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Implementation of a lifestyle coaching program for prevention of nonalcoholic fatty liver disease progression

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Implementation of a lifestyle coaching program for prevention of nonalcoholic fatty liver disease progression

A dissertation submitted in partial satisfaction of the

requirements for the degree

Doctor of Nursing Practice

by

Therese Marie Donnelly

2022

ABSTRACT OF THE DISSERTATION

Implementation of a lifestyle coaching program for prevention of nonalcoholic fatty liver disease progression

by

Therese Marie Donnelly

Doctor of Nursing Practice

University of California, Los Angeles, 2022

Professor Dorothy Wiley, Chair

Problem Statement: Non-alcoholic fatty liver disease (NAFLD) is rapidly increasing in health and economic burden and necessitates the introduction of preventive and treatment measures in high-risk subpopulations to reduce NAFLD-related morbidity and mortality. Studies have shown that following a healthier lifestyle, losing weight, and treating individual metabolic syndromes can proactively help prevent, postpone, or reverse liver damage caused by NAFLD.

Methods: This scholarly project was a single-group, pre- and post-test pilot quality-improvement study designed to improve our understanding of the findings for 26 participants

diagnosed with NAFLD within the past year without recent progression. The focus was on lifestyle changes, evidenced by a change in behavior, slowing down the progression of NAFLD to severe liver disease.

Eight weekly individual coaching sessions, each lasting 30 to 60 minutes, taught, guided, and supported participants to initiate lifestyle changes in diet and exercise. Individual coaching sessions utilized motivational interviewing, followed by a semi-structured curriculum that included questions designed to elicit participants' responses to inquiries intended to assess their progress.

Findings: Study participants were enrolled and underwent baseline measurements. Throughout the course of the study, five subjects dropped out leaving a total of 21participants. The sample's average baseline waist circumference was 41.2 inches (95% CI: 28.8, 54). The final waist circumference measurement was 39.3 (95% Cl: 27.6, 51.1) inches, which displayed a trend in the correct direction. At baseline, individuals weighed 206.5 (141.8–271.1) pounds. The average weight at week eight was 194.8 (95% CI: 133.4, 256.1) pounds. Adjusting for height, individuals' baseline BMI was 34.8 kg/m^2 (95% Cl: 26.3, 43.1). The average BMI at week 8 was 32.6 kg/m^2 (95% Cl: 23.7, 41.4) kg/m^2.

The three-factor eating questionnaire (TFEQ) is one of the most commonly used instruments to measure dietary restraint characteristics (Stunkard et al., 1985). The TFEQ data suggests a trend toward overall improvement in uncontrolled eating behaviors, cognitive restraint, and emotional eating behaviors.

Conclusion: Participants on average showed a modest reduction in weight over the intervention period, which suggests that the intervention may have been successful. The waist circumference measurements and data indicate the intervention reduced the waist circumference. The results are

not statistically significant with the BMI data suggesting that the intervention contributed to a decreased BMI at the post-intervention visit. However, these findings suggest improvements in NAFLD as well with the emphasis placed on weight-reduction as a principal treatment for NAFLD.

The dissertation of Therese Marie Donnelly is approved.

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Dorothy Wiley, Committee Chair

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2022

This dissertation is dedicated to my family. To my parents, for every single sacrifice they made in raising my brother and myself to be strong minded, kind-hearted, artistic, and intelligent individuals. For demonstrating, through words but mostly actions, resilience, fortitude, sacrifice, unconditional, and tough love. Mom and dad, I am so grateful for who you have raised me to become and am grateful in your continued presence, support, and love in my little family's life. My children are beyond blessed to have your constant presence. To my brother, Harold, who has never wavered in his support for my successes and happiness. I know I don't say it much, but I am so grateful for you and who you are. I am proud of you and will always support and love you. Ditto, man, ditto. To my children, Angelia and Jaxton, who have helped me find strength and love I never knew I could possess. You both make me so proud, and I love watching you develop into human beings who strive for more as you grow. Remember that you are never too old to try new things and you will always be enough to turn your dreams into goals and your goals into reality. I love you my kiddy kids. And finally, to my favorite human being, my husband Joe. Words will never express my love and gratitude for you. You have made my academic and professional journey as easy as possible every step of the way without missing a beat with our beautiful family. Your support and unconditional love have helped me become a better human being, a better wife, mother, daughter, sister, friend, and nurse practitioner. Thank you for everything and for always believing in me, even when I would lose faith in myself. I love you forever and always.

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VITA

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CHAPTER ONE: INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is the collective term for a variety of histological diseases, including non-alcoholic steatohepatitis (NASH), cirrhosis, liver fibrosis, and hepatocellular cancer (HCC) (Perumpail, 2017). NAFLD is the most common liver disease in the United States, affecting an estimated 80 million to 100 million people, with 25% developing further into NASH (Perumpail, 2017). NAFLD, the most common liver disease in the US, is caused mainly due to the increase in the obesity epidemic and metabolic syndrome (Perumpail, 2017).

The financial toll that NAFLD has on healthcare is significant. The projected yearly cost of NAFLD in the US is $292.2 billion, of which $103.3 billion are indirect expenditures, such as employment absenteeism (Caussy, 2019). NAFLD's rapidly rising health and economic costs necessitate implementing preventive and treatment interventions in high-risk subpopulations to reduce NAFLD-related morbidity and mortality (Iqbal, 2019). The lifetime cost of NAFLD in the US is $32,249 per patient, with a total patient cost of $222.6 billion (Younossi et al., 2016). The overall cost of inpatient hospitalization for NAFLD patients grew from $7.7 billion to $19.9 billion between 2007 and 2014 (Younossi et al., 2016). The annual cost per person for a new diagnosis of NAFLD was $7,804, according to a health economics analysis utilizing claims data, with the cost per person for long-term care being $3,789 annually (Hirode et al., 2019).

There is currently a lack of authorized effective pharmacologic treatments for NAFLD; therefore, lifestyle improvements such as weight loss, increased physical activity, and dietary adjustments continue to be the preferred course of treatment (Iqbal, 2019). The data shows that about 80% of NAFLD patients are overweight or obese, 72% have had dyslipidemia, and 44% have had type 2 diabetes mellitus, according to a recent meta-analysis of over 8.5 million

people from 42 countries (Tanaka, 2019). NAFLD, on its own, heightens the risk of premature morbidity and mortality due to cardiovascular disease and, as a result, death (Iqbal, 2019). NAFLD screening should be considered in high-risk subpopulations of morbid obesity, diabetes, and other metabolic risk factors to support early diagnosis and prevent hepatic and extrahepatic complications (Iqbal, 2019).

NAFLD's rapidly increasing health and economic burden necessitates introducing preventive and treatment measures in high-risk subpopulations to reduce NAFLD-related morbidity and mortality (Iqbal, 2019). Clinical guidelines for the treatment of NAFLD currently emphasize lifestyle improvements, particularly diet and exercise (Jennison et al., 2019). Current pharmacological treatment does not directly focus on the liver and instead focuses on other comorbidities such as type 2 diabetes mellitus (T2DM), hypertension, and dyslipidemia in order to slow the progression of NAFLD. Weight loss of 7–10% should be the cornerstone of any therapy strategy to improve liver histology and quality of life (Jennison et al., 2019).

Habits developed over a lifetime or adopted among family members are often difficult to change, and those who make those lifestyle changes find them difficult to maintain over time (Beaton, 2017). One approach to weight loss would be a progressive and mentored, nurse-led phone-based health coaching strategy focused on improving diet and exercise. Weekly mobile-phone coaching, with education threaded into each section, may be an effective method for obese persons to assist in weight loss and can be an excellent technique for increasing adherence remotely, which may help induce a healthy rate of weight loss (Alencar et al., 2020).

PICOT Question

This DNP scholarly project is a lifestyle coaching program to assist patients in avoiding the severe disease progression of NAFLD. The PICOT question for this project is: In an NAFLD-diagnosed adult, does an 8-week individual telephone coaching intervention aimed at behavioral lifestyle modification positively affect diet and physical, behavioral changes?

CHAPTER TWO: THEORETICAL FRAMEWORK

Lifestyle modifications such as dietary education and increased physical activity are the most frequently recommended technique for managing NAFLD; a lack of commitment to health-promoting advice complicates the prevention and management of such illnesses (Nourian et al., 2020). The Health Belief Model (HBM) is one of the most effective models for developing interventions to enhance health behaviors and is composed of six categories that relate to the performance of health-related behaviors concerning NAFLD: perceived vulnerability to NAFLD, perceived severity of NAFLD, perceived benefits of lifestyle modification, perceived barriers to lifestyle modification, signals to action, and self-efficacy (Nourian et al., 2020). The HBM will make individuals realize the hazards associated with their sickness and alter their behavior. The understanding of NAFLD and its implications serves as a motivator for these patients to improve their behavior.

CHAPTER THREE: REVIEW OF LITERATURE

Relevant studies were identified using search terms and database-specific search methods in the PubMed, Google Scholar, Wiley online library, and Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases. Each database required a unique search strategy that combined keywords and phrases: NAFLD, fatty liver disease, fatty liver, obese, obesity, morbidly obese, cirrhosis or cirrhotic, weight loss, weight reduction, lifestyle coaching, weight-

loss coaching, education, educating, learning, health belief model, HBM, telephone, telephonic, mobile phone, and smartphone. These terms were separated by Boolean operators such as: and, or, not, used in conjunction with other keywords to combine or exclude them from a search, resulting in more productive results. The search resulted in 367 articles, with the whole text of each article being evaluated to establish its relevancy. Publications relevant to telephonic coaching for lifestyle adjustments needed by obese patients were prioritized in the search. English full-length articles were included, and other languages were omitted. Discussion of NAFLD in conjunction with obesity and lifestyle changes was included. These academic journals will contribute to the presentation of clinical data from the lifestyle coaching-based scholarly project to assist patients in reversing NAFLD development through weight loss. The narrowed search revealed five articles were identified as relevant to this scholarly project.

Diverse intervention data suggest that telephonic follow-up with tailored coaching improves adherence to lifestyle change protocols in complex diseases (DeWalt et al., 2006; Possin et al., 2019). One pilot study shows that additional support improves adherence to diet and exercise lifestyle recommendations (Javanmardifard et al., 2017). The exploration of telephone-tailored coaching as an added clinical intervention to support behavior change shows low risk and a possible high return on investment for care providers.

A prospective randomized controlled trial by Lim et al. (2020) enrolled 108 persons with NAFLD who were recruited from an outpatient clinic for fatty liver disease. Patients were randomly assigned to either a control group (n = 53) receiving standard care, which included dietary and lifestyle advice from a trained nurse, or an intervention group (n = 55) receiving dietary and lifestyle guidance from a dietitian in addition to using the Nutritionist Buddy (nBuddy) mobile app. Bodyweight, alanine aminotransferase (ALT), aspartate aminotransferase

(AST), waist circumference, and blood pressure were assessed at baseline. Statistical comparisons were made using intention-to-treat and per-protocol analyses.

The intervention group at three and six months achieved a higher proportion of participants who lost five percent of their body weight than the control group. The adjustment for age, gender, and ethnicity, intention-to-treat, and per-protocol analyses revealed that, when compared to conventional care, using the mobile-enabled lifestyle intervention program was independently linked with a greater likelihood of attaining a five percent weight loss at three and six months (Lim et al., 2020).

Nourian et al. (2020) study found that NAFLD was the most prevalent emerging liver disease globally. The most heavily emphasized technique of disease management found in this study is a lifestyle change. Lifestyle changes such as dietary education and increased activity are the most effective ways to prevent and control NAFLD, many people fail to follow these recommendations (Nourian et al., 2020). The Health Belief Model (HBM) is one of the most effective models used for informing the creation of interventions to enhance health behaviors (Nourian et al., 2020). The HBM comprises six categories connected to the performance of health-related behaviors: perceived vulnerability to NAFLD, perceived severity of NAFLD, perceived benefits of lifestyle modification, perceived barriers to lifestyle modification, signals to action, and self-efficacy (Nourian et al., 2020). The concept of this model is that individuals will readily alter their behavior when they realize the hazards associated with their sickness (Nourian et al., 2020).

This study assessed the impact of lifestyle change education on HBM variables and NAFLD indices such as liver enzymes and sonography. The study that was performed was aa parallel, randomized controlled experiment, 82 NAFLD patients were recruited and randomly

assigned to either the intervention or the control group. Significant gains were observed in all HBM variables and knowledge within the intervention group ($p < 0.001$) and between the two groups ($p < 0.001$) after two months of intervention. The intervention group showed a significant reduction in AST and ALT ($p < 0.001$); although the control group showed a slightly significant drop in AST ($p = 0.05$), the between-group analysis revealed a substantial reduction in both AST and ALT in the intervention group when compared to the control group. Ultrasonographic findings within the control group furthermore demonstrated a considerable improvement in the intervention group. The severity of hepatic steatosis improved in both groups after intervention (case: $p = 0.008$ vs. control: $p < 0.001$), a between-group analysis revealed that the intervention group improved statistically significantly more than the control group ($p = 0.025$). The results of this study state that HBM-based lifestyle change education may successfully enhance not only HBM domains but also NAFLD parameters (Nourian et al., 2020). The study concluded that it may be beneficial to implement this coaching program utilizing HBM with NAFLD patients to affect their thoughts and physical bodies simultaneously.

Overweight or obese adults recruited from a large technological organization were offered a 12-month digital weight management intervention with one-on-one health coaching. The participants were investigated using a retrospective, observational approach (Silberman et al., 2020). Individualized health coaching sessions were provided throughout the 24-week intensive phase and following the maintenance phase. The intervention focuses on long-term changes in exercise and diet, in-app food and activity logs, Fitbit integration, and optional sleep and stress modules. The self-determination theory and the transtheoretical model are incorporated to motivate behavioral change. Weight changes were analyzed retrospectively using multilevel mixed-effects models.

The mean 12-month weight loss for the overweight group was seven percent, significantly above the indicated five percent threshold by two percent (95% confidence interval [CI], 0.7 percent to 3.8 percent; P.01). Similarly, the obese group's mean weight loss of 7.6 percent exceeded the 5-percent target by 2.6% (95% CI, 1.4 percent to 3.9 percent; P.01). Significant heterogeneity in baseline weight ($\chi2(1) = 85,929$, $P < .01$) and rates of change in weight ($\chi2(1) = 20,586$, $P < .01$). Heterogeneity across coaches was significant for baseline weight ($\chi2(1) = 3.95$, $P < .05$), but not for rates of change ($\chi2(1) = 0.03$, ns). The current data implies that certain digital health interventions may result in weight loss that is at least comparable to that reported with strong, in-person programs. Additional research is necessary, this preliminary evidence appears encouraging and with further development and research, digital health interventions for obesity could significantly alleviate the present obesity pandemic.

In a randomized controlled clinical study, 60 NAFLD-affected patients were systematically assigned to one of two groups (Javanmardifard et al., 2017). Individualized nutrition counseling and instruction in physical activity were made available to participants. Patients could elect to receive dietician feedback over the 12-week intervention (Javanmardifard et al., 2017). The researchers employed a nutritionist for this study to provide advice to all participants (Javanmardifard et al., 2017). Participants were given written dietary advice, with findings indicating that even passive participation with the dietician resulted in more readily produced nutrition and exercise lifestyle changes among intervention-group participants than controls in the short term (Javanmardifard et al., 2017). Nutrition scores improved by 12.7 points in the intervention group compared to 1.59 points in the control group ($p < 0.001$) (Javanmardifard et al., 2017). When physical activity was measured, scores improved by 9.87 points on average versus 0.96 points for the intervention and control groups, respectively

($p < 0.001$) (Javanmardifard et al., 2017).

DeWalt and colleagues (2006) showed telephone coaching was especially effective in low-health literacy populations, but somewhat less so in groups with high-health literacy. This study implemented intensive lifestyle and self-management coaching, resulting in lower death rates at 12 months, as evidenced by an unadjusted death incidence rate ratio of 0.77 (95% CI 0.30, 1.94) while the adjusted death incidence rate ratio was 0.39 (95% CI 0.16, 0.91) (DeWalt et al., 2006). Years of education does not clearly define *health literacy* and its effect on human health (Fan et al., 2021).

Possin and colleagues (2021) systematically reviewed 19 qualitative studies and found that nine of the 19 showed statistically significant elevated risk for death associated with low health literacy and no studies that showed protective effects. The study found that caregiver burden and patient quality of life decline with dementia, increasing the likelihood of avoidable hospitalizations and long-term care placement (Possin et al., 2021). The implementation of a telephone coaching program to augment classroom educational interventions to increase adherence to dietary recommendations for NAFLD shows little risk and significant potential for improvement in a clinical practice setting.

Synthesis of Literature Review

Science has revealed after more than 20 years of clinical research and experience complicated links between NAFLD, obesity, and modifiable risk behaviors, such as inactivity and a high-fat diet (George et al., 2018). Behavior changes interventions for liver disease have received even less attention (Lazarus et al., 2020). Current guidelines advocate lifestyle modification, including careful food selection and greater physical activity, as the primary treatment for NAFLD (Golabi et al., 2018). Large-scale behavior change trials in cardiovascular

and metabolic illnesses show mixed results. Some data suggest practicing physicians are doubtful or lack the resources to initiate behavior change interventions in clinical practice for NAFLD-affected adults (Golabi et al., 2018). Vital interventions to improve knowledge and adherence to a lifestyle change required to prevent NAFLD from progressing to cirrhosis, or HCC, are limited in day-to-day clinical practice (Golabi et al., 2018).

NAFLD is rapidly becoming the most prevalent liver ailment globally (El-Agroudy et al., 2019). NASH and fibrosis impose a tremendous burden on patients and healthcare systems. Effective lifestyle interventions for NAFLD, such as dietary modifications and exercise training, are now the preferred therapy methods in the absence of approved pharmaceutical medications (El-Agroudy et al., 2019).

The studies presented in the review of literature demonstrate a range of methodologies and study designs that advocate for several lifestyle adjustments that can help slow the advancement of NAFLD, thereby supporting telephonic coaching's possibilities for building stronger skills to adhere to lifestyle change. The review of the literature aligns with the value-based healthcare delivery model, which rewards providers for helping patients improve and optimize their health, reduce chronic disease incidence, and live healthier lives at the lowest possible fiscal cost (Gray, 2017).

CHAPTER FOUR: METHODS

Project Design

This scholarly project was reviewed by the University of California, Los Angeles, South (Campus) General Institution Review Board (IRB), #22-000173, which served as the privacy board for Lew Medical Practice. The IRB waived the requirement for HIPAA Research

Authorization for research and the requirement for signed informed consent for the research (45 CFR 46.117).

The project was a single group, pre- and post-test, pilot quality-improvement study to improve our understanding of findings for 26 participants who were diagnosed with NAFLD without recent progression, where the participants served as their own controls. The intervention was an eight-week lifestyle coaching program focused on lifestyle changes, as evidenced by a change in behavior, to slow the progression of NAFLD to severe liver disease. An initial educational meeting included structured educational presentations on NAFLD pathophysiology, dietary and exercise recommendations, along with examples, guided meditation, and positive reinforcement. English-speaking adult patients who were current Lew Medical patients were eligible to participate. Each participant had been diagnosed with NAFLD, and they ensured that their NAFLD had not recently progressed, that they were overweight or obese, had abdominal adiposity, and had moderately elevated liver enzymes.

Intervention

The study protocol was initially implemented using a structured presentation using PowerPoint and transmitted over Zoom®. The participants were given information on the pathophysiology of NAFLD using simple terminology that they could understand. The information helped them narrow down the potential causes of their NAFLD. The participants were given general dietary suggestions that aimed to improve their NAFLD, exercise advice with examples that can start with simple daily activities, and techniques to help with behavioral and mental changes, such as guided meditation and positive reinforcement. The Centers for Disease Control (CDC, 2021) created guidelines on how to take an accurate waist circumference

measurement. This initial class meeting provided an opportunity for the APRN to educate participants on how to properly measure waist circumference with a return demonstration.

Weekly Zoom® group calls offered the participants voluntary weekly group support. Examples of topics that were discussed, chosen based on reported participant concerns, included how to read a nutritional label, techniques for improving sleep, turning everyday activities of daily living into exercise, and guidance on wisely choosing when eating at a restaurant (Appendix D). One weekly 30-minute to one-hour telephone follow-up call predicated on motivational interviewing techniques were conducted (Appendix D). The study by Zeidi (2013) found that using motivational therapy sessions resulted in a lower body mass index and weight loss, with the results following motivational interviewing showing a substantial change in weight, BMI, and eating habits. The evidence supports the idea that self-efficacy and weight loss are linked to enhanced psychological and physiological well-being (Zeidi, 2013).

Each participant, during the final week, reported their waist circumference measurement. Measurements were recorded in the participant's personal program log. A TFEQ post-test was completed by participants and mailed to the investigator. Knowledge was assessed from the post-test questionnaire results. The participants also completed a program evaluation, where comments about the program were encouraged (Appendix E).

Sample and Setting

This project was performed in partnership with Lew Medical, a family practice medical group located in Glendale, California. Dr. Edmund Lew, MD, the lead physician for Lew Medical, strongly supports preventative care for his patients through lifestyle changes such as diet, exercise, and smoking cessation.

Eligibility Criteria

Participants were referred by medical-group providers or self-referred if they met all eligibility criteria. Requirements included a body mass index (BMI) greater than 24.9 kg/m^2 and a waist circumference greater than or equal to 34 inches for women and 40 inches for men. Participants were required to have a diagnosis of NAFLD without progression to cirrhosis or HCC. Next, measurements were performed within the month prior to enrollment, and participants were required to show alanine aminotransferase (ALT) > 55 International Units/Liters (IU/L) and aspartate aminotransferase > 48 IU/L. The Three-Factor Eating Questionnaire was standardized in English; thus, all participants were English-speaking adults. All participants were adults, ages 18 to 60, who had completed at least one primary care visit with a Lew Medical provider.

Recruitment

Individual handouts that advertised the coaching program were placed in the Lew Medical office waiting room (Appendix A). Lew Medical providers received copies of the flyer to distribute to patients, and advertisements were placed in the Lew Medical (practice) monthly newsletter. There was a successful enrollment of 26 participants. No control group was required. Participants were compared to themselves through the pre- and post-study Three-Factor Eating Questionnaire (TFEQ), one of the most commonly used instruments to measure dietary restraint characteristics (Stunkard et al., 1985).

Obesity research gave rise to the notions of cognitive restraint, uncontrolled eating, and emotional eating, which correlate to the three elements of the TFEQ; however, none of the behaviors are unique to obese people. The term restriction refers to a habit of restricting one's food intake on a regular and intentional basis rather than relying on physiological cues such as

hunger and satiety to regulate food intake (Anglé et al., 2009). Restrained eaters eat less than they would prefer, but not necessarily less than they require to maintain energy balance. Uncontrolled eating is characterized by a proclivity to overeat and a sense of being out of control. The inclination to eat in response to negative emotions is known as "emotional eating" (Anglé et al., 2009).

Two group meetings were held for all participants. The first meeting included an orientation to the intervention, a discussion of NAFLD, and a teach-back demonstration of waist circumference measurements. At the conclusion of the intervention, a second meeting was convened to discuss their experiences related to the intervention. A question-and-answer period was held during each group meeting. Weekly coaching visits were scheduled individually with each participant to ensure personal concerns were addressed in private.

Proper techniques for measuring waist circumference were discussed and demonstrated. Each participant measured their waist circumference during the individual meeting held over Zoom® and corrected when the technique was observed. Each participant was instructed to measure their body weight every morning. Participants were instructed to first urinate to empty the bladder, next disrobe, and then step on a scale to measure their body weight using one weight scale throughout the project. Weights were recorded using a weekly log to ensure consistent data collection (Appendix E).

A visit-by-visit script of information was prepared in advance (Appendix D), while weekly coaching sessions were scheduled in advance. Motivational interviewing techniques were utilized to explore participant concerns, such as decisional balancing, the cycle of preparedness for change, increasing conflict between values and dietary behavior, management of dietary behavior in the face of enticing opportunities, and imaginative viewpoint, while reflective

listening was employed. Barriers to success requiring supplemental information about dietary choices and exercise options and mental and emotional barriers to change were addressed during weekly phone calls or emails.

Instrumentation

Data were abstracted from the electronic medical record (EMR) using a standard tool (Appendix B). Baseline sociodemographic data included sex (male or female), formal education (years completed), race and ethnicity, body weight (pounds), height (inches), and age (years). The last-performed alanine aminotransferase (ALT) and aspartate aminotransferase (AST) measurements which, if elevated, are indicative of liver inflammation, and abdominal ultrasound findings to evaluate for fatty deposits in the liver. The most frequent abnormal laboratory test results are raised ALT and AST levels, which are sometimes the only indicators of NAFLD (Sanyal et al. 2002).

Project participants were given a post-coaching patient satisfaction survey. Participants would then have to honestly rate their answers on a scale of one to five, with five representing an "excellent" response. This gave participants a chance to point out the program's advantages and disadvantages.

A weekly coaching log that included concepts discussed guided the investigator's weekly sessions with each participant (Appendix E). Each session lasted 30 minutes to an hour and was scheduled once a week. To ensure privacy, each education visit and phone follow-up coaching session were recorded in a central log that was kept under lock and key. A patient identifier number was assigned and used to code abstracted electronic medical record (EMR) data as well as weekly follow-up status.

Waist circumference and body weight were measured weekly by the participant and documented after being educated on proper waist measurement. Weekly waist circumference measurements employed a standard protocol and a single plastic measuring tape in inches. The Centers for Disease Control (CDC, 2021) developed instructions on how to measure a waist circumference appropriately. Participants were advised to place a tape measure around their mid-section, slightly above their hipbones, while standing, ensuring the waistband tape was horizontal; while maintaining a close fit around the waist, they were to avoid squeezing the skin. The participants were to measure their waist and document the measurements as soon as the participant exhaled

One of the most widely used instruments for studying eating behaviors is the three-factor eating questionnaire (TFEQ) (Duarte et al., 2018). It primarily assesses three types of eating behaviors or concepts: cognitive restraint, uncontrollable eating, and emotional eating.

Obesity research gave rise to the notions of cognitive restraint, uncontrolled eating, and emotional eating, which correlate to the three TFEQ variables (Duarte et al., 2018). However, none of the concepts or behaviors are unique to obese populations. The inclination to limit one's food intake consistently and actively in lieu of employing physiological cues, such as hunger and satiety, as regulators of food intake is referred to as "restraint" (Duarte et al., 2018). Duarte et al. (2018) state that restrained eaters might not always eat as much as they need to maintain an energy balance but choose to eat less than they would like to. Uncontrolled eating is characterized by a propensity to overeat and a sense of helplessness. The propensity to eat when feeling unhappy is known as emotional eating (Duarte et al., 2018).

Last, a patient satisfaction form was created by the investigator and distributed to participants at the last study meeting (Appendix F). Feedback about the project's strengths and limitations was elicited through open-ended questions that will guide future program revisions.

Threats to Validity

Measurement inaccuracies in the waist circumference may have threatened the validity of the data to evaluate change. Each participant measured their own waist at prescribed intervals to increase the consistency of the assessment. Participants were required to keep a personal, weekly outcome measurement diary, which they would self-report. Loss-to-follow-up may have endangered internal validity. An eight-week time commitment was employed to decrease attrition.

Self-reported data may result in increased bias due to faulty recall (LaMorfe, 2020); for example, in a case-control study, affected subjects may remember past exposures more or less accurately in comparison to controls. The effects of this misclassification on the analysis may not be easily predicted when multiple variables are related (Dosmeci et al., 1990).

Statistical Analysis

Descriptive, graphical, and tabular analyses evaluated the effect of one-on-one coaching on waist circumference and BMI over an 8-week period. One of the exploratory aims of this quality-improvement program, comparison of the pre-intervention measurements to the 8-week waist circumference and body weight measurements. The distribution of age, sex, education, race, and ethnicity in the data was evaluated using Excel®. Arithmetic means (*average*) and standard deviations (*stdev.s*) were estimated using Excel® functions, and 95% confidence intervals were estimated, reflecting critical t-values and degrees of freedom. The comparison of

means employed Student's t-tests, and the critical values for each two-tail test reflected the size of the sample used in the comparison.

A TFEQ questionnaire was completed at the first study visit and following the completion of this coaching program. Each TFEQ item was scored according to a published scoring protocol (Löffler et al., 2015). Two TFEQ items were developed as inversely coded questions and required recoding for the analysis. The three subscales of the TFEQ were analyzed separately and reported as a comparison between the pre- and post-test scores to evaluate the coaching intervention on eating: cognitive restraint, uncontrolled eating, and emotional eating.

CHAPTER FIVE: RESULTS

Descriptive Statistics

Fifty-three percent (41/77) of patients referred by their providers to this program were eligible, of whom 63.4% (26/41) enrolled in the 8-week lifestyle modification intervention. A total of five participants were lost to follow up. Nearly 58% (15/26) were female, and the average age of participants was 37.8 years (Figure 1). Twenty-three percent of participants identified as white, 19% identified as Hispanic, 16% identified as African-American, and 42% identified as Asian (Figure 2). In comparison to Service Planning Area (SPA) 3 demographic characteristics, these data suggest that the sample may overrepresent Asian and Pacific Islanders (28.6%) and African Americans (3.7%), underrepresent Hispanics and Latinos (46.3%), and closely approximate the proportional representation of Whites (21.2%) in this community (Los Angeles County Department of Public Health 2017). The number of years of formal education was positively skewed, with no participant reporting fewer than 11 years of schooling, while 58% reported 11 to 15 years, and 42% reporting 16 or more years of formal education (Figure 3).

Figure 1: Proportional distribution of sex characteristics for 26 adults participating in an APRN-led lifestyle modification program for diet and exercise

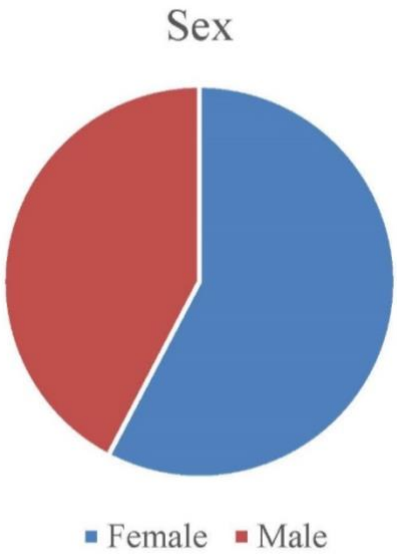


Figure 2: Proportional distribution of self-reported race and ethnic characteristics for 26 adults participating in an APRN-led lifestyle modification program for diet and exercise

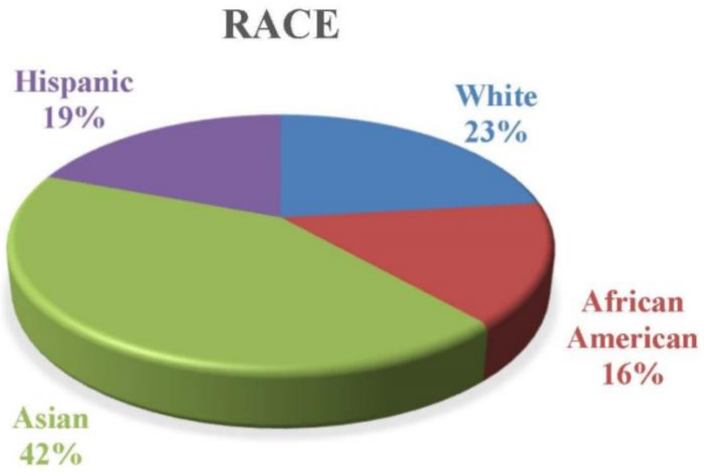
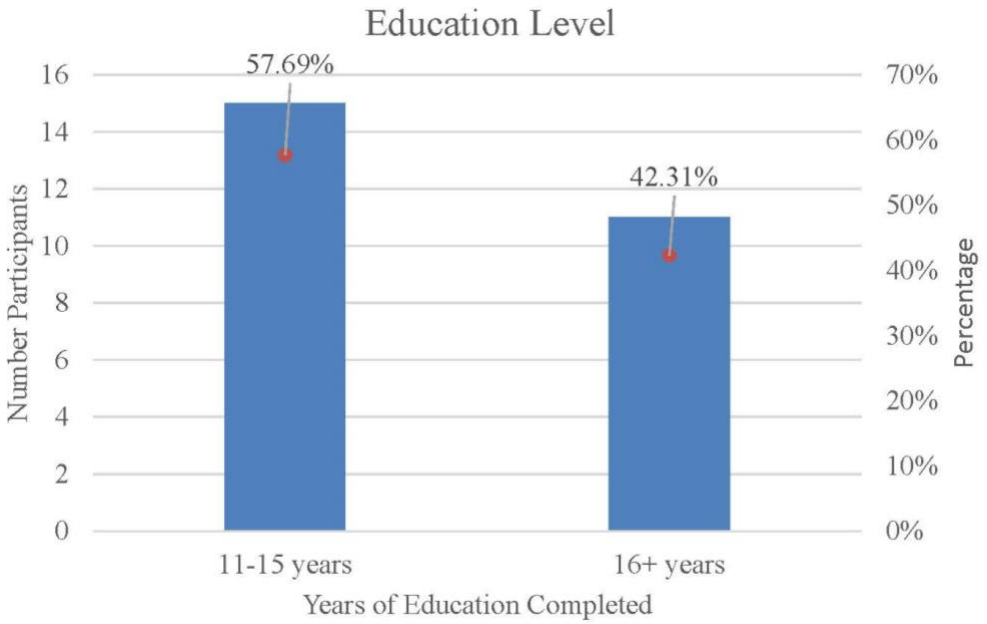


Figure 3: Frequency of Maximum Number of Years of Formal Education Reported by 26 Adults Participating in APRN-led Lifestyle Modification Program for Diet and Exercise.



The analyses showed the cognitive restraint domain improved by 3.51 (-14.39, 7.38) points between the first and last intervention visit (Figure 4). Scores for the uncontrolled eating scale improved, on average, by 6.75 (-26.31, 12.78) points, and emotional eating scores improved by 11.46 (-28.84, 5.90) appreciably more (Figure 4); no domain showed statistically significant improvement. Domain scores for male and female participants were compared, and only modest differences were found (Figure 5). Specifically, when Three Factor Eating Questionnaire scores were evaluated using uncontrolled eating, cognitive restraint, and emotional eating subscale measurements, an Analysis of Variance suggested that sex was associated with the overall score (Mean Square (MS) within = 745.87, MS between = 3.25, 20 df, $p = 0.05$) (Figure 5).

Figure 4: Comparison of the difference between self-reported three-factor eating questionnaire measurements for 21 adult participants in an eight-week nurse-led lifestyle modification coaching intervention: cognitive restraint, uncontrolled eating, and emotional eating subscales.

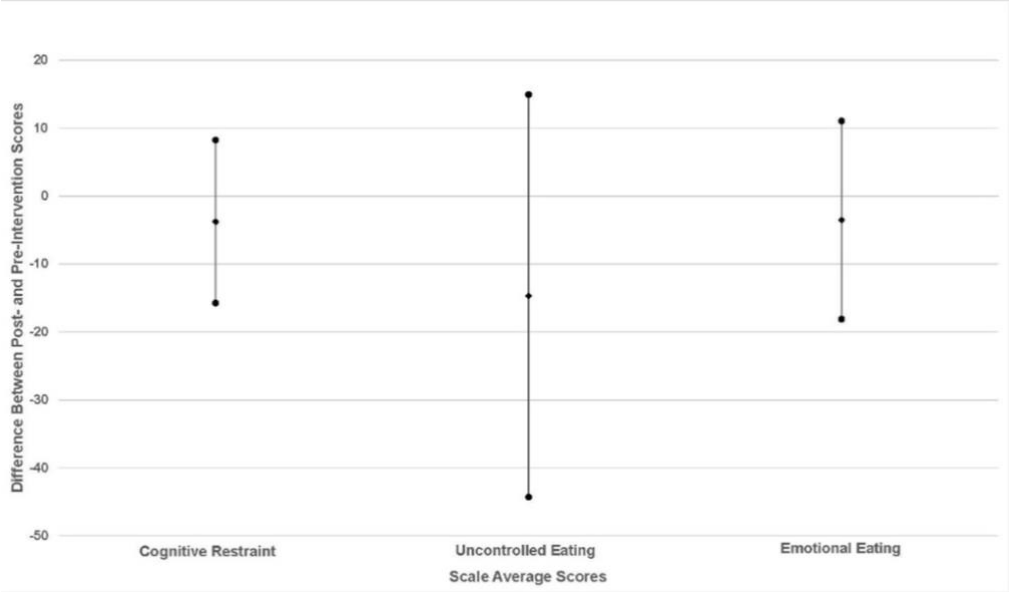
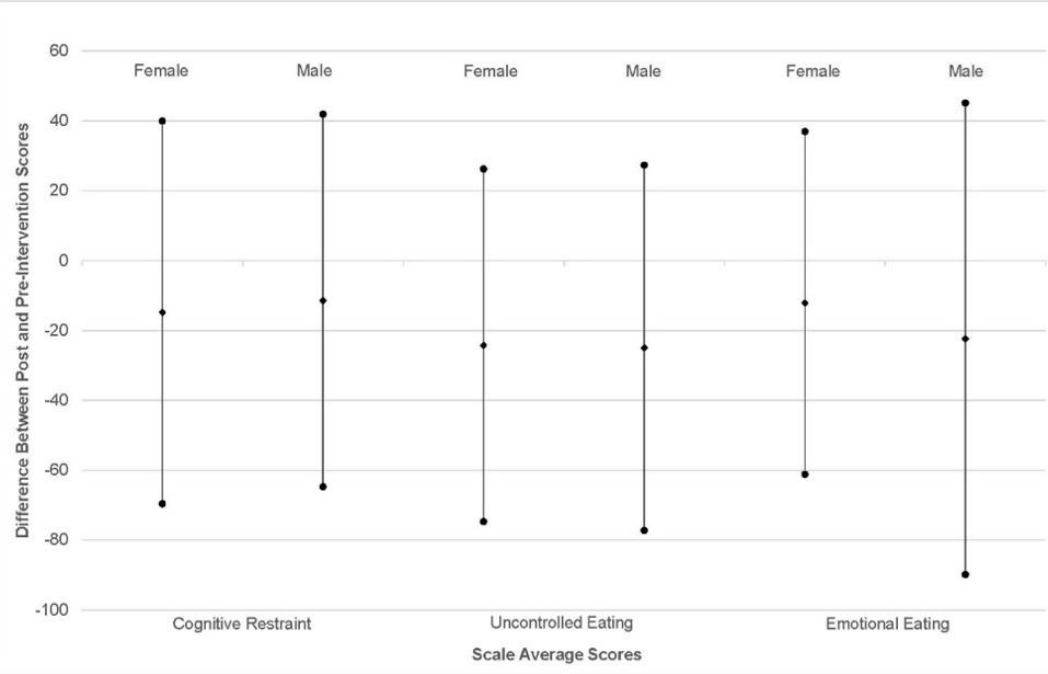
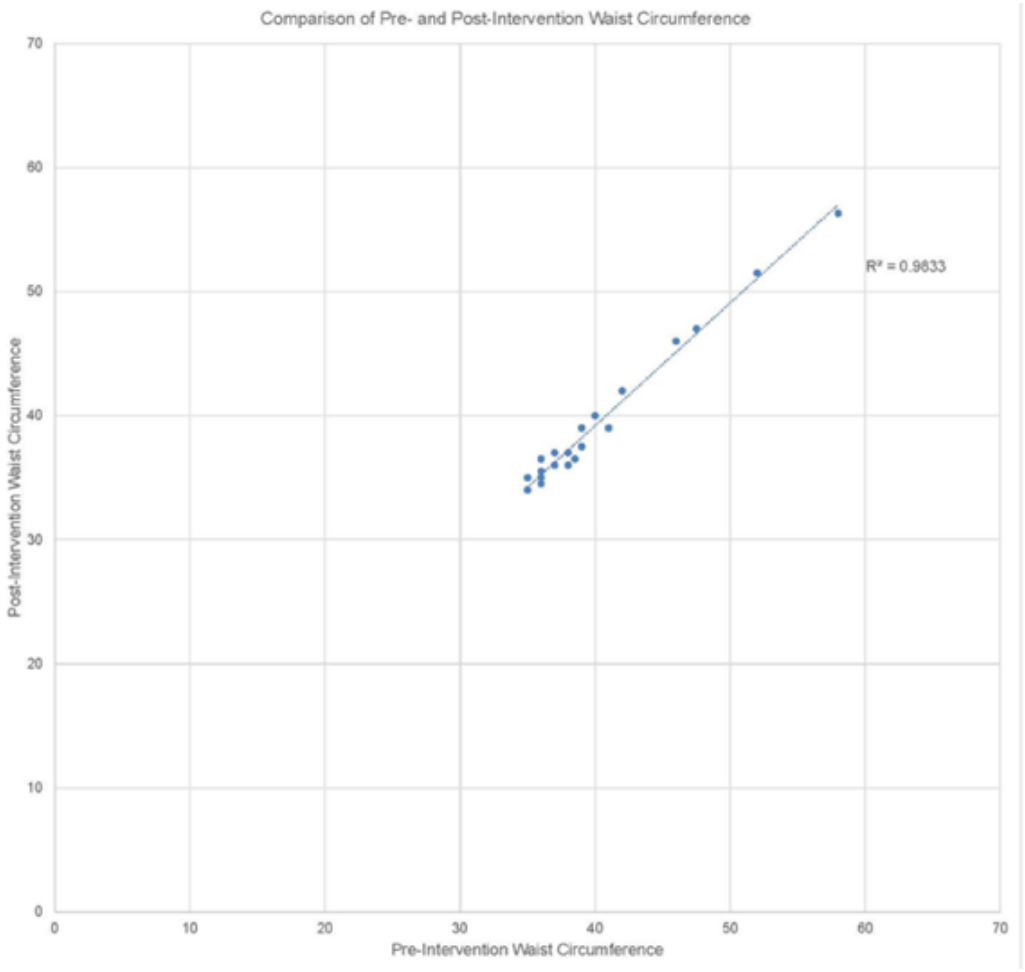


Figure 5: Comparison of a sex-specific self-reported three-factor eating questionnaire for participants in an eight-week nurse-led lifestyle modification coaching intervention: cognitive restraint, uncontrolled eating, and emotional eating subscales



The waist circumference on average was 41.2 (95% CI: 28.8, 54) inches for the sample at the baseline visit. Albeit not statistically significantly improved, the measurement at the conclusion was trending in the right direction: 39.3 (95% Cl: 27.6, 51.1) inches. This data may suggest that the intervention may have contributed to a smaller waist circumference. A plot comparing the measurements taken at the outset and the conclusion of the intervention is shown in Figure 6.

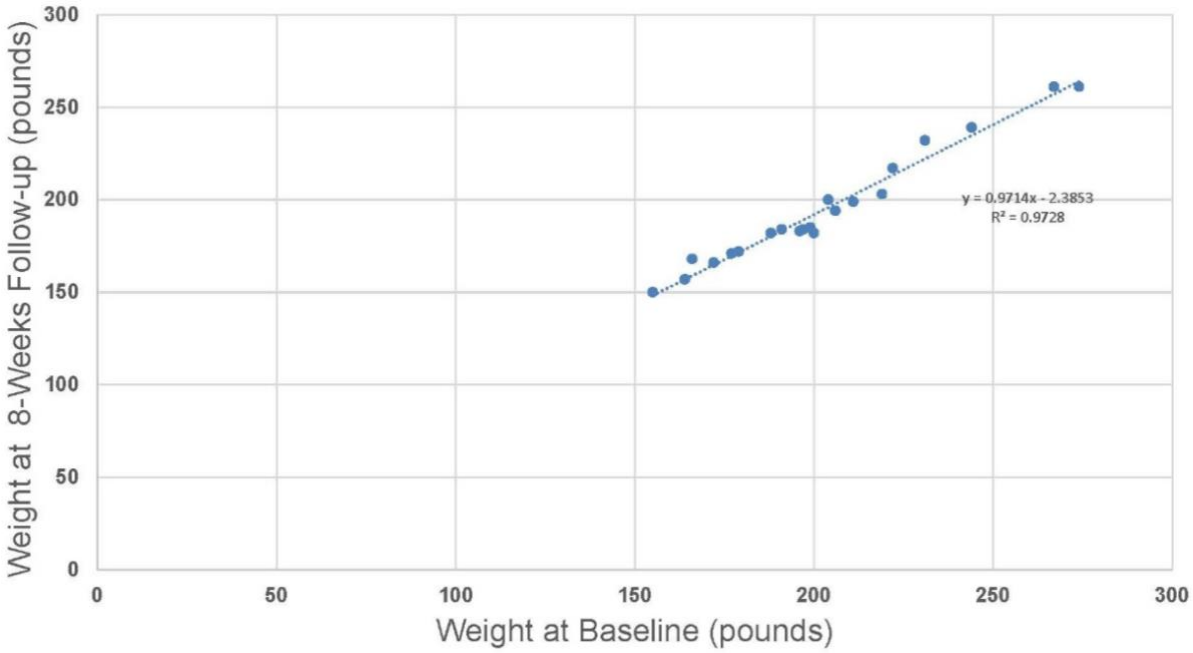
Figure 6: Association between pre- and post-intervention waist circumference measurements (inches) for 26 adults participating in an APRN-led lifestyle modification program for diet and exercise



Participants on average weighed 206.5 (95% CI: 141.8, 271.1) pounds at the baseline visit. Less than five participants who were lost to follow-up, the average weight at week eight was 194.8 (95% CI: 133.4, 256.1) pounds. A plot comparing the pre- and post-intervention weights showed approximately 97% of the variability was explained by the pre-intervention weight (R-square = 0.9728) (Figure 7). Participants showed a modest reduction in weight over

the intervention period: mean = 8.19 (SD: 5.24) pounds, ranging from two pounds gained to 18 pounds lost among participants.

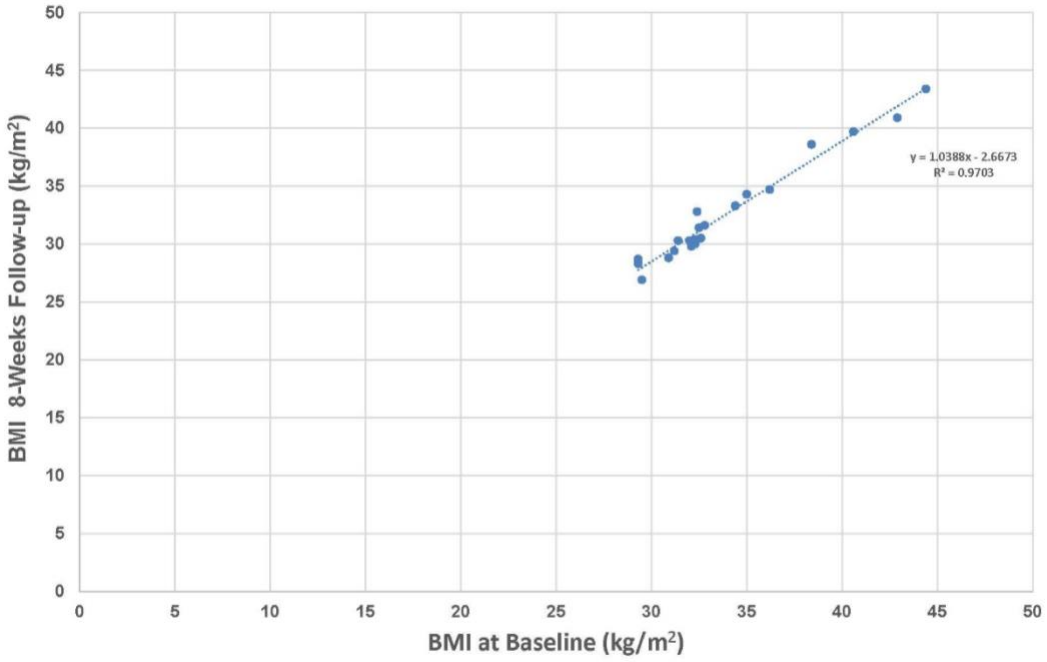
Figure 7: Association between pre- and post-intervention weight in pounds (pounds) for 26 adults participating in an APRN-led lifestyle modification program for diet and exercise



Body Mass Index adjusts for the effect of height and weight as a single measure. Participants showed an average BMI of 34.8 kg/m^2 (95% Cl: 25.9, 43.6) at the baseline visit. The average BMI at week eight was 32.6 kg/m^2 (95% Cl: 23.3, 41.9 for the program completers. The participants lost to follow-up showed a BMI of 38.2 (SD: 2.2) kg/m^2 at visit 1 in comparison to program *completers* that showed 32.6 (SD: 4.51) kg/m^2. The plot of pre- and post-intervention weight demonstrated the contrast of BMI measurements shows that 97% of the post-intervention BMI was explained by the pre-intervention measurement (R-square: 0.9703) (Figure 8). Over the

observation period, among completers the change in BMI ranged from a loss of 2.6 to a gain of 0.4 kg/m^2, respectively. The mean change in BMI was -1.35 (95% CI: -2.99, 0.29) kg/m^2 ($p>0.05$). Some subjects showed healthy changes in BMI across the intervention period, which was a individual health goal of this project.

Figure 8: Association between pre- and post-intervention BMI (kg/m^2) for 26 adults participating in an APRN-led lifestyle modification program for diet and exercise



CHAPTER SIX: DISCUSSION

Implications for Research and Practice

Few effective pharmacotherapies reverse NAFLD, a weight loss of 7–10% remains the first-line therapy to prevent NAFLD progression to liver failure (Fernandez et al., 2022). A recently published meta-analysis evaluated 30 randomized clinical trials (RCTs), including data for 3840 NAFLD participants concluded that lifestyle modifications for diet, exercise, or both are effective and beneficial in the treatment of NAFLD (Fernandez et al 2022). Separately, a meta-analysis of 20 diet and exercise RCTs, characterizing the experience of 1073 NAFLD participants, showed exercise, alone or in conjunction with dietary change, improved NAFLD-activity score (NAS) and liver enzymes in serum: NAS (Standardized Mean Difference (SMD)=-0.61 (95% CI: --1.09, -0.13); Alanine Transaminase (ALT) (SMD= -0.59 IU/L, (95% CI: -0.8, -0.37)); and to a lesser extent, Aspartate Transaminase (AST) SMD= -0.35 (95% CI: -0.80, 0.09) (Katsagoni et al., 2017). The NAS is a non-invasive clinical assay that provides a composite score linking steatosis, inflammation, and hepatocellular ballooning due to intracellular fat droplets (Tamaki et al., 2022; Caldwell et al., 2010). In addition, experts report that exercise positively reduces intrahepatic triglycerides, a biomarker associated with insulin resistance even without weight loss (Katsagoni et al., 2017; Ress et al., 2016).

The findings from this quality improvement project are consistent with these more extensive analyses. Refining and testing this intervention over several Plan-Do-Study-Act (PDSA) cycles may progressively improve outcomes. The adherence to recommended diet and exercise levels that improve NAFLD is challenging. Developing interventions that achieve our goal and maintain the gain made over successive PDSA cycles is essential (Green & Valentini,

2015). The risk of untreated NAFLD progressing to hepatic steatosis, a precancer, and malignancy remains high in the absence of lifestyle change (Soto-Angona et al., 2020).

The high correspondence between the pre-intervention and post-intervention measurements of waist circumference suggests a need for more time on study and, possibly, a larger sample of adult participants. More observation time may be necessary before weight loss, abdominal adiposity, and abdominal muscle tone improve sufficiently to reduce waist circumference. Patient-performed waist circumference measurements may be inaccurate, and routinely performed measurements by trained providers or certified medical assistants may improve the accuracy of this intervention.

Future initiatives should develop stringent follow-up protocols. Coaching interventions that concentrate on realizing a reduction in waist circumference, a feature of abdominal adiposity, are essential to improving health outcomes. The evaluation of the economic feasibility of coaching in lifestyle modification located in the community seems essential. Meeting people where they live locates interventions aimed at health promotion back to the community. Increasing the sample size of adults with NAFLD may detect statistically significant differences attributable to the coaching intervention in controlled analyses that account for the effects of confounding variables. The experience in this project suggests that patients who completed the program were highly motivated and reported positive changes in eating and activity behaviors. Future quality-improvement studies promise to improve the public's health significantly.

Limitations

Lew Medical geographically sits within service planning area (SPA) three, a geographical area inside Los Angeles County, also known as the San Gabriel Valley. According to Los Angeles County's Key Indicators for Health, SPA 3 has an average of 23.8% with a BMI $\geq$30

kg/m^2. By design, the participants in this study are obese, with an average BMI of 34.8 kg/m^2. Population data suggest the San Gabriel community shows obesity statistics that closely approximate the countywide prevalence (23.5%), which itself is lower than the national average (28.9%) (LA County Public Health, 2017). Overall resources that promote health within the San Gabriel community may support the attainment of normal weight and adequate physical activity better than some communities within service planning areas that are challenged by a high prevalence of obesity.

The education program's feasibility may limit our findings. The cost of coaching by a nationally certified Nurse Practitioner is high. Patients may be unable to remain involved and motivated for program completion. Trust in the educator or coach may affect a patient's progress with NAFLD lifestyle modification recommendations. Further innovations that develop training programs for medical assistants, *promotores de salud,* or health educators that can deliver a high-quality coaching intervention is a high priority to developing an affordable intervention (DeWalt, 2006). This is a really old reference, anything more recent?

Findings may be challenging to replicate in other practices or community settings due to language barriers, limited health literacy, socioeconomic status, and reasonably priced internet access. California Governor Gavin Newsom signed legislation, A.B. 156, in July of 2021 to expand equitable and affordable high-speed internet access across the state, which will help with this possible limitation (A.B. 156, 2021).

CONCLUSION

Lifestyle changes involving food and physical exercise are strongly associated with improved health for people with metabolic disease, including NAFLD. Weight loss, as measured by a reduction in waist circumference, is the most well-known treatment for NAFLD, with a

dose-response relationship comparable to insulin (Romero-Gómez et al., 2017). More than seven percent of body weight loss is linked to clinically significant disease status regression (Beaton, 2017). Beaton (2017) additionally states that exercise has a multitude of health benefits for the cardiovascular system. In people with NAFLD, combining exercise and dietary changes is likely to be more effective in delaying disease development (Romero-Goméz et al., 2017).

Although nutritional education and increased physical activity are most often recommended for managing NAFLD, failure rates are high, posing a significant barrier to the successful prevention and management of chronic diseases (Nourian et al., 2020). Factors affecting self-care include low self-efficacy, depressed mood, and multiple social and environmental barriers. The centrality of self-efficacy in self-care behaviors makes it necessary, but possibly not sufficient, for behavior change (Lim et al., 2017). Active engagement and collaboration are more likely to result in more prolonged and beneficial clinical and psychological effects than didactic therapies with limited participant input (Young et al., 2014).

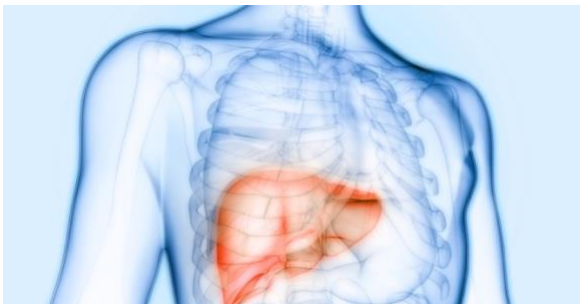
Significant studies suggest follow-up in individualized coaching program promotes adherence to lifestyle change in complex conditions (DeWalt et al., 2006; Possin et al., 2019). DeWalt and colleagues (2006) showed a lower risk for hospitalization and death within 12 months of self-care coaching among heart-failure patients with low health literacy, and no statistically significant difference among similarly coached adults with high health literacy among people with low health literacy. The systematic review suggests years of formal education, the data available for this quality-improvement project, only poorly approximates the effect of health literacy on mortality risk (Fan et al., 2021). The overall trend in this study group is highly skewed toward high levels of formal education.

Personalized coaching as an additional clinical intervention may better facilitate behavior change at a very low risk for adverse events. Prolonged lifestyle diet and exercise behavior changes hold promise for a return on the investment for care providers. The value of one-on-one coaching can help patients improve their self-efficacy by providing support, verbal encouragement, and appropriate feedback in the areas of physical activity and diet compliance while being cost-effective.

APPENDICES

Appendix A: Recruitment Flyer

Have you been diagnosed with Nonalcoholic Fatty Liver Disease



Please inquire about this no-cost program and study conducted by a Nationally-Board certified Family Nurse Practitioner and UCLA Doctoral of Nursing student to see if one-on-one coaching is beneficial for you.

Are you interested in receiving one-on-one coaching to help you make diet and exercise

Criteria for the program:

1) A current patient who has had at least one medical visit with a clinician at Lew Medical
2) Diagnosed with Fatty Liver Disease (NAFLD)
3) Between the ages of 18-60
4) BMI of 30 and over
5) Have a waist circumference of over 102 cm for males, 88 cm for females
6) Can commit for a total of 14 weeks, start date January 30, 2022
7) Have reliable internet and phone access

For more information, please email

TDonnellyNP@gmail.com

UCLA School of Nursing

Appendix B: EMR Abstraction Tool

Participant ID Number: _____

Birthdate: _____

Sex: _____

Race: _____

How many years of school completed: _____

Weight: _____

Height: _____

Waist Circumference: _____

Latest ALT: _____

Latest AST: _____

Last ultrasound date and findings: _____

Average time of weekly exercise (minutes): _____

Appendix C: Three-Factor Eating Questionnaire

Participant ID Number: _____

Please read each statement and select from the multiple choice options the answer that indicates the frequency with which you find yourself feeling or experiencing what is being described in the statements below.

1. When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal. Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

2. I deliberately take small helpings as a means of controlling my weight.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

3.When I feel anxious, I find myself eating.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

4. Sometimes when I start eating, I just can't seem to stop.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

5. Being with someone who is eating often makes me hungry enough to eat also.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

6. When I feel blue, I often overeat.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

7. When I see a real delicacy, I often get so hungry that I have to eat right away.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

8. I get so hungry that my stomach often seems like a bottomless pit.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

9. I am always hungry, so it is hard for me to stop eating before I finish the food on my plate.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

10. When I feel lonely, I console myself by eating.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

11. I consciously hold back at meals in order not to weight gain.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

12. I do not eat some foods because they make me fat.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

13. I am always hungry enough to eat at any time.
Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

14. How often do you feel hungry?
Only at mealtimes (1)/ sometimes between meals (2)/ often between meals (3)/almost always (4)

15. How frequently do you avoid "stocking up" on tempting foods?
Almost never (1)/ seldom (2)/ moderately likely (3)/ almost always (4)

1**6.** How likely are you to consciously eat less than you want?
Unlikely (1)/ slightly likely (2)/ moderately likely (3)/ very likely (4)

17. Do you go on eating binges though you are not hungry?
Never (1)/ rarely (2)/ sometimes (3)/ at least once a week (4)

18. On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never "giving in"), what number would you give yourself?

Revised 18-Item (Karlsson et. Al. 2000)

Appendix D: Motivational Interview and Script for Weekly Meetings

Motivational interviewing is a form of counseling that intends to assist people in finding the motivation to make positive changes in their lives. This client-centered approach is particularly effective for people who are hesitant to change their routines. Participants will be coached via motivational interviewing each week during each session to help comprehend their apprehension and issues with change. Instead of being combative, which can lead to failure and attrition, the approach will be more empathetic and collaborative.

1. The first week's discussions will focus on how a person interprets the term "weight loss," as well as evaluating past diet behaviors and techniques, both successful and failed. The objective is to figure out what mental processes or strategies that work best for the participant in order to keep them motivated so they can continue to be guided in a manner that is effective for them.
2. The second week's discussions will focus on how to properly read a nutrition label. Reading a nutrition label is greatly misinterpreted. For instance, many patients that I have worked with in the past do not understand that that each package may contain more than 1 serving. Accurate counts are imperative to having proper caloric and dietary restrictions.
3. Week three will focus on helping participants count their oral intake, both solid and liquid. The aim is to help them understand specifically what they're eating and how much they're eating in order to pinpoint their dietary habits and make adjustments as deemed necessary
4. The fourth week’s discussions will focus on how to properly log food counts into an app or on pen and paper. Visualizing a daily calorie intake can help figure out how to deal with

certain behaviors and provide better alternatives or provide assistance for behavioral changes. If pinpointing their actual calories, adjustments can be made is deemed necessary.

5. The fifth week's discussion will focus on fitting exercise into a weekly routine. Implementing fitness can prove to be difficult, so helping participants find out how to slowly increase their activity level will be the goal. For example, parking far from the store or taking trash out by taking the longer route would be good ways to fit in a little jump in the heart rate while performing a normal task.

6. Week six will focus on learning how to handle hunger and recognize satiety. Some individuals eat out of emotion. Emotions can include anything from stress, happiness, sadness, and even boredom. The aim is to help participants recognize eating that is not derived from hunger but rather the need to satisfy emotional need.

7. Week seven will focus on eating during social events. Will discuss strategies on how to eat mindfully and not choose their intake while they are distracted by conversation. The topic of portion control will be discussed, and participants will be given strategies on how to portion control in a large social event.

8. Week eight will delve into ways of managing daily stress. Strategies to facilitate activities of daily living such as meal prepping to take stress out of choosing a meal for the day, methods for ways of relaxing such as meditation to help bring down stress levels.

9. Week nine will focus on strategies on improving sleep. Addressing possibilities such as restless leg syndrome or obstructive sleep apnea that can be addressed through their primary care provider. CDC recommendations such as no large meals or caffeine before bedtime, no electronics, consistency in sleep time will be reviewed with patient.

10. Week 10 will focus on methods on staying motivated without one-on-one coaching. This meeting will discuss the successes of our previous weeks and what they've learned and how they can apply it to daily life without guidance.

Appendix E: Weekly Log

Participant ID Number: _____

Date	Weight (weekly)	Waist Circumference(weekly)	Blood Sugar (Daily)	Blood Pressure (Daily)

Appendix F: Program Evaluation Form

Lew Medical
UCLA School of Nursing

PROGRAM EVALUATION FORM
Presenter: Therese Marie Donnelly, MSN, FNP-c

Name: _____ Date: _____

(Key: 1-poor, 2-below average, 3-average, 4-above average, 5-excellent,)

Clear explanation of Fatty Liver Disease	1	2	3	4	5
Presentation pertains to my lifestyle.	1	2	3	4	5
Organization of presentation/Timeliness	1	2	3	4	5
Quality/Clarity of Presentation	1	2	3	4	5
Presenter Interesting	1	2	3	4	5
Responsiveness to questions	1	2	3	4	5
Handout information understandable	1	2	3	4	5

1. Will you begin to read nutrition labels after this coaching program ? (circle one)

Not likely Somewhat likely Likely Absolutely

2. Will you begin to practice **caloric control** after this coaching program? (circle one)

Not likely Somewhat likely Likely Absolutely

3. Will you begin to increase physical activity after this coaching program? (circle one)

Not likely Somewhat likely Likely Absolutely

4. Do you feel like you are ready to start making small lifestyle changes? (circle one)

Not likely Somewhat likely Likely Absolutely

Additional suggestions or comments:

_____
_____
_____
_____

Please complete and return the form to Therese Donnelly.
Evaluations are used for the improvement of program only.
Thank you in advance for your participation.

TABLE OF EVIDENCE

Author, Year	Purpose	Sample & Setting	Methods Design Interventions Measures	Results	Discussion, Interpretation, Limitation of Findings
Lim, S. L., Johal, J., Ong, K. W., Han, C. Y., Chan, Y. H., Lee, Y. M., & Loo, W. M. (2020). Lifestyle intervention enabled by mobile technology on weight loss in patients with non-alcoholic fatty liver disease: Randomized controlled trial. *JMIR MHealth and UHealth*, *8*(4). https://doi.org/10.2196/14802	This study aimed to evaluate if a lifestyle interventi on using a mobile app may assist NAFLD patients in losing weight.	- Gender, age (40 years or 40 years), and BMI (27.5 kg/m2 or 27.5 kg/m2) were used to stratify the randomization of screened subjects. - A total of 101 patients completed the study, with 50 allocated to the intervention group. - National University Hospital (NUH) in Singapore's NAFLD clinic through referrals from clinicians. - adults aged ≥21 years with a BMI 23 kg/m2, read and write English, had a smartphone - Exclusion criteria ETOH ≥ than 15 g for women and 30 g for males Have hepatitis B/C. Poorly controlled diabetes (HbA1c>10%), diabetes requiring insulin, cardiovascular events in the past six months, stage 4 and above kidney disease, concomitant liver disease, depression, untreated hypothyroidism, heart failure, and clinically or biochemically identified systemic diseases.	- Randomized controlled study conducted at NUH between July 2017 and November 2018. - Participants randomly assigned to the control or intervention group within each stratum based on a 1:1 allocation. - Participants in the intervention group received dietary and physical activity modification guidance from a nutritionist during a single face-to-face appointment in the clinic, followed by 6-months of remote support via a mobile app. - All outcomes were obtained by standard measures and blood testing - The assessors were not blinded to the study participants' groups.	- The 6-month mobile app intervention approach increased the odds of 5% weight loss by five times compared to usual treatment. - The mobile-enabled lifestyle intervention also appeared to improve liver enzymes (AST, ALT) and blood pressure - intervention group had a 3.6 cm waist circumference reduction compared to the control group at six months	- Using randomized stratification guaranteed that the control and intervention groups had similar baseline characteristics. - a modified intention-to-treat analytic approach was used. - one of the first randomized controlled trials to look at how a mobile app can help people with NAFLD lose weight and improve physiological and biochemical indicators. - Limitations: a single-center trial with an intervention that precluded non-smartphone users and those illiterate in English. It depended on education attainment and household income, including a smaller proportion of people of lower socioeconomic status, leading to the restrictions of generalizability of findings to the greater population.

Author, Year	Purpose	Sample & Setting	Methods Design Interventions Measures	Results	Discussion, Interpretation, Limitation of Findings
Javanmardifard, S., Ghodsbin, L., Kaviani, M. J., Jahanbin, I. (2017). The effect of telenursing on self-efficacy in patients with non-alcoholic fatty liver disease: a randomized controlled clinical trial *Gastroenterol Hepatol Bed Bench.* 2017 Autumn; 10(4): 263–271.	The purpose of this study was aimed to evaluate how telenursing affected dietary behavior and self-efficacy in patients with non-alcoholic fatty liver disease (NAFLD).	- 60 NAFLD patients referred to Shiraz University of Medical Sciences Gastroenterology clinics chosen at random from a convenience sample. - The study's inclusion criteria: age 19 or older, overweight or obese (BMI > 25 kg/m2), able to exercise, having a home or mobile phone, and no speech or hearing issues. - Exclusionary criteria: Having chronic liver diseases, hyper/hypothyroidism, bile duct cancer, diabetes mellitus, obesity due to excessive corticosteroid use, and chronic infections such as tuberculosis were excluded. - The intervention group had eight females (26.7%) and 22 males (73.3%), while the control group had six females (20.7%) and 23 males (77.3%)	- Telephone intervention was 12 weeks to help participants adhere to the diet and exercise plan. - Intervention group had self-report questionnaires created by the researcher to track daily nutrition and exercise. - Control group received standard of care treatment. -	- Following the intervention, both groups' dietary and physical activity self-efficacy increased. - A paired t-test revealed that this rise was solely significant in the intervention group ($p<0.001$), with p 0.054 for the control group. - The intervention group's change from undesirable to desirable nutritional behaviors was statistically significant ($p<0.001$), but not the control group's ($p>0.05$).	- Telenursing may increase patients' self-efficacy in adherence to food, physical activity, and disease-related healthy behaviors by raising their awareness. - Regular follow-up and telephone consultation services following clinical consultation can stabilize healthy behaviors, preserve training effects, and improve treatment outcomes. -

Author, Year	Purpose	Sample & Setting	Methods Design Interventions Measures	Results	Discussion, Interpretation, Limitation of Findings
Possin, K. L., Merrilees, J. J., Dulaney, S., Bonasera, S. J., Chiong, W., Lee, K., Hooper, S. M., Allen, I. E., Braley, T., Bernstein, A., Rosa, T. D., Harrison, K., Begert-Hellings, H., Kornak, J., Kahn, J. G., Naasan, G., Lanata, S., Clark, A. M., Chodos, A., Gearhart, R., Ritchie, C., & Miller, B. L. (2019). Effect of Collaborative Dementia Care Via Telephone and Internet on Quality of Life, Caregiver Well-Being, and Health Care Use: The Care Ecosystem Randomized Clinical Trial. *JAMA Internal Medicine*, *179*(12), 1658-1667.https://doi.org/10.1001/jamainternmed.2019.4101	To determine if the Care Ecosystem can improve outcomes for people with dementia (PWD), caregivers, and payers.	- A total of 512 PWD-caregiver pairs were randomized to the Care Ecosystem - 268 to usual care. - All eligible PWDs had dementia, were on Medicare or Medicaid and spoke English, Spanish, or Cantonese. - Intention-to-treat analyses	- A pragmatic single-blind randomized clinical trial was done with PWDs and their caregivers. - A certified care team navigator provided information, support, and care coordination with a team of dementia specialists by telephone (advanced practice nurse, social worker, and pharmacist).	- PWD quality of life improved (B, 0.53; % CI, 0.25-1.30; P =.04), ER visits decreased (B, -0.14; % CI, -0.29 to 0.01; P =.04), and caregiver depression (B, -1.14; 95 % Ci, -2.15 to -0.13; P =.03) and caregiver burden decreased (B, -1.90; 95 % Ci, -3.89 to -0.08; P= .046)	- The treatment reduced ED visits but did not alter hospitalization or ambulance use. In addition, the Care Ecosystem improved caregiver burden, depression, and self-efficacy at six months, and the effects lasted 12 months for burden and depression. - Most caregivers were pleased with the training, and 97% would recommend it to another caregiver.

Author, Year	Purpose	Sample & Setting	Methods/ Design Interventions Measures	Results	Discussion, Interpretation, Limitation of Findings
DeWalt, D. A., Malone, R. M., Bryant, M. E., Kosnar, M. C., Corr, K. E., Rothman, R. L., Sueta, C. A., & Pignone, M. P. (2006). A Heart Failure Self-Management Program for Patients of All Literacy Levels: A Randomized, Controlled Trial [Isrctn11535170]. *BMC Health Services Research*, *6*, 30. https://doi.org/10.1186/1472-6963-6-30	- Heart failure self-management programs can minimize hospitalizations and mortality without analyzing usefulness in patients with low literacy. This study has evaluated the efficacy of a low-literacy heart failure self-management program to standard care.	-heart failure patients ages 30–80 taking furosemide - Sixty-four patients (control) and 59 patients (intervention) were involved. - 41% had inadequate literacy. - Clinical diagnosis of heart failure and one of the following: 1) chest x-ray evidence compatible with heart failure, 2) ejection fraction 40%, or 3) peripheral edema history. - NYHA II-IV symptoms in the last three months. - Excluded: Severe hearing impairment, blindness, current substance abuse, a serum creatinine >4 mg/dl or on dialysis, supplemental oxygen at home, or scheduled for cardiac surgery or waiting for a heart transplant.	- 12-month randomized trial - Patient education included daily weight assessment, diuretic dose self-adjustment, and symptom identification and response. Adherence was reinforced with picture-based educational materials, a digital scale, and scheduled phone calls. Usual care was given to the controls. Overall hospitalization or death and quality of life were the primary outcomes.	. After adjusting for age, gender, use of ACE inhibitor or ARB, use of a Beta-blocker, presence of hypertension, intervention patients were less likely to have the outcome (IRR = 0.53; 95% CL 0.32, 0.89). -61% of patients in the control group had at least one hospitalization or died, and 42% of patients in the intervention group had at least one hospitalization or died (p = 0.13). 39 % of the control group and 34% of the intervention group experienced at least one cardiac hospitalization (p = 0.55. Adjusted: for baseline differences, the IRR was 0.85 (95% CI 0.44, 1.7). -In the adjusted model, the difference was 2 points (95 % Ci 9, -5, p = 0.59), indicating no effect on heart failure-related quality of life. -After adjusting for baseline differences, the difference was 2 points (95 % Ci 9, -5, p = 0.59), indicating no effect on heart failure-related quality of life.	- A low-literacy heart failure self-management program lowered the incidence of hospitalization or death. - The study found that patients with poor literacy benefited as much as those with high literacy. - created an easy-to-understand training pamphlet and self-management strategy to help people learn self-management - The intervention taught self-management. - Concentrated on teaching patients how to self-adjust diuretics based on weight fluctuations. - Limitations: research assistants not blinded to group assignment/ To help patients with low literacy, the original questionnaire was changed, which may be less able to identify significant changes in heart failure-related quality of life, small sample size.

Author, Year	Purpose	Sample & Setting	Methods/Design Interventions Measures	Results	Discussion, Interpretation, Limitation of Findings

Nourian, M., Askari, G., Golshiri, P., Miraghajani, M., Shokri, S., & Arab, A. (2020). Effect of lifestyle modification education based on health belief model in overweight/obese patients with non-alcoholic fatty liver disease: A parallel randomized controlled clinical trial. *Clinical Nutrition ESPEN*, *38*, 236–241. https://doi.org/10.1016/j.clnesp.2020.04.004	This HBM-based lifestyle change education may successfully improve not only HBM domains but also NAFLD parameters. Thus, it may be beneficial to implement this educational program with NAFLD patients to affect their thoughts and bodies simultaneously.	- Between September 2017 and June 2018, patients were recruited from the Sedighe There, Isfahan Endocrine and Metabolism Research institute's fatty liver clinic.
		- Eighty-two people met the inclusion criteria and were randomly allocated to either the intervention (n = 41) or control (n = 41) groups using block randomization
		- Inclusionary criteria
		  - Ages 20-50 years old
		  - BMI >25
		  - Absence of drinking ETOH
			- parallel, randomized controlled trial study,
			- Randomization was accomplished by the use of computer-generated random numbers and by trained employees who were unaware of the participants' characteristics.
			- Questionnaire and provided feedback to help verify the HBM questionnaire. In addition, the scale's reliability was assessed using a test-retest procedure in fifteen individuals similar to the intervention sample with a two-week gap. A measure of the questionnaire's reliability, Cronbach's alpha was 0.62, indicating that the questionnaire was accepted.
				- After two months of educational intervention based on the HBM, significant improvements in all HBM variables (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy) and knowledge were observed within the intervention group (p 0.001) and between the two groups (p 0.001).
				- Both groups improved in terms of severity of hepatic steatosis following intervention (case: p = 0.008; control: p = 0.001). The between-group comparison demonstrated a significantly greater improvement in the intervention group than in the control group (p = 0.025).
					- The first parallel randomized controlled trial assessed the effects of lifestyle modification education based on the HBM in NAFLD patients.
					- Findings indicate that two months of lifestyle modification education centered on HBM can considerably enhance knowledge, HBM parameters, liver enzyme levels, and ultrasonographic findings.
					- In the HBM domains that reflect the patient's beliefs and the improvement of NAFLD markers such as liver enzymes and ultrasonographic results, HBM-based lifestyle modification education may be successful.
					- Maybe it may be beneficial to implement this educational program for NAFLD patients to have a combined effect on their minds and bodies.

Note: ALT=alanine aminotransferase ; AST = aspartate aminotransferase; BMI = body mass index; CAP = controlled attenuation parameter; CVD = cardiovascular disease; ETOH = alcohol; FAST score = fibroScan-AST score; HBM = health belief model; HOMA-IR =homeostatic model assessment for insulin resistance; LCHF = low-carbohydrate, high-fat diet; med= medicine; MedDiet Mediterranean diet; MRS=magnetic resonance spectroscopy; NAFLD = nonalcoholic fatty liver disease; PMBC = peripheral blood mononuclear cells ;NASH = nonalcoholic steatohepatitis; Nfr2 = Nuclear factor-erythroid factor 2-related factor 2; SoC = standard of care; TC = total cholesterol; TG=serum triglyceride

REFERENCES

A.B. 156, 2021 Committee on Budget, 2021-2022 Reg. Sess. (Ca. 2021) https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB156

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

Armstrong, G. E., & Sables-Baus, S. (2020). *Leadership and systems improvement for the Dnp*. Springer Publishing Company.

Beaton, M. D. (2017). Current Treatment Options for Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis. *Canadian Journal of Gastroenterology*, *26*(6), 353–357 https://doi.org/10.1155/2012/725468

Caldwell, S., Ikura, Y., Dias, D., Isomoto, K., Yabu, A., Moskaluk, C., Pramoonjago, P., Simmons, W., Scruggs, H., Rosenbaum, N., Wilkinson, T., Toms, P., Argo, C. K., Al-Osaimi, A. M. S., & Redick, J. A. (2010). Hepatocellular ballooning in Nash. *Journal of Hepatology*, *53*(4), 719–723. https://doi.org/10.1016/j.jhep.2010.04.031

Caussy, C. (2019). Should We Screen High-Risk Populations for NAFLD? *Current Hepatology Reports*, *18*(4), 433–443. https://doi.org/10.1007/s11901-019-00497-7

Centers for Disease Control and Prevention. (2021, June 3). *Assessing your weight*. Centers for Disease Control and Prevention. Retrieved August 16, 2022, from https://www.cdc.gov/healthyweight/assessing/index.html

Dosemeci, M., Wacholder, S., & Lubin, J. H. (1990). Does Nondifferential Misclassification of Exposure Always Bias a True Effect toward the Null Value? *American Journal of Epidemiology*, *132*(4), 746-748.

DeWalt, D. A., Malone, R. M., Bryant, M. E., Kosnar, M. C., Corr, K. E., Rothman, R. L., Sueta, C. A., & Pignone, M. P. (2006). A Heart Failure Self-Management Program for Patients of All Literacy Levels: A Randomized, Controlled Trial [Isrctn11535170]. *BMC Health Services Research*, *6*, 30. https://doi.org/10.1186/1472-6963-6-30

Duarte, P. A., Palmeira, L., & Pinto-Gouveia, J. (2018). The three-factor eating questionnaire-R21: A confirmatory factor analysis in a Portuguese sample. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, *25*(1), 247–256. https://doi.org/10.1007/s40519-018-0561-7

El-Agroudy, N. N., Kurzbach, A., Rodionov, R. N., O'Sullivan, J., Roden, M., Birkenfeld, A. L., & Pesta, D. H. (2019). Are Lifestyle Therapies Effective for NAFLD Treatment? *Trends in Endocrinology & Metabolism*, *30*(10), 701–709. https://doi.org/10.1016/j.tem.2019.07.013

Fan, Z.-y., Yang, Y., & Zhang, F. (2021). Association between Health Literacy and Mortality: A Systematic Review and Meta-Analysis. *Archives of Public Health*, *79*(1), 119. https://doi.org/10.1186/s13690-021-00648-7

Fernández, T., Viñuela, M., Vidal, C., & Barrera, F. (2022). Lifestyle changes in patients with non-alcoholic fatty liver disease: A systematic review and meta-analysis. *PLOS ONE, 17*(2). https://doi.org/10.1371/journal.pone.0263931

Golabi, P., Otgonsuren, M., de Avila, L., Sayiner, M., Rafiq, N., & Younossi, Z. M. (2018). Components of metabolic syndrome increase the risk of mortality in non-alcoholic fatty liver disease (NAFLD). Medicine, 97(13). https://doi.org/10.1097/md.0000000000010214

Gray, M. (2017). Value-Based Healthcare. BMJ. https://doi.org/10.1136/bmj.j437

Green, J., Valentini, A., & International Technical Support Organization. (2015). A Guide to Lean Healthcare Workflows [Training manual for quality improvement processes.]. IBM Redbooks

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

Hirode, G., Vittinghoff, E., & Wong, R. J. (2019). Increasing clinical and economic burden of nonalcoholic fatty liver disease among hospitalized adults in the United States. *Journal of Clinical Gastroenterology, 53*(10), 765–771. https://doi.org/10.1097/mcg.0000000000001229

Hirode, G., Saab, S., & Wong, R. J. (2020). Trends in the Burden of Chronic Liver Disease Among Hospitalized US Adults. *JAMA Network Open*, *3*(4). https://doi.org/10.1001/jamanetworkopen.2020.1997

Holmer, M., Lindqvist, C., Petersson, S., Moshtaghi-Svensson, J., Tillander, V., Brismar, T. B., Hagström, H., & Stål, P. (2021). Treatment of NAFLD with intermittent calorie restriction or low-carb high-fat diet – a randomised controlled trial. *JHEP Reports*, *3*(3), 100256. https://doi.org/10.1016/j.jhepr.2021.100256

Iqbal, U., Perumpail, B., Akhtar, D., Kim, D., & Ahmed, A. (2019). The Epidemiology, Risk Profiling and Diagnostic Challenges of Nonalcoholic Fatty Liver Disease. *Medicines*, *6*(1), 41. https://doi.org/10.3390/medicines6010041

Javanmardifard, S., Ghodsbin, L., Kaviani, M. J., Jahanbin, I. (2017). The effect of telenursing on self-efficacy in patients with non-alcoholic fatty liver disease: a randomized controlled clinical trial *Gastroenterol Hepatol Bed Bench.* 2017 Autumn; 10(4): 263–271.

Katsagoni, C. N., Georgoulis, M., Papatheodoridis, G. V., Panagiotakos, D. B., & Kontogianni, M. D. (2017). Effects of lifestyle interventions on clinical characteristics of patients with non-alcoholic fatty liver disease: A meta-analysis. *Metabolism*, *68*, 119–132. https://doi.org/10.1016/j.metabol.2016.12.006

LaMorfe, W. (2020, June 19). *Bias*. Differential Misclassification of Exposure. Retrieved November 15, 2021, from https://sphweb.bumc.bu.edu/otlt/mph-modules/ep/ep713_bias/EP713_Bias5.html.

Lim, S. L., Johal, J., Ong, K. W., Han, C. Y., Chan, Y. H., Lee, Y. M., & Loo, W. M. (2020). Lifestyle intervention enabled by mobile technology on weight loss in patients with non-

alcoholic fatty liver disease: Randomized controlled trial. *JMIR MHealth and UHealth*, *8*(4). https://doi.org/10.2196/14802

Los Angeles County Department of Public Health, Office of Health Assessment and Epidemiology. *Key Indicators of Health by Service Planning Area;* January 2017.

Löffler, A., Luck, T., Then, F. S., Sikorski, C., Kovacs, P., Böttcher, Y., Breitfeld, J., Tönjes, A., Horstmann, A., Löffler, M., Engel, C., Thiery, J., Villringer, A., Stumvoll, M., & Riedel-Heller, S. G. (2015). Eating behaviour in the general population: An analysis of the factor structure of the German version of the three-factor-eating-questionnaire (TFEQ) and its association with the body mass index. *PLOS ONE*, *10*(7). https://doi.org/10.1371/journal.pone.0133977

Lutfiyya, M. N., Chang, L. F., McGrath, C., Dana, C., & Lipsky, M. S. (2019). The state of the science of interprofessional collaborative practice: A scoping review of the patient health-related outcomes-based literature published between 2010 and 2018. *PLOS ONE*, *14*(6). https://doi.org/10.1371/journal.pone.0218578

N. E. J. M. Catalyst (2017, January 1). *What is value-based healthcare?* NEJM Catalyst. Retrieved November 9, 2021, from https://catalyst.nejm.org/doi/full/10.1056/CAT.17.0558.

Nourian, M., Askari, G., Golshiri, P., Miraghajani, M., Shokri, S., & Arab, A. (2020). Effect of lifestyle modification education based on health belief model in overweight/obese patients with non-alcoholic fatty liver disease: A parallel randomized controlled clinical trial. *Clinical Nutrition ESPEN*, *38*, 236–241. https://doi.org/10.1016/j.clnesp.2020.04.004

Perumpail, B. J., Khan, M. A., Yoo, E. R., Cholankeril, G., Kim, D., & Ahmed, A. (2017). Clinical epidemiology and disease burden of non-alcoholic fatty liver disease. *World Journal of Gastroenterology*, *23*(47), 8263–8276. https://doi.org/10.3748/wjg.v23.i47.8263

Poirier, P., & Després, J.-P. (2003). Waist circumference, visceral obesity, and cardiovascular risk. *Journal of Cardiopulmonary Rehabilitation*, *23*(3), 161–169. https://doi.org/10.1097/00008483-200305000-00001

Possin, K. L., Merrilees, J. J., Dulaney, S., Bonasera, S. J., Chiong, W., Lee, K., Hooper, S. M., Allen, I. E., Braley, T., Bernstein, A., Rosa, T. D., Harrison, K., Begert-Hellings, H., Kornak, J., Kahn, J. G., Naasan, G., Lanata, S., Clark, A. M., Chodos, A., Gearhart, R., Ritchie, C., & Miller, B. L. (2019). Effect of Collaborative Dementia Care Via Telephone and Internet on Quality of Life, Caregiver Well-Being, and Health Care Use: The Care Ecosystem Randomized Clinical Trial. *JAMA Internal Medicine*, *179*(12), 1658-1667.https://doi.org/10.1001/jamainternmed.2019.4101

Ress, C. (2016). Mechanisms of intrahepatic triglyceride accumulation. *World Journal of Gastroenterology*, *22*(4), 1664. https://doi.org/10.3748/wjg.v22.i4.1664

Romero-Gómez, M., Zelber-Sagi, S., & Trenell, M. (2017). Treatment of NAFLD with diet, physical activity and exercise. *Journal of Hepatology*, *67*(4), 829–846. https://doi.org/10.1016/j.jhep.2017.05.016

Ross, R., Neeland, I. J., Yamashita, S., Shai, I., Seidell, J., Magni, P., Santos, R. D., Arsenault, B., Cuevas, A., Hu, F. B., Griffin, B. A., Zambon, A., Barter, P., Fruchart, J.-C., Eckel, R. H., Matsuzawa, Y., & Després, J.-P. (2020). Waist circumference as a vital sign in clinical

practice: A consensus statement from the IAS and ICCR Working Group on visceral obesity. *Nature Reviews Endocrinology*, *16*(3), 177–189. https://doi.org/10.1038/s41574-019-0310-7

Sanyal, A. J. (2002). AGA technical review on nonalcoholic fatty liver disease. *Gastroenterology*, *123*(5), 1705–1725. https://doi.org/10.1053/gast.2002.36572

Sherrod, B., & Goda, T. (2016). DNP-prepared leaders guide healthcare system change. *Nursing Management*, *47*(9), 13–16. . https://doi.org/10.1097/01.numa.0000491133.06473.92

Silberman, J. M., Kaur, M., Sletteland, J., & Venkatesan, A. (2020). Outcomes in a digital weight management intervention with one-on-one health coaching. *PLOS ONE*, *15*(4). https://doi.org/10.1371/journal.pone.0232221

Soto-Angona, Ó., Anmella, G., Valdés-Florido, M. J., De Uribe-Viloria, N., Carvalho, A. F., Penninx, B. W., & Berk, M. (2020). Non-alcoholic fatty liver disease (NAFLD) as a neglected metabolic companion of psychiatric disorders: Common pathways and future approaches. *BMC Medicine*, *18*(1). https://doi.org/10.1186/s12916-020-01713-8

Stenberg, U., Vågan, A., Flink, M., Lynggaard, V., Fredriksen, K., Westermann, K. F., & Gallefoss, F. (2018). Health economic evaluations of patient education interventions a scoping review of the literature. *Patient Education and Counseling*, *101*(6), 1006–1035. https://doi.org/10.1016/j.pec.2018.01.006

Stunkard AJ, Messick S. The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *J Psychosom Res.* 1985;**29**:71–83. doi: 10.1016/0022-3999(85)90010-8

Tamaki, N., Ajmera, V., & Loomba, R. (2021). Non-invasive methods for imaging hepatic steatosis and their clinical importance in NAFLD. *Nature Reviews Endocrinology*, *18*(1), 55–66. https://doi.org/10.1038/s41574-021-00584-0

Tanaka, N., Kimura, T., Fujimori, N., Nagaya, T., Komatsu, M., & Tanaka, E. (2019). Current status, problems, and perspectives of non-alcoholic fatty liver disease research. *World Journal of Gastroenterology*, *25*(2), 163–177. https://doi.org/10.3748/wjg.v25.i2.163

The Rudd Center for Food Policy and Obesity. (n.d.). *University of Connecticut*. Motivational Interviewing for Diet, Exercise and Weight. Retrieved November 14, 2021, from https://media.ruddcenter.uconn.edu/PDFs/FACTS2021.pdf.

U.S. Department of Health and Human Services and U.S. Department of Agriculture. *Dietary Guidelines for Americans, 2020–2025*. 9th ed. Washington, DC: US Government Printing Office, 2020, p. 29. Available at https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf Accessed September 28, 2021

Younossi, Z. M., Blissett, D., Blissett, R., Henry, L., Stepanova, M., Younossi, Y., Racila, A., Hunt, S., & Beckerman, R. (2016). The economic and clinical burden of nonalcoholic fatty

liver disease in the United States and Europe. *Hepatology*, *64*(5), 1577–1586. https://doi.org/10.1002/hep.28785

Younossi, Z. M. (2018). Patient-reported outcomes and the economic effects of non-alcoholic fatty liver disease and non-alcoholic steatohepatitis: The value proposition. *Hepatology*, *68*(6), 2405–2412. https://doi.org/10.1002/hep.30125

Zeidi, I. M. (2013). Effect of motivational interviewing on eating habits and weight loss among obese and overweight women. *Journal of Obesity & Weight Loss Therapy*, *S3*(03). https://doi.org/10.4172/2165-7904.1000172