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Effects Of A Residential Lifestyle Intervention Program On Selected Lipid Measures And Nutritional Choices

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EFFECTS OF A RESIDENTIAL LIFESTYLE INTERVENTION PROGRAM ON SELECTED LIPID MEASURES AND NUTRITIONAL CHOICES

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Abstract

Objective: Cardiovascular disease has been the leading cause of death since the early 1920s. As with other chronic diseases, cardiovascular disease is primarily influenced by behaviors and the environment, with poor nutrition being a major contributing factor. Despite knowing the importance of lifestyle modification to manage cardiovascular disease effectively, many individuals have difficulty adhering to lifestyle modification principles. Residential lifestyle modification centers provide the education and support necessary to assist individuals with implementing behavioral changes. This DNP project aimed to demonstrate the value of diet modification implemented at a residential lifestyle center to decrease specific cardiovascular risk factors. ***Method:*** Using data collected between November 2021 through December 2022 from adults at least 18 years of age at a residential lifestyle modification center, this retrospective quantitative project considered two clinical questions: 1) What is the relationship between nutritional patterns and selected cholesterol values? and 2) Does the modification of participants' diet in a residential lifestyle modification program reduce certain cardiovascular risk factors? ***Intervention:*** Participants completed surveys that included nutritional information and had lipid levels assessed at the beginning and end of their program and three to four months later. ***Results:*** Data were collected from 104 participants enrolled in the lifestyle intervention program. Because this DNP project required complete data for evaluation and comparison, the subsequent sample size was 21 participants. The results indicated that nutrition, as part of a comprehensive lifestyle modification program, was effective in lowering the non-HDL cholesterol and total/HDL cholesterol ratio, 12.6% and 7.5% respectively, at the end of the program. Overall nutrition status, eating patterns, and lipid improvements were not maintained at the three to four-month follow-up. ***Conclusion:*** This DNP project contributed to the understanding of the relationship between nutrition and lipid management.

*Key Word*s: *Lifestyle modification, residential lifestyle center, cardiovascular disease, lipids, nutrition*

Dedication

This treatise is dedicated to my mother, Esther Catherine Jarrett Rugless, my brother, David Alan Rugless, and my brother Richard Vance Martin, whose untimely, premature death from lifestyle illnesses served as a catalyst for me to change the trajectory of my life and embark upon the study of lifestyle medicine. Each of these individuals impacted my life so intensely and in such a wonderful way that their unexpected departures from this earth left a vacuum that cannot be filled. Momma, David, and Richard, I am thankful for your influence in my life. There is no me without you.

This DNP project is also dedicated to future healthcare providers with the hope that it will serve as a tool to help provide a way to emphasize the truth that many of us fail to admit or acknowledge, which is that our health truly is in our hands to manage and that through lifestyle modification we can reduce, and possibly eliminate many of the chronic diseases that plague our society.

By our choices, we can control the quality of life we each have. It is my desire that we all decide to add life to our years by making wise lifestyle choices.

Acknowledgments

The success of this project could not have been achieved without the vital contributions of several individuals. Words cannot express my gratitude to the administration of Wildwood Lifestyle Center for their willingness to have this project conducted at their center and to Aysha Inankur, MD, Wildwood Principal Investigator, for graciously consenting to share the valuable data that made this project possible. I am also extremely thankful to the employees of Wildwood Lifestyle Center for their assistance with distributing the surveys, drawing lab work, and compiling the results.

Several individuals made meaningful contributions in the areas of development, execution, or completion of this project. I would like to extend my deepest gratitude to the following persons whose guidance and support played an instrumental role in the realization and fulfillment of this project:

- Holly Gadd, Ph.D. - DNP project faculty advisor
- Samara Sterling, MD - Wildwood researcher
- Lilly Tryon, DNP - DNP program advisor

I would also like to express my heartfelt appreciation to the program participants who generously gave their time and shared their invaluable experiences by completing the surveys and consenting to have labs drawn. This project would not have been possible without your participation. Your contributions have enabled us to better understand the relationship between lifestyle modification and lipid management.

Overall, I am profoundly thankful to all who played a part in bringing this project to fruition. I sincerely hope the results will make a meaningful impact on the lives of many.

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Chapter 1: Introduction

Cardiovascular disease is the foremost cause of death in the United States and around the world. In 2020, it accounted for 696,962 deaths in the United States alone, representing a 4% increase in the age-adjusted death rate for heart disease compared to 2019 (Murphy et al., 2021). Cardiovascular mortality increased to 699,659 deaths in 2022 (Ahmad et al., 2023) and is expected to continue in an upward trajectory in the coming years (Mohebi et al., 2022). The economic impact of cardiovascular disease is staggering and costs the United States $378 billion each year from 2017 to 2018 (Tsao et al., 2022). This is attributed to the cost of healthcare services, pharmaceutical intervention, and lost productivity due to premature cardiovascular mortality. Accounting for 12% of total healthcare expenditures in the United States, this is more than any other diagnostic-related group. The prevalence of cardiovascular disease highlights the urgent need for effective interventions.

While a comprehensive approach to lifestyle modification is very effective in preventing and treating cardiovascular disease, nutrition is fundamental to this process. Nutritional factors are at the core of the development and progression of cardiovascular disease. Substandard diets contribute more to cardiovascular morbidity and mortality than any other modifiable risk factor (Kris-Etherton, et al., 2020). As poor nutrition is a major risk factor for cardiovascular disease (Chareonrungrueangchai et al., 2020), it is advantageous to examine the contribution of dietary modification and healthy dietary patterns in its prevention and treatment.

Because of the prevalence of cardiovascular disease, it is important to understand the efficacy of a residential lifestyle modification center in addressing and reversing the impact of

cardiovascular disease utilizing a nutritional approach. This DNP project examined whether participation in a residential lifestyle modification program influenced nutritional choices and reduced certain cardiovascular risk factors, thereby potentially reducing the incidence of cardiovascular disease.

Background and Significance

Although multiple risk factors contribute to the development of cardiovascular disease, many of the major risk factors are directly associated with lifestyle. The American Heart Association (AHA) focuses on several core behaviors (physical activity, nutrition, weight control, smoking) and health factors (including cholesterol, blood pressure, diabetes, metabolic syndrome, sleep, and kidney disease) in addressing cardiovascular health (Tsao et al., 2022). AHA's "My Life Check" health and well-being assessment emphasizes eight approaches to obtaining and maintaining cardiovascular health: Be more active, get healthy sleep, keep a healthy weight, control cholesterol, do not smoke, vape, or use smokeless tobacco, eat a heart-healthy diet, manage blood sugar, and manage blood pressure (American Heart Association, 2023). These are all affected by lifestyle habits.

A very positive approach to managing and preventing chronic diseases, such as cardiovascular disease, is lifestyle medicine, as it incorporates scientifically supported principles. Lifestyle medicine, as described by the American College of Lifestyle Medicine, refers to collaborative interventions to prevent, treat, and reverse chronic diseases primarily influenced by behaviors and the environment (Rippe, 2019). Studies indicate that lifestyle modification programs with an emphasis on behaviors such as a balanced diet, healthy eating habits, exercise, and positive psychology can mitigate or reduce cardiovascular risk factors that contribute to cardiovascular disease (Razavi et al., 2014) or even result in reversal of coronary artery disease

(Ornish et al., 1998). Based on this scientific evidence, national recommendations for reducing cardiovascular risk consider nutrition an essential foundational aspect (Rippe, 2017).

Although it is generally accepted that modification of health behaviors can positively influence outcomes, compliance with guidelines and adherence to a lifestyle modification regimen has proven to be a challenging undertaking for many (Rippe, 2019). It appears that even after being diagnosed with an illness that can adversely affect the quality and duration of life, many individuals are still not adopting, or consistently adhering to, lifestyle modification practices that can help them to achieve disease control or reversal (Lönnberg et al., 2020). In 2019 the American Heart Association estimated that only 5% of Americans adhered to lifestyle modification recommendations as a significant component of the process of achieving ideal cardiovascular health (Rippe, 2019). Difficulty adopting new healthy lifestyle patterns may be better understood when considering that individuals progress through stages of change, as suggested in the Transtheoretical Model (TTM) of behavior change. Individuals affected by cardiovascular disease are missing a major source of health-promoting care. Healthcare practitioners have an opportunity to explore and discover innovative methods to support individuals in embracing heart-healthy habits.

Problem Statement, Purpose, and Project Inquiry

Many individuals at high risk of cardiovascular disease have difficulty adhering to lifestyle modification principles to reduce or prevent cardiovascular disease (Serour et al., 2007). Various barriers and obstacles may prevent the full adoption of healthy dietary practices. Barriers may include cultural factors such as social support or social and cultural norms; the nutrition environment which includes access, availability, and affordability to healthy food; economic factors such as food security, income, or food purchasing power; or individual-level factors such

as situational issues, psychologic issues, or knowledge, attitudes, or preferences (Kris-Etherton, et al., 2020). An individual's willingness to implement lifestyle change is frequently dependent upon their perception of their ability to actually incorporate behavior change (Lönnberg et al., 2020). Oftentimes, support from healthcare practitioners and other professionals is pivotal in increasing self-efficacy and motivating individuals toward lifestyle changes. The programs implemented at residential lifestyle modification centers lend themselves to providing the support necessary to assist patients with overcoming barriers and guiding them to practices that will improve health outcomes.

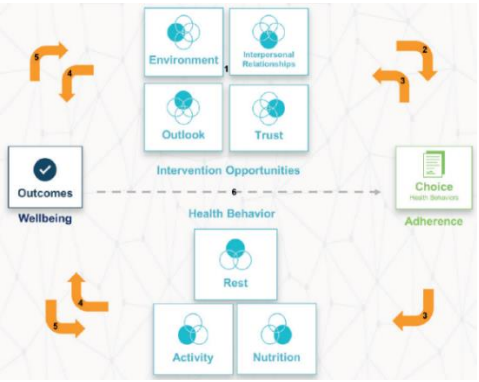
This DNP project aimed to demonstrate the value of diet modification implemented at a residential lifestyle center to decrease specific cardiovascular risk factors, directly impacting health outcomes. Two clinical questions were addressed: For patients at risk for cardiovascular disease, 1) What is the relationship between nutritional patterns and selected cholesterol values? and 2) Does modifying participants' diet in a residential lifestyle modification program reduce certain cardiovascular risk factors?

Theoretical Framework

Two theoretical approaches were utilized in framing this project. The CREATION Life (formerly known as CREATION Health) theoretical model (Figure 1) is viewed as a whole-person approach to assessing and supporting patients to attain and maintain a healthy lifestyle. Developed by AdventHealth, a faith-based healthcare system, this philosophy consists of eight elements, which, together, contribute to achieving holistic (mental, physical, spiritual, and social) health (Anderson et al., 2020). Each letter in the CREATION acronym represents one of these eight principles: Choice, Rest, Environment, Activity, Trust, Interpersonal Relationships, Outlook, and Nutrition.

The CREATION Life theoretical model posits that the four CREATION principles of Trust, Interpersonal Relationships, Outlook, and Environment influence the CREATION principle of Choice which, in turn, influences health behaviors. The results of these health-related behaviors are directly related to the three CREATION principles of Rest, Activity, and Nutrition. In this model, the CREATION principle of Choice serves both as an outcome of the first four principles as well as a mediator of the last three principles (Understanding Our Theoretical Model, 2022).

Figure 1: The CREATION Wellness Model

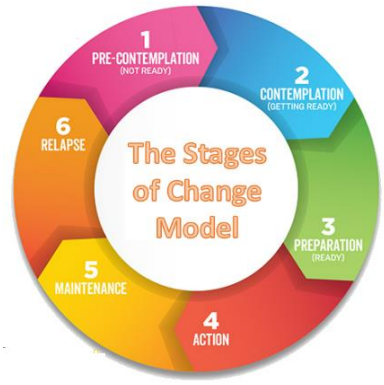


Note: From "The CREATION Model: a whole-person wellness model to facilitate patient-provider partnerships for health promotion", p 490, by Anderson et al., (2020), *J Health Soc Sci*, *5*(4).

Another theory utilized in framing this project is the Transtheoretical Model (TTM) (Figure 2) which theorizes that individuals progress through six stages of change: precontemplation, contemplation, preparation (also called determination), action, maintenance, and termination. (Prochaska & Velicer, 1997). In the precontemplation stage individuals do not recognize the need for change, nor are they interested in changing. Change is considered in the contemplation stage. The preparation stage involves planning for change. New habits are adopted in the action stage, and those new habits and behaviors are consistently practiced in the maintenance stage. An individual possesses the ability to resist relapsing back to unhealthy behaviors in the termination or completion stage. Although completion is the desired end goal,

making lifelong changes can be challenging. Consequently, relapsing to old behaviors may be a common part of the process. It should be noted that advancing through these stages does not occur in a linear fashion. Instead, individuals may repeat or recycle certain stages (Butts & Rich, 2018). Additionally, it is advantageous to utilize different intervention strategies for the various stages. In order for the modification of health behaviors to be effective, the assistance provided to patients must be tailored to their specific needs and current stage of change (Snetselaar, 2010).

Figure 2: The TTM Stages of Change Model



In addition to considering the stages of change, this project focuses on the "Choice" component of the CREATION Life model, as it is a fundamental constituent from which health-related decisions are made.

The utility of combining the CREATION and TTM models (Figure 3) may be found in understanding and explaining resistance to change as well as improving and targeting the appropriate intervention. Assessing and identifying the stages where patients reside on their journey to good health is critical to efficiently and effectively meeting their needs and guiding them to make good choices.

Figure 3: Combined CREATION and TTM Model

Definition of Terms

Cardiovascular Disease

Diseases of the heart or blood vessels that include coronary heart disease, cerebrovascular disease, peripheral vascular disease, heart failure, arrhythmias, and valvular disorders.

Cardiovascular Risk Factors

Modifiable and nonmodifiable characteristics that increase the probability of a heart attack, stroke, or other cardiovascular disease.

Dyslipidemia

A cardiovascular risk factor characterized by increased levels of triglycerides (TG), total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), or decreased high-density lipoprotein cholesterol (HDL-C). This project focuses on the less frequently referenced cholesterol components very-low-density lipoprotein (VLDL), non-high-density lipoprotein (non-HDL), and total to high-density lipoprotein ratio (TC/HDL) cholesterol levels, as these components can also indicate the presence of cardiovascular disease.

Lifestyle Medicine

Lifestyle medicine is the use of evidence-based lifestyle therapeutic intervention—including a whole-food, plant-predominant eating pattern, regular physical activity, restorative sleep, stress management, avoidance of risky substances, and positive social connection—as a primary modality, delivered by clinicians trained and certified in this specialty, to prevent, treat and often reverse chronic disease (What is lifestyle medicine, 2021).

Residential Lifestyle Modification Center

A complete change of environment where one lives away from home at a center focused on managing and treating a range of diseases by modification of lifestyle habits such as sleeping, nutrition, physical activity, and stress management practices.

Conclusion

Healthcare practitioners, especially those specializing in lifestyle medicine, have a unique opportunity to interact with patients on a personal level and recommend alternative, evidence-based therapies. Lifestyle interventions focused on nutrition, physical activity, and other healthy habits, which have been shown to have a substantial impact on risk factors for cardiovascular disease, should be considered an essential tool in the healthcare practitioner's arsenal of treatments. Some elements of lifestyle modification information should be intentionally incorporated into every clinical encounter (Rippe, J.M., 2019). While all patients may not be immediately receptive to adopting the idea of lifestyle modification, for patients who are ready for change and who have access, a residential lifestyle program presents a unique opportunity for lifestyle change. The outcomes of such a program in relation to cardiovascular risk factors are not fully understood. This DNP project seeks to illuminate the short-term and longer-term outcomes of a program of this nature in relation to nutritional habits and selected lipid values.

Chapter 2: Integrated Review of Literature

An integrated review of literature was used to locate studies and synthesize information related to the efficacy of lifestyle modification to reduce cardiovascular risk factors. Medline, PubMed, and Google Scholar electronic databases were utilized with the following key terms: lifestyle modification, lifestyle modification compliance, residential lifestyle center, nutrition and cardiovascular disease, cholesterol components, lipids, and cardiac risk factors. Relevant content from 2018 to 2023 was considered. The literature review helped to inform the DNP project with current practice patterns and provided an evidence-based foundation in the development of concepts related to the leading causes of death, healthcare costs, recommendations for and compliance with lifestyle modification, residential lifestyle modification centers, and lipid profiles.

Leading Causes of Death

According to the National Center for Health Statistics (NCHS), the earliest data available related to the leading causes of death is from 1900. At that time, infectious or communicable diseases, such as influenza/pneumonia, tuberculosis, and diarrhea/enteritis were the primary causes of death, followed by cardiovascular disease, stroke, kidney disease, accidents, cancer, senility, and diphtheria (National Center for Health Statistics, n.d.). However, by 1921, noninfectious or noncommunicable diseases, such as cardiovascular disease, became the consistent leading causes of death. Since that time, heart disease and cancer remain primary and secondary causes of death (National Center for Health Statistics, n.d.). Specifically, in the United States, heart disease and cancer accounted for almost half (over 47%) of all deaths between 1999 – 2020 (Figure 4). According to the Centers for Disease Control and Prevention (CDC), one person in the United States dies from heart disease every 33 seconds (CDC, 2023),

accounting for approximately 25% of the mortality rate in the United States. Heart and cerebrovascular diseases combined contribute to almost one-third of all deaths in the United States. In fact, considering the top ten causes of death in the United States, it should be noted that the leading causes of death are chronic diseases related to lifestyle and high-risk behaviors (Tabish, 2017).

Figure 4: The 10 Leading Causes of Deaths, United States

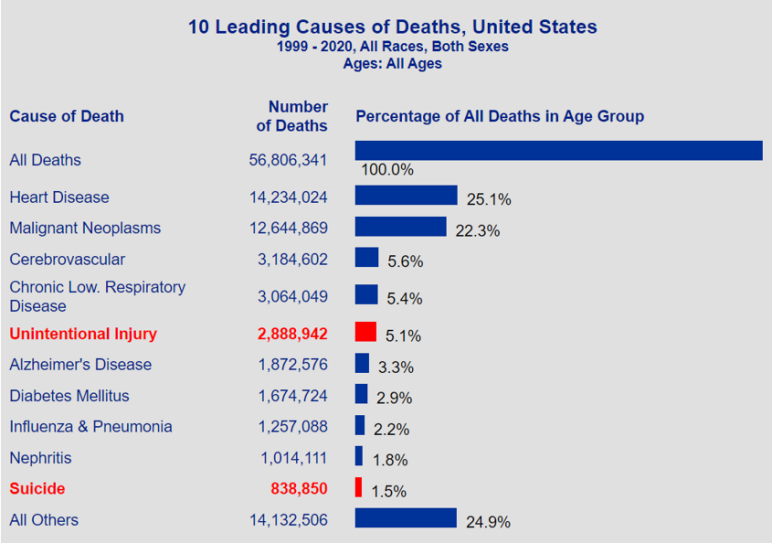


Table produced by National Center for Injury Prevention and Control, Centers for Disease Control and Prevention
Data Source: National Center for Health Statistics (NCHS), National Vital Statistics System

The Centers for Disease Control and Prevention defines chronic diseases as "conditions that last 1 year or more and require ongoing medical attention or limit activities of daily living or both" (Centers for Disease Control and Prevention, 2021). The CDC further states that many chronic diseases can be attributed to specific risk behaviors, such as tobacco use and exposure to secondhand smoke, poor nutrition (including low consumption of vegetables and fruits), lack of physical activity, and excessive alcohol use.

The increase in the prevalence of chronic disease is reflected in the statistics for the United States. The incidence of chronic disease in the United States has grown steadily over the

last 20 years by 7 to 8 million individuals every 5 years (Holman, 2020). It is noteworthy to consider that the majority of Americans (six in ten) live with at least one chronic disease, such as heart disease, cerebrovascular disease/stroke, cancer, or diabetes (NCCDPHP, 2022). It should further be noted that the prevalence of adults in the United States with more than one chronic condition is increasing. In 2001, 21.8% of adults in the United had more than one chronic condition. It increased to 26.0% in 2010, and 27.2% in 2018 (Boersma et al., 2020).

As it relates specifically to cardiovascular disease, 41.5 percent (102.7 million) of individuals in the United States had at least one of the following cardiovascular disease conditions: hypertension (96.1 million), coronary heart disease (16.8 million), stroke (7.5 million), congestive heart failure (5.8 million), or atrial fibrillation (5.2 million) (American Heart Association, 2017). The incidence of cardiovascular disease is projected to continue to increase, afflicting 45 percent (131.2 million) of the total U.S. population by the year 2035.

According to the World Health Organization (WHO), a shift in the balance of the major causes of morbidity and mortality has occurred globally. The burden of noncommunicable diseases has increased rapidly worldwide. In 2001, noncommunicable diseases were responsible for approximately 60% of the 56 million global deaths annually and 47% of the global burden of disease. This is primarily attributable to unhealthy diets, physical inactivity, and tobacco use (WHO, 2004).

The World Health Organization indicates that cardiovascular disease is responsible for 17.9 million deaths globally each year, making it the leading cause of mortality. The majority of global cardiovascular deaths (four out of five) are attributed to heart attacks and strokes, with one-third of these deaths occurring in individuals under the age of 70 (WHO & Mattingly, 2023).

In response to increasing concerns regarding the rising incidence of chronic diseases, the World Health Organization presented its global strategy on diet, physical activity, and health in 2004. Their stated overall goal is to "promote and protect health by guiding the development of an enabling environment for sustainable actions at individual, community, national and global levels that, when taken together, will lead to reduced disease and death rates related to unhealthy diet and physical inactivity" (WHO, 2004). As the data reflect a major influence of cardiovascular disease, there is a proportional relationship to economic burden.

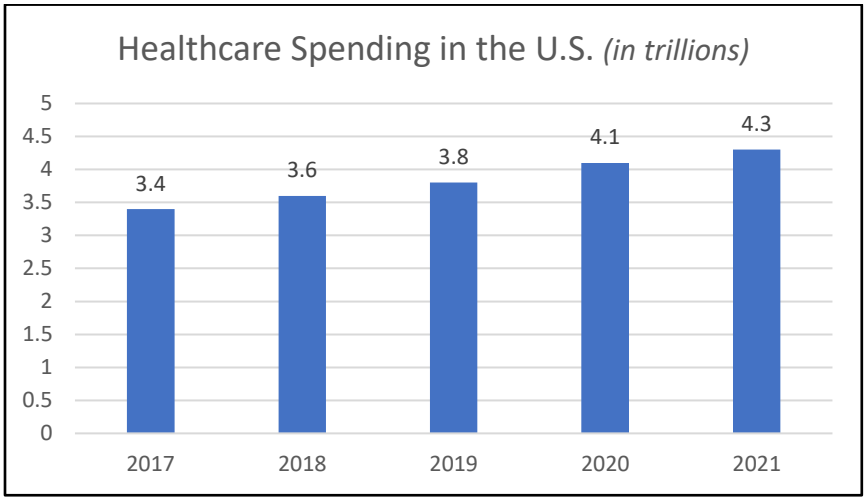
Healthcare Costs

Healthcare spending in the United States is astronomical. The United States spent $3.8 trillion on healthcare in 2019 and 3.6 trillion in 2018 (Figure 5), equating to 4.3% and 4.6% increases, respectively. Spending increased to $4.3 trillion in 2021, or $12,914 per person, accounting for 18.3% of the nation's Gross Domestic Product (GDP) (Figure 6) (NHE Fact Sheet, 2023). This is an increase of 2.7% from the $4.1 trillion spent in 2020 (Figure 5), which at that time amounted to $12,530 per person and 19.7% of the GDP (National Health Expenditure Data, 2022). Due to the nation's spending trajectory prior to 2020, it was estimated that healthcare spending would account for 19.4% of the nation's Gross Domestic Product by 2027 (Edington et al., 2020). However, spending in 2020 exceeded that projection. While it is noted that the increased healthcare spending in 2020 may be attributed, in part, to federal spending in response to the COVID-19 pandemic, (Hartman, et al., 2022), healthcare spending increases every year and was also excessive in prior years.

The Centers for Medicare and Medicaid Services (CMS) projects that between 2022 and 2023 the average growth in national health expenditures (5.4%) will overtake the average GDP growth (4.6%) resulting in an increase in the percentage of healthcare spending from 18.3% in

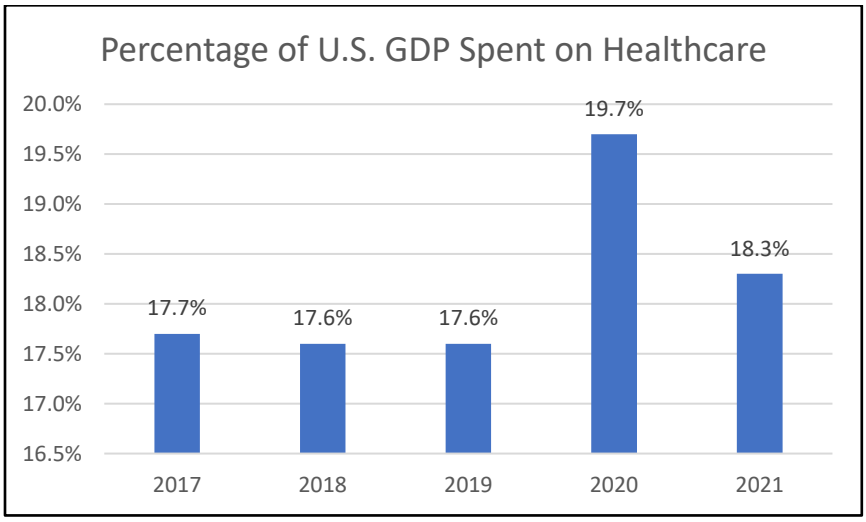
2021 to 19.6% of the GDP in 2031 (NHE Fact Sheet, 2023). It is evident that the rate at which healthcare costs are increasing is not sustainable.

Figure 5: Healthcare Spending in the U.S.



Source: Centers for Medicare and Medicare Services, National Health Expenditures, June 2023

Figure 6: Percentage of U.S. GDP Spent on Healthcare



Source: Centers for Medicare and Medicare Services, National Health Expenditures, June 2023

Hospitals and healthcare systems in the United States are suffering as they bear the brunt of these increased healthcare expenses. Hospital expenditures grew 4.4% in 2021 to $1.3 (NHE

Fact Sheet, 2023). Approximately 50% of U.S. hospitals finished 2022 with a negative margin as growth in expenses overtook revenue increases, resulting in 2022 being recorded as the worst financial year for hospitals since the start of the pandemic (National Hospital Flash Report, 2023). These negative margins are expected to continue through 2023.

In comparison to ten high-income countries (including Australia, Canada, Denmark, France, Germany, Japan, the Netherlands, Sweden, Switzerland, and the United Kingdom), the United States spent almost twice as much on healthcare in 2016 but had poorer outcomes (Papanicolas et al., 2018). The difference in spending appears to be associated with differences in goods such as pharmaceuticals, devices, and administrative costs. Per capita, the United States spends $1443 on pharmaceuticals compared to a range of $466 to $939 in other countries (Papanicolas et al., 2018).

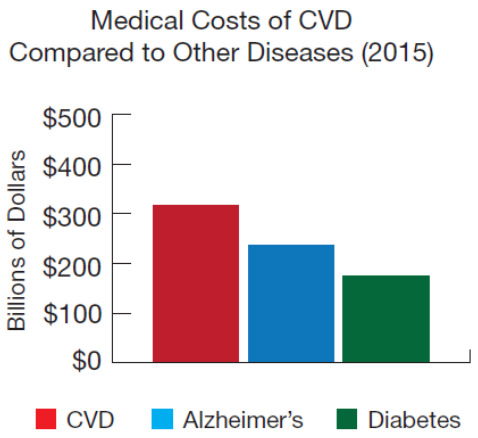
The majority of overall healthcare spending is devoted to the management of chronic diseases, including cardiovascular disease. In 2017 chronic diseases accounted for 86% of healthcare costs (Beckman, 2017). This was unchanged in 2020 (Holman, 2020). This places a strain on individual, corporate, and government budgets.

Of all of the chronic diseases, cardiovascular disease is the most expensive (Figure 7) and is responsible for 12% of total U.S. healthcare expenditures (Tsao et al., 2022). Heart failure and stroke represented the costliest chronic conditions in the Medicare fee-for-service program in 2014. (American Heart Association, 2017).

Healthcare spending for cardiovascular disease in the United States amounted to $555 billion in 2015, including direct and indirect costs (Figure 8). Indirect costs of cardiovascular disease are due to lost productivity at home and in the workplace, while direct costs are related to

financial expenditures for hospital care, physician services, medications, home health or nursing home care.

Figure 7: Medical Costs of Cardiovascular Disease Compared to Other Diseases (2015)



Graph produced by American Heart Association, 2017

Medical costs for cardiovascular disease are projected to continue to increase to $1.1 trillion by 2035 (Figure 8). Due to our aging population, it is expected that by 2035, cardiovascular healthcare costs will triple for individuals who are 80 years of age or older and will double for those between the ages of 65 and 79 (American Heart Association, 2017).

Figure 8: Costs of Cardiovascular Disease

	Direct Costs 2015	Indirect Costs 2015		Direct Costs 2035	Indirect Costs 2035
Hypertension	$68 billion	$42 billion		$154 billion	$67 billion
Coronary Heart Disease	$89 billion	$99 billion		$215 billion	$151 billion
Congestive Heart Failure	$18 billion	$11 billion		$45 billion	$19 billion
Stroke	$37 billion	$30 billion		$94 billion	$49 billion
Atrial Fibrillaton	$24 billion	$7 billion		$55 billion	$11 billion
Other	$83 billion	$48 billion		$187 billion	$71 billion
Total Medical Costs	**$318 billion**	**$237 billion**		**$749 billion**	**$368 billion**

Source: American Heart Association, 2017

The American Heart Association views cardiovascular disease as a preventable disease (American Heart Association, 2017). It would seem reasonable, then, to assume that the United

States could reduce healthcare spending by appropriately responding to the prevalence of cardiovascular disease and placing a greater emphasis on preventive care. Instead of treating cardiovascular disease after it has developed, encouraging heart-healthy practices early in an individual's life, reducing healthcare disparities, providing community resources and education, and promoting regular screenings for cholesterol, diabetes, and blood pressure are all ways of reducing the incidence of cardiovascular disease and, therefore, the rising costs of this leading cause of morbidity and mortality in the United States and globally.

Recommendations for Lifestyle Modification

For many years the prevailing school of thought for managing certain chronic diseases has been regular screenings, pharmaceutical interventions, and in some instances, surgical intervention. It was believed that once a patient was diagnosed with a chronic disease, pharmaceutic management was the primary means of reducing morbidity and mortality. These interventions could be augmented by surgical procedures if needed, such as coronary or other artery stents and bypasses. Clinical research has demonstrated that many chronic conditions can be reversed or markedly decreased without pharmaceutical or surgical intervention. Numerous studies have demonstrated that the body is able to heal itself of some conditions (such as diabetes and cardiovascular disease) previously thought to be permanent and irreversible when provided with the appropriate environment (Campbell et al., 1998; Ornish et al., 1998; Panigrahi et al., 2023; Watts et al., 1992).

A very positive approach to managing and preventing chronic diseases is lifestyle medicine, as it incorporates scientifically supported principles. Studies have shown that lifestyle changes, such as a balanced diet, healthy eating habits, exercise, and positive psychology when combined, play an integral part in the treatment and prevention of many chronic diseases (Rippe,

2019). The Centers for Disease Control and Prevention (CDC) highlights the contribution of lifestyle modification programs in reducing the risk of cardiovascular and cerebrovascular events associated with prediabetes and the improvement of participants' overall health (CDC, 2021). The CDC further indicates that individuals with prediabetes who participate in a structured lifestyle modification program and lose 5% to 7% of their body weight can reduce their risk of developing type 2 diabetes by 58%. This reduction is increased to 71% in individuals greater than 60 years of age.

Although lifestyle modification has been practiced selectively for many years, it was not widely accepted in the past. In fact, in 2003 when a report, which was commissioned by the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) was released, some of the recommendations and findings in the report were met with stiff opposition from the United States government. The WHO/FAO joint report, "Diet, Nutrition, and Prevention of Chronic Diseases", which would provide the evidence base for their global strategy, indicated that a large number of deaths from chronic diseases are caused by obesity, hypertension, hypercholesteremia, and physical inactivity (Parodi & De Lorenzo, 2003). It further stated that obesity and many chronic diseases may be avoided through diet and exercise and recommended that the food industry reduce sugar and specific types of fats in processed foods and snacks (Fleck, 2003). However, in response to effective lobbying efforts by American food manufacturers, the United States Department of Health and Human Services rejected the association between obesity and junk food (Dyer, 2004). Certain members of Congress requested that the secretary of health consider revoking the United States' annual $406 million contribution to the World Health Organization. Additionally, the National Soft Drink Association contested the report, insisting that there are no deleterious effects from having 25% added sugar in the

average diet. The Sugar Association threatened to "exercise every avenue available to expose the dubious nature" of the report (Dyer, 2004, p. 185). The United States' official response in a letter from William Steiger, special assistant at the Department of Health and Human Services, stated that the WHO/FAO joint report "fails to meet the standards of the U.S. Data Quality Act, lacks external peer review, and mixes science and policymaking in the same exercise" (Dyer, 2004, p. 185). In response to this opposition and criticism, Dr. Derek Yach, WHO Executive Director, Noncommunicable Diseases and Mental Health, stated, "We are confident about the science on the contribution of nutrition – and especially the role of saturated fats, sugars, and salt and excessive consumption – to the major chronic diseases" (WHO meets with food, beverage, and producer associations, 2003, para. 4).

Even years after T. Colin Campbell, renowned nutritional scientist, released his groundbreaking China Study research in 2005, powerful lobbyists and other governmental entities attempted to discredit and silence his message detailing the connection between nutrition and heart disease, diabetes, and cancer. In 2011 Dr. Campbell and Dr. Caldwell Esselstyn presented impressive research demonstrating the benefits of a plant-based diet to the Kentucky House of Representatives. Although it was well received at the time, when Dr. Campbell, his son, Nelson, and Kentucky State Representative Tom Riner later proposed a pilot program to the same Kentucky House of Representatives documenting the health benefits of a plant-based diet, the proposal was abysmally rejected. This was due to aggressive and intensive lobbying by agribusiness lobbyists. Even after Nelson Campbell successfully conducted several trials in North Carolina demonstrating the significant health changes experienced when a whole-foods plant-based diet was adopted, the Kentucky legislature refused to even agree to a motion stating that a primarily plant-based, low sugar and reduced salt diet has health benefits (Campbell &

Corry, 2015). These experiences are an unfortunate testimony to the grip special interest groups and political activists have on public health, education, disease prevention, and related healthcare costs in some parts of this country.

Despite attempts to discredit and disregard it, lifestyle medicine has gained a greater following in recent years due, in part, to increasingly positive scientific evidence. In a randomized controlled trial conducted from 1986 to 1992, Dr. Dean Ornish demonstrated that coronary artery disease could be reversed. The Lifestyle Heart Trial was the first of its kind to explore atherosclerotic plaque regression (Ornish et al., 1998). The St Thomas' Atherosclerosis Regression Study (STARS) assessed the effects of dietary modification on the progression of coronary artery disease. It was found that a lipid-lowering diet successfully decreased overall progression and increased regression of the disease (Watts et al., 1992). Studies of this nature continue to be validated by newer research. Esselstyn and Golubic (2014) presented several case reports highlighting the nutritional reversal of cardiovascular disease. In 2015, Massera et al. published a case study demonstrating the reversal of angina by utilizing a whole-food plant-based diet without medications or procedures. The results of the Coronary Artery Risk Development in Young Adults (CARDIA) prospective cohort study revealed that healthy lifestyle changes among young adults aged 18 to 30 years of age were associated with subclinical atherosclerosis 20 years later (Spring et al., 2014). In short, lifestyle modification in young adulthood results in decreased cardiovascular risk, while an unhealthy lifestyle is associated with an increased risk of atherosclerosis in middle age. In 2018, Farrer presented emerging evidence for HDL-increasing therapies and diet in the treatment of cardiovascular disease.

The Centers for Medicare & Medicaid evaluated the effectiveness of two lifestyle modification programs in patients with symptomatic coronary artery disease: the Dr. Dean

Ornish Program for Reversing Heart Disease and the Cardiac Wellness Program of the Benson-Henry Mind Body Institute. The evaluation revealed that both programs produced significant improvement in most cardiac risk factors. Additionally, improvements in body weight, blood pressure, and LDL cholesterol were well-sustained in participants who remained in the programs for two years (Razavi et al., 2014). As a result, there are three Medicare-approved Intensive Cardiac Rehabilitation (ICR) programs available through the national coverage determination process (NCD) (Intensive Cardiac Rehabilitation Programs, 2021). Medicare defines ICR as a physician-supervised program that provides cardiac rehabilitation services more frequently and more rigorously than traditional cardiac rehabilitation programs by focusing on comprehensive cardiac risk modification (diet modification, weight loss, smoking cessation, exercise, and reduction of blood pressure, lipids, and stress) through structured lifestyle intervention. Coverage of a holistic program of this nature is contingent on medical necessity, meaning that a cardiac event has occurred, such as an acute myocardial infarction (AMI) within the past 12 months, a coronary artery bypass surgery, a heart or heart-lung transplant, heart valve repair or replacement, current stable angina pectoris, percutaneous transluminal coronary angioplasty (PTCA) or coronary stenting, or stable, chronic heart failure. It would be advantageous to have ready and affordable access to programs similar to the Intensive Cardiac Rehabilitation (ICR) programs that not only focus on rehabilitation but prevention, as well.

Several agencies and organizations now recommend lifestyle medicine as treatment for chronic conditions. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) indicates that lifestyle management, including nutrition therapy, physical activity, weight loss, counseling for smoking cessation, and psychological support, often delivered in the context of diabetes self-management education and

support, are fundamental aspects of diabetes care (Davies, et al., 2018). The American College of Lifestyle Medicine (ACLM) encourages the use of therapeutic lifestyle interventions as a primary modality to treat chronic conditions such as cardiovascular disease (Lifestyle Medicine Overview, n.d.). Organizations such as the American Heart Association, Centers for Disease Control and Prevention, Harvard Health, and the National Institutes of Health, all promote the adoption of healthy habits and lifestyle strategies to reduce cardiovascular risk factors and prevent and treat cardiovascular disease (AHA, 2017; CDC, 2023; Rippe, 2019; Yeh, 2019). In fact, one lifestyle medicine authority suggests that anything less than a comprehensive holistic approach to lifestyle modification will not be optimally effective for those individuals who already have cardiovascular disease, as it is more difficult to reverse disease than it is to prevent it (Ornish & Ornish, 2022).

The purpose of this DNP project was to ascertain if participation in a residential lifestyle modification program influenced nutritional choices and reduced certain cardiovascular risk factors, thereby reducing the incidence of cardiovascular disease. Hence, these research studies and programs have a critical bearing on cardiovascular disease risk and overall treatment and improved health outcomes. Although lifestyle modification is highly recommended for the prevention and even the reversal of cardiovascular disease, change is not easy. Adopting new habits is challenging. Maintaining healthy choices may be even more difficult.

Compliance with Lifestyle Modification Recommendations

Although it is accepted that modification of health behaviors can positively influence health outcomes, compliance with guidelines and adherence to a regimen has proven to be a challenging undertaking for many. In 2010, 18% of patients with cardiovascular disease

continued to smoke, and only 11% of patients with diabetes followed dietary recommendations for the reduction of saturated fat intake (Lianov & Johnson, 2010).

The Prospective Urban Rural Epidemiology (PURE) study evaluated the prevalence of adherence to lifestyle modification practices by individuals with coronary heart disease or who had experienced some type of cerebrovascular accident (Teo, 2013). This large prospective study enrolled 153,996 individuals between January 2003 and December 2009. It included adults between 35-70 years of age from 628 urban and rural communities in four low-income countries, three lower-middle-income countries, seven upper-middle-income countries, and three high-income countries. The study revealed a low prevalence of healthy lifestyle behaviors in patients with coronary heart disease or a stroke event. Evidence of poor lifestyle choices that would contribute to coronary heart disease and stroke were present across all income levels but were more prominent in countries with lower socioeconomics.

Similarly, a study conducted by Adriouch et al. (2017) compared the level of compliance with nutritional and lifestyle recommendations in adults diagnosed with cardiometabolic diseases (hypertension, diabetes, dyslipidemia, and cardiovascular disease) to that of healthy individuals. Data collected from 26,570 participants (13,285 patients and 13,285 controls) aged 35 to 70 years revealed that, overall, the individuals with cardiometabolic disease had unhealthier nutritional habits and lifestyles. They exercised less frequently, ate fruit less frequently, had increased intake of meat, processed meat, and added fats, and had similar habits related to the consumption of alcohol and tobacco.

Even patients prescribed cardiac rehabilitation in conjunction with treatment for coronary artery disease benefitted more from intensive lifestyle modification than traditional cardiac rehabilitation. A longitudinal, observational study of 84 post-coronary artery bypass or

percutaneous coronary intervention patients compared the outcomes of those engaging in cardiac rehabilitation alone, with those participating in the Ornish Heart Disease Reversing Program (Aldana et al., 2003). Among other aspects, the Ornish program included the consumption of a low-fat vegetarian diet, engaging in regular exercise, and the utilization of progressive relaxation and stress management techniques. The researchers noted a decrease in systolic and diastolic blood pressure, cholesterol and triglycerides, and episodes of angina for those individuals participating in the Ornish program compared to those in a traditional cardiac rehabilitation program. In fact, the one-year follow-up revealed an appreciable reduction in coronary artery stenosis. The researchers concluded that intensive lifestyle modification is beneficial in reducing cardiovascular risk in patients with known cardiovascular disease.

These studies demonstrate unhealthy lifestyles that contribute to cardiovascular disease and remain even in the presence of a cardiac diagnosis. Furthermore, the studies provide evidence that lifestyle modification, when fully embraced, can appreciably reduce the impact of cardiovascular disease. The Ornish program provides support for better outcomes with more intense lifestyle therapy. A holistic approach, such as noted in the Ornish program, is practiced regularly at residential lifestyle modification centers.

Residential Lifestyle Modification Centers

Residential lifestyle modification centers have been positively impacting the lives of individuals for many years. Specifically, in the United States, residential lifestyle centers have recorded success stories as early as the 19th century. John Harvey Kellogg, a pioneer in health reformation, founded the Battle Creek Sanitarium in 1866 in Battle Creek, Michigan. Kellogg described his center, originally named the Western Health Reform Institute, as “a composite physiologic method comprising hydrotherapy, phototherapy, thermotherapy, electrotherapy,

mechanotherapy, dietetics, physical culture, cold-air cure, and health training" (Kellogg, 1908, p. 9). Over time, the center became celebrated globally as a valuable resource for restoring health by promoting the education and practice of lifestyle principles (Sanitarium – Our History, 2022).

Nathan Pritikin, a researcher, educator, and early lifestyle medicine pioneer was diagnosed with coronary artery disease in his early 40s. However, diet and exercise effectively reversed his atherosclerosis. He opened the Pritikin Longevity Center in 1975. Located in California, the health resort provides a residential lifestyle program that focuses on nutrition and exercise and prescribes a whole-food, plant-based eating pattern. The center continues to be instrumental in helping clients reverse or mitigate health challenges such as type 2 diabetes mellitus, obesity, hypercholesteremia, and hypertension (Pritikin Longevity Center + Spa, 2022).

Several residential lifestyle modification centers are operated by the Seventh-day Adventist church. One of these, the Weimar Institute, located near Sacramento, California, in the foothills of the Sierras, has operated for over 40 years. Weimar's NEWSTART Lifestyle Center offers an 18-day physician-monitored residential program that is based on eight fundamental principles designed for optimal health impact. Their focus on nutrition, exercise, water, sunlight, temperance, air, rest, and trust is purported to reverse diabetes, improve or reverse heart disease, decrease blood pressure, and improve the overall quality of life (NEWSTART Lifestyle Center, 2022). Similar residential programs are offered in various locations in the United States, such as Uchee Pines Institute in Seale, Alabama, Eden Valley Institute in Loveland, Colorado, MEET Ministry in Huntington, Tennessee, and Wildwood Lifestyle Center in Wildwood, Georgia.

Residential lifestyle centers have the advantage of providing focused, intense, and immersive therapy. This has the potential to bring about measurable and positive changes in

health status and risk factors. For those with cardiovascular disease or risk, changes in lipid profiles as a result of dietary and activity alterations can be one of the areas objectively tracked with known long-term benefits for cardiac health.

Lipid Profiles

Estimation of atherosclerotic cardiovascular risk is often associated with plasma total cholesterol (TC), low-density lipoprotein (LDL), and high-density lipoprotein (HDL). However, assessment of some of the lipoprotein subfractions can be of considerable value. It has been noted that individuals with lowered low-density lipoprotein due to treatment with statins may still experience cardiovascular events due to unhealthy non-high-density lipoprotein (non-HDL) cholesterol levels that create residual risk. Studies have identified non-HDL cholesterol as instrumental in predicting cardiovascular risk (Puri et al., 2016) as compared to LDL or HDL alone. Both the International Atherosclerosis Society and the National Lipid Association have flagged non-HDL cholesterol as the major form of atherogenic cholesterol and a primary therapeutic target (Jacobson, 2015; Panel & Grundy, 2013).

Very low-density lipoproteins (VLDL) are referenced less frequently but may also represent an opportunity to predict and reduce residual cardiovascular risk (Lawler et al., 2017). Additionally, studies have concluded that the total to high-density lipoprotein ratio (TC/HDL) is a more significant measure of cardiovascular risk than LDL or total cholesterol levels (Kinosian et al., 1994).

While studies have shown changes in LDL, HDL, and total cholesterol resulting from lifestyle modification, an opportunity exists to associate a change in nutritional patterns with changes in the non-HDL cholesterol, VLDL, and TC/HDL ratio.

Summary

Cardiovascular disease is a major problem globally. As the leading cause of death in the United States, it is classified as a noncommunicable disease that develops primarily due to poor lifestyle choices, such as inactivity, smoking, and poor and excess nutrition. The link between dyslipidemia as a cardiovascular risk factor, and obesity, hypertension, diabetes, and cardiovascular disease, as related noncommunicable diseases, is lifestyle.

Lifestyle modification is possible, but difficult. Lifestyle modification programs have demonstrated cardiovascular risk reduction, regression of cardiovascular disease, improved lipid profiles, and better overall health. Residential programs have the potential for a larger impact. This DNP project examines the outcomes of one such program.

Chapter 3: DNP Project Plan

This chapter outlines the project's objectives, stakeholders and champions, and the project's congruence with the organization's strategic plan. It also addresses project assumptions, financial aspects, policy aspects, sampling plan, measurement tools/instruments, and plan for data analysis.

Type of Project

This DNP project was a retrospective quantitative study of participants who were enrolled in the 11-day or 25-day residential lifestyle intervention program at Wildwood Lifestyle Center in Wildwood, Georgia during the 6-month period of 11/28/21 through 05/15/22. Residents of Wildwood Lifestyle Center voluntarily attend the various programs at the center to obtain assistance in addressing current medical challenges or for the purpose of improving their overall health.

This DNP project aimed to demonstrate the value of diet modification implemented at a residential lifestyle center to decrease specific cardiovascular risk factors. The objectives were two-fold: 1) To examine the relationship between nutritional patterns and very-low-density lipoprotein (VLDL), non-high-density lipoprotein (non-HDL), and total to high-density lipoprotein ratio (TC/HDL) cholesterol levels, and 2) To compare cardiovascular disease markers of VLDL, non-HDL cholesterol, and total cholesterol/HDL ratio immediately following, and 3-4 months after attending a residential lifestyle intervention program in United States adults.

The lifestyle modification program was conducted at Wildwood Lifestyle Center under the direction of the providers and staff of the facility who were responsible for the delivery of care and collection of data related to the program. Access to some of the program data was

provided for the purposes of this DNP project and to assess some elements of the program and patient outcomes.

Stakeholders and Champions

Several stakeholders were involved in the collection and processing of the data. The baseline and completion data were collected from the participants of a residential lifestyle modification program by staff members at Wildwood Lifestyle Center. Wildwood staff members were also responsible for entering the data into a database. The 3–4-month follow-up data were collected by an independent individual contracted by Wildwood for this purpose. The principal investigator for the major project conducted at Wildwood Lifestyle Center provided permission to access the data for the purpose of conducting a review of the efficacy of the program.

Congruence of Organization's Strategic Plan

Because of the widespread incidence of chronic disease and the associated increasing economic burden, utilization of lifestyle modification principles as primary treatment has the potential to not only reduce mortality and healthcare costs but also increase the quality of life. The millions of Americans currently dealing with the downstream consequences of chronic diseases, such as cardiovascular disease, diabetes, hypertension, and stroke can conceivably obtain resolution or reduction of side effects and comorbidities.

Twenty-seven percent of individuals in the United States have more than one chronic disease (Boersma et al., 2020). Lifestyle medicine interventions are similar across all of these chronic diseases, primarily focusing on dietary and nutritional patterns and physical activity.

The residential lifestyle program at Wildwood Lifestyle Center aims to assist individuals in achieving a higher level of wellness and reversing disease through a variety of medically supervised lifestyle interventions. Individuals who attend one of the programs receive a plant-

based diet with two healthy meals per day and instruction on how to prepare such meals themselves. They engage in exercise and may be prescribed other natural remedies.

The Lifestyle Medicine DNP program at Southern Adventist University shares this interest in therapies that reverse disease, prevent disease progression, and empower individuals to take control of their lives and health. This project allowed for a DNP student to work with Wildwood Lifestyle Center in a complimentary manner to assist in data and program analysis. Understanding program outcomes provides opportunities for strengthening the lifestyle medicine activities at Wildwood and beyond.

Project Assumptions

There were three project assumptions made by the DNP student: 1) Considering that all participants attended the residential lifestyle center voluntarily and agreed to participate in the project of their own volition, it is assumed that program participants answered the questionnaire honestly and fully complied with the lifestyle modification program outlined for them. 2) Additionally, it is assumed that all participants completed their designated programs within the timeframe established by the lifestyle center. 3) It is also assumed that since program participants are, of their own accord, seeking assistance with their medical challenges, they are at least at the preparation/determination stage of change in the transtheoretical model (TTM) of change, signifying their commitment to making the necessary lifestyle changes (Prochaska & Velicer, 1997). One would expect that upon completion of the program, individuals have received sufficient assistance to progress to the action/willpower stage and will take active steps to incorporate the learned lifestyle practices into their daily routines upon returning home.

Financial

Attendance at a residential lifestyle center comes with out-of-pocket costs to the patient, as this level of care is currently not covered by medical insurance. However, the other costs incurred by this DNP project were minimal, as all of the survey and lab data used in this project were a standard part of the participant's program at Wildwood Lifestyle Center. The DNP student received the data at no cost. The only cost incurred for this project was for the SPSS (Statistical Package for the Social Sciences) statistical software utilized for data analysis.

Policy

While some insurance plans may include an option for lifestyle medicine consults, Chronic Care Management visits, or intensive cardiac rehabilitation for cardiac patients, a holistic comprehensive program, such as one offered at a residential lifestyle center, is not usually included in the coverage for the general population. A survey conducted by the American College of Lifestyle Medicine (ACLM) revealed that of the 261 lifestyle medicine practitioners surveyed, only 42% of them received compensation for their services (Jensen et al., 2019). While the Affordable Care Act provides for some preventive care services, the short 15 to 30-minute visits for this type of care in physician's offices may not be sufficient to effect substantial lifestyle change (Jackson et al., 2021). It would be advisable to work toward instituting policy changes that allow for care of this nature on a routine basis.

Intensive interventions such as those conducted at residential lifestyle centers can directly impact skyrocketing healthcare costs. Incorporating lifestyle medicine into the healthcare system can appreciably decrease the need to utilize traditional healthcare avenues for the management and prevention of cardiovascular disease and other chronic diseases, thereby reducing overall healthcare expenditures. This can, in turn, reduce the need for insurance compensation not only

for the management of chronic diseases, but also for the associated symptoms, physical impairments, and mental health challenges that sometimes result. One can conclude that active implementation of intensive lifestyle medicine principles at a residential lifestyle center provides a substantial return on investment (ROI). It is hoped that results from studies of this nature will be instrumental in impacting the consciousness of politicians and effecting policy changes so that preventive care of this magnitude is included in standard insurance coverage.

Sampling Plan

A research study was already being conducted at Wildwood Lifestyle Center under the Kettering Health Network Institutional Review Board (IRB) and was not the focus of this DNP project. The following discussion is provided to describe the sampling plan used for that study.

The study population consisted of adult residents at least 18 years of age enrolled in the 11-day or 25-day residential lifestyle intervention program at Wildwood Lifestyle Center in Wildwood, Georgia during the 6-month period of 11/28/21 through 05/15/22. All participants completed health and nutrition questionnaires as part of their program. Additionally, all participants had laboratory testing as part of their initial and follow-up assessments. Routine consents for treatment and data collection were obtained by Wildwood personnel at the time of the participant's program entrance. Inclusion criteria included 1) An alumnus of Wildwood Lifestyle Center's residential lifestyle interventional program, 2) A minimum of 18 years old, 3) The ability to speak and read the English language, and 4) A U.S. resident.

Exclusion criteria included 1) Adults unable to consent, 2) Individuals who are not yet adults (infants, children, and teenagers), 3) Pregnant women, and 4) Prisoners.

For the purposes of this DNP project, an additional inclusion criterion was the completion of all surveys and lab work as directed.

Measurement Tools/Instruments

A 78-page questionnaire comprised of several validated surveys addressing lifestyle practices was administered by Wildwood Lifestyle Center staff and completed by the program participants at the beginning and end of the program. Blood was drawn through standard laboratory procedures at the beginning and end of the program. Blood testing included, but was not limited to, a lipid panel. A 3–4-month follow-up assessment was conducted with program participants that involved completion of the same questionnaire and drawing blood for lab analysis of the same lab elements.

This DNP project used responses from the first 27 questions of the Wildwood questionnaire, which represented nutritional data and included selected items from the Mediterranean Eating Pattern for Americans (MEPA) III food frequency survey that assesses adherence to Mediterranean-like diet patterns. Additionally, demographic data such as gender, age, educational level, marital status, and ethnicity were utilized from the questionnaire. Very-low-density lipoprotein (VLDL), non-high-density lipoprotein (non-HDL), and total to high-density lipoprotein ratio (TC/HDL) cholesterol levels were calculated from the lipid panel results provided by Wildwood. This data sample was instrumental in evaluating if there is a relationship between dietary patterns and these specific cardiac biomarkers and assessing demographics and dietary patterns.

The data were analyzed to address the following project inquiries related to cardiovascular disease: 1) What is the relationship between nutritional patterns and selected cholesterol values? 2) Does modification of participants' diet in a residential lifestyle modification program reduce certain cardiovascular risk factors?

Plan for Data Analysis

Data were entered into IBM® SPSS® Statistics Standard GradPack 28 statistical software and data analysis was conducted by the DNP student. Descriptive statistics were used to examine the means, frequencies, ranges, and attributes of the participants and their lipid and nutritional profiles. Correlation analysis was used to examine the relationship between laboratory results and nutritional habits. Repeated measures ANOVA was used to examine variability in lipids and nutritional patterns from the participant's baseline to the end of the program and at the three-to-four-month follow-up. Data, output, and interpretation were reviewed by the DNP Project Advisor.

VLDL, Total Cholesterol/HDL ratio, and non-HDL cholesterol lab values were calculated using the following formulas:

VLDL = Triglycerides/5

Total Cholesterol/HDL ratio = Total Cholesterol/HDL

Non-HDL cholesterol = Total Cholesterol - HDL

Chapter 4: Results

This chapter addresses the two research questions and contains the demographic characteristics of the project participants as well as the results of the data analysis. First, the characteristics of the program participants will be described (Demographics); next, the analysis of lipid and nutritional information will be presented (Outcomes); and lastly, the relationships between nutritional practices and lipid results will be examined to ascertain any correlations.

Demographics

The study population consisted of 21 program participants with ages ranging from 28 to 78 years. The mean age was 63. The majority of the participants were female (90%) and African American (67%) (19 of 21 and 14 of 21, respectively). Seventeen of the twenty-one participants (81%) had some college education or a college degree. Five of the participants were married (24%), with the remainder being either single, separated, divorced, or widowed. See Table 1.

Table 1

Sociodemographic Characteristics of Participants

Category	Sub-categories	Frequency (n)	Percent
Gender (n = 21)	Male	2	9.5
	Female	19	90.5
Ethnicity (n = 21)	Black	14	66.7
	White	4	19
	Hispanic	2	9.5
	Asian	1	4.8
Marital status (n = 21)	Single	4	19
	Married	5	23.8
	Separated	2	9.5
	Divorced	7	33.3

	Widowed	3	14.3
Education level (n = 21)	Some high school	1	4.8
	High school	3	14.3
	Some college	8	38.1
	College graduate	5	23.8
	Graduate degree	4	19
Sessions completed (n=21)	One 11-day session	16	76.2
	Two 11-day sessions	4	19
	One 7-day session	1	4.8

The lifestyle program participants had an option of attending one or two 11-day sessions. The majority of the participants (16) completed one 11-day session, while four participants completed two 11-day sessions. The one remaining participant stayed for seven days.

Outcomes

Lipid Results

Each participant had a lipid profile drawn at baseline, a second lipid profile completed at the conclusion of the program, and a third lipid profile analyzed three to four months after program completion. While total cholesterol (TC), low-density lipoprotein (LDL), and high-density lipoprotein (HDL) values are usually the primary focus of lipid analysis, the purpose of this paper is to focus on secondary lipid analysis. Specifically, the very-low-density lipoprotein (VLDL), non-high-density lipoprotein (non-HDL), and total to high-density lipoprotein ratio (TC/HDL) cholesterol levels results are presented. Repeated measures ANOVA was used to analyze these data. See Table 2.

Table 2

Lipid Profile

Lipid	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Non-HDL cholesterol	125.67 (45.97)	109.81 (42.94)	127.29 (44.79)	5.275(2), .009 [a, b]
Total cholesterol/HDL ratio	3.30 (.85)	3.05 (.74)	3.43 (1.21)	3.58 (2), .037 [a]
VLDL	22.59 (13.14)	18.62 (6.88)	19.65 (9.25)	2.33(2), .111

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

The non-HDL cholesterol had a significant drop from baseline (125.67) to the end of the program (109.81). This decrease was lost at the 3–4-month follow-up (127.29), with participants demonstrating a return to baseline. The effect size (.41) and observed power of .85 were within acceptable limits.

Similar results were noted for the total cholesterol/HDL ratio, with a baseline of 3.3, an end-of-program value of 3.05, and follow-up of 3.43. Effect size was .34 and observed power was .74.

The VLDL did not change significantly as a result of program participation. The baseline VLDL was 22.59, and the end-of-program VLDL was 18.62, with the 3–4-month follow-up being 19.65. The effect size and observed power for these were less, .104 and .444 respectively.

Nutritional Survey Results

Tables 3-11 reveal that all of the program participants improved their nutritional status while participating in the program. However, adherence to the established dietary regimen was not maintained in the long term.

There was a substantial increase in the consumption of dark green leafy vegetables and non-starchy vegetables and a modest decrease in the consumption of non-fried starchy vegetables when comparing baseline to end-of-program. Although the consumption of fried starchy vegetables was minimal prior to completing the program, none were consumed during the program. The end-of-program evaluation revealed that although the improvements gained in vegetable intake during the program were not sustained, a slight decrease was noted in the consumption of fried starchy vegetables and non-fried starchy vegetables compared to the baseline. See Table 3.

Table 3

Vegetable Intake – Servings per Week

Type of vegetable	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Dark green leafy vegetables	8.2 (7.74)	18.9 (11.49)	8.88 (6.44)	10.206 (2), < .001 [a, b]
Non-starchy vegetables	8.5 (7.04)	15.65 (11.01)	6.35 (3.12)	10.270 (2), < .001 [a, b]
Non-fried starchy vegetables	5.3 (5.25)	4.80 (3.99)	4.71 (3.95)	.125 (2), .882
Fried starchy vegetables	.838 (.964)	.00 (.00)	.813 (1.42)	6.74 (2), .003 [a, b]

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Consumption of berries increased significantly at the end of the program (12.75) compared to baseline (8.81). However, the 3-month follow-up revealed that consumption of berries and other types of fruit decreased to levels below the baseline. Whole grain foods were consumed at a higher rate at the end of the program compared to the baseline. Although the 3-month follow-up showed a decrease in consumption of whole grain foods, the end result was higher than the baseline. See Table 4.

Table 4

Fruit and Whole Grain Intake – Servings per Week

Type of fruit or whole grain	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Berries	8.81 (8.71)	12.75 (7.79)	7.21 (6.69)	4.473 (2), .018[a, b]
Other types of fruits	12.25 (9.19)	11.00 (6.85)	10.60 (7.73)	.304 (2), .739
Whole grain foods	6.95 (5.41)	12.73 (9.27)	9.50 (6.91)	3.195 (2), .052

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

The consumption of red meat, poultry, and fish was negligible at baseline (.89, 1.29, and .83 respectively) and was eliminated at the end of the program. The 3-month follow-up revealed that intake of these items decreased by 50% or more compared to the baseline. While consumption of beans increased from baseline (7.77) to end-of-program (10.66), intake at the 3-month follow-up decreased moderately (5.13) compared to baseline. See Table 5.

The consumption of unsaturated fat in the form of avocados, olive oil, peanuts, or peanut butter decreased markedly during the program compared to the baseline. Intake of other nuts and nut butters increased during the program compared to baseline. The 3-month follow-up revealed a decrease in avocado consumption and an increase in olive oil utilization compared to the

baseline. Consumption of peanuts, peanut butter, and other nuts and nut butters returned to baseline intake. See Table 6.

Table 5

Protein Intake – Servings per Week

Type of protein	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Red meat	.89 (2.09)	.00 (.00)	.44 (1.10)	2.47 (2), .097 [a, b]
Poultry	1.29 (3.30)	.00 (.00)	.559 (1.19)	2.89 (2), .067
Fish	.83 (1.82)	.00 (.00)	.32 (.71)	3.28 (2), .48
Beans	7.77 (10.20)	10.66 (7.70)	5.13 (3.56)	2.93 (2), .066 [a, b, c]

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Table 6

Unsaturated Fat Intake – Servings per Week

Type of unsaturated fat	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Avocado	6.00 (9.55)	1.85 (3.03)	2.69 (3.41)	3.388 (2), .044 [a, b, c]
Olive oil	2.83 (2.60)	.48 (1.59)	3.73 (4.26)	10.353 (2), < .001 [a, b]
Peanuts or peanut butter	2.25 (4.20)	.56 (1.58)	2.38 (3.48)	2.031 (2), .145
Nuts or nut butters	5.43 (5.94)	8.88 (6.66)	5.41 (4.40)	2.937 (2), .065

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Participants' consumption of trans fats, saturated fats, and dairy in the form of coconut oil or MCT oil, pastries, cookies, cakes, ice cream, full-fat cheese, butter or cream, and milk

appeared to be influenced by program participation. Not only were they non-existent during the program, but intake of these items also decreased at 3-month follow-up in comparison to baseline. While utilization of other vegetable oils, salad dressings, or mayonnaise decreased during program participation, intake increased at the 3-month follow-up compared to baseline. See Table 7.

Table 7

Trans Fats, Saturated Fats, and Dairy Intake – Servings per Week

Type of intake	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Coconut oil or MCT oil	1.93 (4.42)	.03 (.11)	.697 (1.66)	2.353 (2), .110[a, b]
Pastries, cookies, cakes, ice cream	2.75 (5.35)	.238 (.399)	1.44 (1.86)	3.46 (2), .041 [a, b]
Other vegetable oils, salad dressings, or mayonnaise	2.31 (3.59)	.43 (1.54)	3.21 (5.01)	3.259 (2), .049 [a, b]
Butter or cream	1.20 (2.19)	.00 (.00)	1.05 (1.69)	4.06 (2), .025 [a]
Full-fat cheese	1.92 (3.47)	.00 (.00)	.85 (1.85)	4.14 (2), .023
Milk	1.31 (3.43)	.00 (.00)	.31 (.68)	2.35 (2), .109

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

All of the participants decreased their intake of sugar-sweetened beverages and increased their intake of water and unsweetened beverages during the program. The improvement in the intake of water and sugar-sweetened beverages noted at the end of the program was not sustained at the 3-month follow-up, but the intake of unsweetened beverages continued to increase. Alcohol consumption, which was minimal at baseline, was completely eliminated at end-of-program and at the 3-month follow-up. See Table 8.

Table 8

Beverage Intake – Servings per Week

Type of beverage	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Sugar-sweetened beverages	1.37 (2.22)	.012 (.055)	1.08 (1.83)	4.017 (2), .026 [a, b]
Unsweetened beverages	24.21 (18.22)	28.79 (24.74)	29.29 (22.23)	.356 (2), .703
Alcohol	.595 (.222)	.00 (.00)	.00 (.00)	1.506 (2), .234
8-oz water intake per day	6.25 (2.31)	8.40 (2.62)	6.45 (2.01)	7.137 (2), .002[a]

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

The frequency with which participants ate at fast-food restaurants, ate prepared or pre-packaged, canned, or frozen meals per week, or consumed snacks was not appreciable at baseline. However, the incidence decreased markedly during the program. A decrease of the first two items was noted at the 3-month follow-up compared to baseline. Snacking at the 3-month follow-up returned to baseline levels. See Table 9.

The majority of participants (43%) reported eating breakfast, lunch, and dinner in the initial baseline survey. At the end of the program, 71% of participants limited meals to breakfast and lunch, and only 29% ate breakfast, lunch, and dinner. The three-month follow-up revealed that almost half of the participants (48%) were limiting their meals to breakfast and lunch (compared to 29% at baseline), and almost one-third of the participants (29%) were consuming breakfast, lunch, and dinner (decreased from 43%). At the three-month follow-up, the percentage of participants who limited their intake to two meals a day increased from 52% to 62%. See Table 10.

Table 9

Eating Habits – Frequency of Fast-Food Restaurants and Snacks

Type of intake	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Eating in fast-food restaurants	1.24 (3.05)	.00 (.00)	.559 (.96)	2.386 (2), .105[a, b]
Eating prepared or pre-packaged, canned or frozen meals per week	2.39 (6.26)	.16 (.49)	1.39 (2.32)	2.550 (2), .091
Snacks per day (last 2 weeks)	1.86 (1.39)	.43 (.87)	1.71 (1.42)	10.685 (2), < .001 [a, b]

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Table 10

Eating Habits – Which Meals Are Eaten Each Day

	Base #	Base %	EOP #	EOP %	3-mo. #	3-mo. %
Lunch	1	4.8			2	9.5
Breakfast and Lunch	6	28.6	15	71.4	10	47.6
Breakfast and Dinner	2	9.5			1	4.8
Lunch and Dinner	3	14.3			2	9.5
Breakfast, Lunch, and Dinner	9	42.9	6	28.6	6	28.6
Total	21	100	21	100	21	100

There were distinct changes in the consumption of the largest meal of the day. At baseline, 38% of participants reported breakfast as the largest meal of the day, followed by lunch at 33% and dinner at 29%. At the end of the program, 91% of participants reported breakfast as

the largest meal of the day, followed by lunch at 9%. Dinner was not consumed during the program. The number of participants reporting breakfast as the largest meal of the day increased to 48% at the 3-month follow-up (compared to 38% at baseline), with lunch increasing to 43%. Most notably, only 10% of individuals reported consuming dinner as the largest meal of the day at the 3-month follow-up (compared to 29% at baseline). See Table 11.

Table 11

Eating Habits – Largest Meal of the Day

	Base #	Base %	EOP #	EOP %	3-mo. #	3-mo. %
Breakfast	8	38.1	19	90.5	10	47.6
Lunch	7	33.3	2	9.5	9	42.9
Dinner	6	28.6			2	9.5
Total	21	100	21	100	21	100

Relationships between lipids and nutrition

Pearson correlation coefficient tests were conducted to assess the relationship between baseline nutritional patterns and the three selected cholesterol values of this project (Table 12). Moderate correlations were noted for red meat consumption and TC/HDL ratio, fish intake and both HDL and TC/HDL ratio, indicating higher levels of ingestion were associated with higher lab values. A high correlation was noted between butter and cream intake and the VLDL level with higher consumption associated with higher lab values. No other statistically significant relationships were noted. These findings may be due, in part, to the baseline status of the participants who present as a homogenous population with shared nutritional values. Baseline surveys revealed that their diets and nutritional status did not closely reflect patterns of the standard American diet (highly processed foods, added fat, and sugar), as their intake of red meat and other saturated fats was low and their intake of vegetables, beans, and berries was notable.

Those who are interested in obtaining assistance at this particular lifestyle center appear to share a faith base that embraces a vegetarian diet and freedom from alcohol and tobacco substances and other cardiac risk factors.

Table 12

Correlations – Baseline Lipid and Selected Nutritional Values

Nutritional measure – Servings per week (unless otherwise specified)	Baseline non-HDL r value (signif)	Baseline TC/HDL ratio r value (signif)	Baseline VLDL r value (signif)
Dark leafy green vegetables	.153 (.507)	.272 (.234)	-.002 (.992)
Nonstarchy vegetables	.082 (.725)	.171 (.458)	.217 (.345)
Nonfried starchy vegetables	-.023 (.920)	-.032 (.889)	.021 (.927)
Fried starchy vegetables	.131 (.573)	.245 (.285)	.092 (.693)
Peanuts or peanut butter	-.109 (.639)	.087 (.709)	.070 (.763)
Nuts or nut butter	-.054 (.816)	-.185 (.423)	-.231 (.314)
Avocado	.150 (.517)	.134 (.561)	-.173 (.453)
Berries	-.308 (.175)	-.150 (.515)	.053 (.818)
Other fruits	-.031 (.894)	.016 (.944)	-.029 (.899)
Olive oil	.352 (.117)	.236 (.302)	.156 (.500)
Coconut oil or MCT oil	-.273 (.259)	-.275 (.254)	-.233 (.359)
Other vegetable oils, salad dressings, or mayonnaise	.169 (.476)	.160 (.488)	-.172 (.455)
Butter or cream	.126 (.586)	.150 (.515)	.756 (<.001)**
Red meat	.415 (.061)	.533 (.013)*	.061 (.791)
Poultry	.212 (.357)	.281 (.217)	-.127 (.584)
Fish	.450 (.041)*	.476 (.029)*	.091 (.696)
Milk	-.226 (.325)	.031 (.893)	.315 (.164)
Full fat cheese	-.115 (.618)	.064 (.784)	.391 (.080)

Beans	-.013 (.955)	-.033 (.887)	-.019 (.936)
Whole grain food	.010 (.966)	-.109 (.648)	.080 (.738)
Pastries, cookies, cakes, ice cream	-.152 (.511)	-.011 (.964)	.047 (.841)
Times eating at fast food restaurant	-.001 (.998)	.034 (.885)	-.088 (.705)
How often eating pre-prepared or pre-packaged canned or frozen meals	-.053 (.825)	.011 (.964)	.008 (.973)
Sugar-sweetened beverages	-.246 (.281)	-.219 (.341)	-.197 (.393)
Unsweetened beverages	-.075 (.753)	-.269 (.251)	-.095 (.690)
Alcohol	-.092 (.691)	-.142 (.540)	-.156 (.498)
Snacks – per day	-.067 (.774)	-.092 (.691)	-.362 (.107)

* Significant correlation at .05 level or less. ** Significant correlation at .01 level or less.

Evaluation

Data were collected on 104 individuals. However, those who met the criteria for inclusion in this project were fewer in number due to requirements related to the completion of all of the surveys, compliance with lab draws, and 3-month follow-up. Because inclusion criteria for this DNP project required complete data for evaluation and comparison of baseline, end-of-program, and 3-month follow-up, the resulting sample size was 21 participants.

A comparison of outcomes for those who completed one 11-day session versus two 11-day sessions was considered. Some initial between-group repeated measures analyses were conducted. There were only four individuals (19%) who completed two sessions and sixteen individuals (76%) who completed one session. The number of participants, the difference in group sizes, and the low effect size and observed power resulted in no meaningful data analysis.

Incidental Findings

Income data were available for only 9 of the 21 program participants (43%). Of these, two-thirds (6 participants) listed their income as less than $50,000 per year. No data were collected about medical insurance or other socioeconomics. As was noted previously, the participants overall had high levels of education with 81% of the group having some college education, 24% being college graduates, and 19% having a graduate degree.

Twenty of the 21 program participants (95%) had a Seventh-day Adventist religious affiliation. Many Seventh-day Adventists (approximately 40%) adhere to a diet that is primarily plant-based and devoid of alcohol and tobacco (Panoff, 2023). Some Adventists are vegan, while others include fish, dairy, and eggs in their diets. Some also refrain from consuming caffeine and large amounts of sugar.

Conclusion

This project sought to answer the question of whether modification of a participant's diet in a residential lifestyle modification program reduced certain cardiovascular risk factors. Undoubtedly, a regimented program where an individual has only plant-based healthy food choices and restricted meals results in a reduction of cardiovascular risk factors, such as the lowering of very-low-density lipoproteins (VLDL), non-HDL cholesterol, and total cholesterol/HDL ratio. It also improves the nutritional profile through a higher consumption of healthy foods versus those that are not as healthy.

It is evident that some of the dietary patterns practiced during the program were impactful, influencing some behaviors and practices even three months after the conclusion of the program. However, at three months many eating patterns reflected baseline habits more than the patterns introduced during the intensive program. This may be indicative of the need for

some form of post-program continued support. Further discussion about these opportunities for enhanced support and follow-up will be included in the next chapter.

Chapter 5: Discussion

This chapter includes a review and discussion of the project results in relation to other literature, application to clinical practice, and recommendations for future research. It includes the practice inquiry and purpose, limitations, observations on the demographic, lipid, and nutritional analysis, and application to theory.

Practice Inquiry and Purpose Discussion

Focusing on specific cardiovascular risk factors generally considered secondary in nature, this DNP project examined very-low-density lipoproteins (VLDL), non-HDL cholesterol, and the total cholesterol/HDL ratio in relationship to nutritional factors. Additionally, the project sought to determine the impact of a residential lifestyle modification program on these lipid values and dietary choices and patterns.

Observations and Limitations

Making lifestyle modifications and consistently adhering to them can be challenging without sufficient support. A residential lifestyle center is an effective vehicle for facilitating lifestyle changes. A center of this nature provides support and encouragement on several levels, which contributes to increased compliance.

The Wildwood Lifestyle Center in Wildwood, Georgia served as the location for this project. This residential lifestyle modification center offers several different support services in conjunction with its "Disease Reversal" program. These services include cooking classes, daily exercise, group counseling, hydrotherapy, initial and ending lab work, lifestyle coaching, lifestyle medicine lectures, nutritional counseling, chaplain services, natural remedies, a medical provider treatment plan, and a 90-day follow-up program. Additionally, vegan meals are provided to program participants twice a day (Wildwood Lifestyle Center Programs, n.d.). This

comprehensive program supports the general idea that while several factors may influence the development of lipid disorders, which in turn lead to the development of cardiovascular disease, a holistic, multifaceted approach that addresses multiple avenues is optimal for recovering from this state.

Residential lifestyle programs are costly, generally not covered by insurance, and typically paid out of pocket. This is a limiting factor for most individuals who are in need of lifestyle medicine for cardiovascular disease. It would be particularly limiting to individuals of lower socioeconomic status. Additionally, such programs are not available in all communities, so access is limited. Taking time away from home, work, and family may also be a limiting factor for enrollment in a residential program.

In the case of this DNP project, the DNP student was not involved in administering the program or collecting data. There was no personal contact with participants and no ability to enhance understanding of the data through such interactions. There was also no engagement in planning for data collection, procedures, timing, demographic or personal information to be gathered, or instruments used. Deidentified data were provided to the DNP student by the principal investigator based on approved protocols from within Wildwood Lifestyle Center.

In spite of limitations, there were benefits to working with Wildwood Lifestyle Center. The compatibility of their mission and that of the DNP Lifestyle Medicine program made for a compatible synergy. DNP students work within a limited timeframe to address clinical and practice problems as a culminating learning experience in the DNP program. Wildwood Lifestyle Center had a program where research and clinical protocols were already in progress and yielding data to address cardiovascular risks and related nutrition, diet, and laboratory factors. Providing data access in accordance with the Health Insurance Portability and Accountability

Act (HIPAA) and Institutional Review Board (IRB) standards was not difficult and facilitated program evaluation for them while accomplishing the DNP student academic goal.

Demographics Observations

Program participants had the option of participating in a session lasting 11 days or choosing a longer 22-day session. The study population consisted of 16 subjects (76%) who completed one 11-day session, four subjects (19%) who completed a 22-day session, and one subject (5%) who completed seven days of the program. Within-group numbers were not sufficient to determine if program length made a difference in outcomes, either at the immediate end of the program or three-to-four-month follow-up outcomes.

The demographic composition of this study population was particularly interesting when considering the characteristics of individuals in the general population with a higher incidence of lipid disorders. As individuals age, their cholesterol levels rise. In fact, women's LDL cholesterol levels tend to rise after menopause occurs. Additionally, certain races tend to have higher cholesterol levels. It has been noted that African Americans typically have higher LDL cholesterol levels than Caucasians (MedlinePlus, 2020) and higher levels of cardiovascular disease (Carnethon et al., 2017). Fifty-nine percent of African American women ages 20 and older have cardiovascular disease (AHA, 2023). The study population for this project reflected these characteristics, as the mean age was 63, and the majority of the participants were female (91%) and African American (67%).

Also notable was the educational level of the participants. Eighty-one percent of the participants had some college education or a college degree. This is noteworthy when one considers that educational attainment can be correlated with exposure to certain lifestyle risk factors and the prevalence of chronic diseases. (Puka et al., 2022) Typically, lower socio-

economic status and education levels are associated with a higher risk for cardiovascular disease. In view of that, this group of participants may not be representative of the general population. The composition of the study group is also significant because ethnic minorities, in general, are an under-studied cohort, and an underwhelming number of studies are conducted on the female African American population. This is a group that may be overlooked in other settings but is well-represented here.

Lipid Analysis Observations

Lipid analysis of the study population was focused on three less-commonly reviewed lipid components: very low-density lipoproteins (VLDL) cholesterol, non-high-density lipoprotein (non-HDL) cholesterol, and total cholesterol-to-HDL ratio (TC/HDL). As no direct test measures VLDL cholesterol, the VLDL value was calculated as one-fifth of the triglyceride level. A normal VLDL cholesterol level is between 2 and 30 mg/dL (A.D.A.M. Medical Encyclopedia, 2023). VLDL levels higher than 30 mg/DL indicate an increased cardiovascular disease risk. While some of the participants had a baseline VLDL higher than 30 mg/dL (ex. 44.20, 64.0, 31.60), the mean value of the group was 22.50 mg/dL. The mean value decreased by 17.57% at the end of the program to 18.62 mg/dL and increased to 19.65 mg/dL at follow-up. The participant with the highest VLDL (64.0) experienced a marked decrease of 46.88% to 34 mg/dL after one 11-day session.

The non-high-density lipoprotein (non-HDL) cholesterol reflects the combined amount of cholesterol in the blood other than high-density lipoprotein (HDL), including LDL and other types of cholesterol such as VLDL, intermediate-density lipoprotein (IDL) and lipoprotein (a). The desired level is less than 130 mg/dL (MedlinePlus, 2020). The non-HDL value was calculated by subtracting the HDL from the total cholesterol. The study population's baseline

non-HDL cholesterol ranged from 70 to 258 with a mean of 125.67 mg/dL. While the mean of the group decreased by 12.62% to 109.81 at the end of the program, an appreciable decrease of 16.28% was noted in the participant with the highest non-HDL cholesterol, decreasing from 258 to 216. Interestingly, this result was obtained after one 11-day session.

The total cholesterol-to-HDL ratio (TC/HDL) was calculated by dividing the total cholesterol (TC) by the high-density lipoprotein (HDL). A ratio of 3.5:1 or less is generally desired, while higher ratios are associated with a higher cardiovascular risk. A 17-year cohort study found that women with a TC/HDL ratio of 3.5:1 or less had the lowest risk of acute myocardial infarction (AMI) (Calling et al., 2019). The researcher suggests that including the examination of this ratio routinely for women may provide a more complete clinical picture and contribute to the early identification of those at risk for AMI. The baseline TC/HDL ratio of the study population ranged from 2.40:1 to 5.53:1, with the mean being 3.30:1. This value decreased to 3.05:1 at the end of the program, a decrease of 7.58%. The individual with the most elevated ratio at baseline (5.53:1) experienced a decrease of 12.12% to 4.86:1 at the end of the 11-day program. It should be noted that individuals with a ratio of 5.0:1 or above are 89% more likely to experience an acute myocardial infarction (Calling et al., 2019), so this intervention may have been instrumental in preventing this unfortunate event in the individual with the baseline ratio of 5.53:1.

As a group, the mean values for VLDL cholesterol, non-HDL cholesterol, and TC/HDL were not elevated above normal ranges at baseline. This may possibly be due, in part, to the moderate lifestyle being practiced by participants prior to attending the lifestyle center. However, appreciable improvements in lab values were realized as a result of program participation. Unfortunately, the mean values of the study group returned to near baseline values for all three

measures at the 3-month follow-up. This apparent benefit loss suggests that additional support following the completion of the participant's program may have been helpful in sustaining the gains made during the program.

Nutritional Analysis Observations

The nutritional analysis included examining the consumption of fruits, vegetables, whole grains, protein, unsaturated fats, trans fats, saturated fats, dairy, and beverages. Eating habits were also examined including the frequency of consuming snacks, prepackaged foods, and visiting fast-food restaurants. Other eating habits explored included the types of meals ingested during the day as well as the largest meal consumed per day.

Numerous studies reveal that consuming a diet rich in fruits and vegetables can appreciably decrease the risk of cardiovascular disease (Aune, 2017; Feng, 2022; Liu, 2021; Tang, 2017). In fact, the higher the consumption, the lower the risk of developing cardiovascular disease. A meta-analysis of cohort studies demonstrated that, for each additional serving per day of fruits and vegetables, the risk of death from cardiovascular disease decreased by four percent (Wang et al., 2014). While the American Heart Association (AHA) recommends four to five servings each of fruits and vegetables daily as part of a 2,000-calorie/day diet (American Heart Assoc, 2023), a study of two million adults published in the journal Circulation suggests that two servings of fruit and three servings of vegetables a day (known as the "5-a-day" approach) can help reduce the risk of chronic diseases and is associated with the lowest risk of mortality. (Wang et al., 2021). Unfortunately, the number of adults consuming the recommended servings of fruits and vegetables or adhering to recommended nutritional practices is scant (Rippe, 2017). According to the Centers for Disease Control (CDC), only one in 10 adults consume enough fruits and vegetables (Lee et al., 2022).

While not ideal, this Wildwood Lifestyle Center study population's consumption of fruits and vegetables at the beginning of the program was healthier than the average American diet. They were well on their way to adhering to the "5-a-day" recommendation, as at baseline they consumed 2 servings of either dark green leafy vegetables or non-starchy vegetables a day, as well as 3 servings of fruit a day. Predictably, their consumption of fruits and vegetables increased appreciably during the program but returned to baseline at the 3-month follow-up.

Many foods have a powerful influence on blood cholesterol levels. Saturated fats in the form of fried and processed foods, dairy products, baked goods, and some meats contribute to elevated cholesterol levels. In contrast to the standard American diet, the study population's consumption of these types of food products at baseline was relatively low. Prior to beginning the program, red meat and fish were consumed less than once per week (.89 and .83 servings, respectively) by the program participants, and 1.3 servings of chicken were consumed per week. Consumption of trans fats, saturated fats, and dairy products ranged from 1.2 servings per week to 2.75 servings per week. These low consumption levels, most likely, contributed to the near-normal lipid levels of the group noted at baseline. During the program, the consumption of those items was essentially eliminated. The three-month follow-up showed a meaningful reduction in tropical oils, desserts (such as pastries, cookies, cakes, and ice cream), butter or cream, full-fat cheese, and milk compared to the baseline. The long-term benefit of the continued reduced intake of these types of foods would certainly be a reduction in weight, cardiac risk, and diabetes risk.

In addition to an increased intake of fruits and vegetables, study data revealed an increased consumption of whole-grain foods, water, unsweetened beverages, and nuts and nut butters. The intake of beans increased from 8 servings per week to 11 servings per week.

Essentially, participants consumed a diet high in soluble fiber, which is instrumental in preventing the digestive tract from absorbing cholesterol. Because there is a dose-response relationship between plant sterols and the reduction of cholesterol levels (Li et al., 2022), it is safe to assume that the high consumption of fruits and vegetables during the program was instrumental in reducing the cholesterol components noted in the program participants.

Limitations

One of the challenges experienced during this project was securing an adequate sample size. Because the research question in this project included examination of variables at the beginning and end of the program, and 3-4 months after completion of the program, any participants who did not supply all of the data were excluded. Lack of compliance in completing the follow-up surveys and lab work resulted in a smaller participant population than expected (21 out of 104 initial program participants). A closer connection with the participants and increased communication may have resulted in greater compliance and improved follow-up.

Another limitation noted for this project was the composition of the sample population. Wildwood's lifestyle center is located in the southeastern United States. It is unknown if participants came to this location because of proximity or convenience. Additionally, the program participants appeared to already be consuming a relatively healthy diet (low intake of animal products, etc.). It may be that those who chose this center have a certain propensity toward lifestyle modification. The demographic characteristics of the study population also pose a limitation, as the mean age of the group was 63. This may represent an age group where concerns about one's health begin to become more evident, or the occurrence of a health crisis serves as a motivator to make lifestyle changes.

Furthermore, possible familial association with hypercholesteremia was an unknown factor. Because cardiovascular disease is a multifactorial disorder influenced by lifestyle, environment, and heredity, the knowledge of hereditary factors may have informed the intervention and observations. Recent studies have shown that individually tailored lifestyle interventions are especially effective in the adoption of lifestyle modification and reduction of cardiovascular risk factors (including cholesterol levels) (Incazli et al., 2022).

Opportunities may exist to broaden the scope of this project by including a wider range of ages, individuals from a wider geographical area, and those with more diverse lifestyles and eating habits. In view of these limitations, this particular study population may not be reflective of the population at large. Therefore, results cannot be reliably applied overall to the general population.

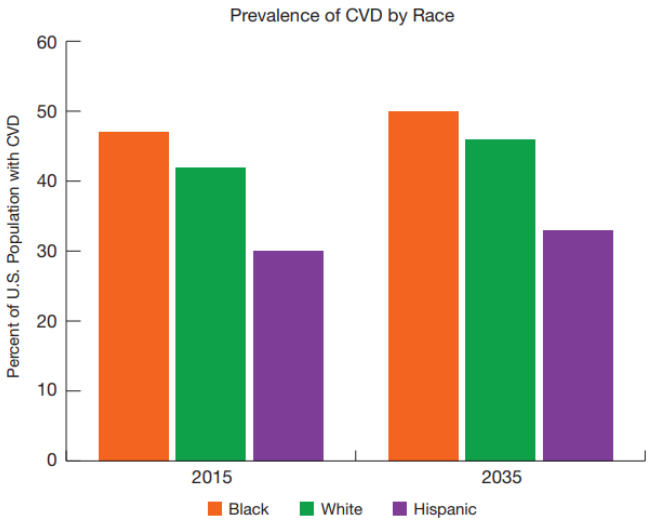
Implications for the Doctorate of Nursing Practice

While the environment at the lifestyle center is conducive to making effective lifestyle changes, the participants may be challenged to continue the lifestyle practices and maintain the comprehensive approach after returning to their home environment. Several factors may contribute to this inability, including a lack of support from family and friends, influences from social networks, insufficient time to adopt the necessary new life skills, undeveloped food preparation skills, level of education, a bewildering array of information and choices, life's demands, past failures, gender, age, socioeconomic status, lack of access to nutritious food choices (food desert), or a toxic environment. In order to effectively care for patients with chronic diseases such as cardiovascular disease, healthcare providers need to understand the unique lifestyle challenges facing patients and consider creative ways to assist them with overcoming their deterrents. Healthcare providers have the opportunity to help reinforce

important lifestyle practices, emphasizing to patients that approaches of this nature should not be considered as a temporary program or for a specific time duration, such as one might embark upon with a weight loss program. Instead, this approach needs to be considered as a way of life, a lifestyle choice.

The prevalence of cardiovascular disease is projected to increase in the future, impacting racial and ethnic minorities disproportionately (Mohebi et al., 2022). African Americans are expected to have the highest rates of cardiovascular disease in the next two decades (Figure 9) (American Heart Association, 2017).

Figure 9: Prevalence of Cardiovascular Disease by Race



Graph produced by American Heart Association, 2017

It is anticipated that providing lifestyle management care and support to marginalized populations will be particularly impactful, as these individuals often experience disproportionate rates of numerous lifestyle-related chronic diseases contributing to increased overall all-cause morbidity and mortality. The healthcare practitioner may address these disparities by identifying strategies to impact the inequities in healthcare present in underserved communities.

Opportunities exist for healthcare providers to implement cost-effective lifestyle modification programs and influence governing bodies to enact healthcare policies that provide affordable and preventive healthcare.

Pharmacological and technological treatments in the area of cardiovascular medicine have made notable advances in the past 50 years. Through these advances, in conjunction with policy initiatives to reduce cardiovascular mortality, contemporary medicine is attempting to appreciably respond to cardiovascular disease statistics. However, these advances come with a cost that many states and countries are ill-equipped to afford. According to The Commonwealth Fund, an independent research group, healthcare expenditures in the United States are higher than in any other high-income country but the United States has the highest rate of people with multiple chronic diseases and the highest obesity rate of the countries studied (Gunja et al., 2023).

The most recent Commonwealth Fund report, released January 2023, reveals that despite the fact that the healthcare budget in the United States is approximately 18% of the Gross Domestic Product (GDP), Americans are sicker, die at an earlier age, and have the highest rates of avoidable deaths compared to individuals in other high-income countries. To address these statistics effectively, Dr. Georges Benjamin, executive director of the American Public Health Association indicates that our society needs to invest more resources in primary care prevention (Howard, 2023). Unfortunately, politicians do not appear to be focused on ways to increase budgets to support methods of primary prevention. This may be due, in part, to pressures and incentives by special interest groups. The healthcare practitioner can act as an advocate in the public arena by engaging with politicians to educate, inform, and encourage legislation aimed at preventative and restorative lifestyle measures.

The healthcare practitioner may become involved in community, school, and church organizations that promote healthy living spaces, community gardens, and education programs. Additionally, there is an opportunity to advocate for policies to advance nutrition and food security, nutrition research, and nutrition education. The U.S. Department of Agriculture (USDA) describes nutrition security as "consistent and equitable access to healthy, safe, affordable foods essential to optimal health and well-being" (Food and Nutrition Security, n.d., para. 1). This is differentiated from food security which is defined by the Food and Agriculture Organization of the United Nations (FAO) as existing "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2006). There is a correlation between nutrition insecurity and diet-associated chronic diseases that disproportionally affect those with a lower socioeconomic status and income (Food and Nutrition Security, n.d., para. 2). As healthcare professionals advocate for the importance of addressing long-standing nutritional inequities, not only will the food system infrastructure be strengthened, but the prevalence of chronic diseases will, in turn, be impacted, thereby decreasing the burden of healthcare costs in our country.

Application to Theory

This project used the "Choice" component of the CREATION Life theoretical model, as choosing to modify one's behavior is the first step in making changes to improve health outcomes. In fact, it is fundamental to improving all areas of one's life and is the starting point from which everything emerges. The transtheoretical model (TTM) equates choice to action (attempting change), which is preceded by precontemplation, contemplation (ambivalent or considering change), and preparation (also called determination and involves taking steps toward

the change). The challenges to behavior change are multifactorial, and many elements impact one's ability to commit to making positive choices. As the CREATION Life model indicates, the ability to make sound, positive choices is influenced by four other components in the model: Trust, Interpersonal Relationships, Outlook, and Environment. The residential lifestyle center ably addresses each of these four components during its program. Residents are enveloped in an encouraging, affirming environment and provided with counseling sessions and the reinforcement necessary to overcome obstacles that would adversely impact their ability to choose wisely. Residents are then enabled to make positive choices in the other areas of the model: Nutrition, Rest, and Activity. When one considers that many of the leading causes of death are related to lifestyle choices, it is important to begin with this component of the CREATION Life theoretical model. By voluntarily attending this residential lifestyle center, this group demonstrated their conscious choice, their readiness to change, and their intention to modify their behaviors. Attendance in the lifestyle modification program facilitated and enhanced their power of choice.

Choice, as an ongoing action, results in what the transtheoretical model (TTM) designates as the maintenance of a behavior. If the choices of an individual with cardiovascular disease or risk are positive lifestyle changes, such as those taught in a residential program like that of Wildwood Lifestyle Center, they will promote a positive health trajectory. If, however, the choice is to terminate positive behaviors (Prochaska's final state of behavior change) and stop engaging in healthy lifestyle habits, then the result will be an increase in cardiovascular morbidity and mortality. The participants described in this DNP project appeared to terminate new behaviors and revert to familiar pre-program habits. This creates an unfortunate risk for these individuals.

As individuals progress through the various stages, their needs and levels of acceptance and readiness change. Commitment to change is gradually solidified at each stage. Healthcare practitioners must be sensitive to the motivational stage and provide the appropriate support accordingly. Recognizing the patient's stage of change and intervening appropriately can, not only reduce ambivalence to change, but also encourage motivation to change and promote movement along the various stages of change.

In conjunction with recognizing the stages of change, there are various tools that healthcare practitioners should utilize to assist patients in achieving their healthcare goals. One such tool is motivational interviewing, which is framed within the transtheoretical model of change. Motivational interviewing is a client-centered counseling approach that involves encouraging the patient to explore their own reasons for change by using basic interaction skills and techniques such as open questions, affirmation, reflective listening, and summary reflections (OARS) (Miller & Rollnick, 2013). This approach, which engages the patient as an equal partner, was recommended by the European Society of Cardiology and graded as class 1 level A in supporting cardiovascular lifestyle risk modification (Piepoli et al., 2016). Because motivational interviewing is particularly helpful in supporting patients who are hesitant or equivocal about making changes to address their risk factors, healthcare practitioners owe it to their patients to develop and enhance this evidence-based counseling strategy to strengthen their patients' personal motivation and commitment to change.

Evidence-Informed Practice

Because cardiovascular disease is the primary cause of mortality worldwide, accounting for 45% of deaths in females and 39% of deaths in males (Timmes et al., 2022), the focus of this project was the relationship between nutritional factors and certain indicators or risk factors of

cardiovascular disease. Science has shown that healthy lifestyle choices may have a significant impact on cardiovascular disease, specifically myocardial infarction, decreasing the risk by more than 80%, with dietary choices being a major factor (Kahleova et al., 2018).

The China Study, the largest and most comprehensive study examining the relationship of diet to health, demonstrated that the consumption of meat and dairy products, which tend to be major sources of saturated fat, can have an adverse effect on a range of chronic diseases. In fact, consuming only a small amount of animal products can be associated with a significant increase in chronic degenerative diseases (Campbell, 2016). The researcher for the China Study, Dr. T. Colin Campbell, referred to diseases that commonly plague Western civilizations (cancers, diabetes, and heart disease) as "diseases of nutritional extravagance", as elevations in blood urea nitrogen and cholesterol were directly associated with the consumption of dietary fat, meat, milk, and eggs (Campbell et al., 1998). At the time of Campbell's study, mortality rates for cardiovascular disease for men and women in the United States were 16.7 and 5.6 times greater, respectively, than their Chinese counterparts.

Conversely, plant-based diets have been associated with a decreased risk of chronic diseases, including heart disease, hypertension, and type 2 diabetes. In his 20-year study conducted with more than 6,500 subjects from 65 rural counties in China, Campbell found that increased consumption of plant-based foods along with a decreased consumption of animal-based foods resulted in a decreased risk of coronary artery disease and the smallest amount of chronic disease (Campbell, 2016). Dr. Dean Ornish's landmark randomized clinical trial, the Lifestyle Heart Trial, demonstrated that coronary artery disease could be reversed with a plant-based diet, exercise, social support, and stress reduction without the use of lipid-lowering medications (Ornish et al., 1990). In another study, published in 2018, researchers observed that

a vegetarian diet reduced the risk of coronary heart disease and cardiovascular disease by 40% (Kahleova et al., 2018). A 2020 review of 15 studies revealed that systolic and diastolic blood pressure were both reduced significantly by adherence to a vegetarian diet compared to an omnivorous diet (Lee et al., 2020). A recent study series published in the American Journal of Lifestyle Medicine shows that remission from type 2 diabetes and medication reduction can be achieved by using lifestyle-based interventions with a focus on a predominantly plant-based diet (Panigrahi et al., 2023). Considering the interrelation of chronic diseases, it is reasonable to assume this study can be extended to the reversal or reduction of cardiovascular disease.

With this preponderance of irrefutable scientific evidence that diet and nutrition can prevent, control, and even reverse a wide range of diseases, how can healthcare practitioners and others not acknowledge that traditional treatments with medications and surgery are not the optimal sustainable solutions to this country's chronic disease healthcare crisis? Attention must shift to prevention and emphasis on the importance of lifestyle modification and therapies to optimally address the needs of those with a high-risk profile.

The healthcare practitioner has the opportunity to respond to the intentional influence of the food industry to addict consumers to unhealthy foods or heavily processed foods. Marion Nestle, Ph.D., MPH, a critical analyst of the food industry, has repeatedly written articles on the immense influence the food industry has on dietary choices. Often referred to as the founder of the field of food studies, Nestle has revealed how some companies fund or underwrite studies to misrepresent and distort science to their advantage, market their products in a way to purposely confuse and mislead consumers, and lobby Congress for laws that will subvert discovery of their underhanded tactics and ensure their financial success (Nestle, 2022). In the book, *Salt Sugar Fat*, the author exposes the practice of some food scientists to utilize advanced technology to

calculate the “bliss point” of sugary beverages and manipulate the chemical structure of fat to enhance the oral sensation (Moss, 2013). The combination of certain levels of salt, sugar, and fat has not only resulted in the consumption of foods with less-than-ideal nutritional benefits but often the ingestion of exponentially more of it than recommended.

A longitudinal study of 1,171 adult men and women who were followed for over 10 years revealed that individuals with a history of cardiovascular disease increased their mortality when a diet rich in ultra-processed food was consumed. The researchers concluded that a diet high in ultra-processed foods not only increases the risk of cardiovascular mortality but all-cause mortality as well. The consumption of highly processed foods stands as a significant public health concern when considering secondary cardiovascular disease prevention (Bonaccio, 2022). Healthcare practitioners have the opportunity to sound the clarion call and share this vital information in anticipation of encouraging consumers to make healthier choices.

Residential lifestyle centers are effective in assisting individuals in modifying their diets and behaviors while residents are participating in the program in the supportive environment created by the center. However, it takes longer than the amount of time spent at the center to cement and solidify the new lifestyle practices and nutritional pattern changes in the average human. Researchers from University College London performed a study of habit formation among individuals attempting to make lifestyle changes and determined that it generally takes sixty-six days for habits to develop (Lally et al., 2010). Given this, an opportunity exists to support individuals after leaving the residential lifestyle center to help reinforce new practices. Additionally, interdisciplinary collaboration, such as including mental health professionals in care, after participants return to their home environments could provide expertise in removing barriers and may influence long-term success and maintenance of healthy behaviors.

A large percentage of the population is unable to avail themselves of the residential lifestyle center experience due to the expense, which is primarily assumed by the individual. To address this, healthcare practitioners should share this vital information and inform the public of ways these important lifestyle changes may be incorporated in a cost-effective and sustainable manner. Various community-based lifestyle modification programs can be of invaluable assistance and impactful in this regard.

The Complete Health Improvement Program (CHIP) has been doing this for more than 35 years. Inspired by the successful transformations at the Pritikin Longevity Center, Dr. Hans Diehl founded the comprehensive lifestyle intervention program in 1986. Since that time, CHIP has been implemented in thousands of communities and in corporate and clinical settings in a cost-effective manner (Morton et al., 2016).

The nonprofit group, PlantPure Communities (PPC), was formed in 2016, following the release of the PlantPure Nation documentary, with the mission to "engage as many people as possible in a grassroots movement to build a plant-based world" (Campbell & Corry, 2015). The organizers promote the idea that nutrition is foundational in the quest for good health. In addition to providing education on a broad scale through written content, a cooking show, and video content, the organization encourages smaller regional groups, called Pods, to gather monthly and provide education, critical social support, and local outreach.

The core elements of both the CHIP and PPC programs can certainly be adapted and duplicated in communities across the United States by healthcare practitioners. The opportunity exists to uncover interesting and novel ways to help individuals make sustainable lifestyle changes.

This DNP project provides evidence for the effectiveness of healthy changes in diet and nutrition for the reduction of cardiovascular risk factors; specifically, the reduction in non-HDL and TC/HDL ratios. These lifestyle changes likely also affect primary lipids such as TC, LDL, HDL, and triglyceride levels (analyses that were not part of the scope of this project). How much the secondary lipid changes impact cardiovascular risk reduction is not fully evident in the current literature and was not a focus of this DNP project. There is a wealth of evidence for overall lipid influence on heart disease and the impact of diet and nutrition in cardiovascular disease reduction. This project also provides evidence related to the difficulty with the maintenance of lifestyle changes. Understanding and intervening to prevent regression to prior unhealthy behaviors is a challenge deserving of innovative interventions and further study.

Implications for Future Projects

This project highlights several needs within the area of cardiovascular risk reduction through lifestyle medicine modalities. One such project could include working with Wildwood Lifestyle Center to create focus groups of those who have completed their programs. With these groups, the DNP project would assess factors that led participants to not follow up and revert to prior unhealthy choices. Furthermore, the project could focus on how these individuals feel they could have been supported to follow up and continue with healthy choices. These data may be used to enhance the lifestyle program.

Another project could entail designing and assisting Wildwood Lifestyle Center in implementing an enhanced follow-up program. The DNP project could incorporate elements from other lifestyle center practices or after-monitoring programs for heart failure patients.

Sometimes DNP students have the opportunity to assist in program evaluations, such as was done with this project. With similar lifestyle programs, additional considerations could also

be made, such as focusing on a more diverse participant composition. The participants in this project may primarily be faith-based and already consume a moderate diet. Examination of those who more closely represent consumers of the standard American diet (SAD) may yield very different results.

The small sample size and limited duration of this project present an opportunity for future projects to replicate this study utilizing a larger sample size and a longer duration. Additionally, although this project focused on the impact of nutritional factors on specific lipid components, other influences that the participants were exposed to may have also had an impact on the improved lipid results. Future projects with a wider scope that includes additional variables such as exercise, social support, and stress management will be useful to further solidify and reinforce the benefits of a holistic approach to lifestyle modification.

Future projects may consider improvements in participants with multiple chronic conditions. This project focused on changes in some of the minor lipid components. While some questions may still exist regarding the direct impact they have on cardiovascular disease, it is known that several lifestyle-related conditions such as diabetes, obesity, hypertension, and cardiovascular disease typically co-exist. Americans with five or more chronic conditions comprise 12 percent of the population and are responsible for 41 percent of total healthcare spending (Buttorff, et al., 2017). It will be useful to ascertain the impact nutritional changes have on other chronic conditions.

This project did not consider the medications being taken by program participants for chronic diseases. Future projects can examine changes in medication dosages (e.g., less insulin, fewer anti-hypertensives, decreased cholesterol-lowering drugs, etc.) or reductions in medication requirements due to program participation.

Conclusion

Cardiovascular disease continues to be the leading cause of mortality in the United States. The benefit of utilizing nutrition to address cardiovascular risk factors cannot be overstated. This DNP project sought to determine if there was a relationship between nutritional patterns and selected cholesterol values and if modification of one's diet during a residential lifestyle modification program reduced certain cardiovascular risk factors.

Examining the impact of a residential lifestyle modification program, such as that offered at Wildwood Lifestyle Center, contributes to the understanding of the role such a center can play in reducing the impact of cardiovascular disease by helping individuals adopt healthy behaviors. Lipids, nutritional choices, and eating patterns were assessed at baseline, end of the residential program, and 3-4 months later. This project focused on minor or less-emphasized lipid risk factors: very low-density lipoproteins (VLDL) cholesterol, non-high-density lipoprotein (non-HDL) cholesterol, and total cholesterol-to-HDL ratio (TC/HDL).

The nutritional approach used by this residential lifestyle center of increasing fiber intake by offering fresh fruits, vegetables, whole grains, and legumes, and replacing unhealthy fats with healthy monounsaturated and polyunsaturated fats appeared to be an essential step in the quest to lower cholesterol and its associated components. The mean values of the VLDL, non-HDL, and TC/HDL cholesterol levels were decreased at the completion of the program.

A major limitation was that of 104 program participants, only 21 completed all of the follow-up assessments. Additionally, demographics reveal an older (mean age 63) group who were mostly female, African American, well educated, with reasonably healthy eating habits in many areas (e.g., low red meat, low alcohol consumption). These characteristics are not

necessarily representative of the general population. Some of these factors also serve as strengths in that they represent information about individuals less studied.

This project provides firm evidence for the short-term effectiveness of a residential lifestyle modification program. It demonstrates that changes in lipids can occur quickly. Because residential programs are expensive, not generally covered by insurance, and provide care outside of the participants' normal environment, these programs likely represent a special niche for lifestyle intervention – one that meets the needs of only a small portion of those affected by chronic disease and cardiovascular risk. Instead, DNP providers and other healthcare leaders have the opportunity to devise and implement more widely available, accessible, and affordable, community-based, public health strategies to promote lifestyle practices that will mitigate risk factors for cardiovascular disease. Although effective management of patients with risk factors for cardiovascular disease may be challenging, doing so is critical to reducing the prevalence of morbidity and mortality of this very preventable leading cause of death. Not only would this transform the health outcomes of the society at large and improve the healthcare system but would also result in improved economic stewardship. Healthcare advocates owe it to their patients to work toward this end.

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Appendix A: Institutional Review Board Approval

SOUTHERN ADVENTIST UNIVERSITY — INSTITUTIONAL REVIEW BOARD

SOUTHERN ADVENTIST UNIVERSITY
Power for Mind & Soul

IRB
Institutional Review Board

October 19, 2022

Principal Investigator: Delores M. Rugless
Research Project: Effects of residential lifestyle intervention programs in specific cardiovascular risk factors
IRB Tracking Number: 2022-2023-021

Dear Delores,

The Institutional Review Board has examined your research study proposal, **Effects of residential lifestyle intervention programs in specific cardiovascular risk factors**, with supporting documents at the IRB committee level and it is a delight to inform you has approved your research request as expedited. This level of approval is for classroom usage only meaning data collected cannot be used for anything other than a class project. We wish you the very best as you move forward with this study and look forward to reading your findings when your study is completed.

As you move forward with your study, if there is a need to make minor changes to this research, before making those changes please notify us by completing and submitting a FORM B (Certification of Modification, Annual Review, Research Termination, or Research Completion). Please submit all applications to irb@southern.edu. If substantial changes are planned, you, as the principal investigator, should submit a new IRB FORM A application.

Many blessing to you as you move forward. Please let us know if there is anything additional, we can do to assist you with this research study.

Always in His service,

Robert Overstreet

Robert Overstreet, Ph.D.
IRB Chair
Southern Adventist University
423-236-2285
robertoverstreet@southern.edu
"I applied my mind to study and to explore by wisdom all that is done under the heavens…" - Ecclesiastes 2:13
"Research is to see what everyone else has seen and to think what nobody else has thought." - Albert Szent-Gyorgyi

Appendix B: Consent for Data Sharing

P.O. Box 129, Wildwood, GA 30757-0129 | Office: (706) 820-1636 | Fax: (706)820-1474

Wildwood

LIFESTYLE CENTER

September 13, 2022

To Whom It May Concern at Southern Adventist University's IRB:

I am writing to give consent for Delores Rugless to use data from patients at Wildwood Lifestyle Center.

Ms. Rugless may use data from persons who attended residential lifestyle intervention sessions starting on 11/28/21 to 5/15/22. Ms. Rugless may use data from participants of these 11- and 25-day programs who have consented to participate in research at Wildwood Lifestyle Center.

Data provided will be de-identified and will include survey results from the New LIFESTYLE Patient Questionnaire (questions 1-27 addressing nutritional intake) and demographic and laboratory data (VLDL, non-HDL, and total cholesterol/HDL ratios). Demographic data will include but may not be limited to participant age, gender, race, annual household income, and educational attainment.

Data from baseline and end-of-program will be provided as well as 3-9 months follow-up, as available.

Sincerely,

Aysha Inankur, MD, FACE, dipABLM

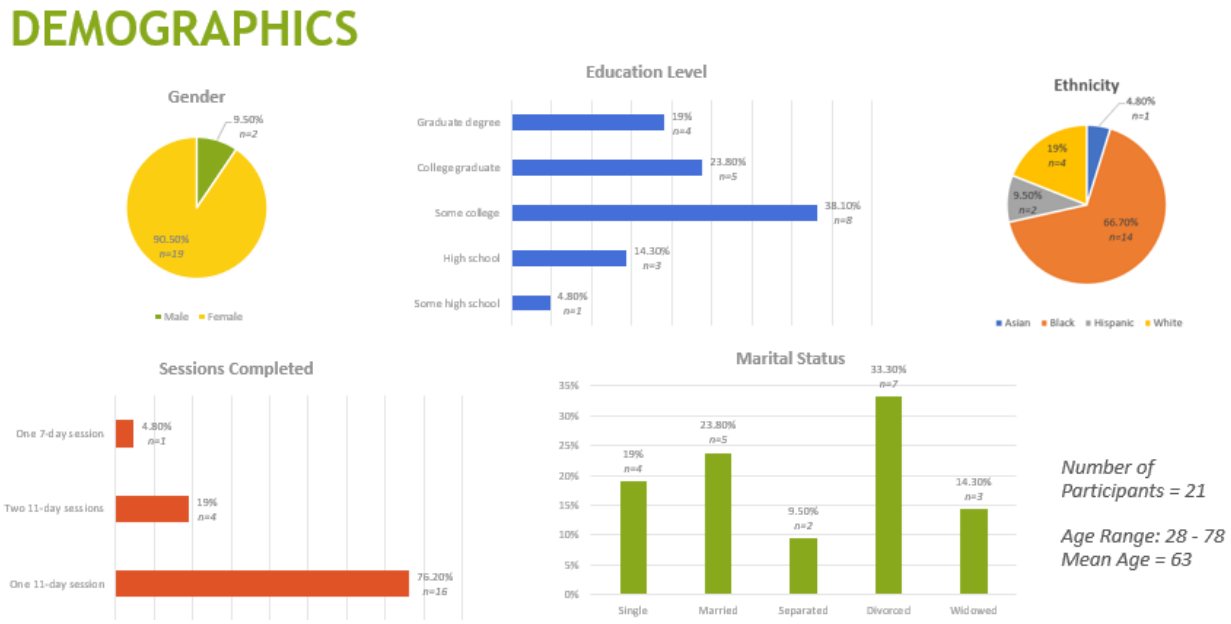
Endocrinologist

Appendix C: Evidence Tables

Evidence Review Table 1

Sociodemographic Characteristics of Participants

Category	Sub-categories	Frequency (n)	Percent
Gender (n = 21)	Male	2	9.5
	Female	19	90.5
Ethnicity (n = 21)	Black	14	66.7
	White	4	19
	Hispanic	2	9.5
	Asian	1	4.8
Marital status (n = 21)	Single	4	19
	Married	5	23.8
	Separated	2	9.5
	Divorced	7	33.3
	Widowed	3	14.3
Education level (n = 21)	Some high school	1	4.8
	High school	3	14.3
	Some college	8	38.1
	College graduate	5	23.8
	Graduate degree	4	19
Sessions completed (n=21)	One 11-day session	16	76.2
	Two 11-day sessions	4	19
	One 7-day session	1	4.8

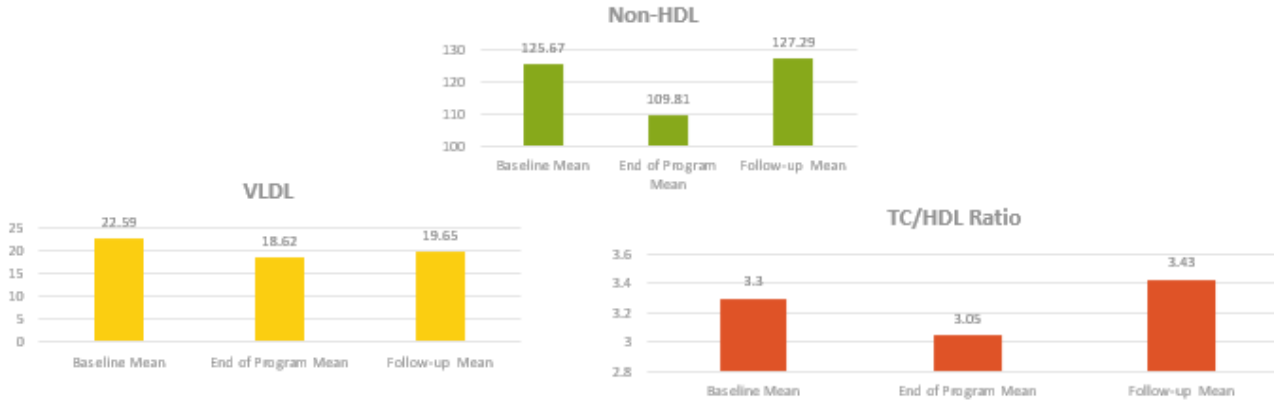


Evidence Review Table 2

Lipid Profile

Lipid	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Non-HDL cholesterol	125.67 (45.97)	109.81 (42.94)	127.29 (44.79)	5.275(2), .009 [a, b]
Total cholesterol/HDL ratio	3.30 (.85)	3.05 (.74)	3.43 (1.21)	3.58 (2), .037 [a]
VLDL	22.59 (13.14)	18.62 (6.88)	19.65 (9.25)	2.33(2), .111

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

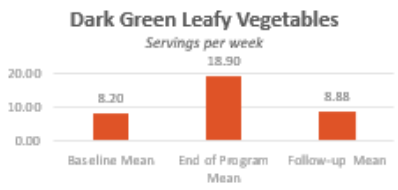


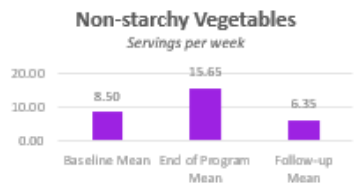
Evidence Review Table 3

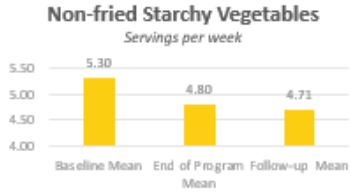
Vegetable Intake – Servings per Week

Type of vegetable	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Dark green leafy vegetables	8.2 (7.74)	18.9 (11.49)	8.88 (6.44)	10.206 (2), < .001 [a, b]
Non-starchy vegetables	8.5 (7.04)	15.65 (11.01)	6.35 (3.12)	10.270 (2), < .001 [a, b]
Non-fried starchy vegetables	5.3 (5.25)	4.80 (3.99)	4.71 (3.95)	.125 (2), .882
Fried starchy vegetables	.838 (.964)	.00 (.00)	.813 (1.42)	6.74 (2), .003 [a, b]

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.







Evidence Review Table 4

Fruit and Whole Grain Intake – Servings per Week

Type of fruit or whole grain	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis - F (df), p
Berries	8.81 (8.71)	12.75 (7.79)	7.21 (6.69)	4.473 (2), .018[a, b]
Other types of fruits	12.25 (9.19)	11.00 (6.85)	10.60 (7.73)	.304 (2), .739
Whole grain foods	6.95 (5.41)	12.73 (9.27)	9.50 (6.91)	3.195 (2), .052

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Evidence Review Table 5

Protein Intake – Servings per Week

Type of protein	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Red meat	.89 (2.09)	.00 (.00)	.44 (1.10)	2.47 (2), .097 [a, b]
Poultry	1.29 (3.30)	.00 (.00)	.559 (1.19)	2.89 (2), .067
Fish	.83 (1.82)	.00 (.00)	.32 (.71)	3.28 (2), .48
Beans	7.77 (10.20)	10.66 (7.70)	5.13 (3.56)	2.93 (2), .066 [a, b, c]

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Evidence Review Table 6

Unsaturated Fat Intake – Servings per Week

Type of unsaturated fat	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Avocado	6.00 (9.55)	1.85 (3.03)	2.69 (3.41)	3.388 (2),

				.044 [a, b, c]
Olive oil	2.83 (2.60)	.48 (1.59)	3.73 (4.26)	10.353 (2), < .001 [a, b]
Peanuts or peanut butter	2.25 (4.20)	.56 (1.58)	2.38 (3.48)	2.031 (2), .145
Nuts or nut butters	5.43 (5.94)	8.88 (6.66)	5.41 (4.40)	2.937 (2), .065

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Evidence Review Table 7

Trans Fats, Saturated Fats, and Dairy Intake – Servings per Week

Type of intake	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Coconut oil or MCT oil	1.93 (4.42)	.03 (.11)	.697 (1.66)	2.353 (2), .110[a, b]
Pastries, cookies, cakes, ice cream	2.75 (5.35)	.238 (.399)	1.44 (1.86)	3.46 (2), .041 [a, b]
Other vegetable oils, salad dressings, or mayonnaise	2.31 (3.59)	.43 (1.54)	3.21 (5.01)	3.259 (2), .049 [a, b]
Butter or cream	1.20 (2.19)	.00 (.00)	1.05 (1.69)	4.06 (2), .025 [a]
Full-fat cheese	1.92 (3.47)	.00 (.00)	.85 (1.85)	4.14 (2), .023
Milk	1.31 (3.43)	.00 (.00)	.31 (.68)	2.35 (2), .109

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Evidence Review Table 8

Beverage Intake – Servings per week

Type of beverage	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Sugar-sweetened beverages	1.37 (2.22)	.012 (.055)	1.08 (1.83)	4.017 (2), .026 [a, b]
Unsweetened beverages	24.21 (18.22)	28.79 (24.74)	29.29 (22.23)	.356 (2), .703

Alcohol	.595 (.222)	.00 (.00)	.00 (.00)	1.506 (2), .234
8-oz water intake per day	6.25 (2.31)	8.40 (2.62)	6.45 (2.01)	7.137 (2), .002[a]

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Evidence Review Table 9

Eating Habits – Frequency of Fast-Food Restaurants and Snacks

Type of intake	Baseline Mean (SD)	End of program Mean (SD)	Follow-up at 3-4 months Mean (SD)	Repeated measures analysis F (df), p
Eating in fast-food restaurants	1.24 (3.05)	.00 (.00)	.559 (.96)	2.386 (2), .105[a, b]
Eating prepared or pre-packaged, canned or frozen meals per week	2.39 (6.26)	.16 (.49)	1.39 (2.32)	2.550 (2), .091
Snacks per day (last 2 weeks)	1.86 (1.39)	.43 (.87)	1.71 (1.42)	10.685 (2), < .001 [a, b]

[a] Significant difference between baseline and end-of-program means. [b] Significant difference between end-of-program and follow-up means. [c] Significant difference between baseline and follow-up means.

Evidence Review Table 10

Eating Habits – Which Meals Are Eaten Each Day

	Base #	Base %	EOP #	EOP %	3-mo. #	3-mo. %
Lunch	1	4.8			2	9.5
Breakfast and Lunch	6	28.6	15	71.4	10	47.6
Breakfast and Dinner	2	9.5			1	4.8
Lunch and Dinner	3	14.3			2	9.5
Breakfast, Lunch, and Dinner	9	42.9	6	28.6	6	28.6
Total	21	100	21	100	21	100

Evidence Review Table 11

Eating Habits – Largest Meal of the Day

	Base #	Base %	EOP #	EOP %	3-mo. #	3-mo. %
Breakfast	8	38.1	19	90.5	10	47.6
Lunch	7	33.3	2	9.5	9	42.9
Dinner	6	28.6			2	9.5
Total	21	100	21	100	21	100

Table 12

Correlations – Baseline Lipid and Selected Nutritional Values

Nutritional measure – Servings per week (unless otherwise specified)	Baseline non-HDL r value (signif)	Baseline TC/HDL ratio r value (signif)	Baseline VLDL r value (signif)
Dark leafy green vegetables	.153 (.507)	.272 (.234)	-.002 (.992)
Nonstarchy vegetables	.082 (.725)	.171 (.458)	.217 (.345)
Nonfried starchy vegetables	-.023 (.920)	-.032 (.889)	.021 (.927)
Fried starchy vegetables	.131 (.573)	.245 (.285)	.092 (.693)
Peanuts or peanut butter	-.109 (.639)	.087 (.709)	.070 (.763)
Nuts or nut butter	-.054 (.816)	-.185 (.423)	-.231 (.314)
Avocado	.150 (.517)	.134 (.561)	-.173 (.453)
Berries	-.308 (.175)	-.150 (.515)	.053 (.818)
Other fruits	-.031 (.894)	.016 (.944)	-.029 (.899)
Olive oil	.352 (.117)	.236 (.302)	.156 (.500)
Coconut oil or MCT oil	-.273 (.259)	-.275 (.254)	-.233 (.359)
Other vegetable oils, salad dressings, or mayonnaise	.169 (.476)	.160 (.488)	-.172 (.455)
Butter or cream	.126 (.586)	.150 (.515)	.756 (<.001)**

Red meat	.415 (.061)	.533 (.013)*	.061 (.791)
Poultry	.212 (.357)	.281 (.217)	-.127 (.584)
Fish	.450 (.041)*	.476 (.029)*	.091 (.696)
Milk	-.226 (.325)	.031 (.893)	.315 (.164)
Full fat cheese	-.115 (.618)	.064 (.784)	.391 (.080)
Beans	-.013 (.955)	-.033 (.887)	-.019 (.936)
Whole grain food	.010 (.966)	-.109 (.648)	.080 (.738)
Pastries, cookies, cakes, ice cream	-.152 (.511)	-.011 (.964)	.047 (.841)
Times eating at fast food restaurant	-.001 (.998)	.034 (.885)	-.088 (.705)
How often eating pre-prepared or pre-packaged canned or frozen meals	-.053 (.825)	.011 (.964)	.008 (.973)
Sugar-sweetened beverages	-.246 (.281)	-.219 (.341)	-.197 (.393)
Unsweetened beverages	-.075 (.753)	-.269 (.251)	-.095 (.690)
Alcohol	-.092 (.691)	-.142 (.540)	-.156 (.498)
Snacks – per day	-.067 (.774)	-.092 (.691)	-.362 (.107)

* Significant correlation at .05 level or less. ** Significant correlation at .01 level or less.

Appendix D: Nutrition-Related Questions from New LIFESTYLE Patient Form

New Lifestyle Patient Form											
Instructions: Answer the following questions about how often you eat these foods each day, each week, or each month. Mark "Day" or "Week" or "Month" and mark the number of servings that corresponds to the number of times you eat that food either in a day, a week, or a month. Serving sizes (for one serving) for each food group is listed in parentheses after each question. If you do not eat that food, put a "0" anywhere in the frequency column.											
1. How many servings of dark leafy green vegetables (e.g., spinach, kale, mustard greens, collard greens, arugula) do you eat? (serving = 1 cup raw leafy vegetables, ½ cup cooked leafy vegetables)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10
2. How many servings of these types of vegetables (e.g., zucchini, onion, cauliflower, tomatoes, pepper, broccoli, string beans, mushroom, asparagus, vegetable juice) do you eat? (serving = ½ cup vegetables, 4 oz juice)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10
3. How many servings of these types of starchy vegetables do you eat? (serving = ½ cup vegetables) a. Peas, corn, non-fried white/sweet potatoes, squash (acorn, butternut)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10
b. Fried potatoes (French fries, sweet potato fries, hash browns)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10
4. How many servings of peanuts or peanut butter do you eat? (serving = ¼ cup peanuts, 2 Tablespoons peanut butter)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10
5. How many servings of other nuts, other nut butters, and seeds (e.g. walnuts, almonds, almond butter, sunflower seeds) do you eat? (serving = ¼ cup nuts/seed, 2 Tablespoons nut butter)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10
6. How many servings of avocado do you eat? (serving = ¼ avocado, 2 Tablespoons guacamole)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10
7. How many servings of berries (e.g. blueberries, raspberries, strawberries, cherries, cranberries) do you eat? Do not include juices. (serving = ½ cup)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10
8. How many servings of other types of fruit, not including berries (e.g., apples, oranges, watermelon, peaches, 100percent fruit juice), do you eat? (serving = 1 medium fruit, ½ cup fruit, or 4 oz juice)	O Day			O Month				O Week			
Servings	0	1	2	3	4	5	6	7	8	9	10

9. How many servings of these oils (including that used on salads and in cooking) do you eat? (serving = 1 Tablespoon)											
a. Olive oil	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
b. Coconut oil, MCT oil	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
c.. Other Vegetable oils, regular salad dressings or mayonnaise	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
10. How many servings of butter, or cream (e.g. whipping cream, half and half) do you eat?	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
11. How many servings of red meat, ground beef, pork, and processed/Luncheon meats (e.g., bacon, sausage, turkey deli meat) do you eat? (serving = 3 oz, 3 strips, or 3 slices)	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
12. How many servings of poultry (e.g., chicken, turkey, duck) do you eat? (serving = 3 oz)	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
13. How many servings of fish (e.g. tuna, salmon, tilapia, shellfish) do you eat? Do not include fried fish. (serving = 3 oz cooked fish)	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
14. How many servings of milk (low-fat or full-fat) or yogurt (low-fat or full-fat) do you eat? (serving = 1 cup?)	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
15. How many servings of full-fat cheese (e.g. cheddar, mozzarella, cream cheese, ricotta cheese, cottage cheese, parmesan) do you eat? Do not include low-fat versions. (serving = 1.5 oz cheese, 1 Tablespoon cream cheese, or ¼ cup cottage cheese)	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
16. How many servings of beans (e.g. pinto beans, black beans, lentils, garbanzo beans (chickpeas), hummus, soy, edamame, tofu) do you eat? (serving = ½ cup)	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10
17. How many servings of whole grain breads, pasta, or cereal (e.g., plain popcorn, quinoa, brown rice, old-fashioned or steel-cut oats) do you eat? (serving = 1 slice bread, ½ cup cooked grains or oats, or 1 cup dry cereal)	O Day				O Month				O Week		
Servings	0	1	2	3	4	5	6	7	8	9	10

18. How many servings of pastries, cookies, cakes, candy bars, or frozen desserts (ice cream) do you eat? (serving = 1 cookie/pastry, 1 regular chocolate bar, ½ cup ice cream)	O Day			O Month			O Week				
Servings	0	1	2	3	4	5	6	7	8	9	10
19. How many times do you eat food from a fast-food restaurant (e.g., McDonald's, Pizza Hut, Kentucky Fried Chicken, Taco Bell, Panda Express)?	O Day			O Month			O Week				
Servings	0	1	2	3	4	5	6	7	8	9	10
20. How often do you eat pre-prepared or pre-packaged boxed, canned, or frozen meals (e.g., potato/tortilla chips, microwave popcorn, boxed macaroni and cheese, refined grain pastas or breakfast cereals (both hot and cold), granola or cereal bars)?	O Day			O Month			O Week				
Servings	0	1	2	3	4	5	6	7	8	9	10
21. How many servings of sugar-sweetened beverages (e.g., sweetened coffee, lattes, tea, Gatorade, sodas, Kool-Aid, lemonade, hot chocolate, mochas) do you drink? (1 serving = 12 oz)	O Day			O Month			O Week				
Servings	0	1	2	3	4	5	6	7	8	9	10
22. How many servings of unsweetened beverages (e.g. water, sparkling water, unsweetened tea or coffee) do you drink? Do not include diet soda. (1 serving = 12 oz)	O Day			O Month			O Week				
Servings	0	1	2	3	4	5	6	7	8	9	10
23. How many servings of alcohol do you drink? (1 serving = 5 oz wine, 12 oz beer, 1.5 oz hard liquor)	O Day			O Month			O Week				
Servings	0	1	2	3	4	5	6	7	8	9	10
24. On average, which meals do you eat every day (check all that apply)?	O Breakfast			O Lunch			O Supper				
25. On average, which is your largest meal of the day?	O Breakfast			O Lunch			O Supper				

26. OVER THE LAST TWO WEEKS, on average, how many times per day did you snack (eat between meals)?										
O 0	O 1	O 2	O 3	O 4	O 5	O 6	O 7	O 8	O 9	O 10
27. OVER THE LAST TWO WEEKS, on average, how many 8 oz. glasses of water did you drink per day?										
O 0	O 1	O 2	O 3	O 4	O 5	O 6	O 7	O 8	O 9	O 10

Appendix E: Scholarly Project EOP SLO Synthesis

Southern Adventist University
School of Nursing
DNP Scholarly Project EOP SLO Synthesis

This section discusses the relationship between this scholarly project and Southern Adventist University's Doctor of Nursing Practice End of Program Student Learning Outcomes (EOP SLO). Two research questions guided this project: For patients at risk for cardiovascular disease, 1) What is the relationship between nutritional patterns and selected cholesterol values? and 2) Does the modification of participants' diet in a residential lifestyle modification program reduce certain cardiovascular risk factors? The eight SLOs include Cultural Competence, Evidence-Based Practice, Health Promotion, Patient-Centered Care, Quality and Safety, Informatics and Information, Teamwork and Collaboration, and Professionalism. These outcomes are addressed below.

1. **Cultural Competence:**
   Mentor Christian responsiveness and caring to a global culture through sensitivity and competence for patient traditions and values.

   This project integrates knowledge from the biophysical, psychosocial, and analytical sciences as it relates to lifestyle medicine. By focusing specifically on patients at risk for cardiovascular disease, this project ascertains if adherence to lifestyle factors can influence specific cardiac biomarkers.

2. **Evidence-Based Practice:**
   Translate quality research findings and outcomes to solve problems for quality personalized outcomes.

   A thorough literature review was conducted to locate evidence-based practices that were associated with the intended research questions. Relevant findings were applied to the development of this project.

3. **Health Promotion:**
   Propose evidence-based methods that prevent disease and promote human flourishing through the utilization of a holistic framework to educate and empower healthy lifestyle choices.

   This project demonstrated the value of residential lifestyle centers for decreasing certain risk factors that contribute to the development of cardiovascular disease. It highlighted the use of a holistic approach to address the healthcare needs of this at-risk population to promote and advance positive health outcomes.

4. **Patient-Centered Care:**
   Facilitate inter/intra-professional healthcare to achieve personalized, compassionate, and coordinated whole-person care.

   The residential lifestyle program focused on whole-person care by addressing life alignment, mental health and wellness, and disease reversal. This was approached in several ways: cooking classes, daily exercise, group counseling, hydrotherapy, lifestyle coaching, lifestyle medicine lectures, nutritional counseling, and chaplain services. Program participants received instructions and guidance related to the continued practice of the lifestyle principles initiated during the program. The counseling sessions were instrumental in addressing any potential social or environmental lifestyle challenges participants may be faced with upon returning to their home environments.

5. **Quality and Safety:**
   Evaluate current evidence and outcomes of practice in health care systems to ensure a just culture that minimizes the risk of harm and promotes safety and quality of care.

   Several steps were taken to ensure a just and ethical culture that minimized the risk of harm and promotes safety and quality of care:
   1. Informed consent was provided so that patients were respected in their decision to participate in the research project.
   2. Participants were assured of complete confidentiality. Extreme care was taken to ensure the participant's rights to confidentiality were maintained. The aggregated data did not contain any identifying information and was stored securely.
   3. Extreme care was exercised to ensure the patients were protected from harm while participating in the residential program, by inquiring about allergies and sensitivities and adhering to safe practices in this regard. Additionally, oversight was provided during all program-sponsored activities.

6. **Informatics and Innovation:**
   Analyze healthcare outcomes using knowledge of nursing, computer, and information sciences to ethically and innovatively manage data, information, and technology.

Information technology was utilized in the organization and synthesis of the data collected. An electronic database was created to capture the participant's survey responses and lab results. Access to the database was limited to those individuals entering and synthesizing the data.

Program participants have the opportunity to enhance their experience and outcomes by utilizing health-monitoring technology, as it has the potential to reshape individuals' perspectives and relationships to their own health and wellness. The health and wellness marketplace is rife with numerous effective tools to motivate adherence to certain health behaviors. Tracking and recording one's progress electronically may assist in the recognition of strengths, uncover opportunities for improvement, and provide motivation and encouragement to maintain focus on reaching established goals. Wellness technologies exist that measure and analyze metrics such as heart rate, blood pressure, sleep patterns, physical activity, stress levels, and mental health. Other applications address dietary concerns and keep track of adherence to certain nutritional goals. These technologies can be helpful in one's attempts to maintain balance in the effort to achieve optimal health and wellness.

7. **Teamwork and Collaboration:**
   Organize effective inter/intra-professional teams to promote quality health outcomes and reduce risk.

   This project provided the opportunity to work with individuals of other disciplines to develop a climate of mutual respect and shared values. Effective communication between members of the project team, including the data collectors, principal investigator, and researcher, was facilitated and occurred in a responsive, respectful, and responsible manner which supported a cohesive team approach.

   Interdisciplinary collaboration that includes nutritionists, exercise physiologists, and mental health professionals, during the lifestyle intervention and after participants return to their home environments, could provide expertise in removing barriers, thereby contributing to improved health outcomes and reduced risk.

8. **Professionalism:**
   Advocate for Christ-centered excellence in nursing roles and professional behaviors throughout the inter/intra-professional team.

   Because a project of this nature had not been conducted at this particular residential lifestyle center, this project will serve to illuminate the exceptional work being done at this center. It will also provide a roadmap into options for research and can potentially provide the opportunity for other nursing professionals to benefit from the research process utilized, with the possibility of replication at other lifestyle centers.