Research Proposal: Nutrition for Law Enforcement: Combating Metabolic Syndrome Through a Modified Mediterranean Diet Intervention

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Abstract

Law enforcement is a demanding career that can be extremely dangerous. Although some risks are obvious, such as high-speed pursuits, other risks are obscure. Research over the past several decades has uncovered a staggering trend of diseases plaguing the profession. Metabolic syndrome specifically affects officers at higher rates than their civilian counterparts. The role of diet in the development, prevention, and treatment of metabolic syndrome is well established. The purpose of the proposed study is to determine if adherence to a Mediterranean style diet will improve the biochemical and anthropometric markers that define metabolic syndrome within a law enforcement population. Utilizing a randomized control trial over the course of 12 months, roughly 100 police officers will be assigned to either a control or intervention group. The intervention group will receive a multifaceted dietary intervention based on the acronym COPSS (color, oils, plant foods, seafood, and sugar). It is anticipated that significant improvements will be observed in waist circumference (men, $P = 0.003$ and women, $P = 0.002$) and fasting triglycerides ($P = 0.004$) amongst the intervention group. Significant improvements in overall diet quality, evident by increases in Mediterranean diet adherence screening tool (MEDAS) scores ($P = 0{,}04$), reported use of pre-made meals ($P = 0.009$), goal setting ($P = 0.001$), and self-monitoring ($P = 0.009$) are also anticipated. The proposed study will contribute valuable data to the limited body of research on the topic and provide framework and recommendations for future research.

Keywords: law enforcement, metabolic syndrome, Mediterranean diet, dietary intervention

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Chapter 1: Introduction on to the Study

Law enforcement officers (LEOs) face a wide range of challenges throughout their careers. Some challenges are more apparent than others. From social unrest, life-or-death situations and daring rescues to underfunded and understaffed departments, long working hours, and trying to juggle work and family time, LEOs face unique challenges not commonly experienced by most people (MacKenzie-Shalders et al., 2020). The nature of law enforcement work is demanding and stressful. Riedy et al. (2020) explain that since policing never ceases, meaning it occurs 24 hours a day, seven days a week, police departments schedule officers in shifts. Many police departments have limited personnel and rely heavily on the use of overtime to ensure each shift has an appropriate amount of personnel to effectively police that departments area of responsibility. In Wisconsin specifically, 2022 marked the lowest number of active-duty police officers since 2008 (Cameron, 2022). At the same time, the population of Wisconsin grew by roughly four percent that same year according to the U.S. Census Bureau (2022). So, with a higher citizen-to police ratio to conduct policing, individual officers are left to make do, which increases stress and fatigue felt by the individual officer and can lead to adverse health problems (Riedy et al., 2020).

Background

The overall health of the individual police officer can be a challenge that the public rarely notices. In fact, LEOs experience higher rates of metabolic syndrome than the general population (Hartley et al., 2011a). Metabolic syndrome is a cluster of five different conditions that have been linked to an increased risk of developing more dangerous health conditions including stroke, heart disease, and diabetes. (AHA, 2021). The conditions that define metabolic syndrome

include elevated blood glucose, centralized obesity, elevated serum triglycerides, low high-density lipoprotein (HDL) cholesterol, and elevated blood pressure.

Although some research has been conducted in hopes of determining the cause of the elevated rates of metabolic syndrome experienced by LEOs, no clear answers have been found; like many complex problems, this one is multi-factorial. Some researchers have investigated the high rates of overweight and obesity within the profession as well as several mental health variables including perceived stress and post-traumatic stress disorder (PTSD) (Violanti, 2006). However, the literature contains little evidence-based research examining the dietary habits of LEOs.

Many aspects of police work can lead to poor dietary habits. Shiftwork, high stress, limited time to eat, limited food storage ability, and limited access to high quality nutritious food are just a few examples of potential barriers. So, although it is well established that health disparities exist within the law enforcement population, very little is known about the etiology (Gu et al., 2013; Hartley et al., 2011a; Violanti, 2006). Since metabolic syndrome is largely affected by lifestyle choices, it is logical to assume that diet could be one of the leading causes of the observed health disparities.

Problem Statement

Current literature on the topic of law enforcement officer health reveals a fair amount of research examining disease rates as well as potential causes within the law enforcement population. Very little research has been conducted on the dietary habits and behaviors of active duty LEOs. Even less research has been done involving specific nutrition interventions. To date, not a single study has been done looking into the effects of a Mediterranean diet-focused

nutritional intervention and its effects on the diagnostic criteria for metabolic syndrome specifically within a law enforcement population.

Purpose of the Study

This study aims to explore the assumption that diet plays a major role in the high rates of metabolic syndrome experienced by LEOs. Using a randomized control design, the primary objective of this study will be to determine if a comprehensive nutrition intervention affects the diagnostic criteria that defines metabolic syndrome. The secondary objective of this study will be to collect more data on the dietary habits of LEOs to add to the limited body of existing research on this topic.

Research Questions and Hypotheses

Does adherence to a modified Mediterranean diet decrease a police officer's risk of developing metabolic syndrome?

Hypotheses:

H_o: Adherence to a modified Mediterranean diet has no effect on the risk of developing metabolic syndrome within the law enforcement community.

H_a: Adherence to a modified Mediterranean diet does affect the risk for the developing metabolic syndrome within the law enforcement community.

Theoretical framework/models

The proposed study uses the Social Learning Theory (SLT), also known as the Social Cognitive Theory (SCT), as a guide for the intervention (LaMorte, 2022). Developed in 1986 by Albert Bandura, SCT theorizes that humans learn through the dynamic and complex relationship

between an individual's environment, past experiences, and behavior. The environment in which LEOs work is of particular importance considering its uniqueness compared to other professions. MacKenzie-Shalders et al. (2020) found that most LEOs have the desire to make more healthful food choices but believed their efforts to make positive changes were hindered by the environmental characteristics of the job.

Two characteristics mentioned in the study were the inability to predict the events of the day ahead and irregular working hours (MacKenzie-Shalders et al., 2020). However, numerous environmental factors exist within the law enforcement profession that impact dietary choices including where officers physically eat, their access to cooking equipment, the amount of time they have to eat, what food, if any, is available within their department building, and which food establishments are available within their jurisdiction. These factors span the three types of environments outlined in SCT which include imposed, selected, and constructed.

Considering these numerous environmental factors, the proposed intervention is designed to be extremely flexible and simple, so that it can be applied to each of the three types of environments. To accomplish this, the focus of the intervention will be on teaching officers how to change rather than what to change, as this may be too specific and not fit within the limitations of their environment, which follows the guidance from recent research on this topic (MacKenzie-Shalders et al., 2020).

Nature of the Study

To explore how a comprehensive nutrition intervention affects metabolic syndrome risk within the law enforcement profession, a randomized control trial will be conducted in partnership with four consenting police departments located in southeastern Wisconsin. With the

goal of recruiting no less than 80 and no more than 100 active duty LEOs from this area, the cohort will be divided randomly into two groups. The intervention group will receive a comprehensive nutrition intervention based on the Mediterranean diet. The intervention will include individual nutrition counseling conducted by registered dietitians (RDs), utilization of educational handouts, and access to digital resources including a recipe book designed by a registered dietitian.

Multiple data points across four categories will be collected to assess the effectiveness of the planned intervention. The categories include nutrition related behaviors, behaviors that support behavior change, nutrient intake, and anthropometric measurements and bio-chemical markers. The latter two categories focus specifically on the diagnostic criteria that define metabolic syndrome.

Data collection will be done in three parts. First, behavioral surveys, a food frequency questionnaire (FFQ), and the Mediterranean Diet Adherence Screener (MEDAS) will be distributed through the cost-free application Google Forms (Bekar & Goktas, 2021). Second, anthropometric measurements will be collected by researchers at each police department. Thirdly, Diagnostic Solutions (Milwaukee, WI), a contracted service provider, will be used to collect blood samples and analyze the bio-chemical markers of interest. Finally, descriptive statistics, including mean, median, and mode, distribution percentages of age, years of service, and gender, and dispersion, specifically standard deviation as well as inferential statistics, including two-sample independent t-tests and least squares regression will be used to interpret the data and determine the effectiveness of the proposed intervention.

Definitions

Civilian: An individual that is not a member of the armed forces or police force.

Jurisdiction: A geographical region where a law enforcement officer has the official power to make legal decisions and judgments.

LEOs: Acronym for Law Enforcement Officer.

Metabolic syndrome: Determined by meeting at least three of the following criteria. Waist circumference (greater than or equal to 102cm in men and 88cm in women), Triglycerides (greater than or equal to 150mg/dL), HDL cholesterol (<40mg/dL in Men and <50mg/dL in women), Blood Pressure (greater than or equal to 130mmHG systolic and 85mmHG diastolic), and Fasting glucose (greater than or equal to 100mg/dL).

Modified Mediterranean Diet: Because of the number of countries that compose the Mediterranean region and diverse cultures, a modified Mediterranean diet for purposes of this study will be defined as a diet that is high in plant foods including fruit (>2 servings daily), vegetables (>4 servings daily), legumes (>1 serving daily), whole grains (>2 servings daily), nuts and seeds (1 or more servings daily), seafood at least twice per week, low to moderate intake of red meat (1 or fewer servings daily) and low-fat dairy products (3 or fewer daily servings), and the incorporation of olive oil (1 or more servings daily). This is based on the MEDAS which was designed based on the PREDIMED study (Papadaki et al., 2018).

Tactical Professional: Any individual working within a military, law enforcement, or firefighting capacity.

First Responder: A collection of occupations including law enforcement, fire fighters, emergency medical technician (EMT), and paramedics.

Assumptions

Several assumptions are made during this study to assess the overall effectiveness of the planned intervention. A primary assumption related to this study, considering that a large portion of this study will be based on officers' self-reported data (including dietary intake), is that the participants will be truthful in their responses. It is assumed that participants will accurately report nutrient intake within their FFQs as well as their MEDAS. Second, participants will self-report accurate levels of physical activity. Third, participants will accurately report behaviors including those related to nutrition and those that support behavior change. Finally, it will be assumed that all subjects will accurately report prescription medicine, and supplement use.

Limitations

There are several limitations to the proposed study. First, because of the geographic location, the diversity of the sample population will likely be different from that of other departments across the nation. The primary ethnicity of the departments in this study will likely match their jurisdictions and be majority Caucasian males. Second, the sample size of this study is relatively small. This is due to limited support from RDs to conduct counseling sessions as well as to limited funding. Third, a large portion of this study will include self-reported data. Although some research suggests that this data can be as accurate as that obtained by researchers (Can and Hendy, 2014), there is still the potential for misreported data, thus making it a limitation. Finally, due to the high demand of the job, there is potential for a high rate of attrition.

Delimitations

There are several delimitations to the proposed study. First, only active duty LEOs may participate. Civilians working within the selected and consenting departments, regardless of their working capacities within that department, will be excluded. Second, the intervention will be limited to individual counseling conducted by RDs, and education in the form of handouts and digital resources. Intervention strategies such as physical fitness and meal plans will not be included in the proposed study. Finally, the duration of this study is 12 months. This is long enough to observe changes in both anthropometrics and biomarkers, but not so long that the study subjects' lose interest and opt-out.

Significance

Law enforcement is a crucial component in all societies. Communities rely on LEOs at their most dire and vulnerable times. With such a major responsibility, it is imperative that these individuals remain in top physical condition. The current rates of metabolic syndrome within the law enforcement community are a major threat to the individual officers, their departments, and the communities that they serve. This study will contribute to the current body of research in the realm of tactical health as it relates to nutrition, and it will serve as a guide for future research regardless of the results.

Summary

Nutrition is a pillar of overall health and performance. When it comes to disease, nutrition can play a role in both prevention and management. The current research suggests that certain health threats experienced by LEOs, including metabolic syndrome, are mostly preventable (Hartley et al., 2011a; Violanti, 2006). Many studies have shown the importance of nutrition as it relates to the management and prevention of the conditions that comprise

metabolic syndrome (Castro-Barquero, 2020). The proposed study will seek to explore the role of nutrition as it relates to metabolic syndrome within a law enforcement population. The next chapter will discuss the available literature on this topic.

Chapter 2: Review of Literature

Introduction

The purpose of this review of literature is to properly define metabolic syndrome, determine the prevalence of metabolic syndrome within a law enforcement population, identify nutrition related behaviors within this community, and explore what other researchers have done to encourage positive dietary changes within a law enforcement population. It will also serve as a guide for future research on this topic. The following chapters will include a review of literature, the methodology of the proposed study, the anticipated results, and finally a discussion that will reintroduce the problem and interpret the findings of the proposed study.

Metabolic syndrome

Metabolic syndrome is a cluster of five different conditions that have been linked to an increased risk of developing more dangerous health conditions including stroke, heart disease, and diabetes. (AHA, 2021). Over the past two decades, the conditions that comprise metabolic syndrome have remained constant and include: elevated blood glucose, centralized obesity, elevated serum triglycerides, low high-density lipoprotein (HDL) cholesterol, and elevated blood pressure. The range of acceptable values for each condition has varied slightly over the years, having come primarily from four different sources. These four major accredited bodies whose criteria is most widely used include the European group for study of insulin resistance (EGIR), American Heart Association's (AHA) National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III), International Diabetes Federation (IDF), and the National Heart, Lung, and Blood Institute (NHLBI) (Fahed et al., 2021). Despite the minor differences in diagnostic criteria, rates of metabolic syndrome remain high across the United States.

Based on a recent analysis of data collected from National Health and Nutrition Examination Survey (NHANES), the prevalence of metabolic syndrome from 2011-2016 was 34.7% (Hirode & Wong, 2020). Although there was not a significant rate of change in the overall prevalence of metabolic syndrome, there was a significant ($P = 0.02$) increase in the prevalence among young adults, ages 20-39, increasing from 16.2% to 21.3%. Additionally, it was found that with increasing age, the prevalence significantly increased. These rates are alarming, especially considering the number of Americans that suffer from diabetes and heart disease. According to the latest numbers from the CDC, 11.3% of Americans have diabetes and about 7.3% of adults 20 years of age and older have coronary artery disease (CAD). Heart disease remains the leading cause of death in the United States.

Health of law enforcement officers

Metabolic syndrome continues to impact the health of Americans in general, but individuals working in law enforcement have been shown to be disproportionately affected by this condition (Hartley et al., 2011a). The Buffalo Cardio-Metabolic Occupational Police Stress Pilot Study (BCOPS) was a seminal study that began in 1999 and is one of the first studies that sought to measure the effects of physical, physiological, and psychological aspects of police work on health outcomes (Violanti, 2006). Several metrics were collected in this study including Body Mass Index (BMI), body composition using Dual Energy X-Ray Absorptiometry (DEXA), blood pressure, heart rate, cortisol levels, Flow Mediated Dilation (FMD), carotid Intima-Media Thickness (IMT), mental health markers of Post-Traumatic Stress Syndrome (PTSD), and the impact of events using the Impact of Event scale (IES). As it relates to metabolic syndrome, several results stood out.

First, the officers had higher cardiovascular disease risk factors including lower FMD and IMT (Violanti, 2006). Surprisingly, the cortisol levels of the officers studied were slightly lower than that found in similar studies of non-police populations, which could be the result of officers having a higher tolerance to stressors resulting from the nature of their work. In any case, having occluded blood vessels and poor vasodilation will cause an individual's blood pressure to rise; elevated blood pressure is a diagnostic metric for metabolic syndrome. The second set of results that stand out are the anthropometric findings including BMI and body fat percentage.

Based on BMI, 83% of the officers in this study were considered overweight, compared to the general population at the time which was roughly 71% (Violanti, 2006). The researchers did point out that this value could be due to higher levels of muscle mass since strength training seems to be far more prominent in LEOs than in the general population. The results of the DEXA scans revealed the male officers averaged 23.4% body fat and the female officers averaged 31.5% body fat. The cutoff points for body fat percentage and obesity are debated, and many sources are outdated. They primarily come from the World Health Organizations (WHO) guidelines which are drawn from a study conducted 1995 (Ho-Pham et al., 2011). These guidelines indicate that body fat percentages greater than 25% in men and 35% for women indicate obesity. Using these guidelines, neither male nor female officers from the BCOPS study, on average, would be considered obese. However, both groups had average body fat percentages that were close to the obese cut off, which would increase the likelihood that their corresponding waist circumferences would meet the diagnostic threshold for metabolic syndrome. Several studies have been done using data extrapolated from the BCOPS study that had similar findings.

One cross-sectional study of 464 officers found that 27% of the study population met the diagnostic criteria for metabolic syndrome compared to only a 18.7% prevalence in the general

population at the time (Hartley et al., 2011a). Furthermore, the same researchers conducted a second study in the same year that looked at perceived officer stress and if there were any differences between male and female officers. Researchers found that female LEOs had higher levels of stress than did male officers, but male officers had higher incidence of metabolic syndrome. Interestingly, in female LEOs, stress was positively associated with metabolic syndrome, but this was not the case for male officers (Hartley et al., 2011b). Out of the five components of metabolic syndrome, reduced HDL cholesterol and abdominal obesity were the two variables that most strongly correlated to stress in the female officers. These findings raise two points. First, that interventions may need to be developed differently for male and female officers. Second, that stress is a variable that should be accounted for when conducting research within this population.

Considering that stress is experienced at higher rates within a law enforcement population, it is logical to assume that it may be a primary factor that contributes to poor health outcomes. Gu et al. (2013) used data from the National Health Interview Survey (NHIS), and examined reported rates of psychological stress and analyzed how they correlated with BMI. The study asked participants for their occupation, so it was possible to look specifically at LEOs and compare their data to that of the general population. In total, 929 LEOs were identified out of the general population which contained 105,862 respondents. Psychological distress was measured using six questions commonly known as Kessler 6 (K6). What this study uncovered, was that higher self-reported levels of psychological stress were significantly associated with obesity in female LEOs but not male officers. Furthermore, physical activity was shown to significantly buffer the effects of psychological stress on BMI in male officers ($P = 0.002$) but not female officers ($P = 0.860$). Like the findings of Hartley et al. (2011), there is strong indication that

future research and interventions should account for gender differences. Another interesting finding similar to that of the BCOPS pilot study, was, "The prevalence of serious psychological distress (K6 ≥ 13) among all LEOs was much lower (0.91%) compared to the average prevalence of United States working adults (1.57%)." (Gu et al., 2013). Psychological factors, primarily stress and the subsequent effects of traumatic experience including PTSD seem to be correlated to negative health outcomes, despite LEOs appearing to be more resilient to stress than the general populous. This could point to lifestyle factors playing a part in the observed health disparities.

Many aspects of an individual's lifestyle can contribute to negative health outcomes. Can and Hendy (2014), examined how certain behaviors relate to obesity. They pointed out that previous research has found differences between male and female LEOs in how the variables relate to outcomes. So, for their study, only male officers were included. This study intentionally used self-reported values for height and weight based on research indicating that self-reported height and weight, "…show acceptable test-retest reliability and concurrent validity with values measured by trained personnel" (Can & Hendy, 2014). This is different than the previous studies listed that mention self-reported anthropometrics as a limitation to their research findings. Out of an original sample of 276 LEOs from 18 different police departments (PDs) in Pennsylvania, a final number of 172 male officers participated in this study. An extensive 10-page questionnaire was distributed to the officers that included an anthropometric component and a lifestyle component which consisted of questions regarding sleep, physical activity, alcohol consumption, diet, and stretching. Of seven total behavioral variables, only two were found to be significantly associated with BMI. These two variables included strength training and cardiovascular training. Essentially, the more an officer engaged in one or both training methods, the lower their BMI. In

terms of strength training, this is somewhat contradictory to what the authors of the BCOPS pilot mentioned, hypothesizing that strength training may in fact lead to higher BMIs as the result of individuals having more lean muscle mass than fat mass. Overall, this study found the prevalence of obesity amongst male LEOs to be similar to that of the general population, 41.9% and 40.5% respectively. The contradictory findings mentioned shed light on the opportunity for future research which should use more detailed means of measuring lean body mass and body fat percentage, such as DEXA scanning or skin fold measurements.

Since obesity seems to be a common theme in research involving this population, determining which measures of body mass are most predictive of health is important so that proper targeted interventions can be implemented. In Da Silva et al.'s systematic review on the topic (2014), 23 articles were identified and nine were left after they went through the exclusion process. As suspected, this study found that body fat percentage and BMI were the most common anthropometric indicators used for determining if an officer was overweight or obese. Further, the researchers highlight that BMI is not the most accurate method for determining unhealthy weight, like the previous articles mentioned. The authors concluded that accurately measuring body fat percentage is a more reliable predictor of health outcomes. Although BMI in LEOs may be skewed for reasons such as disproportionate muscle mass compared to the general population, elevated body fat percentages correlate positively to the development of cardiovascular and metabolic diseases. This study notes that factors such as career progression and shift work are two major determinants of body composition and that more research, specifically interventional studies, are needed in order to develop effective programs to improve officer wellbeing.

Geographical differences

Interestingly, it seems that health disparities experienced by LEOs are not contained to the United States. Disproportionate rates of metabolic syndrome could be a result of the job itself, rather than geography. In a study by Janczura et al. (2015), 235 police officers from a southern region in Poland were studied to determine how stress impacted their health. Officers were split into two groups based on the presence or absence of metabolic syndrome. Like previous studies, the researchers analyzed stress and biochemical metrics in the sample group. The results showed that the subjects who had metabolic syndrome reported higher levels of perceived stress, but these higher levels of perceived stress were not associated with the prevalence of coronary plaque. Additionally, there was an overall higher incidence of cardiovascular (CVD) and metabolic syndrome risk factors in the study participants compared to the general population. When considering stress specifically, the researchers found that higher levels of perceived stress were strongly correlated to elevated triglycerides ($r = 0.19$, $P = 0.002$), increased waist circumference ($r = 0.17$, $p = 0.03$), and higher blood pressure ($r = 0.19$, $P = 0.01$; $r = 0.17$, $P = 0.03$; for systolic and diastolic, respectively). South of Poland, in Italy, Garbarino and Magnavita (2015) also investigated the effects of stress related to the law enforcement profession and uncovered similar findings.

The researchers used a group consisting of 234 male police officers of a specialized police unit, VI Reparto Mobile, in Genoa Italy over a five-year period (Garbarino & Magnavita, 2015). During this period, data was collected on self-reported perceived stress levels, biochemical data, and anthropometric data. After the trial period, the researchers found a 20-30% increase in study subjects that had markers of metabolic syndrome exceeding the normal level. What made this study unique was that the police unit studied was considered an elite unit, where

the officers were not only in better physical shape to start, but each officer was directly involved in policing daily. This is different than most other studies that include officers of various job titles including administrative roles. This unique feature and the long duration strengthen the findings of this study and suggest that despite fitness level, stress, as it relates to police work, can play a role in the development of metabolic syndrome. It should be noted that Poland and Italy are still considered part of the Western World, as is the United States, but similar trends exist outside of what is considered western civilization.

In 2017, researchers in Saudi Arabia set out to analyze rates of overweight and obesity within law enforcement. Similar to the BCOPS pilot study, questionnaires were used to obtain anthropometric and demographic data, and laboratory data was collected on blood lipids, fasting glucose, and blood pressure. In total, 160 male police officers participated in this study. The researchers found that 66.9% of the officers studied were considered overweight or obese (Alghamdi et al., 2017). Additionally, the study found a positive correlation between increased body mass and higher incidence of disease risk markers such as high total cholesterol and triglycerides, and low HDL cholesterol which was like that of the general population. Fasting blood glucose levels were higher in the LEOs than the general population. One important hypothesis generated by the researchers was, “Poor health behaviors, which usually include a high intake of red meat, fried foods, and prepared food from restaurants, low intake of fiber-rich foods, and physical inactivity, may be the cause of the high blood lipid levels observed in police officers in the present study” (Alghamdi et al. 2017). This is one of the first studies that analyzed and recorded the dietary habits of police officers. Although several variables such as overweight and obesity and some blood markers were similar to that of the general population, the issue remains that LEOs have unique job requirements that would be better performed by individuals

that are considered more physically fit and metabolically healthy than the general population. This study points to a particular gap in the research surrounding the dietary habits of LEOs. Moving from the Middle East to another region in Asia, George et al. (2017) investigated the health of LEOs in India.

Looking to determine the risk of experiencing a fatal or non-fatal cardiac event within 10 years among LEOs, George et al. (2017) conducted a study that involved sixty LEOs from Devanahalli Taluk, a rural district in India. Demographic information, dietary habits, anthropometric measurements, blood pressure, and blood glucose levels were collected from study participants and the Framingham risk score was used to determine this risk. Dietary elements such as fruit and vegetable consumption were also analyzed in this study. Interestingly, the researchers found that the officers had lower rates of hypertension when compared to the general local population but larger waist circumferences. Of the sixty subjects, 63.3% were found to have waist circumferences that exceeded the normal range. The most significant finding was that 40% of officers had high scores based on the Framingham risk score, despite only 15% of officers being smokers. Regarding the diets of the officers, 40% were found to eat less than three servings of vegetables per day, and 71.7% were found to eat less than 2 servings of fruit per day. This study, like the one conducted by Alghamdi et al. (2017), further the point that lifestyle factors may play a significant role in health disparities experienced amongst LEOs across the globe.

Lifestyle factors

Based on the available literature, it is clear that LEOs exhibit risk factors for metabolic syndrome that are higher than the general population, despite geographical location. Several variables have been identified thus far that are thought to be responsible. Stress along with

certain lifestyle factors such as diet and exercise habits have been looked into as the primary drivers of these negative health outcomes, but results are inconsistent throughout the literature. One lifestyle factor that came up several times in the studies mentioned above was physical fitness (Alghamdi et al. 2017; Can and Hendy, 2014; Garbarino and Magnavita, 2015; Janczura et al., 2015). Schilling et al. (2020) recently investigated what effects physical activity had on stress and metabolic syndrome amongst law enforcement personnel. Of an initial 1000 LEOs from two different departments in Basel, Switzerland, 97 officers consisting of 32 females and 65 males completed the entirety of a 12-month study. The study correlated officers' cardiorespiratory fitness negatively to metabolic syndrome but could not find a definitive link between stress and metabolic syndrome which is consistent with the literature reviewed up to this point.

Although logical to assume that stress would correlate to higher rates of disease based on the negative physiological effects it can have on the body, the association is not very clear. This may be because LEOs have a higher tolerance for stress, but in any case, it cannot be said with a high level of certainty that stress is a main causal agent. Lifestyle factors remain a possible explanation for the disproportionate disease rates experienced amongst LEOs. However, as previously noted, there is a gap in the available literature regarding the specific dietary habits of individuals working in law enforcement. Specifically, dietary information such as daily sodium, added sugar, saturated fat, and fiber intake could not be identified using the search strategy used for this review. Rather, basic dietary information such as fast food and junk food consumption were collected. These generic categories do not provide enough detail on specific nutrient intake.

To date, there are only a handful of research studies that evaluate the effectiveness of diet or lifestyle interventions in the law enforcement community specifically. In contrast, there is a

fair amount of evidence that examined diet and lifestyle interventions amongst fire fighters. Since LEOs almost always work in shifts and have many similarities in job duties compared to firefighters, research was gathered on both of these populations to help develop effective intervention strategies for LEOs.

Lifestyle interventions and barriers to healthy dietary habits amongst first responders

Although the profession of firefighting differs in many ways from that of law enforcement, there are many similarities. Both occupations serve the public, and the physical and mental demands of the job are very similar. For example, both law enforcement and fire fighters work in load bearing gear and are expected to perform their duties effectively while bearing a considerable amount of weight (Elkins, 2021). Another similarity between law enforcement and firefighting is that the typical work schedules can be inconsistent, often broken into shifts, affecting numerous patterns in an individual's life, and making it extremely difficult to set a consistent routine.

Eating healthy food can be quite challenging for firefighters and law enforcement officers because they rarely work typical day-time schedules Monday through Friday, and relatively few establishments are open during the night shifts (MacKenzie-Shalders et al., 2020). Many LEOs frequent fast-food establishments regularly during night shifts, where food is known to be heavily salted, full of simple carbohydrates, saturated fat, and calorically dense. Overconsumption of these nutrients have been linked to increased risk for metabolic syndrome (Hosseini et al., 2021). Outside of the tactical world, professions such as nursing also work in shifts, and can experience similar difficulty in securing healthy food at various times throughout their shifts (Souza et al., 2018). However, little research has been done to examine dietary interventions specifically in shift workers as a broad group. Phoi and Keogh (2019) conducted a

review of literature on this topic and found only a minimal amount of quality research that could be used to guide future interventions for shift workers in general. The main conclusion was that dietary interventions seem to consistently lower study participants LDL-cholesterol across several studies. The researchers noted that more quality research on the topic was needed.

Since lifestyle interventions can range dramatically, a large volume of quality data in such a specific cohort could not be obtained. In a systematic review by Stanlewicz et al. (2019) that analyzed the effectiveness of certain interventions in nurses, it was concluded that there needs to be, "…increased use of standardized tools and checklists to inform intervention design and reporting." This finding was also consistent with the literature review completed by Phoi and Keogh (2019). With so little research existing on which lifestyle intervention is most effective in improving the health of shift workers in general, studies of specific populations would be more beneficial in guiding the design of future studies. Additionally, lifestyle interventions and dietary recommendations seem to vary from one accredited body to the next.

With so many different diets and diet recommendations in use today from various organizations such as the Academy of Nutrition and Dietetics (AND), American Diabetes Association (ADA), and the American Heart Association (AHA), it is challenging to know which recommendations to use when there is not a consensus. In an older study from 2011, Carey et al. investigated the effects of a low-glycemic nutrition intervention with the aim of assessing its effects on metabolic syndrome in firefighters. Using subjects from the SAFFEE parent study, a small cohort of firefighters, 75 in total, participated in a 12-week low-glycemic diet intervention. The dietary protocol in this study was based on two very prominent diets including the Dietary Approaches to Stop Hypertension (DASH), and the Mediterranean diet. In addition, this study involved subjects participating in a physical exercise program. The study

resulted in a significant improvement in metabolic syndrome risk factors, with the study group decreasing the rate of metabolic syndrome prevalence from 70% down to 30% ($P = 0.02$). Mediterranean diet patterns have been studied extensively and is commonly used as a template for various nutrition interventions (Guasch-Ferre & Willett, 2021).

One of the most comprehensive recent studies looking into the Mediterranean diet for tactical professionals, Feeding America's Bravest, used a cluster-randomized sample with cross-over design and a specific Mediterranean Diet Nutrition Intervention (MDNI) with active-duty firefighters in Indiana (Sotos-Prieto et al., 2017). Various intervention tools were used including educational materials, shopping lists, recipe handouts, custom website, group education sessions, and digital content such as cooking demonstrations. The authors explain that these interventions were based on the Social Cognitive theory. At the conclusion of the Feeding America's Bravest study, the authors elaborate on their findings in the article titled "The Effects of a Mediterranean Diet Intervention on Targeted Plasma Metabolic Biomarkers among US Firefighters: A Pilot Cluster-Randomized Trial". Overall, Sotos-Prieto et al. (2020) explain that the dietary intervention, "…induced a decrease in total cholesterol, remnant-C, VLDL-C and LDL-C and an increase in HDL-C and HDL2-C." Since these biomarkers are contained within the diagnostic criteria that define metabolic syndrome, this dietary intervention is notable. Further, a group of independent researchers have also analyzed the data from this study and concluded that, based on the overall adherence rates, this dietary pattern is a valid recommendation within the firefighter population (Hershey et al., 2022).

There is, in general, a lack of research that examines multiple first responder professions and lifestyle interventions as a means of improving health markers, specifically for heart disease and metabolic syndrome. One study within this limited body of research conducted by Gill et al.

(2019), used a randomized control trial over the course of 12 months, that employed a lifestyle intervention and used a study cohort of both police officers and fire fighters. Part of the intervention included telephone coaching with registered dietitians (RDs), which stands out amongst the other research mentioned up to this point. This was the first study identified to have a nutrition intervention that utilized dietitians. The study participants were given personalized plans based on their own unique needs which were determined through detailed assessments. Similar to the studies mentioned above, the individualized dietary plans included sample menus that were based on both the DASH diet and Mediterranean diet pattern. Participants also kept a detailed food journal which aided their respective RD coaches in developing and implementing their individualized nutrition plans. Participants were also given individualized fitness plans which may have impacted the results. The intensive intervention done in the study resulted in significantly lower levels of fasting triglyceride to HDL ratios. Additionally, there were significant decreases in body fat percentages and waist circumferences observed in the treatment group ($P = 0.05$ and $P = 0.002$ respectively). Finally, researchers found a significant drop in fasting insulin levels between groups at the end of the 12 months ($P = 0.03$). As to be expected, better adherence to the intervention resulted in greater improvements in these markers. In regard to nutrition's impact on metabolic syndrome, this study stands out, as improvements were observed in the majority of diagnostic criteria. Of note was the detailed intervention.

The personalized nutrition interventions mentioned above can help to guide the intervention in the proposed study. The personalization in Gill et al.'s study included individualized nutrient intakes based on participants baseline assessments, including carbohydrates, saturated fat, and cholesterol (Gill et al., 2019). Additionally, the intake of high fiber foods such as whole grains, fruit, vegetables, and legumes was promoted. Through digital

tools such as diet trackers and coaching from RDs, participants were able to maintain a high level of accountability. The individual menus that participants were given were based on the Mediterranean diet pattern and the dietary approaches to stop hypertension (DASH). Incorporation of the Mediterranean diet has been consistent in several studies throughout this review. High in fiber and healthy fats as well as being low in ultra-processed foods, this dietary pattern seems to be one tactical professionals have success with when making changes to their baseline diets. For any nutrition-based intervention to be successful, understanding which barriers exist within the study population is crucial.

Two articles reviewed for this study identified barriers to leading a healthy lifestyle through direct feedback from first responders (MacKenzie-Shalders et al., 2020 & Muegge et al. 2018). Respectively, one study used surveys with LEOs and focused specifically on barriers to having a healthy diet and the other used a focus group of firefighters. Although firefighters and LEOs both suffer disproportionately from increased rates of cardiovascular disease and metabolic syndrome, the barriers to leading more healthful lifestyles are quite different. As Muegge et al. (2018) explain, firefighters struggle most with the culture of the firehouse that includes, "…structured mealtimes, unhealthy comfort foods (high, -calorie, -fat, and -carbohydrate), large portion sizes, second helpings and leftovers, and desserts and snacks that lead to a poor diet." This indicates that interventions for firefighters, specifically, should focus on a shift in culture and shared meals amongst the firehouse. Finances were also a barrier, as each firefighter is required to contribute to the cost of shared meals.

In contrast, barriers to change for LEOs were related to certain aspects of police work, including irregular working hours and busy lifestyles (MacKenzie-Shalders et al., 2020). Both factors were previously discussed in this review, and shift work is a common theme within the

available literature. Another important finding, which was also previously discussed, was the importance of individualized lifestyle interventions. The authors explain, “However, to effectively target nutrition interventions for law enforcement personnel, it is important that they are tailored specifically for the requirements of this high-risk population.” This finding is consistent with the other available literature on this topic.

Research Methodology:

Based on the available research on the topic of decreasing the rates of metabolic syndrome within the law enforcement community, an effective study design is a randomized control trial utilizing individualized lifestyle interventions that focus on nutrition and physical activity. Gill et al. (2019) developed individualized nutrition and physical activity interventions based on detailed assessments that lasted for a duration of 12 months. This research design was used to guide the structure of the current study. One major difference between the proposed study and the one conducted by Gill et al. (2019), will be that this study will use exclusively law enforcement personnel to narrow the focus, as this demographic is the population of interest.

Summary:

Law enforcement is an inherently stressful profession that comes with greater risks to health than other careers. It seems however, that the greatest risk to LEOs is not a violent suspect or high-speed chases, rather, it is mostly preventable conditions such as metabolic syndrome (Fahed et al. 2022 & Hartley et al., 2011). This review shed light on the prevalence of this health disparity within the law enforcement community and showed that it was not unique to one geographical location but occurred globally across different law enforcement systems. The studies in this review illustrated the problem, but there was not a strong consensus as to what the primary etiology is causing the disproportionate rates of metabolic syndrome. Almost every

study mentioned obesity rates and elevated BMI's amongst LEOs but differed on whether this impacted disease risk, or if the values are skewed due to many LEOs having more muscle mass and participate in strength training more frequently than the average person. The impact of stress was another factor tested in several studies, but once again, a consensus within the literature could not be reached. Law enforcement is a very stressful profession, however one theory for stress not being the main cause of these diseases is that LEOs adapt and have higher tolerances to stress than the normal person, buffering the negative effects that stress has on the body (Gu et al., 2013). Essentially, there are numerous possible explanations to the problem, but no clear answers.

The second half of this review focused on lifestyle interventions within first responder careers, primarily fire fighters, and shift workers such as nurses. Although a consensus could not be reached as to what the etiology is for the higher rates of metabolic syndrome, the literature on lifestyle interventions and their subsequent effects on disease markers is clear. It seems that if adhered to closely, lifestyle interventions that focus on nutrition and physical activity can be quite successful in improving the health of individuals that work as first responders or shift workers. This makes sense, especially in law enforcement, where long and inconsistent working hours can make it really challenging to eat healthy and exercise regularly. Overall, for an intervention to be most successful, it should be individualized (based on a detailed assessment), focus on both diet and exercise, be adhered to closely, and include coaching from dietitians.

No law enforcement officer wants to be unhealthy, and with careful planning, each law enforcement department has the capability of introducing some form of intervention to its officers, but it will take the work and dedication of health care professionals such as RDs to develop interventions that can be used by departments that want the help. Given that there is

currently no evidence on the effects a Mediterranean diet intervention has on metabolic syndrome within a law enforcement population specifically, the proposed study aims to explore this gap in the literature. The following section will discuss the planned methodology for the proposed study and outline how this gap in research will be explored.

Chapter 3 Methodology

Little is known about the etiology behind the disproportionate rates of metabolic syndrome experienced by law enforcement personnel. The purpose of this study is to examine nutrition's role in this condition plaguing law enforcement and attempt to measure its significance. This chapter will detail how the proposed study will be conducted, what will be measured, and how the collected data will be analyzed and interpreted. Table 1 summarizes the research question and primary variables (independent, dependent, and confounding) that the proposed study intends to measure.

Research Design

Research Question:

Does adherence to a modified Mediterranean diet decrease a police officer's risk of developing metabolic syndrome?

Hypotheses:

H_o: Adherence to a modified Mediterranean diet has no effect on the risk of developing metabolic syndrome within the law enforcement community.

H_a: Adherence to a modified Mediterranean diet does affect the risk for developing metabolic syndrome within the law enforcement community.

Table 1:

Research Questions and Variables

Research Question	Independent	Dependent	Confounding
Does adherence to a modified Mediterranean diet decrease a police officer's risk of developing metabolic syndrome	1. Mediterranean Diet Adherence Screener (MEDAS) score	1. Blood pressure 2. Waist circumference 3. Fasting blood glucose 4. HDL cholesterol level 5. Serum triglycerides 6. Body weight	1. Physical activity 2. Smoking 3. Medications 4. Supplement use

Study Design

The proposed study will be a randomized-control trial that will last 12 months. This timeline, which was used in a similar study by Gill et al. (2019), allows for changes to be observed in the diagnostic criteria for metabolic syndrome and gives the study participants enough time to apply the information provided in the intervention into their daily lives. Furthermore, the timeline is not excessive in duration, which should reduce the number of dropouts. Study participants will consist of LEOs from consenting police departments within southeastern Wisconsin, and the total number of officers will be based on convenience sampling. Officers participating in this study will be randomized through the designation of a computer randomized number and separated into two groups including a control and intervention group. Initial assessments will be conducted to obtain baseline characteristics on dietary intakes and behaviors in both groups prior the implementation of the proposed intervention.

Dietary Intervention

The intervention for this study will be multi-faceted and consist of one-on-one nutrition counseling, digital content including a recipe book developed a registered dietitian that has granted authorization of use in the proposed study, and educational handouts. There will be two handouts given to study participants in the intervention group including the Harvard healthy eating plate and another developed by the researchers. This program will focus on the basic principles of the Mediterranean diet including an emphasis on fruit, vegetable, nut, and legume intake, unsaturated fats versus saturated fats, seafood intake, and alcohol consumption. The program will use the name COPSS, an acronym, and will be used to guide the recipe selections and education material.

COPSS stands for color, oils, plant foods, seafood, and sugar. More specifically, the goal will be to achieve a minimum of three different colors (red, orange, yellow, blue, or purple) at each meal, use healthy oils such as olive oil for cooking and dressing instead of fats that are mostly saturated, incorporate plant foods at every meal, aim to consume at least two servings of seafood weekly, and limit added sugars to 20 grams per day. Ideally, by applying this acronym, participants will adhere more closely to a Mediterranean dietary pattern. This will be determined using the Mediterranean Diet Adherence Screener (MEDAS) which will be administered at the beginning of the study, the six-month mark, and upon completion of the study after 12 months.

The recipe book will include 15 recipes, including entrées and snacks. They will be based on a generalized Mediterranean diet that emphasizes colorful high fiber foods, whole grains, and healthy fats. The education handouts will focus on the COPSS acronym and include relative information based on each component of the acronym. The use of an acronym was strategized based on the heavy use of acronyms within the law enforcement profession, where they are used to keep radio communications succinct and private so civilian bystanders are unable to ease drop

on important radio traffic (Dees, 2021). Individual counseling sessions will be conducted quarterly and incorporate the use of motivational interviewing.

Sample Population

Law enforcement is a unique population in many ways. In general, the individuals that make up police departments range in gender, age, ethnicity, and socioeconomic status among other things. The officers that make up the departments in southeastern Wisconsin follow this trend. Within each department there are numerous roles and responsibilities that come along with the various ranks. Some officers work more administrative roles and hold a fairly consistent schedule that mirror the standard work forces working hours and business days. Other officers may work third shift, for 12 hours per shift, three days in a row, then have several days off before returning to work. Males make up the majority of the active-duty police officer population. According to the most recent Uniformed Crime Reporting website (2017), hosted by the Federal Bureau of Investigation (FBI), female officers only make up 12.5 percent of the law enforcement officer population nationwide.

Recruitment

Subjects for this study will be recruited through their respective departments. Several departments have been selected based on their size and geographic location and asked to participate. These departments include Waukesha, Delafield, Pewaukee, and Hartford. The chief of police at each department has agreed to have their department participate, however, ultimately it will come down to the individual officers to determine whether they will participate in the proposed study. Once enough subjects agree and provide their informed consent, recruitment will cease. The goal is to secure no less than 80 and no more than 100 willing participants. The only

inclusion and exclusion criteria will be the individual subject's status as a full-time active-duty police officer. No civilian employees or contractors will be considered for this study.

Sample Size:

Convenience sampling will be used in this study to obtain the overall sample size. Several police departments will be recruited and asked to participate, with the goal of recruiting to be no less than 80 police officers and no more than 100, or 40-50 study participants in each the control group and intervention group. The convenience sample size was determined based on the number of registered dietitians (RDs) that will be recruited to assist in the study which is expected to total 10. Each RD will have a case load of 4-5 study subjects, which will total 10-12.5 hours each month, every third month, based on 45 minutes of chart review, 60 minutes of counseling for the initial session, 30 minutes of counseling for the follow-on sessions, and 45 minutes of charting following the session. This is based on a recent study that found a minimum of four sessions per year with an RD and sessions lengths of 60 minutes and 30 minutes for initial and follow-up sessions respectively, was necessary to affect change (Siopis et al., (2020).

Data Collection

Four categories of data will be collected during this study and are depicted in Table 2. Two of these categories are mostly qualitative but will be quantified for this study so that they can be properly analyzed. Category one will measure nutrition related behaviors including use of pre-prepared food for meals and snacks, who prepares the individuals food, and whether or not the individual follows a diet. Category two will measure behaviors that contribute to behavior change including the use of goal setting, rewards, social support from friends, family, or fellow officers, and self-monitoring tools. Category three will measure specific nutrient intakes using

quarterly food frequency questionnaires (FFQs). The FFQs will be used to assess several specific nutrient intakes including fiber, added sugar, saturated and unsaturated fats, sodium, and potassium. Additionally, the Mediterranean Diet Adherence Screener (MEDAS) will be used quarterly to measure adherence rates throughout the study. Finally, category four will measure biomarkers and anthropometric data. Specifically, HDL cholesterol, triglycerides, fasting blood glucose, blood pressure, height, weight, body fat percentage, and waist circumference. These will be collected at the onset of the study, six-month mark, and the conclusion if the study at the 12-month mark. Data in categories in the first three categories will be obtained through responses on the forms disseminated on Google forms. Anthropometric measurements will be collected at each department over the course of three days to ensure each officer can participate while on duty and not interfere with their time off. All blood work will be collected using the contracted services of Quest Diagnostics, who have multiple locations in the southeaster Wisconsin region.

Table 2:

Data Categories

Category 1: Nutrition related behavior	**Category 2: Behavior that contributes to behavior change**	**Category 3: Nutrient intakes**	**Category 4: Anthropometric measurements and bio-chemical markers**
1. Use of pre-prepared food for meals and snacks 2. Who prepares food for study participant 3. Follows diet	1. Use of goal setting 2. Use of rewards 3. Social support from friends, family, or fellow officers 4. Use of self-monitoring tools.	1. Daily fruit servings 2. Daily vegetable servings 3. Daily whole grains servings 4. Daily high sugar food servings 5. Weekly fish servings 6. Daily high saturated fat food servings 7. Daily unsaturated fat food servings 8. Alcohol servings 9. Mediterranean Diet Adherence Screener (MEDAS) score	1. Blood pressure 2. Waist circumference 3. Fasting blood glucose 4. HDL cholesterol level 5. Serum triglycerides 6. Body weight 7. Body fat %

Instrumentation

Several instruments will be required for this study. For the first three categories, the digital application Google Forms will be used to administer surveys that will assess behavior, as well as the MEDAS and FFQs. This application is cost free and convenient, making it less of a burden to the study participants, which should increase compliance. For security purposes, participants will identify themselves on these forms only by their study participant number assigned to them. The MEDAS is a validated tool that has been used in numerous studies since it was devised in 2012 to measure adherence to a Mediterranean eating pattern (Bekar & Goktas,

2021). Similarly, FFQs are one of the most frequently used tools to measure an individual's specific nutrient intakes (Kusuma et al., 2022). For collection of anthropometric data, calibrated scales will be used to assess officers' weights. Flexible measuring tapes, PWT80G's from the Perfect Measuring Tape Company, will be used to assess officers' heights and waist circumferences. Skin fold measurements will also be taken to assess officers body fat percentages, using calibrated Lange calipers. For blood pressure analysis, the Premium Multiuser Blood Pressure Monitor by A&D Medical will be used. This device is on the US Blood Pressure Validated Device Listing (2023). Finally, blood samples will be taken and analyzed quarterly at Quest Diagnostics, which will be a contracted service. Study participants will have two weeks to schedule and conduct their appointments at any of the local quest diagnostic facilities.

Data Analysis Plan

Standard descriptive statistics will be calculated to interpret the collected data. These will include measures of central tendency including mean, median, and mode, distribution percentages of age, years of service, and gender, and dispersion, specifically standard deviation. Inferential statistics will also be used to assess the data sets collected throughout the course of the study. To determine differences between the intervention and control groups, two-sample independent t-tests will be used at the beginning, six-month mark, and 12-month mark. To determine the relationship between MEDAS scores and the diagnostic criteria that define metabolic syndrome, least squares regression will be used. Significance will be determined based on the calculated p-values compared to the established Alpha-value of 0.05. Correlation coefficients will also be calculated. Like the study conducted by Gill et al. (2019), the JMP statistical package from JMP Statistical Discovery, a subsidiary of SAS (Cary, NC) will be used, however this study will utilize the version for windows opposed to Mac.

Threats to Validity

As with any study, there are potential threats to validity. Internal threats to validity include instrumentation, maturation, experimental mortality (participant drop-out), and social interaction. Each instrument used in this study will be calibrated appropriately following the manufacturer's guidance. Because the study is planned to occur over the course of 12 months, there is the possibility of study participants experiencing physical changes such as illness or injury, that will impact the results. Additionally, if a study subject is placed on prescription medication, such as a statin, this may impact their results. Medication use as it relates to metabolic syndrome will be assessed and recorded throughout the study for each participant. Upon completion of the study, an analysis of subjects' medications added or removed will be annotated in the results section. Due to the high demands of the profession, experimental mortality is also a very real threat considering the long duration of the proposed study. Finally, considering the tight-knit culture of law enforcement departments, there is a chance that subjects in opposing groups will share information with one another, potentially leading to the control group making dietary changes that lead to improved test scores, food choices, and biomarkers.

External threats to the proposed study include changes to the department standards during the course of the study, changes to the departments health care coverage, and any changes to the department's internal policy regarding their officers in respect to the study. If a department decides to enforce physical fitness standards, such as an annual physical fitness test with minimum criteria that must be met, this could impact the anthropometric and bio-chemical markers of the study subjects. Other examples of standards may include no vending machines, or not accepting food donations that don't meet certain nutrition criteria. Another potential risk is a department changing its health care coverage. Although unlikely, if this were to happen this

could impact numerous factors regarding the study participants. Some examples include new doctors prescribing new medications, access to RDs, and potentially access to non-medical services such as gym membership. Finally, if there is a change of command that takes place within a department during the course of the study, the new command may decide to pull their department out of the study entirely.

Ethical Procedures

Maintaining the highest level of ethics will be a top priority for the proposed study. Numerous steps are in place to ensure that this standard is met. All researchers will be required to complete the ethics training course from the Collaborative Institutional Training Initiative (CITI) before being allowed to participate. CITIs focus, as stated in their mission statement, "…include courses in ethics, research, meeting regulatory requirements, responsible conduct of research, research administration and other topics pertinent to the interests of member organizations, individual learners, and society." (CITI, n.d.). Additionally, all RDs performing counseling as part of the nutrition interventions will have their credentials vetted to ensure they are legitimate and up to date. Current state licensure will be required of all RDs for this study. Participants will only be included after providing their informed consent regarding the aims of the study. They will be de-identified and several precautions will be used to ensure their personal information remains secure. Throughout the study, only participants corresponding computer generated numbers will be used on all digital and print material. The only document containing subjects' personal information will be stored safely on the primary researcher's computer which is password protected. A formal application was submitted to the Institutional Review Board (IRB) for the Protection of Human Subjects at Mount Mary University along with a copy of the

informed consent forms for study subjects. Finally, all state and federal laws regarding live subject research will be stringently adhered to.

Summary

Determining the root cause of any health problem is always a difficult pursuit. Considering the lack of research regarding the nutritional tendencies of LEOs, this study has the potential to unveil a better understanding into the reasons for the observed health disparities, as well as contribute to the limited existing body of literature on the subject. The proposed 12-month randomized control trial will analyze the dietary behaviors of LEOs in southeastern Wisconsin and determine the effectiveness of a comprehensive nutrition intervention that focuses on a modified Mediterranean diet. A uniform theme following the acronym COPSS (Color, Oils, Plant foods, Seafood, and Sugars), which focuses on the key aspects of the Mediterranean diet will be the common thread that ties the different interventional components together. Various nutritional behaviors, intakes, anthropometric markers, and bio-chemical markers will be collected at the beginning, six-month mark, and upon completion of the study. Using descriptive and inferential statistical tools such as two-sample independent t-tests, researchers will analyze the collected data and determine the effectiveness of the proposed intervention. As with any study, threats to validity do exist, however with these considered, the proposed study was designed to mitigate as many potential threats as possible. Ethical standards and procedures are in place to ensure the safety and security of all human subjects, as well as the research team. Looking ahead, chapter four will discuss the anticipated results of the proposed study, detailing what the research team expects to find based on similar literature on this topic.

Chapter 4: Anticipated Results

Characterization of Study Participants

A total of 163 law enforcement officers (LEOs) will be recruited from four southeastern Wisconsin police departments including Waukesha (113 officers), Delafield (12 officers), Pewaukee (15 officers), and Hartford (23 officers). The officers will be randomly assigned to either the control group (81 officers) or the intervention group (82 officers). Based on a similar study by Gill et al. (2019), it is anticipated that there will be an attrition rate of roughly 44%, leaving a total of 91 participants who would complete the full 12-month study. This would include a dropout rate of 32% in the intervention group, and 12% in the control group. The researchers attributed this to the increased demands placed on the intervention group.

Figure 1

Flowchart of study participants

Baseline Characteristics of Sample Population

Table 3 depicts the anticipated baseline characteristics of the sample population. It is anticipated that at baseline, there will be no significant differences between the control and intervention groups. Based on the current literature detailed thus far in the proposed study, there

are several anticipated findings in the sample populations. First, it is anticipated that the baseline weights and BMI's will indicate an average that falls within the overweight or obese category. Second, fasting triglycerides will be above the recommended 150 mg/dL and blood pressure ranges will average above 120/80 mm Hg. Third, it is anticipated that the average LEO follows a less than ideal diet based on findings from MacKenzie-Shalders et al. (2020) study, which will be indicated by a MEDAS score less than 6. Regarding dietary behaviors, it is anticipated that less than 50% of the sample population will report the use of pre-made meals such as packing a lunch. Below, illustrated in Table 3, are the anticipated results of the sample population at baseline.

Table 3

Baseline characteristics of sample population

Characteristic	**Control (n = 81)**	**Intervention (n = 82)**	***p*-value**
Gender			
Male	71	72	0.81
Female	10	10	0.77
Age (y)	39.3(7.4)	41.6(6.8)	0.60
Metabolic Syndrome Diagnostic Criteria			
Waist Circumference (cm)			
Male	101.2 (12.3)	103.1 (12.9)	0.64
Female	84.7 (11.8)	86.2 (12.6)	0.73
Fasting blood glucose (mg/dL)	102.8 (22.3)	105.3 (23.1)	0.85
Triglycerides (mg/dL)	161.6 (101.2)	163.7 (105.4)	0.43
Blood pressure (mmHg)			
Systolic	134.6 (15.2)	135.3 (18.7)	0.78
Diastolic	85.4 (11.5)	87.3 (12.1)	0.53
HDL Cholesterol (mg/dL)			

Characteristic	Control (n = 81)	Intervention (n = 82)	*p*-value
Male	41.2 (11.9)	39.8 (14.3)	0.09
Female	52.1 (8.7)	50.8 (9.2)	0.12
Other Health Markers			
BMI			
Male	31.2 (5.2)	32.4 (6.1)	0.69
Female	28.3 (5.4)	27.9 (4.7)	0.75
Body fat %			
Male	26.6 (6.5)	26.8 (5.9)	0.54
Female	29.7 (6.1)	30.1 (6.3)	0.56

BMI, body mass index; HDL, high-density lipoprotein; MEDAS, Mediterranean Diet Adherence Screener

Table 4

Baseline nutrition related characteristics of sample population

Characteristic	Control (n = 81)	Intervention (n = 82)	*p*-value
Nutrition related Behaviors			
Who prepares majority Of meals? (% of total population n = 92)			
Self	75%	77%	0.75
Significant other	23%	22%	0.81
Other	2%	1%	0.77
Follows a "diet" (% Yes)	81%	78%	0.54
Use of pre-prepared meals (% Yes)	45%	48%	0.78
Behaviors that support Behavior change			

Characteristic	Control (n = 81)	Intervention (n = 82)	*p*-value
Use of goal setting (% Yes)	66%	63%	0.43
Use of rewards (% Yes)	15%	19%	0.38
Use of social support (% Yes)	56%	51%	0.46
Use of self-monitoring Tools (% Yes)	12%	15%	0.51
Diet characteristics			
MEDAS Score (1-12)	5.6 (2.3)	5.4 (2.2)	0.80
Daily fruit servings	1.4 (1.2)	1.3 (1.1)	0.83
Daily vegetable Servings	1.2 (1.8)	1.4 (1.5)	0.67
Daily whole grain Servings	0.8 (1.3)	1.1 (1.2)	0.72
Daily high sugar Food servings	3.2 (2.1)	2.9 (1.8)	0.55
Weekly fish servings	0.8 (1.4)	0.9 (1.2)	0.58
Daily low-fat dairy Servings	3.1 (1.8)	3.2 (1.6)	0.82
Daily high sat. Fat meat servings	3.3 (1.6)	3.0 (1.3)	0.77
Daily high unsaturated Fat servings	2.2 (1.4)	2.4 (1.6)	0.81
Daily nuts & seeds Servings	0.8 (1.5)	0.7 (1.7)	0.64

BMI, body mass index; HDL, high-density lipoprotein; MEDAS, Mediterranean Diet Adherence Screener

Anticipated changes in control and intervention groups following dietary intervention

Several changes are anticipated between the intervention and control groups following the proposed dietary intervention. Based primarily on two studies detailed in the review of

literature, it is anticipated that some, but not all, of the metrics being measured will show improvement in the intervention group when compared to the control group. First, regarding the diagnostic criteria that define metabolic syndrome, it is anticipated that significant improvements will be shown in waist circumference and fasting triglycerides (Gill et al., 2019). Second, based on the anticipated reduction in the intervention group's waist circumferences, it is anticipated that reductions in BMI and body fat percentages will also be significant among subjects in the intervention group. Third, it is anticipated that behaviors including the use of pre-made meals, goal setting, and self-monitoring will all significantly improve amongst the intervention group subjects (MacKenzie-Shalders et al., 2020). Finally, it is anticipated that the overall diet quality of the officers in the intervention group will significantly improve compared to the control group, which will be evident by increases in MEDAS scores, as well as increases in the recommended food groups being measured. Table 5 details the anticipated findings.

Table 5

Observed changes in control and intervention groups following dietary intervention.

Observed changes between intervention and control groups (Independent t-test)				
	Intervention vs Control Group +/- SD		***p***	
	Δ 6 Mo	**Δ 12 Mo**	**Δ 6 Mo**	**Δ 12 Mo**
Metabolic Syndrome Diagnostic Criteria				
Waist Circumference (cm)				
Male	-2.3 (1.65)	-4.1 (1.20)	0.24	0.003
Female	-2.1 (1.74)	-3.9 (2.1)	0.33	0.002
Fasting blood glucose (mg/dL)	-5.3 (4.6)	-6.2 (5.4)	0.24	0.09
Triglycerides (mg/dL)	-42.2 (8.31)	-56.42 (14.1)	0.0008	0.004
Blood pressure (mmHg)				
Systolic	-2.1 (1.9)	-0.22 (1.64)	0.31	0.89

	Intervention vs Control Group +/- SD		***p***	
	Δ 6 Mo	**Δ 12 Mo**	**Δ 6 Mo**	**Δ 12 Mo**
HDL Cholesterol (mg/dL)				
Male	+1.62 (1.34)	+0.94 (1.22)	0.24	0.45
Female	+2.11 (1.83)	+1.32 (1.44)	0.36	0.52
Other Health Markers				
BMI				
Male	-1.61 (0.35)	-0.97 (0.42)	0.003	0.012
Female	-1.58 (0.41)	-1.02 (0.39)	0.004	0.023
Body fat %				
Male	-2.53 (1.31)	-1.49 (0.62)	0.10	0.04
Female	-2.65 (1.53)	-1.92 (0.81)	0.12	0.05
Nutrition related Behaviors				
Who prepares majority Of meals? (% of total population n = 92)				
Self	+2.3	+2.4	0.42	0.33
Significant other	-1.72	-1.68	0.53	0.44
Other	-0.04	-0.02	0.82	0.66
Follows a “diet” (% Yes)	+6.2	+8.1	0.03	0.01
Use of pre-prepared meals (% Yes)	+7.4	+8.2	0.02	0.009
Behaviors that support Behavior change				
Use of goal setting (% Yes)	+8.9	+9.2	0.002	0.001
Use of rewards (% Yes)	+0.6	+0.7	0.88	0.83

	Intervention vs Control Group +/- SD		***p***	
	Δ 6 Mo	**Δ 12 Mo**	**Δ 6 Mo**	**Δ 12 Mo**
Use of self-monitoring Tools (% Yes)	+4.7	+4.9	0.05	0.034
Diet characteristics				
MEDAS Score (1-12)	+2.31 (1.02)	+2.8 (1.43)	0.01	0.04
Daily fruit servings	+0.82 (0.54)	+1.2 (0.92)	0.04	0.008
Daily vegetable Servings	+1.92 (1.82)	+2.06 (1.78)	0.03	0.021
Daily whole grain Servings	+2.3 (1.8)	+2.8 (1.7)	0.009	0.007
Daily high sugar Food servings	-1.12 (0.94)	-1.34 (1.04)	0.014	0.011
Weekly fish servings	+0.52 (0.08)	+0.64 (0.12)	0.13	0.09
Daily low-fat dairy Servings	+1.05 (0.97)	+1.22 (0.98)	0.086	0.061
Daily high sat. Fat meat servings	-1.52 (1.03)	-1.78 (1.22)	0.065	0.045
Daily high unsaturated Fat servings	+1.92 (1.13)	+2.03 (1.24)	0.054	0.011
Daily nuts & seeds Servings	+0.81 (0.09)	+0.97 (0.14)	0.072	0.062

BMI, body mass index; HDL, high-density lipoprotein; MEDAS, Mediterranean Diet Adherence Screener

Relationship between MEDAS scores and metabolic syndrome diagnostic criteria

Considering the large volume of data that exists promoting the health benefits of the Mediterranean diet, it is anticipated that higher rates of adherence to the diet will correlate to improvements in all diagnostic criteria that define metabolic syndrome. These correlations are depicted in Table 6 Based on this and the literature detailed thus far in the proposed study, it is expected that there will be significant correlations that exist between MEDAS scores and the

diagnostic criteria that define metabolic syndrome. However, based on the study conducted by Gill et al. (2019), some significant improvements will be shown at the six-month mark, but not the 12-month mark and vice versa. This would be the result of some study subjects reverting back to less than desirable habits in the latter half of the proposed study. Further, some less than desirable habits may not be captured fully by the MEDAS, such as sodium intake. Additionally, some behaviors may take longer than six months to show significant improvements, which is part of the reasoning why the study was designed to last 12 months.

Table 6

Relationship between MEDAS scores and metabolic syndrome diagnostic criteria

Regression slopes ± (SE) of Metabolic Syndrome Diagnostic Criteria (dependent variable) versus Modified Mediterranean Diet Adherence Screening (MEDAS) scores (Independent Variable)				
	Slope ± SE		***p***	
	Δ 6 Mo	**Δ 12 Mo**	**Δ 6 Mo**	**Δ 12 Mo**
Metabolic Syndrome Diagnostic Criteria				
Waist Circumference (cm)				
Male	-0.92 (0.28)	-1.01 (0.29)	0.003	0.002
Female	-1.09 (0.44)	-1.22 (0.56)	0.008	0.006
Fasting blood glucose (mg/dL)	-0.88 (0.54)	-0.92 (0.78)	0.004	0.14
Triglycerides (mg/dL)	-13.48 (4.76)	-7.23 (4.92)	0.0008	0.17
Blood pressure (mmHg)				
Systolic	-1.26 (0.64)	-0.21 (0.72)	0.05	0.71
Diastolic	-0.70 (0.50)	-0.68 (0.54)	0.16	0.18
HDL Cholesterol (mg/dL)				
Male	+0.86 (0.38)	+0.45 (0.36)	0.02	0.19
Female	+0.92 (0.42)	+0.75 (0.48)	0.009	0.08
BMI, body mass index; HDL, high-density lipoprotein; MEDAS, Mediterranean Diet Adherence Screener				

Summary

Overall, the anticipated results are expected to show a net positive improvement in the diagnostic criteria that define metabolic syndrome amongst the intervention group when compared to the control group. The anticipated results detailed above are based primarily on data obtained in two other studies including the 2019 study by Gill et al. and the 2020 study by MacKenzie-Shalders et al. The proposed study is unique in several ways. Specifically, the proposed study looks exclusively at the law enforcement community, whereas other studies often include or exclusively use fire fighter populations. Although similar in many ways to law enforcement, fire fighters' careers also differ in many ways, especially when it comes to their environment, which is a key aspect of the social cognitive theory (SCT). This study also introduces the intentional use of an acronym (COPSS) which the dietary intervention is based on. The law enforcement profession uses countless acronyms in their work, so, by using one to help better guide their nutritional habits, it is anticipated that the adherence to dietary recommendations will be significantly improved compared to the control group.

Chapter 5: Discussion

Introduction

Metabolic syndrome, a condition characterized by the presence of two or more criteria including elevated blood pressure, elevated serum triglycerides, elevated fasting blood glucose, decreased HDL cholesterol, and elevated waist circumference, increases an individual's likelihood of developing more dangerous health conditions such as diabetes and heart disease. Current research shows that nutrition plays a big role in the development and prevention of metabolic syndrome (Fahed et al., 2022; AHA, 2021). Law enforcement officers experience metabolic syndrome at higher rates than their civilian counterparts (Hartley et al., 2011a). To date, extremely little research has been done to examine the effects of dietary choices and behaviors, and how they relate to metabolic syndrome, within a law enforcement population. This chapter will discuss the anticipated results of the proposed study, compare these results with existing research on the topic, strengths and limitations of the study, and finally suggestions of future research.

Interpretation of Results

Based on existing research, it is anticipated that upon completion of the proposed 12-month study, there will be a significant reduction in the presence of metabolic syndrome among the intervention group. This will be evidenced by significant reductions in two defining diagnostic criteria including serum triglycerides and waist circumferences compared to the control group (Gill et al., 2019). It is also expected that positive changes to the diets and behaviors of officers in the intervention group will be observed. This will be reflected by increased Mediterranean Diet Adherence scores (MEDAS) amongst the officers within the

intervention group. Based on these factors, is anticipated that the null hypothesis will be rejected and that the alternative hypothesis will be accepted.

Study population characteristics and attrition.

Similar to research conducted by Gill et al. (2019) and MacKenzie-Shalders et al. (2021), no significant differences in baseline characteristics are expected to be observed between study subjects in the control and intervention groups. This includes gender, age, metabolic syndrome diagnostic criteria, anthropometric data, nutrition related behaviors, behaviors that support behavior change, and diet characteristics. Additionally, it is expected that the intervention group will have a higher rate of attrition than the control group, based on a study conducted by (Gill et al., 2019). The higher rate of attrition in the aforementioned study was attributed to the perceived increased demand placed on the study subjects, considering their typical daily demands were already quite high. There is no reason to suspect that the study subjects in the proposed study will have less demanding schedules than the officers that participated in Gill et al.'s 2019 study. If anything, the job has become more demanding. According to recent data from the 2022 Milwaukee Police Department's Community Report, dispatched calls for service increased by 3% from 2020 to 2021, but the total number of sworn officers decreased by 19% between 2020 and 2022 (Milwaukee Police Department [MPD], 2022). Milwaukee is within a 50 mile radius of each department participating in the proposed study.

Metabolic syndrome diagnostic criteria

Significant improvements in some, but not all, diagnostic criteria for metabolic syndrome are anticipated to be observed within the intervention group. Using the study by Gill et al. (2019) as a guide, it is expected that waist circumference and serum triglycerides will differ

significantly between groups, but there will be no statistically significant difference in fasting blood glucose, blood pressure, or HDL cholesterol. Related to waist circumference, it is also anticipated that both BMI and body fat percentages will show significant improvement in the intervention group compared to the control group (BMI: $P = 0.012$ for men and $P = 0.023$ for women; body fat percentage: $P = 0.04$ for men and $P = 0.05$ for women). It is the hope of the researchers that in the proposed study, there will be significant changes in more than two defining diagnostic criteria for metabolic syndrome based on the unique aspects of the study.

Dietary intakes

Using data from a recent study by MacKenzie-Shalders et al. (2021), it is anticipated that MEDAS scores will increase significantly in the intervention group compared to the control group ($P = 0.04$). Regarding specific food groups, similar to the diagnostic criteria for metabolic syndrome, intakes of some, but not all food groups are expected to show improvement amongst the intervention group compared to the control group. Specifically, it is anticipated that improvements will be shown in daily fruit ($P = 0.008$) and vegetable servings ($P = 0.021$), whole grain servings ($P = 0.007$), high sugar food servings ($P = 0.011$), and high saturated and unsaturated fat servings ($P = 0.045$ and $P = 0.012$). No significant improvements are anticipated for weekly fish servings, low-fat dairy servings, or daily nuts and seeds servings. The improvement in MEDAS scores reflects improved adherence to the modified Mediterranean diet that will be used in the proposed study. The individual food groups offer more detail into the specific intakes that officers are expected to change as well as the food groups that are not anticipated to show much change if any. This will be important for future research, as it may outline some key areas for future research to target more specifically.

Behavior changes

As a pillar of Social Cognitive Theory (SCT), behavior is vital to maintaining a healthy lifestyle, which includes quality nutrition. It is also a quality predictor of future behavior (Brown et al., 2019). Because of this, behaviors related to behavioral change are collected and recorded in the proposed study. Upon completion of the study, behavior change is expected to show some level of significant change overall. Using MacKenzie-Shalders et al. (2020) study as a reference, four areas of behavior that are anticipated to significantly change in the proposed study between intervention and control groups include adherence to a specific diet, the use of pre-prepared meals, use of goal setting, and use of self-monitoring. It is expected that no significant change will be observed between the control and intervention groups in the category of who prepares meals in the household of study subjects, and the use of rewards or social support. By making positive behavioral changes, individuals increase their likelihood of making positive choices in the future (Brown et al., 2019). Additionally, although the use of pre-prepared meals is a behavior, it also impacts an individual's environment, which is another piece of the SCT triad (LaMorte, 2022). By pre-preparing meals, individuals are less sensitive to environmental restrictions such as restaurant options and available cooking equipment.

Strengths and Limitations

The proposed study has several limitations. First, the study will be conducted in a relatively small geographic area and may not be representative of LEOs elsewhere in the world. Second, the study consists of less than 100 active-duty officers which is necessary for convenience but lessens the strength of the findings considering this makes up less than a quarter of one percent of the current population of sworn in officers withing the United States alone according to the latest data from the U.S. Census Bureau (2022). Third, although it will be

assumed that study participants are truthful in their responses, both dietary and behavioral data will be self-reported; self-reporting leaves room for error. Although participants may be truthful in their responses, and instructed on serving sizes, it is plausible to expect some margin of error due to misinterpreted serving sizes or simple forgetfulness.

There are several strengths of the proposed study. First, this study will use an acronym, COPSS, which stands for color, oils, plant foods, seafood, and sugar, to serve as the basis for all intervention components. Acronyms are used widely throughout tactical professions and it is anticipated that the use of an acronym to encompass the main tenets of the Mediterranean diet will increase adherence. Second, registered dietitians will administer nutrition counseling sessions and develop the educational material that will be used to supplement the counseling sessions in this proposed study. As subject matter experts and trained in motivational interviewing techniques, dietitians will be able give objective, evidence-based, and uniform guidance to participating officers. Participants in the intervention group will participate in several counseling sessions, which has been shown to increase adherence to dietary guidance (Siopis et al., 2020). Finally, although an attrition of roughly 44 percent is anticipated, the proposed study duration of 12 months allows for an accurate interpretation of changes in metabolic diagnostic criteria, dietary intakes, and behavior change.

Future Research

Although the anticipated findings of the proposed study point to the effectiveness of dietary intervention improving the bio-chemical and anthropometric markers that define metabolic syndrome in a law enforcement community, several areas were identified that would benefit from further research. First, despite anticipating significant changes in two of the diagnostic criteria for metabolic syndrome within the intervention group, three criteria (fasting

blood glucose, blood pressure, and HDL cholesterol) are not expected to show significant improvement. It may prove beneficial to explore each of these criteria in isolation to identify more effective dietary interventions for a law enforcement population. Second, intakes of several food groups are not expected to change, including weekly fish servings, daily low-fat dairy servings, and daily nuts and seeds servings. Future research that identifies either barriers to intake or strategies to improving intake of these food groups would be beneficial as it could help to improve dietary interventions and subsequent outcomes within this population moving forward. Finally, more long-term observational studies are needed that examine specific nutrient intakes of LEOs including daily sodium intake, daily potassium intake, and macro-nutrient distributions. These studies would assist future researchers in constructing more specific and effective nutrition interventions that could lead to significant changes in the bio-chemical and anthropometric markers that define metabolic syndrome that are not anticipated to change with the proposed study.

Conclusion

In conclusion, the anticipated results of the proposed study would support the rejection of both null-hypotheses, as two diagnostic criteria for metabolic syndrome are expected to show significant improvement in the intervention group. The anticipated improvements in MEDAS scores amongst the intervention group suggest that adherence to a modified Mediterranean diet may help reduce the chances of a law enforcement officer developing metabolic syndrome. By using registered dietitians to administer counseling sessions and develop educational material, and by consolidating the main tenets of the Mediterranean diet into a simple acronym (COPSS), several statistically significant improvements in dietary intake and behavior are expected to be observed within the intervention group. This may serve as an example for future research that

seeks to analyze the role of diet in the health of law enforcement officers. However more research will be needed. Specifically, future research should focus on specific nutrient intakes of law enforcement officers and their impact, if any, on the diagnostic criteria that is not expected to change significantly between groups.

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Appendix A: *IRB form*

Mount Mary UNIVERSITY

Mount Mary University Institutional Review Board (IRB) for the Protection of Human Subjects

Application for IRB Review

DATA COLLECTION CANNOT BEGIN UNTIL THE IRB HAS APPROVED THIS PROJECT

Directions:

- Faculty and student researchers, as well as student research advisors, should **read all relevant information on the University IRB page in My Mount Mary before initiating an application**. This includes full knowledge of the US Department of Health and Human Services Code of Federal Regulations Title 45 (Public Welfare), Part 46 (Protection of Human Subjects). http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html.
- All applicants must verify completion of Human Subjects Training. See http://www.citiprogram.org.
- The IRB application must be filed and approved by the IRB prior to any Mount Mary University faculty, staff, or student (undergraduate or graduate), initiating a research project/study.
- If there is a cooperating institution, attach a copy of their IRB approval.
- In the case of a student research project, the student may complete the IRB application but the student's research advisor must sign and submit the application to the IRB for approval. It is the responsibility of the faculty research advisor to ensure that student applications and all attachments (e.g., informed consent forms and survey instruments) are in their final edited form. Even though a student research project may qualify as exempt from full IRB review, the research advisor may request the student to complete and submit a full IRB application.
- Complete this application using your word processing program (e.g. Word), then send it on or print it out and obtain signatures from all investigators and advisors. (Handwritten applications will not be accepted.) For your benefit, save the completed application on your computer in case it needs to be revised and resubmitted.
- This is a professional document; please check spelling, grammar and punctuation.

- Submit an electronic copy, via email, of the completed application with required signatures and attachments, in a single pdf, to Tammy Scheidegger, IRB Chair, scheidet@mtmary.edu. You will receive an email verifying receipt of the application.
- Allow a minimum of 30 working days to process your application. Make sure this timeframe is accounted for when considering initiation of data collection and due dates for student projects. Please be aware that if, upon completion of the application, you find that no exemptions apply to your research, your application will need to go through a full IRB Committee review which can take as many as 60 days to be completed.
- For class projects you must submit IRB applications to the IRB Chair by October 31st of the fall semester and March 31st for the spring semester. For summer classes, please consult with the IRB Chair.
- Upon receipt of the IRB letter of approval, data collection may begin.

I. **Required Documentation** - ***No action will be taken without these attachments.***

Are the following attached to the IRB application?

Informed Consent Document	Yes	Informed Consent Documents should include an explanation of procedures, risk, safeguards, freedom to withdraw, confidentiality, offer to answer inquiries, third party referral for concerns, signature and date. See Appendix A and use the **MMU Informed Consent Template to avoid delays in the process.**
Survey/Interview Instrument(s)	Yes	If a survey is being administered in any written format (e.g., Google Forms, Survey Monkey, Qualtrics), a copy of that survey must accompany this application. If a survey/interview is being conducted verbally, a copy of the introductory protocol/comments and survey questions being asked must be attached to this application. If survey/interview includes focus group questions, a complete list of the question must be attached. For research using a published/purchased instrument, a photocopy of the instrument will suffice.
Verification of Human Subjects Training	Yes	Copy of transcript, certificate or other evidence that ALL members of the research team have completed the required training.
Copy of cooperating institution's IRB approval.	Yes	Not required if there is no cooperating institution.

II. **Investigator(s):**

Name: Erik Grohmann Phone: (262) 442-5321

Affiliation with Mount Mary University (e.g. faculty, student, etc.): Email: grohmane@mtmary.edu

Signature: Date:

If student, list Research Advisor and complete the application. Research Advisor must provide requested information and verify.

Research Advisor's Name: Janine M. Bamberger Department: Dietetics
Email: Phone:

Research Advisor: Have you completed Human Subject's Training? Yes No

Research advisor's signature indicates responsibility for student compliance with all IRB requirements.

Signature: Date:
Research Advisor

Individuals who participate in research play an important and active role in the advancement of knowledge. In recognition of their important contributions to research, humans will be referred to as "participants" rather than "subjects."

III. **Project Description – Required by all applicants**

Instructions: Briefly describe the proposed project including the sample and methodology (e.g. human subjects, data collection, data analysis and instruments).

1) Objectives (purpose of project):
   This study aims to explore the assumption that diet plays a major role in the in increased risk of metabolic syndrome experienced by LEOs. Using a randomized control trial, the primary objective of this study will be to determine if a comprehensive nutrition intervention effects the diagnostic criteria for metabolic syndrome specifically.

2) Relevance to practice/body of knowledge:

Limited research is available on this topic, and to date, no study has been done exploring dietary intervention and subsequent effects on metabolic syndrome in a law enforcement population.

3) Describe the research design (e.g. subject/participant selection and assignment, design, intervention, data analysis): The proposed study will be a randomized-control trial that will last 12 months. Study participants will consist of roughly 100 active duty law enforcement officers from four consenting police departments within southeastern Wisconsin. Officers participating in this study will be randomized through the designation of a computer randomized number and separated into two groups including a control and intervention group. Initial assessments will be conducted to obtain baseline characteristics on dietary intakes and behaviors in both groups prior the implementation of the proposed intervention. A comprehensive dietary intervention will used and consist of one-on-one counseling with registered dietitians, educational handouts, and a recipe book. The theme of the intervention will be based on a Mediterranean diet and follow an acronym (COPSS: Color, Oils, Plants, Seafood, and Sugar).

4) What measurement/data collection tools are being used? Standard descriptive statistics will be calculated to interpret the collected data. These will include measures of central tendency including mean, median, and mode, distribution percentages of age, years of service, and gender, and dispersion, specifically standard deviation. Inferential statistics will also be used to assess the data sets collected throughout the course of the study. To determine differences between the intervention and control groups, two-sample independent t-tests will be used to compare the data in categories one and two against the data in categories three and four. Least squares regression will be used to test category three data against the data in category four. Significance will be determined based on the calculated p-values compared to the established Alpha-value of 0.05. Correlation coefficients will also be calculated.

IV. **Additional Project Information – Required by all applicants**

1) What human subjects training has the researcher completed (e.g. course work, online certification)? CITI Training: Biomedical Research and Social & Behavioral Research

2) What process is used for obtaining informed consent? See Appendix A for consent content requirements and use the template, available on the MMU IRB webpage, when constructing your informed consent form.

Study participants will be given a consent form which must be read and signed in order to participate in this study.

3) Does the research include special populations?

- Minors under 18 years of age? No
- Persons legally incompetent? No
- Prisoners? No
- Pregnant women, if affected by research? No
- Persons institutionalized? No
- Persons mentally incapacitated? No

If <u>YES</u>, describe additional precautions included in the research procedures.

4) Does the research involve any of the following procedures?

- False or misleading information to subjects? No
- Withholds information such that their informed consent might be questioned? No
- Uses procedures designed to modify the thinking, attitudes, feelings, or other aspects of the behavior of the subjects? No

If <u>YES</u>, describe the rationale for using procedures, how the human subjects will be protected and what debriefing procedures are used.

5) Does the research involve measurement in any of the following areas?

- Sexual behaviors? No
- Drug use? No
- Illegal conduct? No
- Use of alcohol? No

If YES, describe additional precautions included in the research procedures.

6) Are any portions of the research being conducted online?

- Survey posted on a website? Yes
- URL for survey includes information that could identify participants? No
- Invitation to participate sent by email? Yes
- Items use drop-down box? No

If yes, assure that items allow choice of "no response"

- Will you be recording virtual interviews?
  No Audio only Video only Audio & Video
  If video recording is being used, assure anonymity by only recording audio unless the research necessitates visual recording.

If <u>YES</u>, to any of the above items, describe additional procedures.

Study participants will only use the number randomly assigned to them as means of identification on all online correspondence and forms. Only the primary researcher will have the master list that identifies study subjects by name and other personal information.

7) Describe the methods used to ensure confidentiality of data obtained.

Study participants will be assigned a designation number that will be randomly generated through a computer. Subjects will use this number as the only means of identification throughout the study. Only the primary researcher will have a master roster where study subjects personal information will be kept in association with their assigned numbers.

<u>Risks and Benefits</u>

1) Describe risks to the subjects and the precautions that will be taken to minimize them. (Risk includes any potential or actual physical risk of discomfort, harassment, invasion of privacy, risk of physical activity, risk to dignity and self-respect, and psychological, emotional or behavioral risk.)

There will be no risks physical or mental to study subjects participating in the proposed study.

2) Describe the benefits to subjects and/or society. (These will be balanced against risk.)

Considering the health disparities that exist within the law enforcement community, this study would shed light on the role diet plays on a major disease (metabolic syndrome) and add to the very limited body of existing research on the topic. In the best-case scenario, this study could improve the health of numerous police officers and could serve as a guide for future research on the topic. The information obtained through this research has the potential to positively impact the men and women who put their lives on the line every day to keep their communities safe.

V. **Is the proposed project "research" as defined by Institutional Review Board requirements? - Required by all applicants**

Per 45 CRF 46.102: "Research is defined as a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities that meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program that is considered research for other purposes."

Per HHS.gov and the Office for Human Subjects Research (https://www.hhs.gov/ohrp/regulations-andpolicy/requests-for-comments/draft-guidance-activities-deemed-not-be-research-public-healthsurveillance/index.html#:~:text=For%20purposes%20of%20the%202018,by%20a%20public%20health%20aut hority), the following activities are deemed **not** to be research:

- Scholarly and journalistic activities (e.g., oral history, journalism, biography, literary criticism, legal research, and historical scholarship), including the collection and use of information, that focus directly on the specific individuals about whom the information is collected.
- Public health surveillance activities, including the collection and testing of information or biospecimens, conducted, supported, requested, ordered, required, or authorized by a public health authority. Such activities are limited to those necessary to allow a public health authority to identify, monitor, assess, or investigate potential public health signals, onsets of disease outbreaks, or conditions of public health importance (including trends, signals, risk factors, patterns in diseases, or increases in injuries from using consumer products). Such activities include those associated with providing timely situational awareness and priority setting during the course of an event or crisis that threatens public health (including natural or man-made disasters).
- Collection and analysis of information, biospecimens, or records by or for a criminal justice agency for activities authorized by law or court order solely for criminal justice or criminal investigative purposes.
- Authorized operational activities (as determined by each agency) in support of intelligence, homeland security, defense, or other national security missions.

A human subject is defined as a living individual about whom an investigator obtains either 1) data through intervention or interaction with the individual; or 2) identifiable private information. In social science research, human subjects may be referred to as research subjects or research participants.

Does the research involve human subjects/participants or official records about human subjects/participants?

Yes No

If "no", STOP here, and submit application. If the results will be available in the library, presented at a professional conference (includes any presentation to group(s) outside of the classroom), or published, please check the Yes box:

No

If "yes", proceed to SECTION VI. If "no, STOP here, and submit

If no exemptions apply, your application will need to go through a full IRB Committee review. Be advised that this process can take as many as 60 days to be completed.

Appendix A: Required Elements of Informed Consent

Please use the template provided on the MMU IRB website for constructing your Informed Consent Document

Informed consent is the process of communicating to a prospective participant, in easy-to-understand language (usually sixth- to eighth-grade level), all that he or she needs to know about participating in a research project, and then obtaining the prospective participant's agreement to participate. The following ten elements of consent are widely recognized and, except under certain specific conditions, must be included in all consent processes and forms:

1. An explanation of the study, including goals, procedure, and a statement that the study is research.
2. A description of what participants are expected to do and expected length of participation.
3. A description of any likely risks or discomforts for the participants. Potential harm should be explained in language that participants can understand and that relate to everyday life.
4. A description of any likely benefits to the participant or to others.
5. A disclosure of appropriate alternative procedures or courses of treatment, if any, that might be advantageous to the participant.
6. A statement describing the level of privacy assured for collected information (anonymous, confidential) and how private information and information security will be managed.
7. An explanation of whom to contact for answers to questions about the research. When a Mount Mary student is the principal investigator, the name and phone number of a supervising faculty member is required.
8. An explanation of whom to contact for concerns about the participant's privacy and rights, which for Mount Mary University is its IRB Chair.
9. For research involving more than minimal risk, a statement describing any compensation for injuries and contact information. (Minimal risk is a risk of harm to the participant that is no greater than the risk encountered in normal, day-to-day activities or during routine physical or psychological examinations.)
10. A statement that research participation is voluntary and the participant may withdraw from participation at any time, without penalty or loss of benefits to which the participant is otherwise entitled. If the participant is a patient or client receiving medical, psychological, counseling, or other treatment services, there should be a statement that withdrawal from the study will not jeopardize or otherwise affect any treatment or services the participant is currently receiving or may receive in the future. Participants also should be told whether their data will be destroyed should they withdraw from the study. If a survey instrument

or interview questions are used and some questions deal with sensitive issues, the participants should be told they may refuse to answer individual questions.

Appendix B: IRB De-Identification Standard for Information

Protecting the privacy of research participants is a general concern in the vast majority of research projects. The degree to which privacy needs to be ensured or maintained depends on the nature of the particular research, its setting, and the research participants. Researchers share a general obligation to design their research to reduce the risks of disclosure of collected information about individual research participants. Thus, the present standard for de-identification of information is useful as a guide to protecting privacy even when it is not required or fully required. In this regard, the researcher should consider the following question when collecting and handling data.

Does the information I am accessing, recording, and/or disclosing contain identifiers? Simple access to information may be without concern, for example when the researcher is an employee who routinely handles the records in carrying out his or her position. But, the presence of identifiers in any recorded or disclosed information in the research means the information is not anonymous and so does not meet the IRB de-identification standard, which in some cases may also disqualify the research from exemption from IRB review. The IRB de-identification standard includes all 18 direct identifiers specified in the HIPAA Privacy Rule de-identification standard - 45 CFR 164.514(b). Below are listed specific direct and indirect identifiers that lead to information not being anonymous.

Identifiers: Direct; Indirect

One way to distinguish between information that is truly anonymous and information that is simply being kept confidential is to determine whether the data set contains direct or indirect identifiers. Information in a data set with either direct or indirect identifiers is not anonymous.

Direct Identifiers include:

- Names
- Addresses
- Telephone and fax numbers
- Email addresses, IP addresses, and URLs
- Social Security numbers
- Medical record numbers
- Account numbers, such as those associated with bank accounts or health plans
- License or certificate numbers, including driver's license numbers
- License plate numbers and other vehicle identifiers
- Fingerprints, voiceprints, or full-face photographic images
- Other unique characteristics or identification numbers (example student ID numbers)

Indirect Identifiers can be combined with publicly available information to identify individuals. The determination of indirect identifiers depends on the nature of the research participants. For example, in a study of residents of the state of Wisconsin, the information that someone graduated from one of the UW

system schools probably would not be a unique identifier. However, in a study of small business leaders in Racine, WI, the same information might well apply to only one individual. In general, if any single variable in a data set applies to fewer than five participants, it is considered a potential indirect identifier.

Examples of indirect identifiers include:

- Detailed geographical information, such as state, county, or census tract of residence
- Organizations to which participants belong
- Educational institutions from which participants graduated
- Exact occupations
- Places where participants grew up
- Many dates, e.g. birth dates, hospital admission dates, high school or University graduation dates, etc.
- Detailed income information • Offices or posts held by participants.

Appendix B: Consent form

Mount Mary
UNIVERSITY

Research Participant Information and Consent Form

Mount Mary University

Title of Study: Combating Metabolic and Heart Disease in Law Enforcement Through

Invitation to Participate and Purpose of the Research

You are invited to participate in a research study that seeks to determine the role diet plays in metabolic syndrome. More specifically, the impact a modified Mediterranean diet has on the anthropometric and biochemical markers that define metabolic syndrome within a law enforcement population. Participants will be asked to have asked to have their blood drawn and anthropometric data collected (weight, height, waist circumference, skin fold measurements) at the beginning, middle, and end of this 12 month study. Participants may also be asked to take part in individualized nutrition counseling sessions that will last 45 minutes, once every three months. Participants will also be asked to complete surveys that ask questions regarding certain nutrition related behaviors and dietary recalls where participants will record everything they eat and drink over the course of several days. Data will be de-identified and analyzed by researchers. Participants must be 18 years of age or older.

Benefits and Risks

This research is designed to benefit the law enforcement profession, by determining the role diet plays in the anthropometric and biochemical markers that define metabolic syndrome, a condition that affects law enforcement officers at higher rates than their civilian counterparts. Although participants may not benefit personally from being in this research study, findings generated by this research may add new knowledge to the tactical nutrition field in general. There will be no monetary compensation. There are no known potential risks associated with participating in this study. Please address any questions or issues of concern to the researchers using the contact information provided below.

Confidentiality

All information obtained will be kept confidential by the researchers who will be the only people with access to the data. Information obtained will be stored electronically and will be password protected. Per the U.S. Office of Human Research Protections (code §46.115), all data will be destroyed 3 years after the end of data collection. Paper files will be shredded, and electronic files will be deleted. Individual participants will not be identified in any report or publication about this study.

Contact Information *(An explanation of whom to contact for answers to questions about the research. When a Mount Mary student is the principal investigator, the name and phone number of a supervising faculty member is*

required. Also include an explanation of whom to contact for concerns about the participant's privacy and rights, which for Mount Mary University is its IRB Chair.)

If you have questions about this research study, your rights as a research subject, or would like to know the outcome of the research, please contact:

First - Erik Grohmann, R.D. Phone: (262) 442-5321 Email: grohmane@mtmary.edu

Second - Janine M. Bamberger, MS, RDN, CD Phone: (414) 930-3264

Email: bambergj@mtmary.edu

If you have any questions regarding your rights or privacy as a participant in this study, please contact Dr. Tammy Scheidegger, Mount Mary University Institutional Review Board Chair, 2900 North Menomonee River Parkway, Milwaukee, Wisconsin, 53222-4597, telephone: (414) 930-3434 or email scheidet@mtmary.edu.

Consent

By signing below, you are indicating that you have read this consent form, have been given the opportunity to ask questions, and have agreed to voluntarily participate. You may withdraw from participation at any time, or refuse to answer any question herein, without penalty or loss of benefits to which other participants are entitled.

You may request a copy of this page for your records. Thank you for your participation.

Signature of participant_____ Date _____

Appendix C: Mediterranean Diet Adherence Screener (MEDAS)

Mediterranean Diet Adherence Screener (MEDAS)

Adapted from: www.predimed.es, Int J Epidemiol. 2012 Apr; 41(2):377-385, J Nutr. 2011 Jun; 141(6):1140-1145 (Nov 2017)

		ANSWER	POINTS
1.	Do you use olive oil as the main source of fat for cooking?	Yes No	
2.	How many tablespoons of olive oil do you use each day? *Include olive oil used in salads, meals eaten away from home, frying etc*	# tablespoons **per day**	
3.	How many servings of vegetables do you eat per day? *One serving is ½ cup raw or cooked vegetables or 1 cup of raw salad greens*	# servings **per day**	
4.	How many servings of whole fruit do you eat per day? *One serving is ½ cup or a medium sized piece of whole fruit*	# serving **per day**	
5.	How many servings of red meat, hamburger or sausages do you eat per week? *One serving is 3 ½ -5 ½ ounces (100-150 grams)*	# servings **per week**	
6.	How many servings of butter, margarine or cream do you consume per day? *One serving is 1 Tablespoon. This does not include soft non-hydrogenated margarines*	# servings **per day**	
7.	How many sugar sweetened beverages do you drink per week? *One serving is 355ml or one can of pop or 12 ounces. This includes any drinks with added sugars such as regular pop, fruit drinks, sports drinks, energy drinks, iced tea*	# servings **per week**	
8.	Do you drink wine? How much do you drink per week? *1 glass = 150ml or 5 oz* **If you do not drink wine or alcohol, do not start**	# glasses **per week**	

9.	How many servings of legumes like kidney beans, chick peas, lentils, black beans, split peas do you eat per week? *One serving is 5 ounces or 150 grams or ½ - 2/3 cup*	# servings **per week**	
10.	How many servings of fish or seafood do you eat per week? *One serving of fish is 3 ½ -5 ½ ounces or 100-150 grams One serving of seafood is 4-5 pieces or 7 ounces or 200 grams*	# servings **per week**	
11.	How many times do you eat baked goods such as pie, cookies, cake or doughnuts per week?	# times **per week**	
12.	How many times do you eat nuts per week? *1 serving is 30 grams or 1 ounce*	# times **per week**	
13.	Do you eat chicken or turkey more often than beef, pork, hamburger or sausage?	Yes No	
14.	How many times per week do you eat dishes with a sauce of tomato, garlic, onion/leeks sautéed in olive oil?	# times **per week**	
		TOTAL Points	

Appendix D: Initial Reconnaissance From

Initial Reconnaissance

Personal Information

Study Identification Number

Anthropometrics

Metric	
Age	
Height	
Weight	
Goal Weight (If applicable)	
Recent weight loss (if applicable)	

Recent weight gain (if applicable)	

Blood Work

Recent Labs

If you can access your most recent labs, please fill in as much of the table below as possible. It is okay if you don't have all the markers listed.

Biomarker	Value
Total Cholesterol	
HDL Cholesterol	
LDL Cholesterol	
Triglycerides	
Fasting Blood Glucose	
Hemoglobin A1C	
Sodium (Na)	
Potassium (K)	
Calcium (Ca)	
Magnesium (Mg)	
Chloride (Cl)	
Testosterone	
Estrogen (Estradiol)	
TSH	
T3	
T4	
Iron	
B12	

Vitamin D	

Family History

Paternal Family Illnesses

Maternal Family Illnesses

Personal Health History

Medical Diagnosis

Past Hospitalizations/Surgeries

Have you ever worked with a Registered Dietitian? Yes No

Supplements

List all supplements you're currently taking including vitamins, herbs, minerals.

Medications

List all medications you're currently taking.

List your current health concerns in order of importance

Do you experience digestive difficulties?

(i.e. bloating constipation, gas, constipation)

How often do you have a bowel movement?

Do you strain to have a bowel movement?	Yes	No
Are your bowels loose?	Yes	No

List any food or environmental allergies you experience

Diet

How much water do you drink daily?

Do you consume coffee?	Yes	No
Do you consume tea?	Yes	No
Do you consume energy drinks?	Yes	No
Do you consume alcohol?	Yes	No

How many times do you eat each day?

How many times a day do you eat meat?

How many vegetables do you eat per day?

How many fruits do you eat per day?

What are your favorite foods?

What foods do you avoid and why?

Describe your relationship with food (ex: food is fuel only, I believe there are good and bad foods, food is for pleasure, etc...) Please be very specific

Are you currently following "diet"? If so, please describe it.

Do you currently meal prep in any capacity?

Rate your cooking skill level.

1: Burn cereal - 10: Gordon Ramsay

1 2 3 4 5 6 7 8 9 10

Energy, Stress, and Sleep

How is your daily energy level?
1: No Energy - 10: Tons of energy.

1 2 3 4 5 6 7 8 9 10

How is your energy level during exercise?
1: No energy - 10: Tons of energy

1 2 3 4 5 6 7 8 9 10

How many hours of sleep do you average each night?

If it varies based on your occupation, please detail that below.

Rate how rested you feel when you wake on an average day. 1:
Dead to the world - 10: Very rested, ready to crush the day.

1 2 3 4 5 6 7 8 9 10

How would you rate your average daily stress level

1:No stress - 10: High stress

1 2 3 4 5 6 7 8 9 10

Occupation Questions

How long have you worked in your respective field?

Describe how your job impacts your nutrition

List any/all food related equipment you have access too (ex: refrigerator, microwave, etc...)

Lifestyle

How often do you exercise?

What types of exercise do you do?

What do you do to have fun?

How do you express your creativity?

List your main stressors

How many hours per day do you use a computer?

How many hours per day do you use a cell phone?

How many hours per day do you use watch TV?

Environment

Where did you grow up?

- City
- Suburbs
- Country
- Military base

Where do you live now?

- City
- Suburbs
- Country
- Military base/Ship

What type of environment(s) do you work in?

How many cigarettes do you smoke per day?

For how many years? If you quit, how long ago?

Is there anything that will get in the way of following a treatment plan in order to achieve results?

What is your level of commitment to improving your health?

1 2 3 4 5 6 7 8 9 10

1 = Lowest, 10 = Highest

Current Nutrition Knowledge

Describe your highest level of nutrition knowledge

Ex: High school health class, college level nutrition course, online course, etc...

Rate your level of Macronutrient understanding

1 2 3 4 5 6 7 8 9 10

Rate your level of micronutrient understanding

1 2 3 4 5 6 7 8 9 10

Rate your level of human metabolism understanding

1 2 3 4 5 6 7 8 9 10

Briefly describe the areas of nutrition you want the MOST help with

Appendix E: Recipe Book

MISS KIMI'S MEAL-PREP KOOKBOOK & GUIDE FOR

Tactical Fueling

Kimi Maines, MS, RD, CSSD, LD

Table of Contents

Pgs. 4- 8 Breakfast
Pgs. 9-13 Lunch
Pgs. 14-18 Dinner

4. Substitutions

Recommended Materials

- 1,2, or 3 compartment meal prep containers (Dollar Tree, Wal- Mart, Amazon)
- Microwave
- Stove/ burner
- Medium or large frying pan
- 9x 13 in. baking pan (medium-large pan) ○ Alternative: large aluminum baking pan
- Wooden or plastic spatula
- Measuring cups (1/4 – 1 cup)
- Rice cooker
    - ○ Alternative: Instant pot, instant rice (ingredient)
- Medium or large stove pot with lid
- Strainer
- Medium to large glass bowl ○ Alternative: microwave-safe bowl

Ingredients-Based Grocery List

Produce

- Canned (in fruit juice or water), frozen, or fresh
- Veggies: Carrots, broccoli, spinach, celery, peppers, squash, cucumber, tomato, mushrooms, & Brussel sprouts
- Fruit: Apples, bananas, grapes, oranges, berries, pineapple, kiwi, mango, & melons
- Starches: Potatoes, sweet potatoes, & yams

Meat

- Lean beef: 80/20, 90/10
- Chicken: ground, breast meat
- Turkey: lean ground
- Pork: lean sausage, pork chops, bacon
- Fish: salmon, tilapia, cod, tuna
- Eggs

Grains

- Oatmeal
- Brown rice
- Whole wheat bread
- Whole wheat tortilla
- Whole wheat pasta
- Cereal: Cheerios, Chex, Life cereal
- Legumes/ beans: Pinto, black beans, lentils, chickpeas, & white beans

Dairy

- Yogurt: Greek or regular
- Milk: any % fat
- Cheese: slices, shredded
- Sour cream

Fats

- Oils: Olive, avocado, or coconut
- 100% butter
- Ghee butter

Blueberry Chia Overnight Oats

Oatmeal is a great breakfast choice that is going to keep you full and energized for hours. Oatmeal is a complex carbohydrate, that is also high in protein and carbohydrates. Chia seeds contain good unsaturated fats and are a great source of omega- 3's', an essential fat that helps to decrease inflammation.

Ingredients:

2.5 cups	Quick or regular oats
4 cups	Milk or dairy-free alternative milk
½ cup	Chia seeds
2 ½ cups	*Frozen blueberries (sub-any
1 Tbsp	Cinnamon
½ cup	*Chopped or sliced almonds (sub-any nut or seed)
1/3 cup	*Almond butter (sub-any nut or seed butter)
5 servings	*Optional*: vanilla protein (whey or vegan) or peanut butter powder

Directions:

1. Container suggestions: small round Tupperware or mason jars
2. Portion out ½ cup of dry oats, 1 tsp of cinnamon & 1 Tbsp of chia seeds into meal prep container. (*if adding protein powder, do this step here)
3. Pour milk or milk alternative over oatmeal & chia seeds until all oatmeal is covered. Shake the container to mix.
4. Portion ½ cup of frozen berries into each container.
5. Top each container with 1 Tbsp whole/sliced nuts & 1 Tbsp of nut butter.

Substitutions:

*Frozen blueberries → any frozen fruit or fresh banana slices
*Sliced almonds → chopped walnuts, peanuts, pecans or pepitas
*Almond butter → any nut or seed butter

Nutrition facts: Calories 510 (650 with protein powder) **Carbs** 52 g
Protein 22 g (47 with protein powder) **Fat** 25 g **Fiber** 15 g

Protein Berry Parfait

Greek yogurt is an excellent source of complete protein. It contains both whey (a fast digesting protein) and casein (a slow digesting protein), both of which offer unique nutritional benefits when it comes to reaching your health and fitness goals. Fun fact: Greek yogurt also contains probiotics, which are essential to your gut health. Your gut health comprises 70% of your overall immunity, and regularly eating probiotics is the best way to maximize that aspect of your health.

Ingredients:

3 ¾ cups	Vanilla/fruit flavored Greek yogurt or plant-based yogurt
2 ½ cups	*Sliced strawberries and blueberries
1 ¼ cups	Granola or whole grain crunchy cereal (i.e. Kashi, Chex, Cheerios)
1 ¼ cups	*Chopped walnuts
¼ cup	**Optional*: Honey

Directions:

1. Container suggestions: Small round Tupperware or mason jars.
2. Portion out ¾ cup of vanilla Greek yogurt into each container.
3. Wash and rinse strawberries and blueberries thoroughly. Slice into small pieces.
4. Portion ¼ cup of granola (or cereal) into each container.
5. Add ½ cup sliced berries to each container and top with ¼ cup of chopped nuts.
6. *Optional: drizzle ½ Tbsp of honey over berries & nuts.

Substitutions:

*Berries	→	sliced banana or berry varieties
*Chopped walnuts	→	chopped pecans, almonds or seeds
*Honey	→	maple syrup, agave, date sugar

Nutrition facts: Calories 450 **Carbs** 31 g **Protein** 25 g **Fat** 27 g **Fiber** 7 g

Lean Mean Breakfast Sammich

No more wasting time sitting in the fast-food drive through for 15 minutes on your way to work. This high-protein and nutrient dense breakfast sandwich is simple, quick and cheap to prep! Eggs are a great source of protein, iron, B vitamins (energy/metabolism), and choline (cell health). Adding a heart-healthy fat, like avocado, is a great way to add a kick of flavor and boost satiety.

Ingredients:

5	*Whole wheat English muffins
2 ½	Avocadoes, sliced
1	Large tomato, thinly sliced
1 cup 5	Spinach
slices	*Fresh cheddar cheese
10	*Eggs
Dash	Salt & Pepper

Directions:

1. Container suggestions: Small square Tupperware or tinfoil squares.
2. Kitchen tools: Oven or toaster oven. If using oven, preheat to 400F.
3. In a non- stick pan, over medium heat, cook 10 eggs to desired consistency (over hard, etc…)
4. Place whole wheat English muffins on a baking pan over a tin foil sheet. Place a square of cheese on one half of the muffin. Place in the oven or toaster oven for 3-5 minutes.
5. Wash and slice the tomato into 5 slices. Wash and cut the avocado in half, slice into 4 pieces each side, and scoop out with a spoon.
6. When cheese has melted, take the baking pan out of the oven and let cool for 10 minutes. When muffins have cooled, place a fried egg over the cheese, and layer with a slice of tomato, avocado, and lastly, another fried egg on top.
7. Reheat upon eating.

Substitutions:

*Wheat muffin	→	whole wheat bagel or tortilla
*Cheddar cheese	→	any fresh, sliced cheese
*Eggs	→	firm tofu, crumbled and scrambled

Banana Protein Muffins

Bananas are a rich source of potassium and simple carbohydrates for quick energy. One banana supplies half of your daily amount of recommended potassium! Potassium is an electrolyte that is involved in heart health by working to regulate blood pressure and aiding in proper heart and muscle contractions. Cramps? Eat a banana!

Ingredients:

1 cup	Whole wheat flour
½ cup	Vanilla or non- flavored Protein powder (Whey, hemp, soy, pea, etc)
1 tsp	Baking powder
½ tsp	Baking soda
¼ tsp	Salt
1 Tbsp	Cinnamon
3 Large	Extra Ripe or De- thawed frozen bananas, mashed
1 Large	Egg
1 Tbsp	Oil
1 tsp	Vanilla extract
¼ cup	Honey
¼ cup	*Optional: chopped nuts

Directions:

1. Preheat oven to 425F. Prepare a muffin pan with cooking spray.
2. In a large mixing bowl, combine mashed bananas (a blender may be useful) with egg, oil, honey and vanilla. Stir until mixture is smooth.
3. In a separate bowl, combine the dry ingredients- flour, protein powder, baking powder, baking soda, salt and cinnamon. Make a hole in the center of the flour mixture and add wet ingredients. Gently stir until combined… don't overmix.

4. Spoon batter into the prepared muffin tins. Top batter with nuts if you desire. Bake muffins for 5 minutes at 425F. Reduce heat to 350F and bake for another 13-15 minutes.
5. Remove the muffins from the oven and allow to cool for 10 minutes on a wire rack.
6. These muffins will stay good in an airtight container on the counter for 3 days, then move to refrigeration.

Nutrition Facts (per muffin): Calories 110 **Carbs** 15 g **Protein** 5 g **Fat** 3.5 g **Fiber** 2 g

Garden Omelet Bites

Eggs are nature's most biologically available protein source, meaning that we absorb, digest and utilize all of the protein that the egg delivers. The iron is a rich source of nutrients as well- including iron, chromium and essential fats. These bites are a great way to sneak in some veggies if you are a picky eater and go great with a whole wheat English muffin or piece of whole wheat toast.

Ingredients:

7 Large	Eggs
½ cup	Chopped bell pepper (any color)
¼ cup	Chopped onion (any color)
1 cup	Chopped spinach (fresh)
¼ tsp	Salt & pepper
1 tsp	Cumin powder
¼ cup	Milk or milk alternative
½ cup	Shredded cheese (any kind)
2 1/2	Sliced avocado
2 Tbsp	*Optional: salsa

Directions:

1. Preheat oven to 400F. Prepare a muffin pan with cooking spray.
2. Wash produce and pat dry. Finely chop peppers, onion and spinach. Set aside.
3. In a large bowl, whisk together eggs, milk and seasonings.
4. Pour egg batter into muffin tin, leaving 1 cm for the egg to rise.

5. Bake the egg bites for 10- 12 minutes at 400F. Upon removing from oven, immediately sprinkle with cheese of choice.

Nutrition Facts (per bite): Calories 100 **Carbs** 3.5 g **Protein** 5 g **Fat** 7.5 g **Fiber** 2 g

Fresher- than- Chipotle Bowls

Don't get me wrong, Chipotle is a fast and healthy option when it comes to choosing fast food places. However, $10 here and there really adds up. These bowls cost $1.50 per meal, don't have added oils and are packed with high protein and half your daily recommended fiber! Pairing brown rice with beans supplies you with a complete protein, which means this bowl packs in two complete proteins for you (the other is chicken).

Ingredients:

1 ½ cups	Dry rice or instant brown rice (same nutritional content)
2 ½ cans	Black or pinto beans
2	Peppers, chopped (any color)
2 ½ cans	Corn
¼ tsp	Salt
½ Tbsp	Cumin powder or taco seasoning
5	Large chicken breasts (raw, frozen or pre- cooked)
2 ½	Avocado
1 Tbsp	Oil
2 cups	*Optional: Romaine lettuce, chopped
¼ cup	*Optional: Salsa

Directions:

1. Container suggestions: 5, 2 compartment container or large rectangular Tupperware.

2. If cooking chicken from raw or frozen, preheat oven to 400F. Lightly oil a baking pan and lay out chicken breasts, drizzle with a bit more oil. Once heated, cook chicken breasts for 22- 25 minutes.
3. If cooking rice, follow directions on package for rice cooker or stove top (same direction for using instant rice). Add cumin and salt to the water, or taco seasoning.
4. Once chicken is cooked, let cool for 10 minutes.
5. Wash and chop peppers into ½ inch pieces, set aside.
6. Open cans of corn and beans, drain and set aside.
7. Cut chicken into 1- inch pieces on a clean cutting board and set aside.
8. Portion out ¾ cup of rice into each container. Next, portion ½ cup beans and ½ cup corn and ¼ cup of the chopped peppers on top of the rice. Lastly, portion 1 cup of the cut chicken on top, or, if using a two- compartment container, place the chicken on the smaller side.

Nutrition facts: Calories 670 **Carbs** 82 g **Protein** 42 g **Fat** 19 g **Fiber** 18 g

Healthy Hawaiian Bowl

This bowl offers a healthy version of a traditional Hawaiian dish- with higher fiber, protein and vitamin C. The protein (shrimp) can be substituted with tuna, salmon, lean beef or chicken to suit your taste preferences, while keeping the bowl high in lean protein. Brown rice is a great whole grain to incorporate at lunch because it gives you longer, sustained energy to tackle the rest of your day. It is also higher in protein and fiber than its counter- part, white rice.

Ingredients:

1 ½ cups		Dry rice or instant brown rice (same nutritional content)
1	cup	Green beans, raw or frozen
2		Peppers, chopped (any color)
2 ½ cups		Pineapple, canned or fresh

¼ tsp	Salt
½ Tbsp	Chinese five spice
45 pieces	Shrimp, cooked
1 ¼ cup	Peanut halves
1 Tbsp	Oil
½ cup	Teriyaki sauce
½ cup	*Optional: chopped green onion

Directions:

1. Container suggestions: 5, 2 compartment container or large rectangular Tupperware.
2. Wash and chop peppers into ½ inch pieces, set aside.
3. Wash and chop green beans into 1- inch pieces, set aside.
4. If cooking shrimp (or other protein) from raw or frozen, remove from the freezer and let defrost in the fridge overnight. To cook, lightly oil a pan over medium heat. Once heated, cook shrimp, peppers and green beans with a vented cover. Season with salt, Chinese five spice and oil when cooking.
5. If cooking rice, follow directions on package for rice cooker or stove top (same direction for using instant rice). Add a pinch of salt to the water.
6. Once shrimp is cooked, let cool for 10 minutes.
7. Open cans of pineapple and set aside. If using fresh pineapple, cut into ½ inch pieces.
8. Portion out ¾ cup of rice into each container. Next, portion 1 ½ cups of the shrimp and veggie mix into the smaller portion. Lastly, portion ½ cup of cut pineapple on top of the shrimp.

Nutrition facts: Calories 645 **Carbs** 80 g **Protein** 37 g **Fat** 22 g **Fiber** 9 g

Turkey and Taters

Get the Thanksgiving feels from this meal prep without the extra LB's. Ground turkey is a lean alternative to fattier cuts of ground beef, and still packs a lot of flavor! Adding garlic and onion when cooking helps to add even more flavor, and some great sources of prebiotics (feeds the

probiotics that live in your gut). Adding chopped walnuts on top of a baked sw eet potato is a great way to add some crunch and healthy fats to an other- wise boring health food.

Ingredients:

5 medium	Sweet potatoes
5 cups	Green beans, raw or frozen
2 lbs	Ground turkey
1 Tbsp	Garlic powder
½	Red onion, finely chopped
¼ tsp	Nutmeg & cinnamon, each
¼ tsp	Salt
1 ¼ cup	Chopped walnuts
1 Tbsp	Oil

Directions:

1. Container suggestions: 5, 2 compartment container or large rectangular Tupperware.
2. Preheat oven to 450F.
3. Wash and chop green beans into 1- inch pieces, season with garlic powder, set aside.
4. Wash sweet potatoes and cut into ¼ inch- thick fries. Lightly drizzle a baking sheet with oil. Line the cut potatoes evenly across the baking pan. Drizzle lightly with oil, and season with salt, nutmeg and cinnamon. Bake the fries at 450F for 20 minutes, turning them halfway through.
5. If turkey is frozen, remove from the freezer and let defrost in the fridge overnight. To cook, lightly oil a pan over medium heat. Once heated, cook veggies and garlic for 5 minutes. Add turkey to pan and cover for 5 minutes. Continue cooking the turkey and veggies until the turkey is golden brown.
6. Once turkey is cooked, let cool for 10 minutes.
7. Portion out 1 (about 5- 6 pieces) sweet potato into the large portion of the meal prep container. Top with ¼ cup chopped walnuts.
8. Portion out 1 cup of the ground turkey and veggie mix into the smaller portion of the prep container.

Nutrition facts: Calories 490 **Carbs** 40 g **Protein** 33 g **Fat** 25 g **Fiber** 10 g

2 ½ cups	Whole wheat macaroni noodles
2 ½ cups	Marinara sauce (your preferred choice- I suggest one with olive oil and no sugar added)
20	Turkey or lean beef meatballs
½	Red onion, finely chopped
5 cups	Cauliflower florets (raw or frozen)
¼ tsp	Salt
1 Tbsp	Oil
1 can	*Optional: black olives

Directions:

1. Container suggestions: 5, 2 compartment container or large rectangular Tupperware.
2. Follow package directions for cooking macaroni.
3. While macaroni is cooking, finely chop ½ of a red onion and set aside.
4. To cook meatballs: heat a large saucepan over medium heat and lightly coat with olive oil. Once heated, add red onions and sauté for 3 minutes.
5. Add meatballs to the pan and drizzle with a bit more oil. Cover with a vented lid and cook according to package. When meatballs are nearing done, add marinara sauce and cover for a remaining 5 minutes.
6. In a microwave or steamer, steam cauliflower for 10 minutes.
7. When macaroni is drained and cooled, pour back into pot and drizzle with oil, tossing all the noodles so each gets coated.
8. Portion out 1 cup of macaroni into the large portion of the prep container. Top with 4 meatballs.

9. Portion out 1 cup of steamed cauliflower into the smaller portion of the prep container (add

Nutrition facts: Calories 430 **Carbs** 54 g **Protein** 23 g **Fat** 14 g **Fiber** 7 g

Health Nut Bowl

Tilapia is a super source of lean protein, and very reasonably priced! It can take on the flavor of whatever you cook it with, so it is a great fish to experiment new flavors with. This dish pairs it with savory and citrus notes, however you can grill it with pineapple and orange slices, as well as bread it and bake it for some other variations. Quinoa is a whole grain that has received a lot of attention for its high protein and fiber content. It can be a pain to cook, so if you find this challenging, opt to a pre-cooked and packaged quinoa (you can find these at Wal-Mart and the commissary) or substitute for brown rice.

Ingredients:

5 large	Frozen or fresh Tilapia filets
2 cups	Dry quinoa (or 3 ¾ cups of pre-cooked quinoa)
1	Lemon, thinly sliced into rounds
2 Tbsp	Dill or parsley, dried
5 cups	Green beans, raw or frozen
1 ¼ cups	Sunflower seeds, raw or roasted
¼ tsp	Salt and pepper
1 Tbsp	Oil

Directions:

1. Container suggestions: 5, 2 compartment container or large rectangular Tupperware.
2. If fish is frozen, place in fridge for 8 hours to defrost.
3. Preheat oven to 400F. Spray a large baking sheet or drizzle with oil to coat. Line tilapia out evenly across pan.
4. Wash the lemon and slice into round, thin pieces. Place 2 pieces over the tilapia. Sprinkle with dill or parsley. Place in the oven and bake for 10- 12 minutes.
5. Once quinoa is cooked, set aside to cool. Drizzle with olive oil and stir to coat the grain.
6. In the microwave or steamer, steam green beans for 10 minutes.
7. Once tilapia is cooked, set aside to cool.
8. Portion out ¾ cup of quinoa into the large portion of the meal prep container. Place a tilapia filet (with or without lemon slices) on top of the quinoa. Sprinkle with salt and pepper.

9. Portion out 1 cup of green beans into the smaller portion of the container. Top with a very small amount of oil and sprinkle with 2 Tbsp of sunflower seeds for a good source of omega 3's.

Nutrition facts: Calories 585 **Carbs** 60 g **Protein** 40 g **Fat** 25 g **Fiber** 12 g

Pesto Chicken Stuffed Peppers

Did you know that just half of one bell pepper gives you your entire days' worth of vitamin C? Not only is vitamin C essential for your immune system, but it is also a pre-cursor for the building of collagen, the protein that supports muscle tissue and partly makes up tendons, ligaments and skin.

Ingredients:

large	Frozen or fresh chicken breasts
cups	Dry quinoa (or 3 ¾ cups of pre-cooked quinoa)
large	Bell peppers (yellow, orange or red)
stalks	Green onions
¾ cups	Pesto
¼ cup	Lemon juice
tsp	Salt and pepper
¼ cup	*Optional: chopped parsley

Directions:

1. If chicken is frozen, place in fridge for 8 hours to defrost.
2. Bring a pot of water to a boil. Reduce to a gentle simmer, add chicken and cover. Let simmer until chicken is cooked through, about 15 to 20 minutes. Remove chicken and shred into pieces using two forks.
3. While your chicken cooks, cook your quinoa according to the directions on the package.
   Fluff with a fork and set aside.
4. Preheat your oven to 375ºF (191ºC).
5. Cut the tops off of the peppers and discard the seeds and ribs. Place peppers upside down in baking dish and add 2 Tbsp water. Cover with foil and bake for 25 minutes.
6. While peppers are baking, combine the cooked quinoa, shredded chicken, green onion, pesto, lemon juice and sea salt. Mix well and set aside
7. Remove the peppers from the oven. Carefully remove the foil and turn right-side up. Drain any excess water from the baking dish.

8. With the peppers sitting upright, spoon equal amounts of the pesto chicken filling into each. Cover with foil again, then bake for an additional 20 minutes, or until filling is warmed through and peppers are very tender.
9. Remove the stuffed peppers from the oven and let cool for 10- 15 minutes.

Nutrition facts: Calories 600 **Carbs** 60 g **Protein** 40 g **Fat** 25 g **Fiber** 15 g

Greek Chicken Pizza

Chickpeas are a legume known for their high fiber and protein content. Not only are they nutrient dense, but they are used to make a variety of tasty foods, like hummus, crispy salad toppers and can be added to baked goods to moisten them and add flavor.

Ingredients:

small	Frozen or fresh chicken breasts
can	Chickpeas (garbanzo beans)
large	zucchini
cups	Fat free plain Greek yogurt
Tbsp	Fresh dill (or dried)
Tbsp	Olive oil
whole	Whole wheat pitas
¼ cup	Shredded mozzarella
tsp	Salt

Directions:

1. If chicken is frozen, place in fridge for 8 hours to defrost.
2. Bring a pot of water to a boil. Reduce to a gentle simmer, add chicken and cover. Let simmer until chicken is cooked through, about 15 to 20 minutes. Remove chicken and shred into pieces using two forks.
3. Preheat the oven to 450 F.
4. Drain and rinse chickpeas thoroughly. Once rinsed, transfer to a small mixing bowl.
5. Pour olive oil and salt into chickpeas and toss the beans until coated. Evenly distribute on a small baking pan. Bake for 8-10 minutes.

6. In another small mixing bowl, combine plain Greek yogurt, dill and salt using a large spoon to make homemade Tzatziki sauce.
7. Wash and finely dice a zucchini and set aside.
8. Lay out whole wheat pitas and top with 2 large spoonsful of tzatziki. Then evenly distribute shredded chicken, zucchini, crispy chickpeas and mozzarella cheese.

Nutrition facts: Calories 565 **Carbs** 55 g **Protein** 50 g **Fat** 18 g **Fiber** 9 g

Balsamic Glazed Chicken

Chicken doesn't have to be boring, nor should it be! Chicken is a great source of high- quality protein that can be prepared many ways, such as grilling, baking, boiling, roasting and frying. Depending on your nutrition goals, the way you prepare this meat can either help or hinder your progress. For a lower calorie chicken option, stick with chicken breast and low- fat marinades (as featured in this recipe) and opt for baking, grilling or roasting.

Ingredients:

5	Frozen or fresh chicken breasts
1 ½ cups	Brown rice (uncooked)
2 large (5 cups)	Broccoli crowns, chopped (you can use fresh or frozen)
2 Tbsp	Dijon mustard
¼ cup	Balsamic vinegar
2 Tbsp	Olive oil
1 Tbsp	Dried oregano
1 tsp	Black pepper
1 Tbsp	Honey
1 tsp	Garlic powder
1 tsp	Salt

Directions:

1. Preheat oven to 400ºF and line a baking sheet with parchment paper.
2. Place chicken in the center of the baking sheet and arrange the broccoli in a single layer around the chicken. Drizzle oil over chicken and veggies then add half of the salt, pepper and garlic powder. Using your hands, toss or rub the spices evenly all over the chicken and the broccoli. Bake in the oven for 15 minutes.
3. Using a rice cooker, cook rice according to package (or use instant brown rice).
4. Meanwhile, whisk the Dijon mustard, balsamic vinegar, oregano, honey and remaining salt together. Set aside.

5. After the chicken has baked for 15 minutes, remove from oven and brush half the Dijon mixture on top of the chicken and lightly over the broccoli. Return to oven and bake for 10 more minutes.
6. After 10 minutes, repeat step 4 with remaining Dijon mixture. Place back into the oven and continue to bake for 5 to 10 more minutes, or until chicken is cooked through and broccoli is very tender.
7. Remove from oven and serve immediately. Your plate should have 1 chicken breast, 1 cup of broccoli and ½ cup brown rice.

Nutrition facts: Calories 360 **Carbs** 35 g **Protein** 30 g **Fat** 11 g **Fiber** 4 g

Triple Threat Protein Bake

Incorporating one plant- based meal per week improves your health, grocery expenses and the environment. This recipe includes three super sources of plant- based protein and complex carbs. Combining a whole grain (quinoa) and a legume (black bean) makes a complete protein- meaning it contains all the essential amino acids our bodies require to repair and build muscle tissue.

Ingredients:

2 large	Sweet potatoes (yams)
1 can	Black beans
¾ cup	Quinoa (uncooked)
1 large	Bell pepper of choice
2 stalks	Green onion
2 Tbsp	Olive oil
2 tsp	Chili powder
2 tsp	Cumin
2 tsp	Salt
1 1/3 cup	Vegetable broth
2 ½	Sliced avocados
1 lime	Juiced
¼ cup	*Optional: chopped cilantro

Directions:

1. Preheat oven to 375°F.
2. Drain and thoroughly rinse the black beans, set aside.
3. Wash and cut the sweet potato into 1- inch pieces.
4. Wash and cut the bell pepper into 1- inch pieces.
5. In a large baking dish, add the sweet potatoes, black beans, quinoa, pepper, onion, chili powder, cumin, garlic and sea salt. Stir well to combine and then add the broth.
6. Cover the baking dish with foil and bake for 40 minutes or until the broth has absorbed completely, the quinoa is fluffy and the sweet potatoes are tender. Remove from the oven.
7. Let the quinoa bake sit for 5 minutes before dividing between plates. Top each plate with lime juice, cilantro and avocado.

Nutrition facts: Calories 360 **Carbs** 35 g **Protein** 30 g **Fat** 11 g **Fiber** 4 g

Hummus- Crusted Pork Chops with Turmeric Rice

Spices have been used for centuries as a holistic medicinal remedy for things such as stomachache, acne, wounds and inflammation. Ginger is a popular spice for stomach aches, cinnamon is a popular spice for energy control and turmeric is a popular spice for its anti- inflammatory properties. Not everyone is a fan of these spices but finding ways to incorporate (sneak) them into dishes or drinks is a great way to introduce these healing spices into your daily diet.

Ingredients:

5	Pork Chops
1 container	Hummus of choice
1 ¼ cup	Wild rice (or brown)
2 large	Heirloom tomatoes
2 tsp	Turmeric
2 Tbsp	Olive oil
5 cups	Fresh or bagged spinach

Directions:

1. Preheat oven to 375ºF and line a baking sheet with parchment paper.
2. Place pork chops on the baking sheet and coat with hummus. Lightly drizzle with olive oil. Bake for 30 minutes or until cooked through.

3. Meanwhile, make the rice (using a rice cooker) according to the directions on the package, adding in the turmeric and chopped tomato while cooking. Add salt and pepper for seasoning once rice is cooked and cooling down.
4. Divide the pork chops, ½ cup of rice and 1 cup of spinach onto plates. Enjoy!
5. For leftovers- stuff cut pork chops, rice and spinach into a whole wheat pita and warm up for 45 seconds.

Nutrition facts: Calories 390 **Carbs** 30 g **Protein** 30 g **Fat** 16 g **Fiber** 3 g

Substitutions

Each household has their favorite staples. These are foods that are familiar, easy to cook with, reasonably priced, and versatile. Examples of these include rice, beans, bread, chicken, eggs, butter, and vegetable oil. These foods can easily be substituted with items that keep the dish intact, but can pack a new flavor and/or texture component to the dish.

Pro-Tip

Are you new to brown rice, whole wheat pasta or a certain vegetable? Try mixing the old food with the new!
For example, make stir-fried rice with ½ cup jasmine rice and ½ cup brown rice.

Proteins

Chicken → *tofu, *tempeh, lean beef, pork chops

Ground turkey → ground chicken, black bean burger

Turkey meatballs → *falafel, 95% lean beef meatballs

Salmon → *teriyaki-marinated tofu, tilapia, cod, shrimp, tuna
Mozzarella → feta, ricotta, parmesan, *nutritional yeast
Eggs → *extra firm (crumbled) tofu, *mashed chickpeas, *edamame

Fats

Olive oil → avocado, EVOO

Avocado → olives, pesto

Coconut oil → peanut, sesame

Peanut butter → almond, cashew

Sunflower seeds → pumpkin seeds

Grains

Rice → quinoa, barley, millet, farro, cous cous

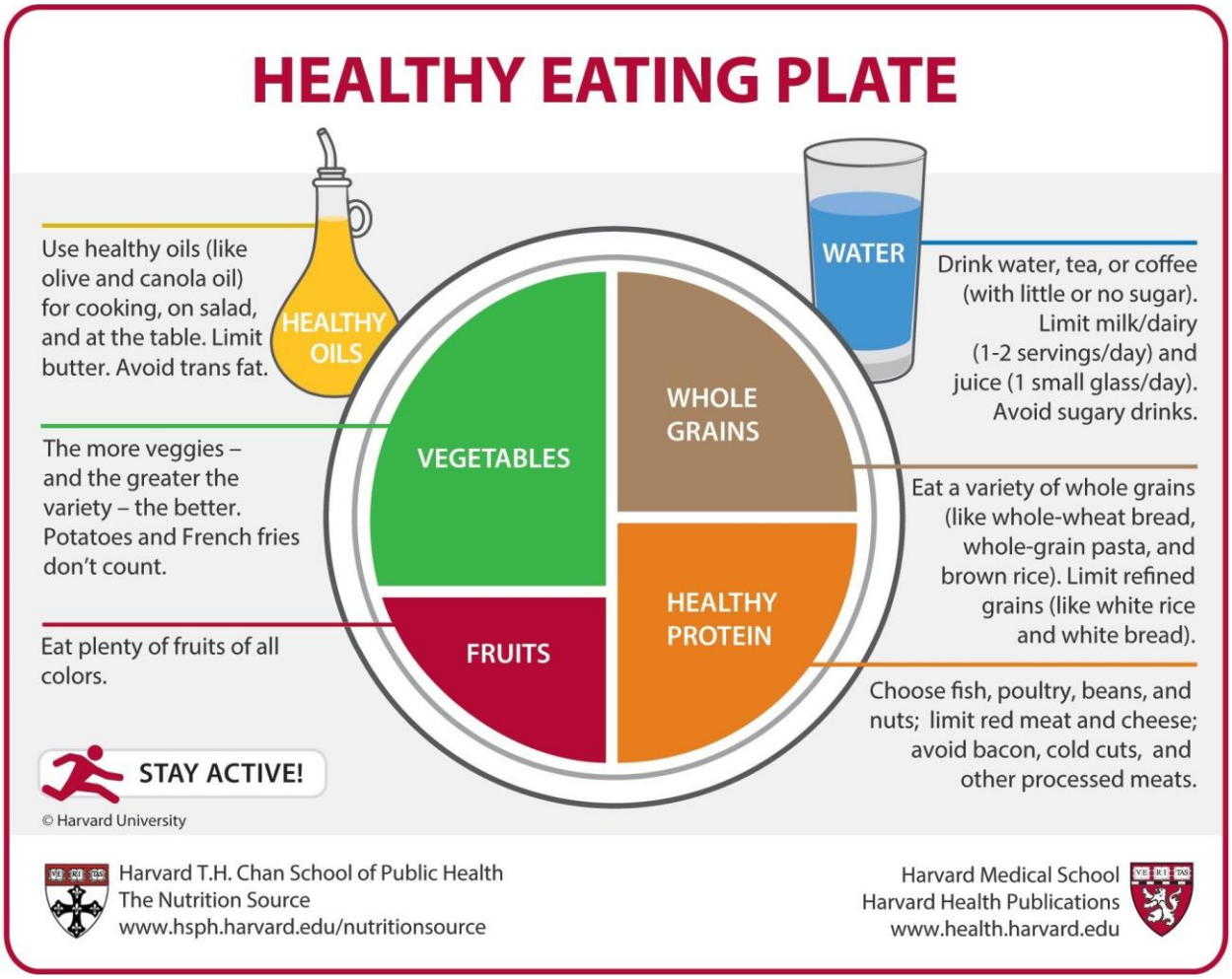
Potato → sweet potato, purple sweet potato, fingerling potatoes

Whole Wheat wrap → whole wheat pita bread, whole wheat pizza crust

Macaroni pasta → whole wheat spaghetti or penne, rice noodles, soba noodles

***** *Denotes plant- based substitutions*

Appendix F: Harvard Healthy Eating Plate



Appendix G: COPSS educational handout