implementation Phase

Various deviations were observed and monitored throughout the implementation phase utilizing cycles; those deviations can be found in *Appendix R.* The implementation phase began January 2, 2022 with initial appointments lasting approximately 30 minutes. The control group and the experimental group both attended an initial appointment where me, or the clinic RN, measured the participant's height, weight, and blood pressure. Additionally, during the initial appointment both groups completed the pre-Weight Loss Questionnaire. Both groups received the same brief general health education about weight management guidelines and lifestyle recommendations to achieve weight loss. Furthermore, I provided additional one-on-one education to the experimental group about MyFitnessPal© and walked through how to set up the application. I gave the experimental group a MyFitnessPal© Handout with information and tips on how to use the mobile application. The experimental group was expected to self-log their dietary intake everyday and log their weight in the application every week. I have assessed weekly participation through MyFitnessPal©, I created a chart to aid in visual data on the

percentage of patients completing self-monitoring through MyFitnessPal© each week in the experimental group and the weekly weigh-ins of each group.

Both groups attended a follow-up appointment at the end of the 12-week implementation to re-assess height, weight, and blood pressure along with the post-Weight Loss Questionnaire.

PDSA Cycles

As the project progressed, there were unforeseen circumstances that lead to necessary changes. Changes to the timeline were necessary to improve the sample size. The changes were made utilizing the Plan, Do, Study, Act (PDSA) cycles. *See Appendix R for the PDSA Cycles.*

Participant Recruitment. A lower sample size was observed at the completion of the 3-week recruitment phase. The expectation during that time was to obtain approximately 30 participants. The first week yielded approximately 36 potential patients that were sent consents and questionnaires. 19 of these patients completed the questionnaire and consents, and then arrived to the initial appointment. 5 patients were recruited from already scheduled annual wellness exams. Overall, there were 24 participants enrolled in the project with 12 in the control group and 12 in the experimental group.

Post-Implementation Phase

Data collection during the implementation was then analyzed and evaluated to determine if weight, BMI, and blood pressure were decreased in the experimental group as compared to the control group with the implementation of weight loss management protocol. After administering the Weight Loss Questionnaire post-intervention, I used the data to compile a chart of common weight loss barriers patient's come across at the clinic and factors contributing to weight gain. Data showed a negative correlation between an increase in patient knowledge of weight loss measures through MyFitnessPal© and a decrease in weight gain. The results of the project were

disseminated to the facility's key stakeholders, the clinic staff, and the Eleanor Mann School of Nursing.

Project Timeline

See *Appendix G* for the comparison of the initial timeline and the final timeline. Changes to the timeline occurred due to COVID diagnoses, inclement weather, and personal events affecting my ability to finish the project on initial timeline dates.

Evaluation of Results

Data Maintenance and Security

A Microsoft Excel spreadsheet and a Qualtrics account were created and used for data collection. At weekly intervals, weight measurements for each patient were recorded and educational reinforcement provided as needed. A retrospective chart review was performed weekly and at post-intervention using MyFitnessPal© to obtain data regarding caloric intake, dietary patterns and physical activity. Data was collected for all subjects and included height, weight, BMI, age, sex, race, income level, education level, marital status, attitudes towards weight loss, and motivation to lose weight at the present time. During the implementation period, additional information was collected including adherence to self-logging through MyFitnessPal©, adherence to weekly weigh-ins on MyFitnessPal©, complications and advantages with use of MyFitnessPal©. See *Appendix Q* for data collection sheets.

Once all patient information was obtained from the electronic medical record, the patient's MRN was deleted to remove all patient identifiers. All patient data was saved and stored on my personal laptop that is password protected. The document was also password protected to increase subject privacy and confidentiality. I was the only person that had access to the project data.

Data Analysis

Data analysis included both descriptive and inferential statistical methods summarizing the results of the DNP quality improvement project implementation. Data was analyzed utilizing SPSS to determine the outcome measures, process measures, and balancing measures of the project results. Project results are outlined below in conjunction with the specified project measures. The objectives of this DNP project were to evaluate how the implementation of MyFitnessPal© at a rural primary clinic affected weight loss for those diagnosed with obesity. The specific aim was to increase weight loss from the participants' baseline weight by 5% by March 2022. A run chart was used to depict process measures, *see Charts 1 and 2*.

Outcome Measures

The outcome measures for this DNP quality project evaluated the impact of the implemented evidence-based program change. The first outcome measure for this project was to identify patient populations that meet the clinical definition of overweight or obese. During the pre-implementation phase, 62 patients were identified as overweight or obese with possible interest in the project, 24 patients agreed to participate and completed the consents and questionnaires that were sent. I was unable to identify the exact number of overweight and obese patients at this clinic while performing the chart review. The second outcome measure was the implementation of a weight loss program utilizing a mobile application, MyFitnessPal© with the goal of reducing participants' BMI by 5%. This outcome measure was achieved through the implementation of a 12-week MyFitnessPal© program. The effectiveness of the program was determined by comparing experimental participants' average pre and post BMI reduction to the control group pre-and post BMI reduction to determine if a significant change was achieved, however there was not a statistically significant change ($t=-.156$; $n=24$: $p=.877$). An independent

t-test was used to compare if the difference between two groups is statistically significant (Xu et al., 2017). The mean of the post-intervention BMI of the experimental group was 36.96 and the mean of the BMI in the post-intervention control group was 37.39. An independent t-test was run indicating difference between the BMI in the control group and the experimental groups after the intervention was implemented, however there was not a statistically significant change (t=-.156; n=24: p=.877). This could be due to a small Cohen's effect size (d=-.064, 95%CI, [-.863, .737]) and small sample size. The mean of the post-intervention weight of the experimental group was 249.08lbs and the mean of the weight in the post-intervention control group was 240.08lbs. Again, an independent t-test was run showing there was a difference between the weight in the control group and the experimental groups after the intervention was implemented, however this difference was not statistically significant (t=.541; n=24: p=.594). A small Cohen's effect size was determined (d=.221, 95%CI, [-.584, 1.021]). This determined the effectiveness of the MyFitnessPal© intervention was clinically significant, however not statistically significant.

A Chi Square test was used to determine the significant relationships between weight and BMI reduction in the MyFitnessPal© intervention group and categorical data including race, gender, marital status, education level, and socioeconomic level. Since there was only one race reported among participants in this project, this was not included in the Chi Square analysis. According to the Chi-Square analysis there were no significant relationships between the variables and weight loss, therefore, there was a failure to reject the null hypothesis.

Additional comparison of pre- and post- implementation percentage were made to determine the impact of MyFitnessPal© on weight loss, BMI and blood pressure in the experimental group. See *Table 1* below.

Table 1.

Effectiveness of MyFitnessPal© Experimental Group

Variable	Pre-implementation (N=12)	Post-implementation (N=12)	
	Mean (SD)	Mean (SD)	p-value
Weight	252.08lbs	249.08lbs	0.016
BMI	37.5	37.0	0.053
Systolic Blood Pressure	126	124	0.128
Diastolic Blood Pressure	78	75	0.216

Note, A small Cohen's effect size was observed. The Kolmogrov-Smirvov test indicates that the participants BMI do follow a normal distribution.

Next, an additional comparison of pre- and post- implementation was made to determine the impact of standard health education on weight loss and blood pressure in the control group. Results are seen below in *Table 2*.

Table 2

Impact of Standard health Education-Control group

Variable	Pre-implementation (N=12)	Post-implementation (N=12)	
	Mean (SD)	Mean (SD)	p-value
Weight	242.17lbs	240.08lbs	0.030
BMI	37.67	37.42	0.191
Systolic Blood Pressure	129.83	128.75	0.262
Diastolic Blood Pressure	81.92	78.92	0.023

Note, A medium Cohen's effect size was observed. The Kolmogrov-Smirvov test indicates that the participants BMI do follow a normal distribution.

Additionally, pre-post measurement of weight and blood pressure will be obtained and compared, *see Tables 3 and 4.* The pre and post systolic blood pressure of the experimental

group results showed a non-significant change (t=1.646, n=12, p=.128). The pre and post diastolic blood pressure of the experimental group results showed a non-significant change in results (t=1.313, n=12, p=.216).

The third outcome measure of this DNP Project was to assess participants' perceptions surrounding weight loss, *see Tables 6, 7, 8, and 9*. This was accomplished via the Weight Loss Questionnaire where concepts regarding attitudes, behavior intention, subjective norms, social norms, perceived power, and perceived behavioral control were assessed via a pre-post survey questionnaires among both the experimental and control group. Overall, There was no significant change in the answers to the post-intervention questionnaire in the control and experimental groups. However there was a significant change in the question #1 (t=-2.803, d(f)11, p=.017) and question #10 (t=-2.462, d(f)11, p=.032) pre and post-intervention in the experimental group. Question #1 measures the *attitude* of the participant towards weight loss. Question #10 measures the *subjective norm* as whether the participant believes their family or friends thinks they should lose weight. There was no significant change between the pre and post answers for the questionnaire of the control group. Additionally, a paired samples t-test will be performed to determine any statistically significant difference among pre-and post project intervention perceptions surrounding weight loss. Perceptions surrounding weight loss were measured with the Weight Loss Questionnaire where concepts regarding attitudes, behavior intention, subjective norms, social norms, perceived power, and perceived behavioral control were assessed. There was no significant difference in the answers to the pre-intervention questionnaire in the control and experimental groups. There was no significant change in the answers to the post-intervention questionnaire in the control and experimental groups. However, there was a significant improvement in the answers given in question #1 (t=-2.803, d(f)11, p=.017) and question #10

(t=-2.462, d(f)11, p=.032) pre and post-intervention in the experimental group. There were no significant changes in the answers given in the pre and post control questionnaires.

Table 3

Participant Demographic Data

Participants	N=24	n=	%
Sex	Male	11	46%
	Female	13	54%
Age	18-29	10	42%
	30-49	9	37%
	50-69	5	21%
Education	High school	10	42%
	College	14	58%
Income	< $40,000/year	5	21%
	> $40,000/year	19	79%
Relationship	Single	13	54%
	Married	10	42%
	Not answered	1	4%

ID	Weight (lb)	BMI	BP	Post-weight	Post-BMI	Post-BP
1	280	36.9	129/82	284	37.5	125/80
2	291	51.5	130/72	284	50.3	130/70
3	273	40.3	134/90	268	39.6	130/90
4	256	38.9	118/68	251	38.2	n/a
5	289	37.1	138/83	287	36.8	135.80
6	211	32.1	120/70	202	30.7	120/60
7	215	30.8	132/88	210	30.1	135/88
8	199	33.1	128/88	200	33.3	120/90
9	298	45.3	130/70	297	45.2	132/60

10	201	31.5	115/79	201	31.5	110/65
11	242	34.7	110/70	240	34.4	110/70
12	270	36.6	128/80	265	35.9	120/80

Table 4

Implementation Measurements Experimental Group

Table 5

Implementation Measurements Control Group

ID	Weight (lb)	BMI	BP	Post-weight	Post-BMI	Post-BP
1	182	31.2	126/88	183	31.4	120/90
2	217	30.3	120/70	219	30.5	122/60
3	175	29.1	116/81	173	28.8	118/78
4	265	42.8	132/80	259	41.8	130/80
5	201	35.6	142/90	200	35.4	140/90
6	294	42.2	132/88	293	42.0	130/87
7	203	30.0	120/71	200	29.5	125/70
8	295	54.0	136/88	295	54.0	135/80
9	276	36.4	134/76	273	36.0	130/75
10	258	47.2	131/89	250	45.7	128/80
11	247	34.4	129/74	247	34.4	130/70
12	293	39.7	140/88	289	39.2	137/85

Table 6

Pre-Intervention Questionnaire Data for Control Group

Question	N	Mean	Std. Deviation
1. For me, managing my weight is	12	4.42	.669
2. My family thinks that I should improve my dietary pattern	12	3.5	1.000
3. My friends thinks that I should improve my dietary pattern	12	3.17	.937
4.My friends exercises regularly	12	3.33	1.155
5. My family exercises regularly	12	3.17	1.193
6. My friends eat a generally healthy diet	12	3.58	.793
7. My family eats a generally healthy diet	12	3.08	.996
8. When it comes to my health, it is important for me to do what my health care team thinks I should do	12	4.58	.389
9. When it comes to my health, it is important for me to do what my friends thinks I should do	12	2.75	.965
10. When it comes to my health, it is important for me to do what my family thinks I should do	12	3.25	.866
11. When it comes to my health, it is important for me to lose weight	12	4.50	1.168
12. For me, making beneficial changes to my diet over the next three months will be	12	3.00	1.128
13. For me, trying to manage my weight over the next three months will be	12	3.00	1.128
14. How often do events arise in your life that suddenly take up your free time	12	3.33	.985
15. How often do you feel ill or tired	12	3.67	.778

Table 7

Pre-Intervention Questionnaire Data for Experimental Group

Question	N	Mean	Std. Deviation
1. For me, managing my weight is	12	4.25	.622
2. My family thinks that I should improve my dietary pattern	12	3.75	1.288
3. My friends thinks that I should improve my dietary pattern	12	2.83	.835
4.My friends exercises regularly	12	2.58	1.379
5. My family exercises regularly	12	2.92	1.311
6. My friends eat a generally healthy diet	12	3.00	1.044
7. My family eats a generally healthy diet	12	3.42	.793
8. When it comes to my health, it is important for me to do what my health care team thinks I should do	12	4.83	.389
9. When it comes to my health, it is important for me to do what my friends thinks I should do	12	2.50	.798
10. When it comes to my health, it is important for me to do what my family thinks I should do	12	3.67	1.073
11. When it comes to my health, it is important for me to lose weight	12	4.58	.669
12. For me, making beneficial changes to my diet over the next three months will be	12	3.33	.985
13. For me, trying to manage my weight over the next three months will be	12	3.25	1.215
14. How often do events arise in your life that suddenly take up your free time	12	3.33	1.614
15. How often do you feel ill or tired	12	3.25	1.138

Table 8

Post-Intervention Questionnaire Data for Control group

Question	N	Mean	Std. Deviation

1. For me, managing my weight is	11	4.27	.492
2. My family thinks that I should improve my dietary pattern	12	4.00	.853
3. My friends thinks that I should improve my dietary pattern	12	3.75	.754
4.My friends exercises regularly	12	3.17	.835
5. My family exercises regularly	12	3.42	.793
6. My friends eat a generally healthy diet	12	3.42	.900
7. My family eats a generally healthy diet	12	3.42	.900
8. When it comes to my health, it is important for me to do what my health care team thinks I should do	12	4.75	.452
9. When it comes to my health, it is important for me to do what my friends thinks I should do	12	3.33	.651
10. When it comes to my health, it is important for me to do what my family thinks I should do	12	3.67	.651
11. When it comes to my health, it is important for me to lose weight	12	4.67	.492
12. For me, making beneficial changes to my diet over the next three months will be	12	2.75	.965
13. For me, trying to manage my weight over the next three months will be	12	2.75	.965
14. How often do events arise in your life that suddenly take up your free time	12	3.45	.820
15. How often do you feel ill or tired	11	3.27	1.104

Table 9

Post-Intervention Questionnaire Data for Experimental Group

Question	N	Mean	Std. Deviation
1. For me, managing my weight is	12	4.67	.492

2. My family thinks that I should improve my dietary pattern	12	4.08	.900
3. My friends thinks that I should improve my dietary pattern	12	3.17	.718
4.My friends exercises regularly	12	3.42	.669
5. My family exercises regularly	12	3.75	.622
6. My friends eat a generally healthy diet	12	3.08	1.084
7. My family eats a generally healthy diet	12	3.58	.900
8. When it comes to my health, it is important for me to do what my health care team thinks I should do	12	4.92	.289
9. When it comes to my health, it is important for me to do what my friends thinks I should do	12	2.92	.996
10. When it comes to my health, it is important for me to do what my family thinks I should do	12	4.42	.515
11. When it comes to my health, it is important for me to lose weight	12	4.67	.492
12. For me, making beneficial changes to my diet over the next three months will be	12	3.17	.937
13. For me, trying to manage my weight over the next three months will be	12	2.92	.996
14. How often do events arise in your life that suddenly take up your free time	12	3.83	.937
15. How often do you feel ill or tired	11	3.17	1.267

Process Measures

The process measures for this study explained the specific steps in the process that led to each outcome measure. Initially, a retrospective chart review was performed at the clinic site and the expectation was for 60 patients to be included in the project with 30 participants in the experimental group and 30 participants in the control group. The sample size was affected due to

lack of participation due to COVID-19, inclement weather, and personal events. Consequently, some patients failed to be enrolled before the program deadline and only 24 participants were enrolled in the project, 12 in the experimental group and 12 in the control group, *see Table 1.*

Another process measure included the percentages of participants who completed the Weight Loss Questionnaire at the pre- and post- intervention with the goal being that 75% of the patients complete the Weight Loss Questionnaire at each point in time. Approximately 100% of the participants in the experimental and the control groups completed the pre-implementation Weight Loss Questionnaire. Approximately 95.8% of participants completed the post-implementation Weight Loss Questionnaire. The one participant who was unable to complete the post-implementation questionnaire was unaware they did not fully complete all of the questions, but the answers they completed were included in the data analysis.

To ensure the outcome measure of self-monitoring compliance was completed, the number of participants who completed diet self-monitoring accurately, by documenting three meals a day on MyFitnessPal©, was monitored. The number of participants who completed weekly weight check-ins was also monitored. After the 12 weeks, 41.7% of the participants in the experimental group successfully completed weekly self-logging by documenting three meals a day. Furthermore, 83.3% of participants in the experimental group performed weekly weigh-ins on the application *see Charts 1 and 2.*

Lastly, the percentage of follow-up attendance among experimental and control groups was 91% between both groups for the initial and the follow-up appointments. The two participants unable to attend their follow-up appointments in-person were sick and their post-intervention weight was recorded from the scale they use at home. Follow-up appointments were monitored via PDSA cycles, *see Appendix R.*

Chart 1

Participation of Weekly Weigh-ins in MyFitnessPal©

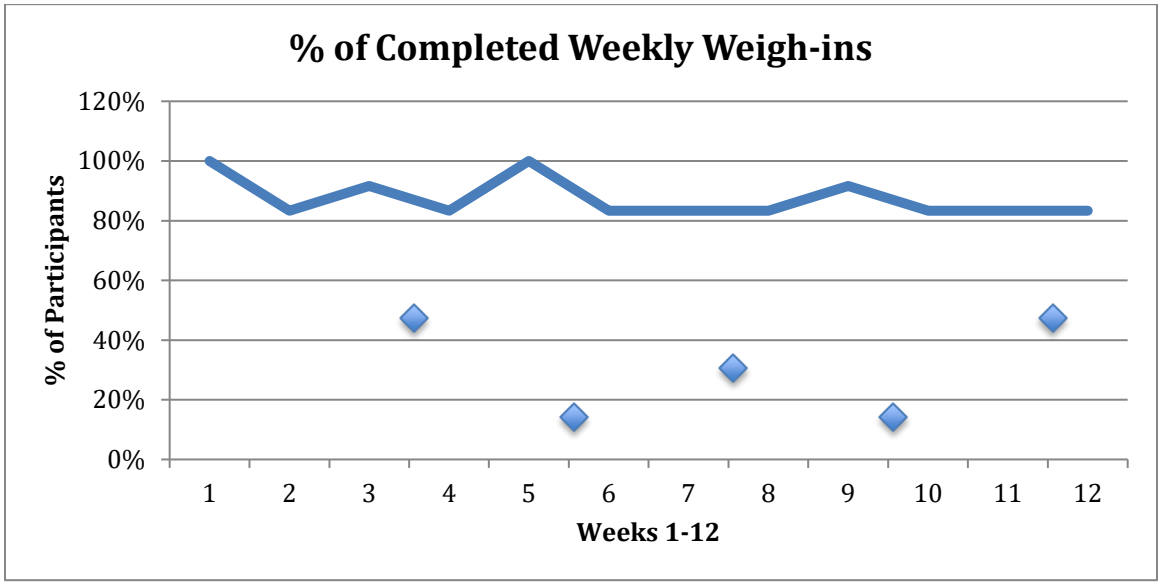
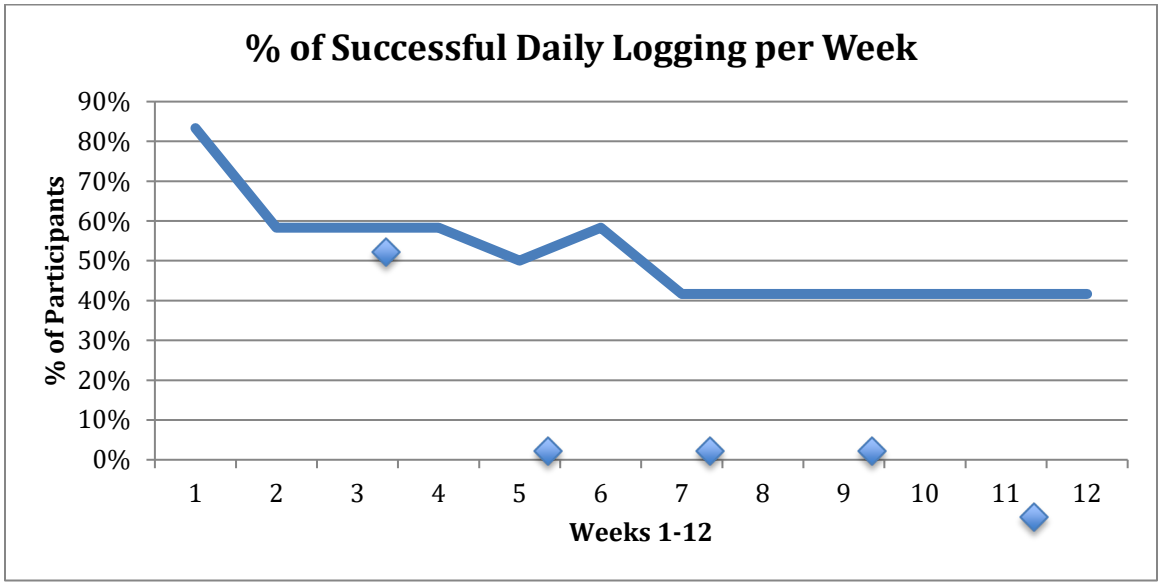


Chart 2

Participation in Self-Monitoring in MyFitnessPal©



Balancing Measures

The balancing measures for this DNP project were used to evaluate both positive and negative effects of the implementation process. With the implementation of a phone-based intervention, there is a potential that increased phone usage and screen time, may negatively impact participants' wellbeing and daily activities. To assess this balancing measure, the post-intervention Weight Loss Questionnaire ascertained increases in screen-time and the impact on well-being and daily activities. Approximately 91.7% participants stated they strongly disagreed that the weight management program caused increased phone usage and screen time. The second project balancing measure assessed participants' satisfaction of the MyFitnessPal© app. The post-intervention Weight Loss Questionnaire for the experimental group assessed patient satisfaction with regards to MyFitnessPal©, weekly weigh-ins, and weekly follow-up communication. Approximately 66.7% participants stated that they were somewhat satisfied with their results after using MyFitnessPal©. Furthermore, 100% of the participants either strongly agreed or somewhat agreed that the MyFitnessPal© application was easy to use.

Overall, there was a difference in mean BMI and weight of the experimental versus the control group, however, not a statistical significant difference. On the other hand, the experimental group experienced a significant change in weight before and after the 12-week weight management program utilizing MyFitnessPal© ($p=.016$). Additionally, the control group experienced a significant change in weight before and after the receiving the standard education and then following up 12 weeks later ($p=.030$). Also, in the control group there was a significant decrease in diastolic blood pressure after the 12 weeks ($p=.023$). Furthermore, 83.3% of participants in the experimental group performed weekly weigh-ins on the application. Overall, there was no statistical significance between the control and experimental groups with perceptions of weight loss assessed in the Weight Loss Questionnaire. However there was a

significant change in the question #1 which asked the experimental group participants how important it was to them to manage their weight (t=-2.803, d(f)11, p=.017). Although a statistical significant difference in weight and BMI of the experimental group compared to the control was not noted, there were still impactful improvements seen.

Discussion

Healthcare Quality Impact

The primary goal of weight management in primary care is to reduce the morbidity and mortality of overweight or obese patients and to improve psychological wellbeing and social function. To achieve this reduction in morbidity or mortality, the risks inducing these have to be decreased (Ghelani et al., 2020). Primary care providers have cited the lack of time and training they have to provide the necessary follow-up and education for overweight and obese patients (Kahan, 2018). Incorporating mainstream technology for weight management is an innovative and cost-effective way to reach larger populations, which can increase access to healthcare (Bracken & Waite, 2020). Overall, evidence suggests that mobile applications, such as MyFitnessPal©, may be useful as low-intensity approaches or adjuncts to conventional weight management strategies. Electronic mobile health apps such as MyFitnessPal© allow room for behavior change while implementing reminders, feedback, goal setting, and diet and activity tracking (Ghelani et al., 2020).

In another randomized control trial similar to this project, the experimental group used MyFitnessPal© for 6 months. Overall, there was no significant difference between intervention and control groups in weight change (mean between group difference, −0.67 lb [CI, −3.3 to 2.1lb]; p = 0.63) or in SBP (mean between group difference, −1.7 mmHg [CI, −7.1 to 3.8]; p = 0.55). The intervention group exhibited increased use of a personal calorie goal compared to the

control group though changes in other self-reported behaviors did not differ between the groups. Most users reported high satisfaction with MyFitnessPal but logins dropped sharply after the first month (Laing et al., 2015). For this study by Laing et al. (2015), the app was given to patients by research assistants, not by their primary care provider and 19% of patients did not attend follow-up appointments.

For this DNP project, the goal was for 75% of participants to complete the questionnaires before and after the 12-week intervention, approximately 100% completed the pre-questionnaire and 95.8% completed the post-questionnaire. Furthermore, 91% of the control and the experimental groups combined, attended the follow-up appointment. Participants in the experimental group were found to have a significant improvement in their attitudes and subjective norms towards weight loss after the intervention was implemented. All participants in the experimental group also reported high satisfaction with easy utilization of the MyFitnessPal© application. Overall, the DNP project was clinically significant, however not statistically significant (t=-.156; n=24: p=.877). This could have been due to the small sample size of 24. One possible explanation for the negative results is that our participants may have wanted to lose weight but was not ready to put in the necessary work to self-monitor their diet. Combining a weight loss app with a proven weight-loss counseling program could also be a powerful combination of tools (Laing et al., 2015).

Economic and Cost Benefits

Nationally, the estimated direct and indirect costs of obesity add up to be more than $190 billion each year. In addition, work absenteeism related to obesity costs $4.3 billion annually (CDC, 2021). However, if obesity trends were lowered by reducing the average adult BMI by only 5 percent, millions of Americans could be spared from serious health problems and

preventable diseases, and the country could save $29.8 billion in five years, $158 billion in 10 years and $611.7 billion in 20 years (Levi et al., 2012). Reducing obesity and improving health can help lower costs through fewer trips to the clinic, fewer tests, fewer prescription drugs, fewer sick days, fewer emergency room visits, and fewer readmissions to the hospital and lower risk for a wide range diseases (Levi et al., 2013). If an improved version of MyFitnessPal© or a similar application proved to be effective at reducing weight in the future, it could easily be distributed to patients at minimal cost. MyFitnessPal© is free and could be introduced to patients by any licensed personnel in less than five minutes. In contrast, the long-term consequences of obesity, such as diabetes and cardiovascular disease, are immensely expensive for the U.S. healthcare system (Laing et al., 2015).

Project Limitations

Despite attempting to limit project limitations, inherently these occur. First, there were multiple limitations presented during the pre-implementation and the implementation phases of the project. Due to a small amount of time to recruit patients, a change in recruitment tactic was made to include individuals already presenting for their annual exam who qualified for the project. This tactic may have included patients who already had the innate desire to improve their weight. Next, there is the confounding variable of the New Year and New Years resolutions since this project implementation took place January through March of 2022. This could be a confounding variable for weight loss, not controlled for in the project.

One of the objectives for this project was to improve the participants BMI by at least 5%. This was completed by weighing patients on the same scale at the clinic before and after the 12-week program. Due to the inability of 2 patients to perform their follow-up appointment in-person, they used the scale they previously owned at home. Unfortunately, there was nothing I

could do to enforce the participants utilizing the scale in the clinic when they are sick. This is a variable that could be measured in the clinic after the project is disseminated.

Furthermore, there are limitations of a quasi-experimental design that made this project unable to be truly randomized. To limit bias, there was no reward for completing the 12-week program or the questionnaires. Also, this project had a small sample size of 24 participants, which limits the power and impacts data analysis. The demographic makeup of the sample may limit generalizability as the project population consisted of only white individuals residing in a rural town of Northwest Arkansas. A diverse population would be more indicative of trends within the general population and may alter the final inferential statistic results. When generalizing results to other states, that state's particular demographic makeup would have to be considered. Additionally, a greater sample size would lead to more confident interpretation of the inferential statistics.

Sustainability

Consistent follow-up and education with patients regarding weight management is important to the sustainability of this project. The frequency and overwhelming nature of weight management continues to persist in part because much of the responsibility lies with the patient. Utilizing MyFitnessPal© is meant to be a beginning step in the process of weight management. Project results will be dispersed to the staff to emphasize the need to continue the use of MyFitnessPal© to assist with weight management after the project as ended.

Recommendations

Practice Implications

After disseminating the research with the University of Arkansas and the identified clinic, there are more opportunities available for dissemination. One way I would like to disseminate

the results is to organize all the materials used for this project, creating a toolkit, and dispersing it for other communities and rural primary care clinics. This toolkit would be used to frame the objectives for dissemination, which will guide the materials that need to be created and the method of dissemination. Additionally, the tool helps the user allocate resources to achieve the dissemination objectives (University of Nebraska, 2017).

Policy Implications

Currently, there are not any policies or protocols for weight management of overweight and obese patients at this clinic. State and school district governments, in particular, have been at the forefront of enacting obesity-related policy interventions in the United States. Statewide, in Arkansas, the Arkansas Department of Health provides guidance, support, and expertise to the Arkansas Coalition for Obesity Prevention (ARCOP). ARCOP's mission is to improve the health of all Arkansas communities by increasing physical activity, healthy eating, and obesity prevention. ARCOP provides leadership and guidance for implementing walking ability, biking ability, access to healthy foods, work-site wellness toolkits for employers, and physical activity requirements for schools. Furthermore, Arkansas Act 1220 of 2003 was one of the first legislations to combat childhood obesity in public schools. This act ensures all children and adolescents have their BMI measured and a policy to implement and promote healthy behaviors at schools. The implementation of this DNP project can assist with future weight management approach and can create awareness for improving patient education regarding weight loss.

Dissemination

Site and DNP Committee Reporting

Results of this DNP project will be disseminated virtually to the clinical site and the DNP committee at the University of Arkansas, Eleanor Mann School of Nursing and the site's nursing

staff and office administrators. The clinic's APRN, the Chief Medical Officer and the Clinic Educator will receive the results of the questionnaires via a summary report depicting the changes and overall response to the weight management program. Dissemination of project results to the University of Arkansas committee, faculty, and students will occur via poster presentation at the DNP Intensive on April 20, 2022. Sharing the results from my project can help other rural organizations learn what works. Informing stakeholders about the weight management program can help build and maintain relationships, credibility, and local support from the community (University of Nebraska, 2017).

After disseminating my research with the University of Arkansas and the clinic site, there are more opportunities available for dissemination. The clinical site has chosen to educate patients about MyFitnessPal© and utilize the MyFitnessPal© Handout created for this project. The clinic APRN and RN will then be able to follow-up with patients and assess their usage of the application at follow-up appointments. One way I would like to further disseminate my results is to organize all the materials used for this project, creating a toolkit, and dispersing it for other communities and rural primary care clinics. This toolkit would be used to frame the objectives for dissemination, which will guide the materials that need to be created and the method of dissemination. Additionally, the tool helps the user allocate resources to achieve the dissemination objectives (University of Nebraska, 2017).

Professional Reporting

Project results can be distributed to the *International Journal of Obesity*, *Obesity, The Obesity Society,* and the *Epidemic of Obesity.* There are several national conferences the results could be disseminated at such as the Arkansas Nurse Practitioner's Conference, the ICOO Overweight and Obesity Conference or the Nutrition, Obesity and Weight Management

Conference, which are both hosted by the World Academy of Science, Engineering, &Technology.

Conclusion

Even though obesity is a preventable disease, it is still associated with the leading causes of death in the United States and worldwide, including diabetes, heart disease, stroke, and some types of cancer (CDC, 2021). Obesity has resulted in a negative economic impact in healthcare costs including annual spending of over $190 billion (USDHHS, 2017). Many providers find it difficult to dedicate time to weight management and counseling. Additionally, in rural primary care communities, providers face workforce shortages and lack of specialized services (Batsis et al., 2017). The DNP project illustrated the usefulness of a routine weight management program implementing MyFitnessPal© and follow-up weight management education among overweight and obesity patients. Strengths of this study include the experimental design, implementation in real-world rural primary care settings, and use of a commercially available, free smartphone application. The initial goal was to identify 30 patients for this project, 24 patients were included. The DNP project aimed to improve the quality of weight loss by at least 5% from the patients' original weight by the end of the 12-week intervention. The principal finding was that the implementation of a weight management program utilizing MyFitnessPal© in this project was clinically significant, however not statistically significant (t=-.156; n=24: p=.877). This could be due to a small Cohen's effect size (d=-.064, 95%CI, [-.863, .737]) and small sample size. Additionally, the goal was for 75% of participants to complete the questionnaires before and after the 12-week intervention, approximately 100% completed the pre-questionnaire and 95.8% completed the post-questionnaire. Participants in the experimental group were found to have a significant improvement in their attitudes and subjective norms towards weight loss after the

intervention was implemented. All participants in the experimental group also reported high satisfaction with easy utilization of the MyFitnessPal© application. At the clinic chosen for this project, the plan is to continue utilizing handout regarding education about MyFitnessPal© and follow-up with their usage of the app in 12-weeks. Smartphone apps, such as MyFitnessPal©, for weight loss may be useful for individuals who are ready to self-monitor dietary habits. For the average overweight primary care patient, however, introducing a smartphone app may be unlikely to produce significant weight change, but can be used as an additional tool to encourage weight loss in obese and overweight individuals.

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Appendices

Appendix A

Hi trittman,

Your support request has been updated, and a full history of your conversation with our support team is below. To respond to the agent you're working with, you can simply reply to this email or follow this link: https://support.MyFitnessPal©©.com/hc/requests/4070063.

If we fixed your issue or provided a proper explanation, your support request will not require an update and will solve automatically in three business days without your response. If your issue requires a fresh set of developer eyes it could take a little while to diagnose and solve, but if you email us from the link above we can provide an update. Regardless, we thank you for your patience, feedback, and assistance in crafting the best fitness tracker on the market.

Stay fit, stay healthy, stay happy!
MyFitnessPal©© Support

Judy (MyFitnessPal©©)
Sep 8, 2021, 12:03 PM PDT

Hello there,

We are honored by your interest in conducting a study involving MyFitnessPal©©. While we very much appreciate your consideration of working with our company, at this time, we are not currently able to provide direct support for any research projects.

We do request that anyone conducting research adhere to our community guidelines and terms of use. You are welcome to create a group or blog post looking for participants for your research. Please do not send unsolicited messages or use the main forum for research purposes.

http://www.MyFitnessPal©©.com/account/terms_and_privacy?

http://www.MyFitnessPal©©.com/welcome/guidelines

I hope this information is helpful and we wish you the very best of luck with your research.

Warm Regards,

Judy

MyFitnessPal©© Staff

Appendix B: Global Aims Statement

Global Aim Statement

Improving quality of weight management in primary care by establishing a 3-month weight loss program for adult patients in rural clinic setting.

We aim to improve to improve the BMI of overweight and obese adult patients by implementing a structured 3-month weight loss program utilizing MyFitnessPal© within the rural clinic setting.

In: Access Medical Clinic in West Fork, Arkansas

The process begins with: an appointment at Access Medical Clinic.

The process ends with a follow-up appointment at Access Medical Clinic.

By working on the process, we expect a decrease in BMI, increased adherence to lifestyle changes, development of a structured and feasible weight loss program and improved patient outcomes.

It is important to work on this now because obesity and overweight increase the risk of developing non-communicable diseases such as cancer, diabetes and cardiovascular diseases. Improving weight management in primary care can reduce obesity-associated comorbidities and improve quality of life (Maurer, 2016).

Specific Aim Statement

We will: ■ improve ☐ increase ☐ decrease

The: ■ quality of ☐ number/amount of ☐ percentage of weight loss

By: n/a

(percentage)

OR

From: original weight

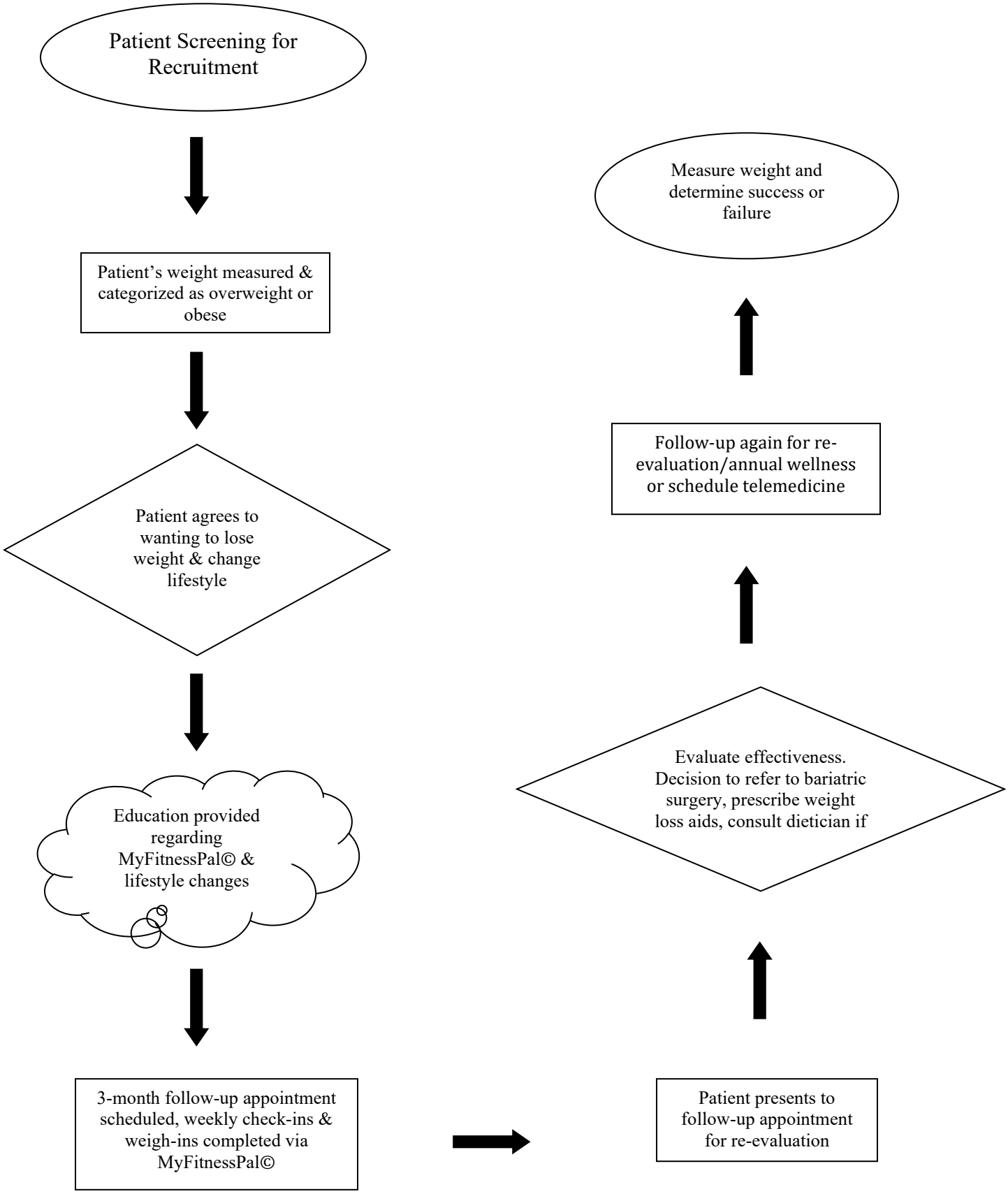
(baseline state/number/amount/percentage)

To/By: 5-15%

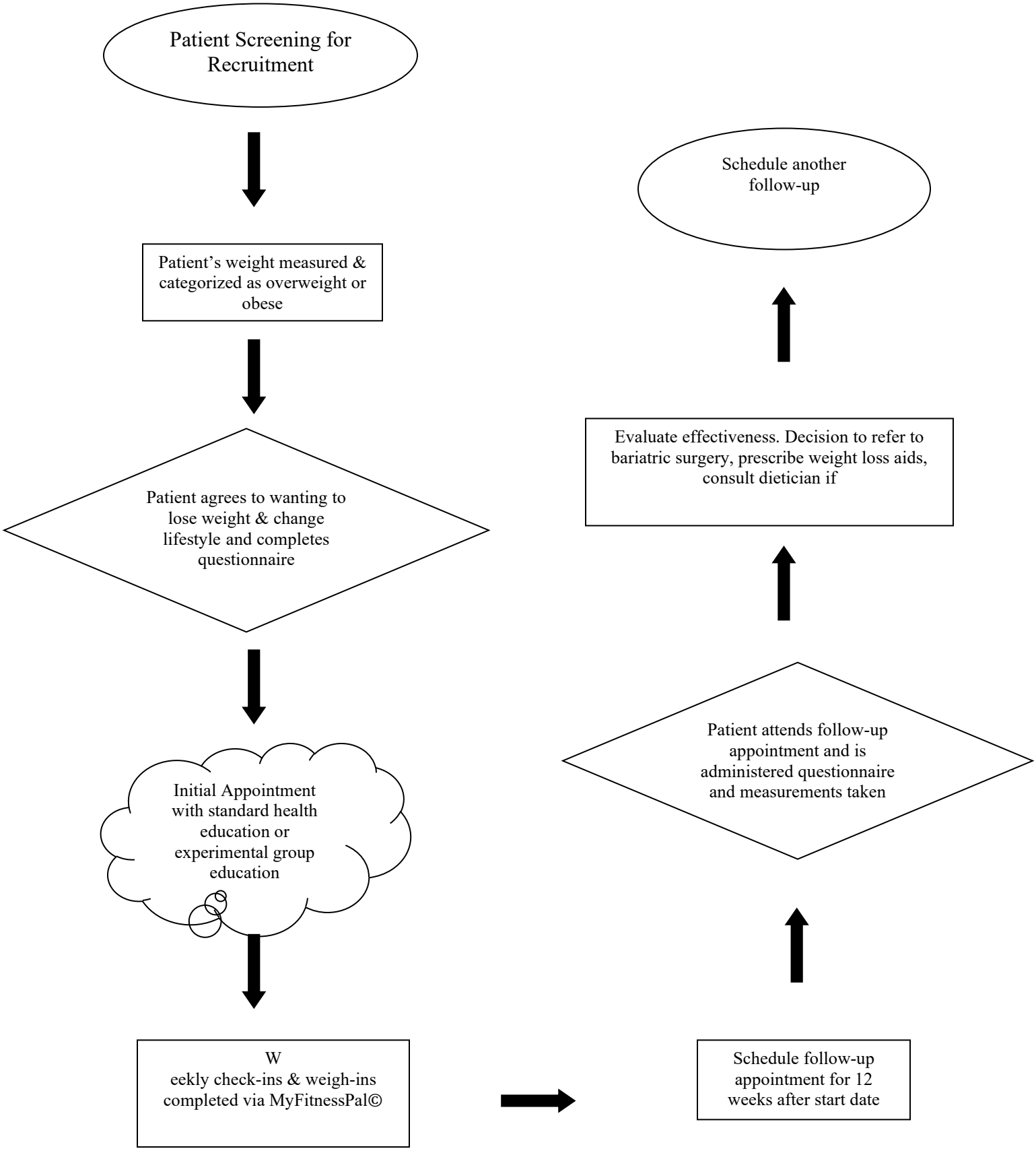
(describe the change in quality or state the number/amount/percentage)

By: March 31, 2022

Appendix C: Pre-Implementation Process Flow Chart



Appendix D: Post-Implementation Process Flow Chart



Appendix D: Evidence Table

Authors	Year	Country where research conducted	Theory guiding the study and identification of concepts	Independent or Treatment Variable(s)	Dependent or Outcome Variable(s)	Research Design	Sample Method (N=)	Data Collection Process	Brief Summary of Results	Strength of evidence (Level)
Afshin et al.	2017	United States	Not stated	Overweight and obese adults	BMI	Systematic Review	68.5 million	Comparative risk assessment	There is an increased need for BMI identification, monitoring, evaluation and evidence based interventions	1
Albaugh & Abumrad	2018	United States	Not stated	Bariatric Surgery	Weight loss in obese individuals	Systematic Review	N/A	N/A	In the future, the indications for metabolic and bariatric surgery will not only continue to broaden to treat obesity but also preclude its development in high-risk individuals	3

Angrisani, L., Santonicola, A., Iovino, P., Vitiello, A., Zundel, N., Buchwald, H., et al.	2018	United States	Not stated	Types of bariatric surgery	weight loss	Data Analysis from IFO database	579,517 surgical operations; 14,725 endoluminal procedures	Survey	Updated overview of all bariatric procedures performed in 2014	2
Batsis,J. A., Pletcher, S. N., & Stahl, J. E.	2017	United States	Not stated	Telemedicine	Quality of care, satisfaction	Retrospective Study	Not stated	Online	Recommendations for improvement in reimbursement for telemedicine services for older adults with obesity	1
Bolling, C.F., Armstrong, S.C., Reichard, K.W., & Michalsky, M.P.	2019	United States	Not Stated	Obesity	Bariatric surgeries	Systematic Review	Not stated	Not stated	Severe obesity in children and adolescents is a worsening health crisis in the United States	1

Bowen, P. G., Lee, L. T., McCaskill, G. M., Bryant, P. H., Hess, M. A., & Ivey, J. B.	2019	United States	Not stated	Primary care providers	Obesity management	Systematic Review	Not stated	Not stated	increase PCPs' awareness of health policy's influence on achieving best management practices for obesity management and the clinical implications of caring for this population.	
Bracken, M.L. & Waite, B.M.	2020	United States	Social Cognitive Theory	MyFitnessPal©© use	Self-efficacy for healthy eating	RCT	112	Online survey	The results from this study suggest that MFP may be the most helpful for those who find it more difficult to meet their nutrition-related goals.	
Cuevas A.G., Chen, R., Slopen, N., Thurber K.A., Wilson, N., Economos,	2020	United States	Not stated	Race/ethnicity	Health behaviors	Cross-Sectional	3,105	Face-to-face interviews	Exposure to stressors may play a role in obesity disparities, particularly among Black and US-born	

C., & Williams, D.R.									Hispanic individuals.	
Evenepoel, C., Clevers, E., Deroover, L., Van Loo, W., Matthys, C., & Verbeke, K.	2020	United States	Not stated	MyFitnessPal©©	Total energy intake	RCT	50	data from a previous intervention study	Strong positive correlations between MyFitnessPal©© and Nubel were observed for energy intake, macronutrients, sugar, and fiber, but not for cholesterol and sodium	
Felso, R., Lohner, S., Hollódy, K., Erhardt, É., & Molnár, D.	2017	Not stated	Not stated	Sleep duration	Weight gain in children	Systematic Review	33 studies (including 3 randomized controlled trials and 30 observational studies)	The Ovid MEDLINE, Scopus and Cochrane Central Register of Controlled Trials (CENTRAL) databases were searched	Sleep duration seems to influence weight gain in children, however, the underlying explanatory mechanisms are still uncertain.	

								for papers using text words with appropriate truncation and relevant indexing terms.		
Ghelani, D. P., Moran, L. J., Johnson, C., Mousa, A., & Naderpoor, N.	2020	United States	Not stated	Mobile applications	Weight management	Narrative literature review of RCTs	Not stated	Online database searches	Overall, evidence suggests that mobile applications may be useful as low-intensity approaches or adjuncts to conventional weight management strategies.	
Gordon, M. L., Althoff, T., & Leskovec, J.	2019	United States	Not stated	Goal-setting	Goal achievement	Systematic Review	1.4 million people	Interviews	We find that, even for difficult long-term goals, behavior within the first 7 days predicts those who ultimately achieve their	

									goals, that is, those who lose at least as much weight as they set out to, and those who do not. We then show that we can use our findings to predict goal achievement with an accuracy of 79% ROC AUC just 7 days after a goal is set.	
Gohil, A. & Hannon, T.S.	2018	United States	Not stated	Sleep routine	obesity	Retrospective review	17 observational, cohort, cross-sectional, and case-control studies from 9 countries found convinci	Not stated	While there is a clear association between OSA and type 2 diabetes in adults, whether or not this association is prevalent in youth is unclear at this time.	

							ng evidence of the link between shorter sleep duration and childhood obesity			
Gray, C.L., Messer, L.C., Rappazzo, K.M., Jagai, J.S., Grabich, S.C., Lobdell, D.T.	2018	United States	Not stated	Environemental qualities (5 domains)	Obesity	Cross-Sectional review	3,137 counties	Multi-level linear regression	We found that poor environmental quality exacerbates the LTPIA-obesity relationship.	
Hager, E.R., Calamaro C.J., Bentley, L.M., Hurley, K.M., Wang, Y.,	2016	United States	Not stated	Sleep duration	Obesity, Inactivity	Experimental control	240	Questionnaires	Toddlers with a shorter nighttime sleep duration are at higher risk for obesity and inactivity.	

& Black, M.M.										
Hägglund, M. & Koch, S.	2015	Sweden	Not stated				135,000	Online portal communication		
Hales, C. M., Carroll, M. D., Fryar, C. D., & Ogden, C. L.	2017	United States	Not stated	U.S. population characteristics	obesity	Cross Sectional survey	Not stated, U.S. census population utilized	**Data from the National Health and Nutrition Examination Survey**	The prevalence of obesity among U.S. adults was 39.8%	

Hassan, Y., Head, V., Jacob, D., Bachmann, M. O., Diu, S., & Ford, J.	2016					Systematic Review of RCTs	17 RCTs			
Piernas, C., MacLean, F., Aveyard, P., Ahern, A. L., Woolston, J. Boyland, E. J., Halford, J. C. G., & Jebb, Susan.	2020	United Kingdom	Not stated	Participation in community weight loss program for 12 weeks	Long-term weight loss	RCT	211	Self-Reported	Average weight loss of 0.259 kg per session at 24 months (p = 0.005). Attending 10-12 sessions resulted in higher rate of weight loss.	1
Ross, K., Qui, P., You, L. & Wing, R. R.	2018	United States	Not stated	3-phase Internet weight loss program implemented at work site	Weight loss	RCT	75	Online questionnaire, weigh-in with smart scales assessment	During the first phase, participants lost weight at a rate of 0.04 kg/wk; they transitioned to regain (0.07 6 0.02 kg/ wk). The next transition	2

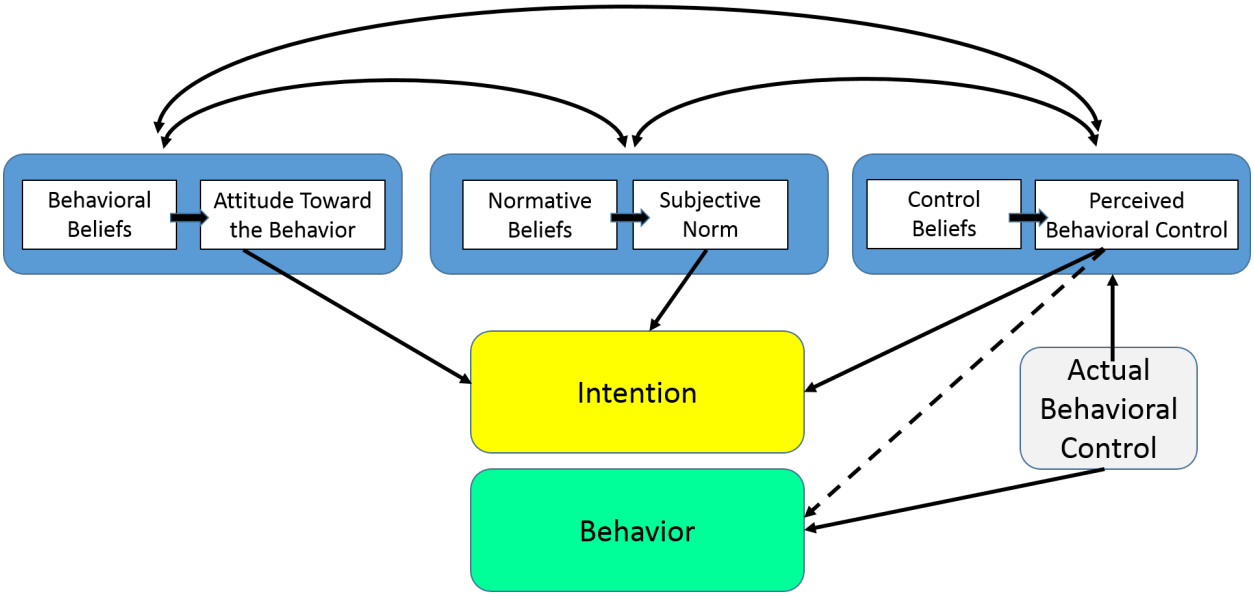
									occurred at after which the rate of regain decreased slightly (0.06 6 0.02 kg/wk)	
Ross K. M. & Wing, R. R.	2016	United States	Not stated	12-week work site wellness program	Weight loss	RCT	75	In-person interview and assessment	An Internet based behavioral weight management intervention can be successfully implemented in a worksite setting and can lead to clinically significant weight losses. Given the low costs of offering this program, it could easily be widely disseminated.	1
Schlicht, C.	201	United States	Not stated	Weight loss program based off NHLBI (2000) obesity	Weight loss and attenden	Retrospecti ve Study	26 African America	Chart reviews and telephone interviews,	One vs. one appointment with NP's over 6 months.	1

	7			treatment guidelines	ce		n, obese and over 18 years of age	one-on-one appointments Multiple Regression Analysis	Increased attendance revealed improved patient outcomes in African American, over 18 yr and obesity.	
Sidhu, M. S., Daley, A., & Jolly, Kate.	2016	United Kingdome	Not Stated	SMS text messaging based weight maintenance program (after completion of 12 week weight loss program)	Patient weight loss	RCT	380	Self-weighing and telephone support	No evidence reported that an SMS based weight intervention prevented weight regain at 3 or 9 months.	1
Tsai, A., Felton, S., Waddon, T. A., Hosokawa, P. W., & Hill, J. O.	2015	United States	Not stated	6 months of intensive behavioral treatment	Patient weight change	RCT	106	In-person visits with interviews and mail-in surveys	In a primary care population, continued in-person visits during the weight loss maintenance phase led to greater weight loss than	3

									contact by mail.	

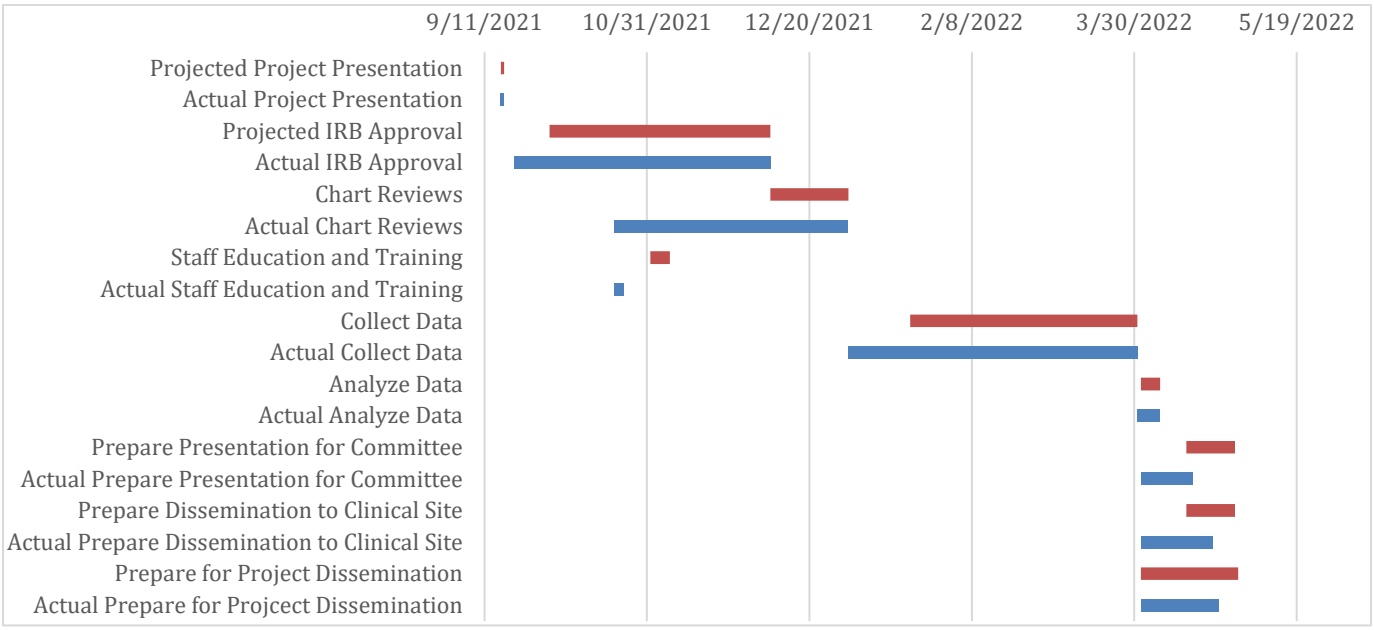
Appendix E: Theoretical Framework

Wayne LaMorte's Theory of Planned Behavior



Appendix F: Conceptual Model

Appendix G: Gantt Chart



Appendix H: Consent Form Experimental Group

Weight Management in Rural Primary Care Setting

PRINCIPAL INVESTIGATOR
Taylor Rittman
University of Arkansas Eleanor Mann School of Nursing
606 N. Razorback Rd.
1-479-575-3904
trittman@uark.edu

FACULTY ADVISOR
Dr. Callie Bradley
University of Arkansas Eleanor Mann School of Nursing
606 N. Razorback Rd.
1-479-575-3904
cmbradle@uark.edu

PURPOSE OF PROJECT

You are being asked to take part in a DNP project. Before you decide to participate in this project, it is important that you understand why the project is being done and what it will involve. Please read the following information carefully. Please ask the principal investigator if there is anything that is not clear or if you need more information.

The purpose of this project is to improve to improve the BMI of overweight and obese adult patients by implementing a structured 3-month weight loss program utilizing MyFitnessPal© within the rural clinic setting.

This project's aim is to improve the BMI of overweight and obese adult patients with the utilization of the MyFitnessPal© application for 12 weeks within a rural clinic setting.

PROJECT PROCEDURES

The following is the suggested procedures that will take place:

- Patient will be determined if eligible for weight loss management program
- Patient will be scheduled for an initial educational appointment for weight loss education and MyFitnessPal© application education
- Patient will be measured for height, weight, and body mass index
- Patient will download MyFitnessPal© mobile application to smart phone
- Patient will set goals for weight loss program utilizing MyFitnessPal©
- Patient will be educated on the common complications and preventative measures
- Patient will receive information on when to seek emergency medical care

RISKS

There are no suspected risks of harm related to the study intervention.

BENEFITS

Benefits to participating in this project include the implementation of an evidence-based practice intervention through the use of MyFitnessPal© to improve weight management. The benefits of MyFitnessPal© will improve patient knowledge of healthier lifestyle interventions, dietary patterns, and physical activity routines. There is minimal potential for emotional or psychological strain when this PI reviews weight management and MyFitnessPal© education with the patient. Providing a private atmosphere during the education process will minimize the risk of these harms and weekly check-ins the patient can perform at home.

CONFIDENTIALITY

Your responses to the surveys will be anonymous. Please do not write any identifying information on your surveys.

To assure patient confidentiality, it is requested that data is de-identified when provided to the principal investigator. The principal investigator will keep data in a computer that is password protected. Notes, interview transcriptions, and any other identifying participant information will be secured in a locked file cabinet in the personal possession of the principal investigator.

Participant data will be kept confidential to the extent allowed by law and University policy. The researcher is legally obligated to report specific incidents which include, but may not be limited to, incidents of abuse and suicide risk.

CONTACT INFORMATION

If you have questions at any time about this project, or you experience adverse effects as the result of participating in this project, you may contact the principal investigator, whose contact information is provided on the first page. If you have questions regarding your rights as a study participant, or if problems arise which you do not feel you can discuss with the Principal Investigator, please contact the University of Arkansas Institutional Review Board at 1-479-575-2208.

VOLUNTARY PARTICIPATION

Your participation in this project is voluntary. It is your decision whether or not to take part in this project. If you decide to take part in this project, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this project will not affect the relationship you have, if any, with the

principal investigator. If you withdraw from the project before data collection is completed, your data will be returned to you or destroyed.

CONSENT

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this project.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

Appendix I: Consent Form Control Group

Weight Management in Rural Primary Care Setting

PRINCIPAL INVESTIGATOR
Taylor Rittman
University of Arkansas Eleanor Mann School of Nursing
606 N. Razorback Rd.
1-479-575-3904
trittman@uark.edu

FACULTY ADVISOR
Dr. Callie Bradley
University of Arkansas Eleanor Mann School of Nursing
606 N. Razorback Rd.
1-479-575-3904
cmbradle@uark.edu

PURPOSE OF PROJECT

You are being asked to take part in a Doctorate Nursing Project. Before you decide to participate in this project, it is important that you understand why the project is being done and what it will involve. Please read the following information carefully. Please ask the principal investigator if there is anything that is not clear or if you need more information.

The purpose of this project is to improve the BMI of overweight and obese adult patients by implementing a structured 3-month weight loss program utilizing brief health education within the rural clinic setting.

This project's aim is to improve the BMI of overweight and obese adult patients during 12 weeks after implementing brief health education within a rural clinic setting.

PROJECT PROCEDURES

The following is the suggested procedures that will take place:

- Patient will be determined if eligible for weight loss management program
- Patient will be scheduled for an initial educational appointment for weight loss education
- Patient will be measured for height, weight, and body mass index
- Patient will be given a pre and post questionnaire assessing preceptions of weight loss
- Patient will be educated on the common complications and preventative measures
- Patient will receive information on when to seek emergency medical care
- Patient will attend a follow-up appointment after the 12-week weight loss program has been completed

RISKS

There are no suspected risks of harm related to the study intervention. There is minimal potential for emotional or psychological strain when this PI reviews weight management and brief health education with the patient. Providing a private atmosphere during the education process will minimize the risk of these harms and weekly check-ins the patient can perform at home.

BENEFITS

Benefits to participating in this project include the implementation of an evidence-based practice intervention through the use of brief health education to improve weight management.

CONFIDENTIALITY

To assure patient confidentiality, data will be collected through patient chart audits and data will be de-identified when provided to the principal investigator. The data will be linked to a code in Qualtrix. The principal investigator will keep data in a computer that is password protected. Notes, recruitment transcriptions, and any other identifying participant information will be secured in a locked file cabinet in the personal possession of the principal investigator. After patient data has been utilized for this project, it will be destroyed.

Participant data will be kept confidential to the extent allowed by law and University policy. The researcher is legally obligated to report specific incidents, which include, but may not be limited to, incidents of abuse and suicide risk.

CONTACT INFORMATION

If you have questions at any time about this project, or you experience adverse effects as the result of participating in this project, you may contact the principal investigator, whose contact information is provided on the first page. If you have questions regarding your rights as a study participant, or if problems arise which you do not feel you can discuss with the Principal Investigator, please contact the University of Arkansas Institutional Review Board at 1-479-575-2208.

VOLUNTARY PARTICIPATION

Your participation in this project is voluntary. It is your decision whether or not to take part in this project. If you decide to take part in this project, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this project will not affect the relationship you have, if any, with the principal investigator or Access Medical Clinic. If you withdraw from the project before data collection is completed, your data will be returned to you or destroyed.

CONSENT

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this project.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

Appendix I: Recruitment Telephone Script

Hello _____,

My name is Taylor Rittman, and I am a DNP student at the University of Arkansas. I am working with the Eleanor Manning School of Nursing and Advanced and Access Medical Clinic to conduct a study focused on lifestyle changes and weight loss management in primary care. In conjunction with Alicia Gates, we are reaching out to existing patients to see if you would be interested in participating in this study. Through this study, resources and guidance on weight loss management will be provided at no direct cost and will just include an initial appointment with myself and Alicia Gates and then a follow-up appointment 12 weeks later. If you are interested in participating in this study then we can schedule you for an appointment, discuss the study procedures and obtain your consent for participation. If you have any questions you can call the clinic at 479-294-6085.

Appendix J: Survey Script

Hello, my name is Taylor Rittman and I am a DNP student at the University of Arkansas. As part of the weight loss program, you have consented to participate in, I am on conducting a survey to investigate your perceptions of weight loss as a part of this project. You are being asked to participate in this survey due to your agreement and previous consent given to participate in this weight loss management project.

Your participation in this survey is voluntary and it is your decision whether or not to take part in this survey. You are not required to participate in the survey, despite your consent to participate, and withdrawing from this survey will not affect the relationship you have with me or this clinic

The survey is designed to take 10 minutes.

Thank you for your participation

Appendix K: Brief Health Education

- Choose minimally processed, whole foods-whole grains, vegetables, fruits, nuts, healthful sources of protein, and plant oils
- Limit sugared beverages, refined grains, potatoes, red and processed meats, and other highly processed foods, such as fast food
- A variety of protein foods such as seafood, lean meats and poultry, eggs, legumes, soy products, nuts, and seeds.
- A low amount of saturated fats, trans fats, cholesterol, sodium, and added sugars
- Staying within your daily calorie needs
- Energy deficit of ≥500 kcal/d. This deficit often is achieved by prescribing 1200 to 1500 kcal/d for women and 1500 to 1800 kcal/d for men
- The recommended amount of aerobic physical activity is >150 minutes per week
- Poor sleep is harmful to overall well-being and is often associated with obesity
- An increase in stress also leads to an increased amount of production of hormones such as cortisol, which controls our energy and hunger urges

Appendix L: Pre-Implementation Weight Loss Questionnaire

(Control and Experimental)

Last 4 digits of phone #: _____

Age: _____

Gender:
- Female
- Male
- Prefer not to say

Race:
- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White

Highest level of education:
- Elementary
- Middle school
- High school
- College

Salary/income level:
- $10,000-$40,000 per year
- $40,000-$60,000 per year
- $60,000-$80,000 per year
- $80,000-$100,000 per year
- $100,000 or more per year

Marital status
- Single
- Married
- Widowed
- Separated
- In a domestic partnership

1. For me, managing my weight is

    - Very important
    - Somewhat important
    - Neither important or unimportant
    - Unimportant

- Very unimportant

2. My family thinks that I should improve my dietary pattern

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

3. My friends think I should improve my dietary pattern

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

4. My friends exercises regularly

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

5. My family exercises regularly

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

6. My friends eat a generally healthy diet

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

7. My family eats a generally healthy diet

    - Strongly agree
    - Somewhat agree

- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

8. When it comes to my health, it is important for me to do what my healthcare team think I should do

   - Strongly agree
   - Somewhat agree
   - Neither agree or disagree
   - Somewhat disagree
   - Strongly disagree

9. When it comes to my health, it is important for me to do what my friends think I should do

   - Strongly agree
   - Somewhat agree
   - Neither agree or disagree
   - Somewhat disagree
   - Strongly disagree

10. When it comes to my health, it is important for me to do what my family thinks I should do

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

11. When it comes to my health, it is important to me to lose weight

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

12. For me, making beneficial changes to my diet over the next three months will be

- Not difficult
- A little difficult
- Neither
- Difficult
- Very difficult

13. For me, trying to manage my weight over the next three months will be

- Not difficult
- A little difficult
- Neither
- Difficult
- Very difficult

14. How often do events arise in your life that suddenly take up your free time

- Very rarely
- Rarely
- Neither
- Sometimes
- Always

15. How often do you feel ill or very tired

- Very rarely
- Rarely
- Neither
- Sometimes
- Always

Appendix L: Post-Implementation Weight Loss Questionnaire (Control)

Last 4 digits of phone #: _____

1. For me, managing my weight is

    - Very important
    - Somewhat important
    - Neither important or unimportant
    - Unimportant
    - Very unimportant

2. My family thinks that I should improve my dietary pattern

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

3. My friends think I should improve my dietary pattern

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

4. My friends exercises regularly

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

5. My family exercises regularly

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

6. My friends eat a generally healthy diet

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

7. My family eats a generally healthy diet

   - Strongly agree
   - Somewhat agree
   - Neither agree or disagree
   - Somewhat disagree
   - Strongly disagree

8. When it comes to my health, it is important for me to do what my healthcare team think I should do

   - Strongly agree
   - Somewhat agree
   - Neither agree or disagree
   - Somewhat disagree
   - Strongly disagree

9. When it comes to my health, it is important for me to do what my friends think I should do

   - Strongly agree
   - Somewhat agree
   - Neither agree or disagree
   - Somewhat disagree
   - Strongly disagree

10. When it comes to my health, it is important for me to do what my family thinks I should do

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

11. When it comes to my health, it is important to me to lose weight

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

12. For me, making beneficial changes to my diet over the next three months will be

- Not difficult
- A little difficult
- Neither
- Difficult
- Very difficult

13. For me, trying to manage my weight over the next three months will be

- Not difficult
- A little difficult
- Neither
- Difficult
- Very difficult

14. How often do event arise in your life that suddenly take up your free time

- Very rarely
- Rarely
- Neither
- Sometimes
- Always

15. How often do you feel ill or very tired

- Very rarely
- Rarely
- Neither
- Sometimes
- Always

16. The brief health education was helpful

- Strongly agree
- Somewhat agree

- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

17. I was satisfied with the lifestyle changes I made after receiving education at the beginning of the 12-week program

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

Appendix L: Post-Weight Loss Questionnaire (Experimental)

Last 4 digits of phone #: _____

1. For me, managing my weight is

    - Very important
    - Somewhat important
    - Neither important or unimportant
    - Unimportant
    - Very unimportant

2. My family thinks that I should improve my dietary pattern

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

3. My friends think I should improve my dietary pattern

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

4. My friends exercises regularly

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

5. My family exercises regularly

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

6. My friends eat a generally healthy diet

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

7. My family eats a generally healthy diet

   - Strongly agree
   - Somewhat agree
   - Neither agree or disagree
   - Somewhat disagree
   - Strongly disagree

8. When it comes to my health, it is important for me to do what my healthcare team think I should do

   - Strongly agree
   - Somewhat agree
   - Neither agree or disagree
   - Somewhat disagree
   - Strongly disagree

9. When it comes to my health, it is important for me to do what my friends think I should do

   - Strongly agree
   - Somewhat agree
   - Neither agree or disagree
   - Somewhat disagree
   - Strongly disagree

10. When it comes to my health, it is important for me to do what my family thinks I should do

    - Strongly agree
    - Somewhat agree
    - Neither agree or disagree
    - Somewhat disagree
    - Strongly disagree

11. When it comes to my health, it is important to me to lose weight

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

12. For me, making beneficial changes to my diet over the next three months will be

- Not difficult
- A little difficult
- Neither
- Difficult
- Very difficult

13. For me, trying to manage my weight over the next three months will be

- Not difficult
- A little difficult
- Neither
- Difficult
- Very difficult

14. How often do event arise in your life that suddenly take up your free time

- Very rarely
- Rarely
- Neither
- Sometimes
- Always

15. How often do you feel ill or very tired

- Very rarely
- Rarely
- Neither
- Sometimes
- Always

16. What is your highest level of education

- Elementary
- Middle school

- High school
- College

17. The MyFitnessPal©© application was easy to use

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

18. I was satisfied with my results after using MyFitnessPal©© for 12 weeks

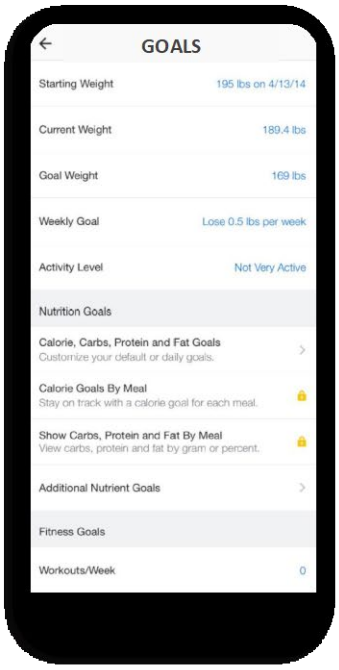
- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

19. Due to MyFitnessPal©©, I spent significantly more time on my phone

- Strongly agree
- Somewhat agree
- Neither agree or disagree
- Somewhat disagree
- Strongly disagree

Appendix L: MyFitnessPal©© Handout

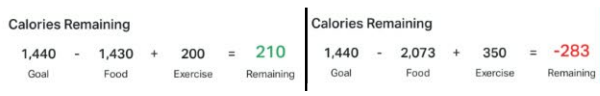
TAKE CONTROL OF YOUR WEIGHT LOSS GOALS WITH myfitnesspal



SCAN OR LOG.

LEARN AND IMPROVE.

STAY MOTIVATED.



WHAT IS MYFITNESSPAL (MFP)?

MFP is a free user-friendly smartphone app that tracks diet and exercise against your personal goals.

HOW DOES IT WORK?

- To track nutrients and calories, users can either scan the barcodes of food items or look up manually.
- The app hosts a database of over 11 million items with restaurant favorites included!
- Save meals and recipes to track food intake.
- Connect with friends and family on the app, as well as join online communities!

WHY SHOULD I USE IT?

- If you are interested in trying to lose weight or maintain a healthy lifestyle, then monitoring what you eat is critical.
- Traditional diets can be restrictive in food options, challenging to maintain or make progress as documenting caloric intake is tedious and time consuming.
- With MFP, users can easily track and count caloric and nutritional intake to reach and maintain their weight and lifestyle goals in a matter of minutes.

HOW DO I GET STARTED?

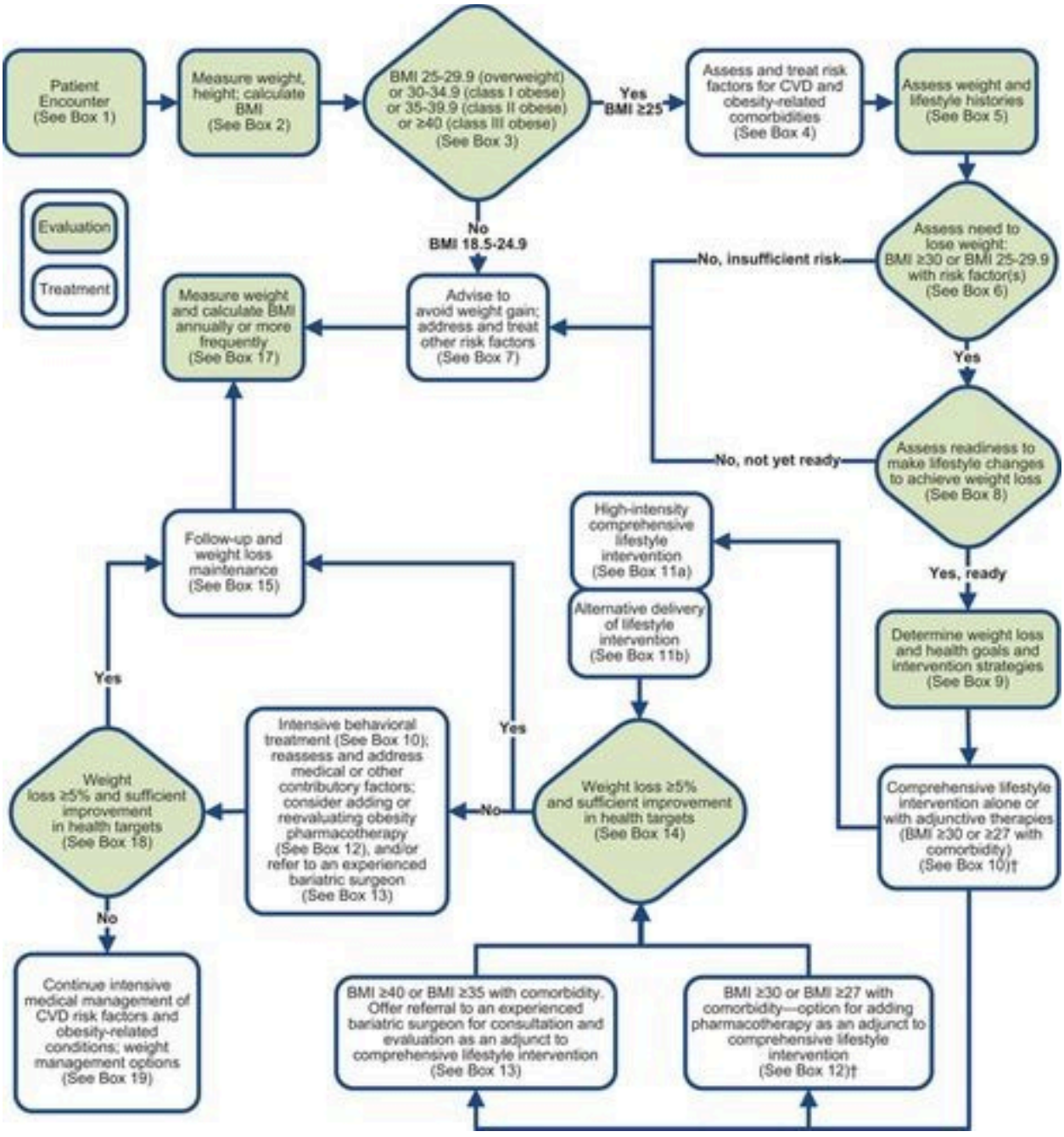
- Download the MyFitnessPal App.
- Answer the self-guided questions to personalize your goals. Tip! Set a realistic intermediate goal.
- Track as you go!

WANT MORE INFORMATION?

Go to https://www.myfitnesspal.com/

Appendix O: Treatment Algorithm

Chronic Disease Management Model for Primary Care of Patients With Overweight and Obesity



Appendix P: Implementation Evolution Over Time

Implementation Evolution Over Time		
Implementation Timeline	Progress	New Changes
9/16/2021	Received Committee approval	PDSA Cycle: Make necessary updates to timeline
12/8/2021	Received UARK IRB approval	PDSA Cycle: Make necessary updates to timeline
12/8/2021 to 12/31/2021	Retrospective Chart reviews for identification of overweight and obese patients was conducted	PDSA Cycle: Increase sample size through extending date of pre-implementation data collection
1/2/2022 to 1/9/2022	Consented and sent 24 surveys to participants during initial appointments	PDSA Cycle: Continue to reach out to participants in experimental group through MyFitnessPal©©
1/10/2022 to 3/31/22	Weekly follow-up with experimental group participants	
3/28/2022 to 4/1/2022	Conduct 3 month follow-up appointments with completion of questionnaire	
4/1/2022 to 4/5/2022	Analyze results	

Appendix Q: Data Collection Sheet

ID	Group	Weight (lbs)	BMI	BP	Post-Weight	Post-BMI	Post-BP
1	Experimental	280	36.9	129/82	284	37.5	125/80
2	Experimental	291	51.5	130/72	284	50.3	130/70
3	Experimental	273	40.3	134/90	268	39.6	130/90
4	Experimental	256	38.9	118/68	251	38.2	
5	Experimental	289	37.1	138/83	287	36.8	135/80
6	Experimental	211	32.1	120/70	202	30.7	120/60
7	Experimental	215	30.8	132/88	210	30.1	135/88
8	Experimental	199	33.1	128/88	200	33.3	120/90
9	Experimental	298	45.3	130/70	297	45.2	132/60
10	Experimental	201	31.5	115/79	201	31.5	110/65
11	Experimental	242	34.7	110/70	240	34.4	110/70
12	Experimental	270	36.6	128/80	265	35.9	120/80
13	Control	182	31.2	126/88	183	31.4	120/90
14	Control	217	30.3	120/70	219	30.5	120/60
15	Control	175	29.1	116/81	173	28.8	120/80
16	Control	265	42.8	132/80	259	41.8	130/80
17	Control	201	35.6	142/90	200	35.4	140/90
18	Control	294	42.2	132/88	293	42	130/87
19	Control	203	30	120/71	200	29.5	125/70
20	Control	295	54	136/88	295	54	135/80
21	Control	276	36.4	134/76	273	36	130/75
22	Control	258	47.2	131/89	250	45.7	128/80
23	Control	247	34.4	129/74	247	34.4	130/70
24	Control	293	39.7	140/88	289	39.2	137/85

Appendix R: PDSA Cycles

PDSA 1		
OBJECTIVE: Obtain IRB approval in order to begin DNP project participant recruitment by 12/10/21		
Change Idea: Prepare all materials in order to have a smooth implementation process for DNP project		
	Personnel Responsible	**Due Date**
Plan: Have all Qualtrics, excel spreadsheets and material prepared for implementation phase	PI	12/1/2021
Do: Complete uploading the questionnaires into Qualtrics and handouts printed for participants	PI	12/1/2021
Study: Become comfortable using Qualtrics and learn how to distribute questionnaires in order to be successfully utilized in DNP project	PI	12/1/2021
Act: Having all of these materials prepared will help the implementation phase run smoothly while I await approval from IRB. Will continue to communicate with chair about this project. Will communicate with IRB coordinator to make sure application process is still moving forward	PI, chair, IRB	12/4/2021
PDSA 2		
OBJECTIVE: To identify at least 30 participants for the Weight Management Program at a rural clinic		
Change Idea: To identify reasons patients may not want to participate in weight management program and make necessary changes to adapt to patient population		
Plan: Utilize recruitment script to reach out to patients on the telephone	PI	12/20/21
Do: Perform retrospective chart review at clinic, unable to perform this step yet but clinical site champion states should not have issues finding participants	PI	12/31/21
Study: Identify and document 30 patients that are interested in Weight Management Program that also fit the requirements of the study in the code book	PI	12/31/21
Act: Reach out to patients after conducting the chart review and make an effort to understand why patients cannot participate if they refuse	PI	12/31/21
PDSA 3		
OBJECTIVE: Increase sample size by 1/20/2022		
Change Idea: Recruit control group participants on the phone who have already been seen in clinic in the prior three weeks		
Plan: Conduct recruitment for one more week	PI	1/21/22
Do: Change implementation day until 1/21/22	PI	1/21/22
Study: During the last week of recruitment there were two more patients recruited for the control group	PI	1/21/22
Act: Follow-up with these patients to conduct a follow-up appointment and ensure questionnaires are completed	PI	1/21/22
PDSA 4		
OBJECTIVE: Make necessary updates to timeline		
Change Idea: Extend implementation dates and follow-up appointments into first week of April		
Plan: Follow-up with chair committee to confirm 1/21/22		
Do: Change impmentation recruitment date until 1/21/22		
Study: All Changes to timeline need to be ready before the implementation phase is over 1/21/22		

Act: Insert updates timeline changes in weekly email and add in final paper 3/31/22