

THE USE OF A CULINARY MEDICINE COURSE TO IMPROVE
NUTRITION KNOWLEDGE, ATTITUDES, AND BEHAVIORS
OF TEACHERS IN THE K-12 SETTING

by
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ABSTRACT

Background: Research indicates that multiple chronic diseases can be prevented through improved nutrition, and specifically, the Mediterranean Diet. An increased Mediterranean Diet Score is associated with a reduced risk for chronic disease. The purpose of this study was to determine the association between a short-term Mediterranean Diet culinary medicine course and the resulting Mediterranean Diet Scores (MDS) of educators and staff employed at a local private school in Fort Worth, Texas.

Methods: In this prospective longitudinal study, 22 K-12 educators and staff from All Saints' Episcopal School in Fort Worth, Texas completed: 1) a pre-survey; 2) a two-week, six-hour Mediterranean Diet culinary medicine course at Texas Christian University (TCU); and 3) a post-survey. The pre- and post-surveys utilized the short, nine-question Oldways' Rate Your Med Diet Score. Study procedures were approved by the TCU IRB, and participants' informed consent was obtained. Data was analyzed to meet study objectives (Excel, $p \leq 0.05$).

Results: Participants' mean pre-intervention MDS was 5.15 (0-9 scale). Participants' mean post-intervention score was 5.96. This increase in MDS was statistically significant using a two-tailed p-value of 0.026. Ninety-two percent of participants' MDSs increased from pre- to post-intervention, with 38.5% of participants reporting a MDS ≥ 6 prior to intervention and 69.2% of participants reporting a MDS ≥ 6 post-intervention.

Conclusions: A short-term Mediterranean Diet culinary medicine course was associated with a favorable increase in the Oldways Rate Your Med Diet Score. This is concurrent with previously published scientific literature which indicates an increased MDS and reduced risk of chronic disease following culinary nutrition intervention.

Chapter I: Introduction

Chronic disease prevention has become a focal point of American health systems due to the commensurate rise in chronic disease prevalence in the United States. Chronic diseases are health conditions that last longer than one year and require ongoing medical attention.³ Some examples include diabetes, hypertension, cancer, cardiovascular disease, and obesity. Per the Centers for Disease Control and Prevention (CDC), more than 34 million Americans have diabetes, and more than 88 million Americans have prediabetes.³ Furthermore, stroke, heart disease, and other cardiovascular diseases are responsible for 1 in 3 deaths in the United States, while cancer is the second leading cause of death for Americans.³ Overall, 6 in 10 adults in the United States have one chronic disease, with many experiencing more than one.³ Such prevalence of chronic disease is not only concerning, but can cause communities to feel helpless. However, improved nutrition is one powerful prevention factor to avoid chronic disease occurrence and progression.

Specifically, the Mediterranean Diet, which emphasizes fruits and vegetables, whole grains, legumes and beans, nuts and seeds, fish, olive oil, and minimal alcohol, sweets, and red meat, has proven itself to be a strong competitor against chronic disease.¹⁵ For example, one foundational study from 2009 found that a 2-point increase in Mediterranean Diet Score (MDS) is associated with a 25% decrease in risk of all-cause mortalities.²³ Despite this profound reduction on all-cause mortality, implementing the Mediterranean Diet in non-Mediterranean countries without educational intervention can be difficult. Therefore, this study sought to observe the impact of a short-term Mediterranean Diet culinary medicine course on American educators' nutrition habits, and thus their resultant chronic disease risk.

Chapter II: Literature Review

The Mediterranean diet consists of various plant-based foods, including beans, nuts, vegetables, fruits, whole grains, and herbs.¹⁵ Ancel Keys was the first to observe the Mediterranean Diet's effects on coronary heart disease, and thus led later researchers to investigate the diet's effects on various other chronic diseases.⁴ Keys specifically characterized the Mediterranean Diet to be low in saturated fat and high in vegetable oils.⁴ His Seven Countries Study was a landmark study for the Mediterranean Diet, establishing its reputation of increasing overall health and decreasing risk for chronic disease.⁴

Components of the Mediterranean Diet

The Mediterranean Diet's key components include a high intake of olive oil, vegetables, fruits, whole grains, nuts, and legumes. The diet considers these food groups pertinent to consume daily.⁴ Additionally, the Mediterranean Diet recommends a moderate intake of fish, meat, dairy, and red wine. These foods designated for moderate intake are encouraged two to three times per week, or weekly in moderate portions.⁴ Lastly, the diet recommends that eggs and sweets be consumed only for special occasions or in small amounts.⁴ Oldways Preservation Trust has depicted this diet in a pyramid diagram, in which individuals can visually organize different food groups to consume and their relative quantities.¹⁵ For example, the foods recommended for high intake share a large portion at the base of the pyramid, while all other foods are placed in descending order of consumption frequency or amount as one moves up the pyramid.

Benefits of the Mediterranean Diet

The Mediterranean Diet has a plethora of benefits, but four specific categories have been identified that emphasize its widespread capabilities. These four categories include major health and nutrition benefits, low environmental impacts and richness in biodiversity, high sociocultural

food values, and positive local economic returns.⁵ The major health and nutrition benefits of the Mediterranean Diet are extensive and widely accepted among the nutrition community. These include decreased chronic disease risks, increased longevity, and keeping individuals agile.⁵ Additionally, persons who adhered to the Mediterranean Diet fulfilled their micronutrient requirements better than any individuals on a typical Western diet, had a healthier body weight and lower waist circumference, and experienced lower incidences of metabolic syndrome and type 2 diabetes in a 2017 study.⁵ The Mediterranean Diet is also known to have low environmental impacts and is rich in biodiversity. Because the diet is primarily plant-based with a low consumption of animal products, the diet reduces the carbon footprint and greenhouse gas emissions.⁶ Livestock produces 20% of the world's greenhouse gas emissions, and because the Mediterranean Diet recommends low consumption of red meats and higher consumption of fish or climate-friendly meats (poultry), adherence to the diet undoubtedly reduces the carbon footprint.⁶ Additionally, the Mediterranean Diet has high sociocultural food values. These values include diversified heritage through embracing various Mediterranean cultures and practicing intimate familial times through meals.⁵ Specifically, the Mediterranean Diet has become a staple aspect of the Spanish, Italian, Greek, and Moroccan cultures, as the diet represents various countries that encompass the Mediterranean region while promoting conviviality.¹⁹ Lastly, the Mediterranean Diet has positive local economic returns by empowering local food producers and their products. One study conducted in 2019 revealed that individuals from Italian households who followed the Mediterranean Diet were more likely to buy local foods, which not only supported local businesses and farmers, but also worked toward reducing greenhouse gas emissions and the total carbon footprint.¹

The Mediterranean Diet in Daily Lives

The Mediterranean Diet originated in countries surrounding the Mediterranean Sea; however, many studies have shown that the diet can be transferred to non-Mediterranean countries, the medical field, and working populations if intervention occurs. For example, the Mediterranean Diet has become widespread across the globe, and in the United States components of the diet have impacted the 2015-2020 Dietary Guidelines for Americans.²⁵ In addition, the Harvard School for Public Health provides public resources (cookbooks, articles, restaurant recommendations) that promote the Mediterranean Diet's habits.²¹ Beyond the general American public, the Mediterranean Diet is also becoming prominent within the medical field. The diet was introduced to the medical field approximately 50 years ago and immediately became known as one of the healthiest lifestyle patterns. Numerous subsequent studies have shown improved cardiovascular, metabolic, cognitive, and anti-neoplastic conditions, while significantly increasing one's quality of life, when following the Mediterranean Diet.¹⁰ These positive effects can be attributed to food synergy, the result of multiple interactions reciprocally enhancing one another's positive effects.¹² In other words, the various nutrient combinations within the Mediterranean Diet allow multiple health conditions to be treated simultaneously. While low red meat intake may decrease one's risk of exposure to carcinogens and thus reduce the risk of developing cancer, the high consumption of whole grains can work toward reducing one's risk for heart disease. This is just one example of the simultaneous health benefits that are provided by adhering to the Mediterranean Diet. It is also worth noting that the Mediterranean Diet has shown to be effective in working-class populations. In a study consisting of 738 employees, a nutritional intervention program promoting Mediterranean Diet ideals in a minimally intensive approach improved the dietary habits of this working population over three

years.²⁴ This study displays the working population's willingness and ability to adopt Mediterranean Diet practices, even while working long days and living a busy lifestyle.

The Mediterranean Diet, Cancer, and Cardiovascular Disease

Olive oil is an imperative component to the Mediterranean Diet. It contains a high percentage of monounsaturated fatty acids, which are beneficial to one's health regardless of their food source. Both *in vitro* and *in vivo* studies have shown that olive oil, as well as other Mediterranean food components, play a key role in the prevention of cancer by inactivating carcinogens, decreasing cell proliferation, inducing cell apoptosis, and inhibiting angiogenesis.¹⁴ Additionally, cardio-protective effects were observed in these same foods through the decrease of oxidative stress and inflammation, modulation of carbohydrate digestion through the reduction of glucose absorption, improved blood lipid levels, and improved blood pressure.¹⁴ Such positive effects can be attributed to these foods' contribution to cellular antioxidant defenses, inflammation, metabolism, survival, and proliferation.¹⁴ In a separate study published in 2015 using samples from urban populations in central and eastern Europe, the Mediterranean Diet was found to reduce the risk of both cardiovascular disease (CVD) and mortality related to CVD.²³ The Mediterranean Diet Score was used to assess the participants' adherence to the Mediterranean Diet, and the score was found to be a positive indicator of both a healthy diet and reduced mortality risk.

The Mediterranean Diet and Diabetes

Studies have shown a widespread improvement of health outcomes for individuals with Type 1 diabetes or Type 2 diabetes when following the Mediterranean Diet. A 2019 Spanish study indicated that a higher adherence to the Mediterranean Diet was correlated to an increased quality of life in those with Type 1 diabetes.⁸ Additionally, a 2015 study displayed the

Mediterranean Diet's effects on those with Type 2 diabetes and concluded that the Mediterranean Diet displayed the most glycemic control and reduction of cardiovascular risk factors when compared to other low-fat diets.⁷ Additionally, they found the Mediterranean Diet to reduce the risk of future diabetes by 19-23%.⁷ Although Type 1 and Type 2 diabetes are inherently different, the Mediterranean Diet has shown to improve both disorders' symptoms and progression.

The Mediterranean Diet and Depression

While the Mediterranean Diet's original focus was on cardiovascular disease risk, the diet has now been attributed to decreasing the risks of even mental health disorders, such as depression. In a 2017 study performed in New Zealand, a Mediterranean Diet supplemented with fish oil improved the depression and overall mental health-related quality of life when compared to the control group after three months of intervention.¹⁸ At six months, these positive effects were maintained.¹⁸ This study also found that a higher MDS correlated to reduced depression and anxiety, as well as better coping practices, over six months.¹⁸

The Mediterranean Diet, the Heart, and Stroke

The Mediterranean Diet has also shown significant effects in reducing the risk of myocardial infarctions and heart disease. In a 2019 study in Milan, Italy, adherence to the Mediterranean Diet displayed benefits in cardiovascular prevention against congenital heart disease.²² Specifically, higher survival rates were associated with certain Mediterranean Diet characteristics, such as ethanol (wine), low consumption of meat, and high consumption of vegetables, fruits, nuts, fish, legumes, and olive oil.²² To note, the risk of stroke was also reduced when individuals adhered to the Mediterranean Diet.²²

The Mediterranean Diet and Liver Disease

Nonalcoholic fatty liver disease (NAFLD) has increased in severity and prevalence worldwide, affecting up to 1/3 of the population.²⁰ Insulin resistance, oxidative stress, and inflammation are each correlated with NAFLD, but can all be improved by the Mediterranean Diet's components.²⁰ To add, previous studies have concluded that the Mediterranean Diet contributes to the treatment of liver disease. Specifically, a study in 2019 measured the liver fat percentage before and after implementing a Mediterranean Diet supplemented with extra-virgin olive oil or nuts. The researchers concluded that a lower liver fat percentage correlation was observed in the group consuming a Mediterranean Diet + extra-virgin olive oil.²⁰

The Mediterranean Diet Score (MDS)

One way to assess an individual's adherence to the Mediterranean Diet was created and displayed in what is now known as the Mediterranean Diet Score (MDS). The official questionnaire consists of 14 questions, and each question asks about consumption or avoidance of various components of the Mediterranean Diet.¹¹ For example, question #1 asks: "Do you use olive oil as main culinary fat?", and question #2 asks "How many times per week do you consume commercial sweets or pastries, such as cakes, cookies, biscuits, or custard?"¹¹ Researchers hypothesize the higher one's MDS, the lower one's risk of chronic disease.²³ In one Spanish study using 7,447 participants, there was found to be an inverse, statistically significant association between the MDS and both general obesity and abdominal obesity.¹¹ Specifically, when observing this inverse relationship between the MDS and obesity, a 2-point increase in the MDS was shown to decrease the incidence of obesity in both men and women.¹¹ To note, a 2-point increase in the MDS is correlated to a 25% decrease in mortality from all-causes.²³

Therefore, analysis of the diet's relationship with obesity is helpful because obesity can indicate higher risks for various other chronic diseases.

The MDS is a valid and reliable indicator of one's chronic disease risks, especially in comparison to other diet quality indexes. In a 2016 study using a sample of Puerto Rican adults, the MDS was associated with a favorable cardiometabolic profile over a 2-year period.¹³ This profile included body mass index (BMI), waist circumference, insulin resistance, and log-C reactive protein.¹³ Weaker associations to an improved cardiometabolic profile were observed using the Alternate Healthy Eating Index (AHEI).¹³

Seven Countries Study

The Seven Countries Study was the first study to recognize the effectiveness of the Mediterranean Diet on risk of coronary heart disease (CHD). Ancel Keys conducted this study which included 12,225 men ages 40-59 without cardiovascular disease.⁹ These individuals were divided into 15 cohorts over seven countries.⁹ Both 5 and 10-year examinations were conducted.⁹ The primary hypothesis of the study was that the rate of coronary heart disease (CHD) in populations would vary due to individual physical characteristics and lifestyle, specifically regarding the fat composition of their diets and serum cholesterol levels.⁹ In all, Keys and the researchers aspired to make associations between diet, other risk factors, and disease rates based on different population samples. In the end, Keys found that the seven countries differed in all-cause death rates and especially differed in coronary mortality.⁹ Those living in Japan and Southern Europe had the lowest rates of coronary death, while the United States, East Finland, and West Finland had the highest rates of coronary death.⁹ Such coronary heart disease deaths were determined to be largely due to serum cholesterol and blood pressure, and this study identified serum cholesterol, blood pressure, diabetes, and smoking as universal risk factors to

developing CHD.⁹ In all, the Seven Countries Study observed that CHD can be prevented by nutrition, as improved nutrition fights against such risk factors. Southern Europe follows a largely Mediterranean diet, and Japan follows a loose Mediterranean Diet as a country with many coastal communities. The United States, East Finland, and West Finland do not follow Mediterranean diets, and consume larger quantities of saturated fat. Therefore, researchers building off Keys' landmark Seven Countries Study have associated the Mediterranean Diet to South Europe and Japan's lower CHD mortality incidences.

While Keys' study was groundbreaking for the Mediterranean Diet, there was and still is controversy surrounding this study. Henry Blackburn, affiliated with the Division of Epidemiology and Community Health at the University of Minnesota, argued that Keys' conclusions were far too causative for having only 15 cohorts.² Additionally, he argued that using six independent variables was too extensive, as specific relationships could not confidently be determined.² Furthermore, some argue that Keys intentionally chose specific populations because previous experiments already predicted what their CHD prevalence, CHD death, and all-cause mortality rates were. These individuals argue that he chose these specific populations because they supported his hypothesis. However, to this day these same locations have consistent CHD and all-cause mortality rates. For example, a 2016 update of Europe's cardiovascular disease prevalence displayed that southern European countries (Italy, Spain) had lower cardiovascular disease prevalence than northern or eastern European countries.¹⁶ While Keys may have been selective in choosing his populations, his data was genuine and presented associations that truly exist.

In all, the Mediterranean Diet has shown its ability to increase longevity through the reduction of both chronic disease risk and mortality. Additionally, the Mediterranean Diet

upholds tradition, is an environmentally sustainable diet, and is economically profitable for local areas. Specifically, the Seven Countries Study was a landmark study in not only displaying universal risk factors for CHD, but in also providing data that allowed for correlations between the Mediterranean Diet and lower CHD rates.

Chapter III: Experimental Design

Study Design

This study utilized a prospective, longitudinal design. There were two study visits (visit #1 and visit #2) that lasted three hours each. Both visits were held in the Nutritional Sciences laboratories in the Annie Richardson Bass Building at Texas Christian University during early Spring 2019. The Texas Christian University Institutional Review Board approved the study, and procedures followed were in accordance with the Helsinki Declaration of 1975 as revised in 1983. Written consent was obtained prior to beginning the study.

Participants

Twenty-two participants were recruited in the Spring of 2019 from faculty and staff currently employed in K-12 education at All Saints' Episcopal School in Fort Worth, Texas. However, several did not want to participate in the study (n=6) and three only completed one of the two studies and were excluded. Inclusion criteria included teachers and staff at the All Saints' Episcopal School in Fort Worth, TX, and participants had to be over the age of 18. No exclusion criteria applied.

Protocol

This study protocol consisted of two visits. At visit #1, participants completed a short, nine-question Oldways Rate your Med Diet Score survey prior to participating in Culinary Medicine. The questionnaires included the following yes/no questions regarding food consumption: 1) Vegetables: Two or more cups of vegetables a day; 2) Fruit: Two or more pieces of fruit a day; 3) Whole grains: Two or more whole grains a day; 4) Wine: ½ to 1 drink a day for women, 1 to 2 for men (but no more); 5) Fish: Fish 2 or more times a week; 6) Legumes/Beans: 2 or more servings a week; 7) Nuts/Seeds: A handful of nuts most days; 8) Fat:

Lots of olive oil and few other fats; 9) Red or processed meats: 2 servings or fewer a week.¹⁷ The range of scores was from zero to one (0=no to 1=yes). After completing the survey (pre-survey), participants participated in a 3-hour culinary medicine lesson on the Mediterranean Diet principles. The culinary medicine lesson incorporated Mediterranean Diet principles and utilized the following instructional format: 1) Welcome participants; 2) Brief introductions; 3) Lesson content; 4) Recipe review; 5) Knife skills; 6) Hands-on cooking by participants; 7) Plate presentations and nutrition analyses of recipes; 8) Communal dining and sharing of prepared dishes; 9) Cost analyses of recipes; 10) Lesson review; and 11) Question and answer session. At visit #2, participants completed a second, 3-hour culinary medicine lesson that followed the same instructional format as previously stated. At the end of visit #2, participants completed the same nine-question Oldways Rate your Med Diet Score survey. Question content on the pre- and post-questionnaires were identical.

Statistical Analyses

Excel was used for all analyses. Counts and percentages were calculated for the pre- and post-Med Diet Score surveys. Mean pre- and post-Mediterranean Diet Scores were tabulated. A score of 8-9 meant, “Long life! Your eating habits follow the Med Diet very closely.” A score of 6-7 meant, “You’re doing well. What would help you to add another point or two?”. A score of 4-5 meant, “A good start, but you can do better, if you value your health.” A score of 0-3 meant, “Time to turn your life around.”¹⁷ Paired t-tests were run to compare participants’ response change pre- and post- culinary medicine participation. Statistical significance was set at $p \leq 0.05$.

Chapter IV: Results

A t-Test (paired two sample for means) was used to analyze the change in participants' Rate Your Med Score (MDS) from pre-culinary medicine course to post-culinary medicine course. Participants' pre-intervention mean score was 5.15 with their post-intervention mean score being 5.96. This increase was statistically significant at $p= 0.026$. This statistically significant increase in mean MDS was observed after participation in only two hands-on culinary medicine courses (six total hours) with a focus on increasing consumption of Mediterranean Diet components.

Sixty-two percent of participants' pre-MDS was 5 or below, while 38% had a pre-MDS of 6 or above. A score of 5 or below indicates “A good start, you can do better, if you value your health,” or worse.¹⁷ A score of 6 or above indicates that “You’re doing well. What would help you to add another point or two?” or better.¹⁷ Following the six-hour culinary medicine intervention focused on the Mediterranean Diet, 31% of participants' MDS was 5 or below, while 69% of participants reported a MDS of 6 or above. Table 1 displays the percentage of scores reporting ≥ 6 and ≤ 5 for both the pre- and post-intervention surveys, as well as the meaning of each value in regards to one’s adherence.

Table 1: Percentage of Scores ≥ 6 versus ≤ 5 based on Pre- and Post-Intervention Mediterranean Diet Scores (MDS) Among Educators and Staff from Fort Worth All Saint's Episcopal School

	% Scores ≥ 6	% Scores ≤ 5
Pre-Intervention	38.5%	61.5%
Post-Intervention	69.2%	30.8%
If your score is... <ul style="list-style-type: none"> • <u>8-9</u> Long life! Your eating habits follow the Med Diet very closely. • <u>6-7</u> You’re doing well. What would help you to add another point or two? • <u>4-5</u> A good start, but you can do better, if you value your health. • <u>0-3</u> Time to turn your life around. 		

These Mediterranean Diet Scores were formulated based on each participant's scores regarding consumption of specific food categories, including vegetables, fruit, whole grains, wine, fish, legumes and beans, nut and seeds, fat, and red or processed meats.¹⁷ Table 2 below indicates participants' change in Mediterranean Diet adherence by food category from pre- to post-culinary medicine intervention.

Table 2: Participant Adherence to Mediterranean Diet by Food Category Pre- and Post-Intervention

Food Category	Pre-Intervention % Met	Post-Intervention % Met
Vegetables	85%	100%
Fruit	15%	38%
Whole Grains	46%	54%
Alcohol	54%	62%
Fish	31%	54%
Legumes/Beans	62%	62%
Nuts	77%	77%
Olive Oil	77%	77%
Red/Processed Meat	69%	69%

Table 2 indicates that participants' adherence either improved or remained the same following the culinary medicine intervention. While vegetables, fruit, whole grains, alcohol, and fish each improved in participant adherence, legumes and beans, nuts, olive oil, and red or processed meat each remained the same following the culinary medicine intervention. Each of charts 1-9 below display an individual Mediterranean Diet food category and its adherence change from pre-intervention to post-intervention among participants.

Chart 1: % Participants Consuming 2+ Cups Vegetables/Day

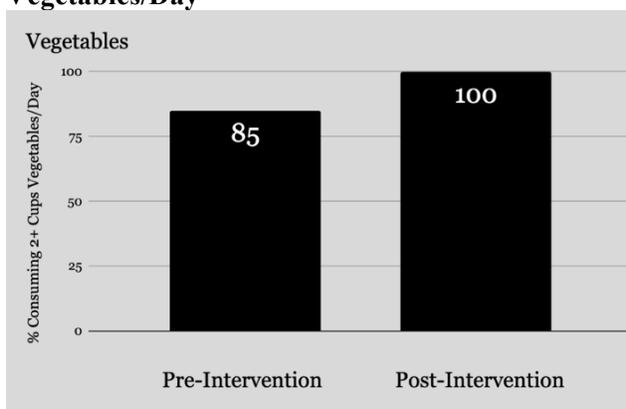


Chart 3: % Participants Consuming 2+ Whole Grain Servings/Day

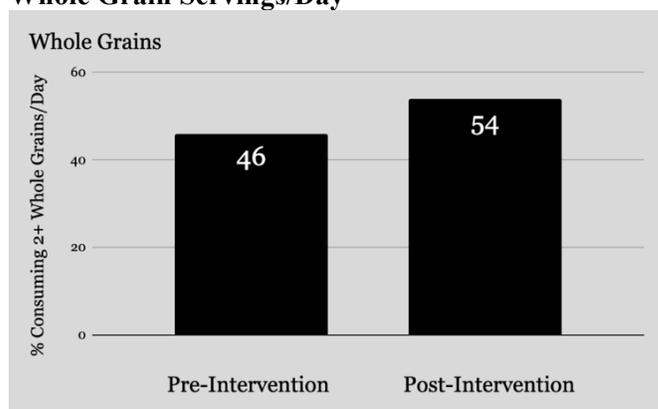


Chart 2: % Participants Consuming 2+ Fruit Pieces/Day

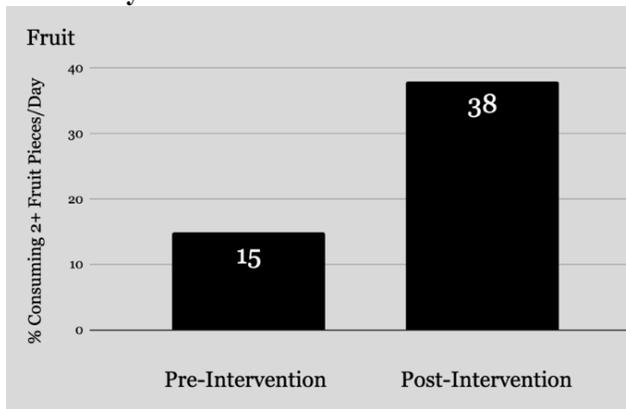


Chart 4: % Participants Consuming 1/2-1 Alcohol (W) or 1-2 Alcohol (M)/Day

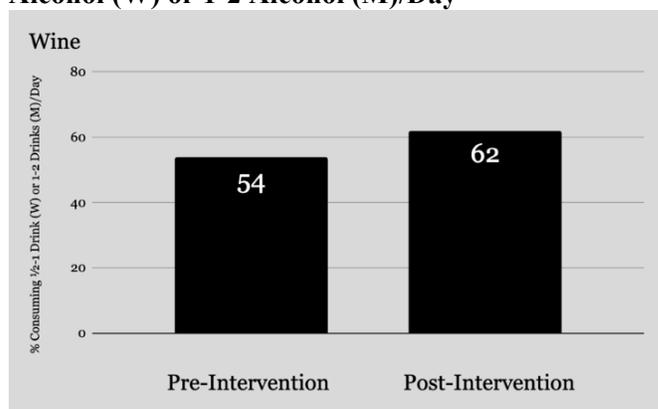


Chart 5: % Participants Consuming 2+ Fish Servings/Week

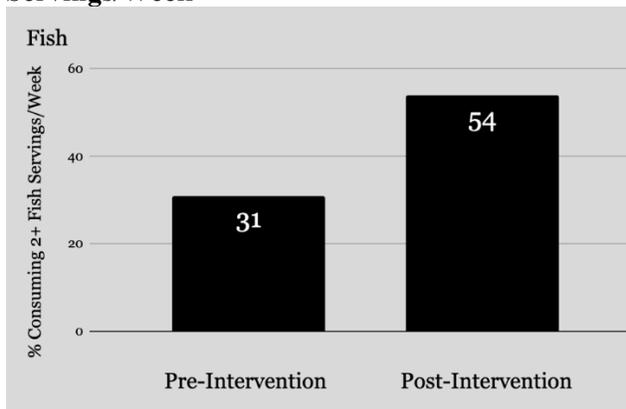


Chart 8: % Participants Consuming Mainly Olive Oil/Few Other Fats

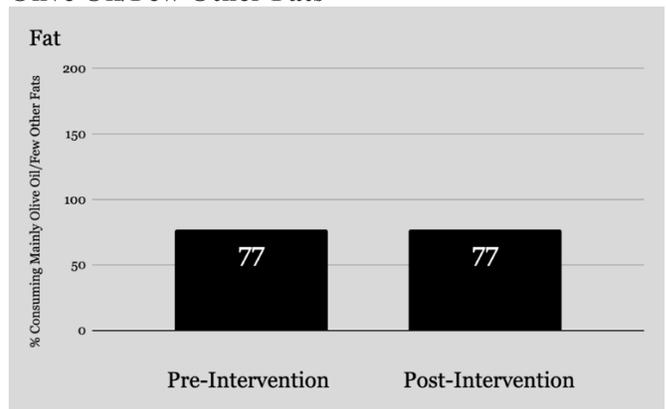


Chart 6: % Participants Consuming 2+ Legumes or Beans Servings/Week

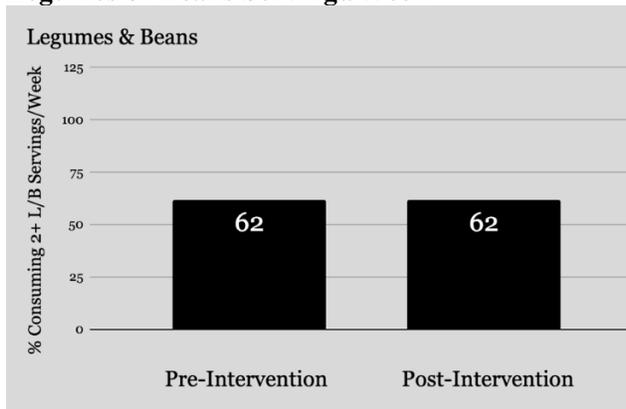


Chart 9: % Participants Consuming Red/Processed Meat 2 Times or Fewer/Week

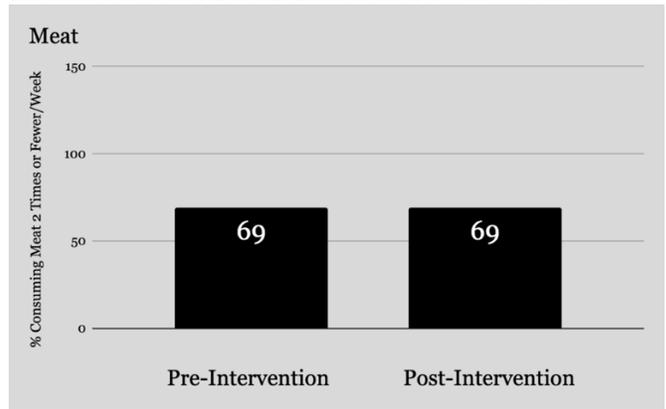
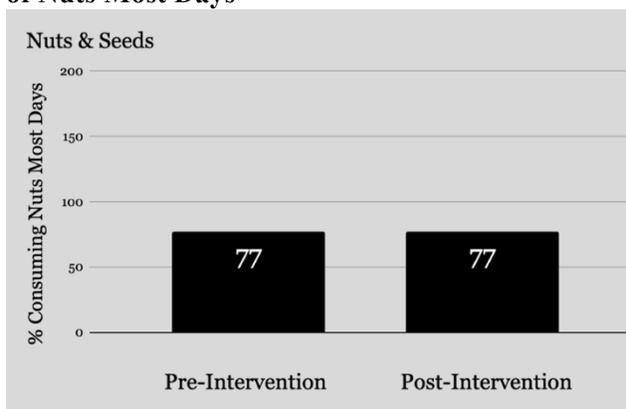
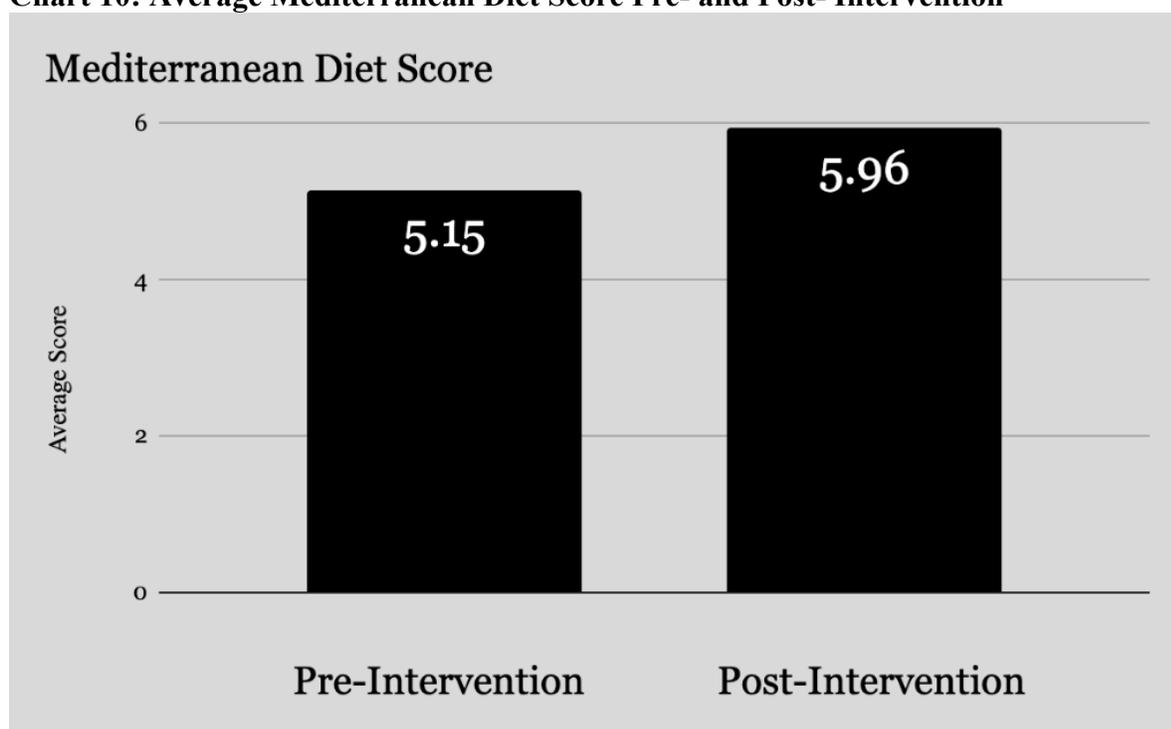


Chart 7: % Participants Consuming Handful of Nuts Most Days



Beyond individual Mediterranean Diet categories, the increase in average Mediterranean diet score from pre- to post-intervention was statistically significant. The average Mediterranean diet score pre-intervention was 5.15 ± 1.63 . The standard deviation of 1.63 indicates that most scores were within ± 1.63 from the average, otherwise stating that most scores were within the range from 3.52-6.78. Post-intervention, the average Mediterranean diet score was 5.96 ± 1.48 , indicating that most scores were within the range of 4.48-7.44. Chart 10 displays the average Mediterranean diet score from both pre- and post- intervention surveys.

Chart 10: Average Mediterranean Diet Score Pre- and Post- Intervention



Chapter V: Discussion & Conclusions

The purpose of this study was to determine the association between a short-term Mediterranean Diet culinary medicine course and the resulting Mediterranean Diet Scores (MDS) of educators and staff employed at a local private school in Fort Worth, TX. Ongoing research is warranted to ascertain the effectiveness of a hands-on culinary medicine course focusing on Mediterranean Diet principles in improving lifestyle choices of participants.

A primary takeaway from these study results is that minimal Mediterranean-diet focused intervention can lead to large improvements in one's diet, and thus reduce risk for chronic disease proportionally. After only two Mediterranean-diet focused culinary medicine classes over two weeks, the average MDS improved from 5.15 to 5.96 among participants. With a maximum score of 9 points, this improvement in score was shown to be statistically significant at $p=0.026$. Research indicates that a 2-point increase in the MDS correlates to a 25% decrease in all-cause mortality.²³ Because this study provided a mean 0.81 score increase after only two culinary medicine courses, a proposal for future research is that adding 2-3 additional Mediterranean Diet culinary medicine classes may double this 0.81 score improvement and approach or achieve this impactful 2-point increase. Thus, a Mediterranean-diet focused culinary medicine program consisting of 4-5 classes may be useful in promoting this 2-point Mediterranean diet score increase, and thus a 25% decrease in all-cause mortality, in more non-Mediterranean communities.

Furthermore, it was observed that adherence to some food categories improved from pre-intervention to post-intervention, while consumption in other food categories remained the same. For example, participants incorporated more vegetables, fruits, whole grains, wine, and fish into their diet, while improved-adherence regarding legumes and beans, nuts and seeds, olive oil, or

red or processed meat following the intervention was not observed. Specifically, the culinary medicine intervention in this study best influenced participants' intakes of fruit and fish, as the consumption of foods in these two categories both increased by 23%. This hands-on culinary medicine intervention did not have a negative impact on participants' consumption of any given food category.

The four food categories that remained at the same adherence frequency post-intervention were legumes and beans, nuts and seeds, olive oil and few other fats, and red or processed meat. These static findings indicate that further culinary medicine courses should be focused on simple, accessible recipes that emphasize legumes and beans, nuts and seeds, mainly olive oil, and substitutes for red meat to better encourage a score increase in these categories. However, the categories where scores did improve (vegetables, fruit, whole grains, wine, and fish) should not be neglected, as they were vital components to increasing the participants' MDSs.

Mediterranean Diet guidelines are closely aligned with the 2015-2020 Dietary Guidelines for Americans.²⁵ The Mediterranean Diet encourages 2+ cups vegetables/day, 2+ pieces fruit/day, 2+ whole grains/day, ½-1 alcohol (females) or 1-2 alcohol (males)/day (but no more), 2+ servings fish/week, 2+ servings legumes and/or beans/week, a handful of nuts/seeds most days, plenty of olive oil/few other fats in general, and 2 servings or fewer of red/processed meat/week.¹⁵ The 2015-2020 Dietary Guidelines for Americans encourages 2.5 cups vegetables/day, 2 cups fruit/day, 6 oz. grains/day, 3 cups dairy/day, 5.5 oz. protein foods/day, 27g oils/day, and 270 kcals from other sources/day.²⁵ The primary differences between these two dietary recommendations include the limitation on alcohol, the focus on fish or plant-based foods for protein, the absence of dairy recommendations, the focus on olive oil, and the limitation of red or processed meat found in the Mediterranean Diet guidelines.

Results from the present study can be compared to food consumption patterns of the Dietary Guidelines for Americans. This study found that Mediterranean Diet goals for consumption of the various food groups post-intervention were met by participants 100% for vegetables, 38% for fruit, 54% for whole grains, 62% for wine, 54% for fish, 62% for legumes/beans, 77% for nuts/seeds, 77% for fat, and 69% for red/processed meat. When compared to food consumption recommendations set forth by the 2015-2020 Dietary Guidelines for Americans, in this study, 100% of participants met vegetable goals, 38% met fruit goals, 54% met whole grain goals, and many likely met protein goals when combining fish, legumes, beans, nuts, and seeds. Not only is the Mediterranean Diet a healthful way of eating, but it also supports the 2015-2020 dietary guidelines for Americans at a more rigorous level. The 2015-2020 dietary guidelines for Americans are largely aimed at reducing chronic disease, and because the Mediterranean Diet encourages stricter standards while paralleling these dietary guidelines, the Mediterranean Diet may actually be more powerful in reducing chronic disease in America.

In future studies, it may be necessary to include questions regarding the participants' health and economic status in the pre- and post-intervention questionnaires. Multiple studies have displayed the health benefits of the Mediterranean Diet: a 2019 study revealed the cardiovascular and anti-cancer benefits; a second 2019 study revealed the improved quality of life in Type 1 diabetes patients; a 2015 study revealed the decreased risk of developing Type 2 diabetes; a 2017 study revealed mental health benefits regarding depression; a 2019 study displayed the decreased risk for myocardial infarctions, and a 2019 study displayed the positive effects on reducing liver disease severity.^{6, 7, 17, 19, 21} The historical health benefits of the Mediterranean Diet are undeniable; however, long-term observation of these benefits among

participants in the present study was not obtainable due to the short duration of the study. A follow-up study to ascertain long-term benefits of these participants is warranted at a later date.

Furthermore, a 2017 study observed the local economic benefits of individuals consuming a mainly Mediterranean Diet. Specifically, this study found that the Mediterranean Diet had been correlated to supporting local farmers and local food products, thus resulting in local economic benefits.⁴ While this would be difficult to determine in an American community if all individuals were not consuming a mostly Mediterranean Diet, implications regarding the impact on individual economic status could be determined. For example, an individual who took part in this study could later be asked if the Mediterranean Diet was shown to be economically feasible or beneficial.

Overall, this study provided insight on the influence of a short-term Mediterranean Diet culinary medicine intervention on the eating habits of participants. This intervention correlated to a statistically significant mean MDS increase from 5.15 to 5.96 over just two weeks. An increase in MDS correlates to chronic disease risk reduction, and results from this study indicate such an impact may be established after only six hours of intervention.²³ It should be noted that implementation of a short-term, Mediterranean-Diet focused culinary medicine program may be advantageous to reducing chronic disease risk among various American communities.

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APPENDIX A: PROTOCOL

INSTITUTIONAL REVIEW BOARD PROTOCOL REVIEW REQUEST

The TCU Institutional Review Board (IRB) is responsible for protecting the welfare and rights of the individuals who are participants of any research conducted by faculty, staff, or students at TCU. Approval by the IRB must be obtained prior to initiation of a project, whether conducted on-campus or off-campus. While student research is encouraged at both the undergraduate and graduate level, only TCU faculty or staff may serve as Principal Investigator and submit a protocol for review.

Please submit this protocol electronically to [IRBSubmit](#) (MS Word preferred). Include the Protocol Approval Form as a word document with highlighted sections filled in. Also submit a consent document, HIPAA form if applicable, Protecting Human Research Participants Training certificates, recruitment materials, and any questionnaires or other documents to be utilized in data collection. We prefer that you combine materials to make a single Word document to submit. A template for the consent document and HIPAA form, instructions on how to complete the consent, and a web link for the Protecting Human Research Participants Training are available on the [TCU IRB webpage](#). Submission deadline for protocols is the 15th of the month prior to the IRB Committee meeting.

1. **Date:** 10/27/2020
2. **Study Title:** The Use of a Culinary Medicine Course to Improve Nutrition Knowledge, Attitudes, and Behaviors of Teachers in the K-12 Setting
3. **Principal Investigator (must be a TCU faculty or staff):** Jada L. Willis (Stevenson), PhD, RDN, LD
4. **Department:** Nutritional Sciences
5. **Other Investigators: List all faculty, staff, and students conducting the study including those not affiliated with TCU.**
Mady Whitcher, Senior – Nutrition Major
6. **Project Period (mm/yyyy - mm/yyyy):** 10/27/2020-10/26/2021
7. **If you have external funding for this project –**
Funding Agency: Andrews Institute of Mathematics and Science Education Research
Grant Project #: N/A **Date for Funding:** October, 2018
8. **If you intend to seek/are seeking external funding for this project –**
Funding Agency: N/A **Amount Requested From Funding Agency:** N/A
Due Date for Funding Proposal: N/A

Purpose: Describe the objectives and hypotheses of the study and what you expect to learn or demonstrate: We want to determine if participating in a culinary medicine (CM) program impacts knowledge, attitudes, and behaviors (via pre- and post-test CM questionnaires) in K-12 teachers. We hypothesize that participation in a CM program will increase knowledge, attitudes, and behaviors towards nutrition, cooking, and health in adult K-12 teachers.

9. **Background: Describe the theory or data supporting the objectives of the study and include a bibliography of key references as applicable.**

The Mediterranean diet consists of various plant-based foods, including beans, nuts, vegetables, fruits, whole grains, and herbs. Ancel Keys was the first to define the Mediterranean diet, and he characterized the diet to be low in saturated fat and high in vegetable oils.³ His Seven Countries Study was the original study covering the Mediterranean diet and was monumental in the diet's reputation of increasing overall health and decreasing risk for chronic disease.³

The Mediterranean Diet's Components

The Mediterranean diet's key components include a high intake of olive oil, vegetables such as leafy greens, fruits, cereals, nuts, and legumes. The diet considers these food groups pertinent to consume daily. Additionally, the Mediterranean diet recommends a moderate intake of fish, meat, dairy, and red wine. These foods designated for moderate intake are encouraged 2-3 times per week, or weekly in moderate portions. Lastly, the diet includes a low intake of eggs and sweets.³ These foods should only be consumed for special occasions or in small amounts. This diet is typically presented in a pyramid in which individuals can visually organize different food groups consumed and their relative quantities. For example, the foods recommended for high intake share a large portion at the base of a pyramid, while all other foods are placed in descending order of consumption frequency or amount as one moves up the pyramid.

The Mediterranean Diet Outcome Benefits

The Mediterranean diet has a plethora of benefits, but four specific categories of benefits have been developed to emphasize its widespread capabilities. These four categories include major health and nutrition benefits, low environmental impacts and richness in biodiversity, high sociocultural food values, and positive local economic returns.⁴ First, the major health and nutrition benefits of the Mediterranean diet are extensive. They include decreased chronic disease risks, increased longevity, and keeping individuals agile. Additionally, persons who adhered to the Mediterranean diet fulfilled their micronutrient requirements better than any individuals on a typical Western diet, had a healthier body weight and lower waist circumference, and experienced lower incidences of metabolic syndrome and type 2 diabetes in a 2017 study.⁴ Second, the Mediterranean diet has low environmental impacts and is rich in biodiversity. Because the diet is mainly plant-based with a low consumption of animal products, the diet reduces our carbon footprint and greenhouse emissions.⁶ Livestock produces 20% of our world's greenhouse gas emissions, and because the Mediterranean diet recommends low consumption of red meats and higher consumption of fish or climate-friendly meats (poultry), adherence to the diet undoubtedly reduces the carbon footprint of humans.⁵ Third, the Mediterranean diet has high sociocultural food values. These values include diversified heritage through embracing various Mediterranean cultures and practicing intimate familial times through meals. Specifically, the Mediterranean diet has become a staple aspect of the Spanish, Italian, Greek, and Moroccan cultures, as the diet represents various cultures that encompass the

Mediterranean region while promoting conviviality.¹⁶ Last, the Mediterranean diet has positive local economic returns by empowering local food producers and their products. One study conducted in 2019 revealed that Italian households who followed the Mediterranean diet were more likely to buy local foods, which not only supports local businesses and farmers, but also works toward reducing our greenhouse gas emissions and total carbon footprint.¹

The Mediterranean Diet in the Real World

The Mediterranean diet did originate in countries surrounding the Mediterranean Sea; however, many studies have shown that the diet can be easily transferred to non-Mediterranean countries, the medical field, and working populations. First, the Mediterranean diet has already become widespread across the globe. In America, the components of the diet have impacted our 2015-2020 Dietary Guidelines for Americans, and the Harvard School for Public Health provides public resources (cookbooks, articles, restaurants) that promote the Mediterranean diet's components.¹¹ Second, the Mediterranean diet is becoming prominent in the medical field. The diet was introduced to the medical field about 50 years ago, and immediately became known as one of the healthiest living patterns. The diet improves cardiovascular, metabolic, cognitive, and anti-neoplastic conditions, while significantly increasing one's quality of life.⁹ These positive effects can be attributed to food synergy- the result of multiple interactions reciprocally enhancing one another's positive effects.¹¹ In other words, the various nutrient combinations within the Mediterranean diet allow multiple health conditions to be treated simultaneously. While the low red meat intake may decrease one's risk of exposure to carcinogens and thus reduce the risk of developing cancer, the high consumption of whole grains can work toward reducing one's risk for heart disease. This is just one example of the simultaneous health benefits that can be provided by adhering to the Mediterranean diet. Lastly, the Mediterranean diet has shown to be effective in a working-class population. In a study consisting of 738 employees, a nutritional intervention program promoting Mediterranean diet components in a minimally intensive approach increased the dietary habits of this working population over 3 years.²¹ This study displays the working population's willingness and ability to adopt Mediterranean diet practices, even while working long days and living a busy lifestyle.

The Mediterranean Diet and Depression

While the Mediterranean diet's original focus was on cardiovascular disease, the diet has now been attributed to decreasing the risks of various diseases, including depression. In a 2017 study performed in New Zealand, the Mediterranean diet supplemented with fish oil improved the depression and overall mental health-related quality of life when compared to the control group after three months of intervention. At six months, these positive effects were maintained. This study also found that a higher Mediterranean Diet Score (higher adherence to the Mediterranean diet) correlated to lower depression and anxiety, as well as better coping practices over six months.¹⁵

The Mediterranean Diet and Myocardial Infarctions

The Mediterranean diet has also shown significant effects in reducing the risk of myocardial infarctions. In a 2019 study in Milan, Italy, adherence to the Mediterranean diet displayed benefits in cardiovascular prevention against Congenital Heart Disease. Specifically, higher survival rates were associated with specific Mediterranean diet characteristics, such as ethanol (wine), low consumption of meat, and high consumption of vegetables, fruits, nuts, fish,

legumes, and olive oil. Additionally, the risk of stroke was reduced when individuals adhered to the Mediterranean diet.¹⁹

The Mediterranean Diet and Liver Disease

Nonalcoholic fatty liver disease (NAFLD) has increased in severity and prevalence worldwide, affecting up to 1/3 of the population. NAFLD is usually correlated with insulin resistance, oxidative stress, and inflammation, which can all be improved by the Mediterranean diet's components.¹⁷ To add, previous studies have concluded that the Mediterranean diet contributes to the treatment of liver disease. Specifically, a study in 2019 measured the liver fat percentage before and after implementing a Mediterranean diet supplemented with extra-virgin olive oil or nuts. They concluded that a lower liver fat percentage correlation was observed in the Mediterranean diet + extra-virgin olive oil group.¹⁷

The Mediterranean Diet and Diabetes

One profound benefit of following the Mediterranean diet is that the diet has been seen to improve both Type 1 and Type 2 diabetes. In a Spanish study performed in 2019, higher adherence to the Mediterranean diet was correlated to an increased quality of life in those with Type 1 diabetes.⁷ This was determined using the Audit of Diabetes-Dependent Quality of Life, a disease-specific measure specifically for Spanish individuals with diabetes. The instrument contains 21 items and measures the impact of their diabetes on each of the 21 domains.⁷ Additionally, a 2015 study displayed the Mediterranean diet's effects on those with Type 2 diabetes. The study concluded that the Mediterranean diet displayed the most glycemic control and decreasing of cardiovascular risk factors when compared to other low-fat diets. Additionally, they found the Mediterranean diet to reduce the risk of future diabetes by 19-23%.⁶ Although type 1 and type 2 diabetes are inherently different in both cause and effects, the Mediterranean diet has shown to improve both diseases' symptoms and side effects when properly adhered to.

The Mediterranean Diet, Cancer, and Cardiovascular Disease

Olive oil is an imperative component to the Mediterranean diet. It consists of monounsaturated fatty acids, which are greatly beneficial to one's health no matter their food source. Both in vitro and in vivo studies have shown that olive oil, as well as other Mediterranean food components, play a key role in the prevention of cancer by inactivating carcinogens, decreasing cell proliferation, inducing cell apoptosis, and inhibiting angiogenesis.¹⁷ Additionally, cardio-protective effects were observed in these same foods through the decrease of oxidative stress and inflammation, modulation of carbohydrate digestion through the reduction of glucose absorption, improved blood lipid levels, and improved blood pressure.¹⁷ These positive effects can be attributed to these foods' contribution to cellular antioxidant defenses, inflammation, metabolism, survival, and proliferation.¹⁷ In a separate study performed in 2015 using samples from urban populations in central and eastern Europe, the Mediterranean diet was found to reduce the risk of both Cardiovascular Disease and mortality related to CVD.²⁰ The Mediterranean Diet Score was used to assess the participants' adherence to the Mediterranean diet, and the score was found to be a positive indicator of both a healthy diet and predicting mortality.

The Mediterranean Diet Score

Eventually, a Mediterranean Diet Score was developed to measure an individual's adherence to the Mediterranean diet. There are 14 questions on the official questionnaire, and each question asks about various components or avoidances of the Mediterranean diet. For example, question #1 asks: "Do you use olive oil as main culinary fat?", and question #2 asks "How many times per week do you consume commercial sweets or pastries, such as cakes, cookies, biscuits, or custard?"¹⁰ Researchers believed that the higher one's Mediterranean Diet Score is, the lower one's risk of chronic disease will be. This relationship has been highly supported by research. In one study using 7,447 participants in Spain, there was found to be an inverse association between the Mediterranean Diet Score and both general obesity and abdominal obesity.¹⁰ Both relationships were found to be statistically significant. Additionally, when observing this inverse relationship between the Mediterranean Diet Score and obesity, a 2-point increase in the Mediterranean Diet Score was shown to decrease the incidence of obesity in both men and women.¹⁰ Additionally, a 2-point increase in the Mediterranean diet score is correlated to a 25% decrease mortality from all-causes.¹⁸ This study statistically analyzed the diet's relationship with obesity because obesity can indicate higher risks for various other chronic diseases.

The Mediterranean Diet Score is a valid and reliable indicator of one's chronic disease risks, especially in comparison to other diet quality indexes. In a 2016 study using a sample of Puerto Rican adults, the Mediterranean Diet Score was associated with a favorable cardiometabolic profile over a 2-year period.¹² This profile includes BMI, waist circumference, insulin resistance, and log-C reactive protein. Weaker associations to an improved cardiometabolic profile were observed using the Alternate Healthy Eating Index (AHEI).¹²

Seven Countries Study

The Seven Countries Study was the first study to measure the effectiveness of the Mediterranean diet on risk of coronary heart disease (CHD). Ancel Keys performed this study and used 12,225 men ages 40-59 without cardiovascular disease. These individuals were divided into 15 cohorts over 7 countries. He performed both 5 and 10-year examinations. His main hypothesis was that the rate of CHD in populations would vary due to their physical characteristics and lifestyle, specifically regarding the fat composition of their diet and serum cholesterol levels.⁸ In all, Keys wanted to make associations between diet, other risk factors, and disease rates based on different population samples. In the end, he found that the 7 countries differed in all-cause death rates, and especially differed in coronary mortality.⁸ Keys found that those living in Japan and Southern Europe had the lowest rates of coronary death, while the United States, East Finland, and West Finland had the highest rates of coronary death. Keys did confirm that coronary heart disease death was largely due to serum cholesterol and blood pressure, and that serum cholesterol, blood pressure, diabetes, and smoking were universal risk factors to developing CHD.⁸ In all, Keys determined that coronary heart disease can be prevented by nutrition and displayed that certain location's diets were better in preventing such disease and mortality. This nutrition prevention Keys was referring to was the Mediterranean diet.

While Keys' study was groundbreaking for the Mediterranean diet, there was and still is controversy surrounding his study. Henry Blackburn, affiliated with the Division of Epidemiology and Community Health at the University of Minnesota, argued that Keys' conclusions were far too causative for having only 15 cohorts, or 15 study units. Additionally, he argued that using 6 independent variables was far too extensive, as specific relationships could not confidently be determined.² Additionally, some argue that Keys intentionally chose specific

populations because previous experiments already predicted what their CHD prevalence, CHD deaths, and all-cause mortality rates were. These individuals argue that he chose these specific populations because they supported his hypothesis. However, to this day these same locations have consistent CHD and all-cause mortality rates. For example, a 2016 update of Europe's cardiovascular disease prevalence displayed that southern European countries (Italy, Spain) had lower cardiovascular disease prevalence than northern or eastern European countries.¹⁴ While Keys may have been selective in choosing his populations, his data was genuine and presented the associations that truly existed.

In all, the Mediterranean diet has shown its capability of increasing longevity through the reduction of both chronic disease risk and mortality. Additionally, the Mediterranean diet upholds tradition, is an environmentally sustainable diet, and is economically profitable for local areas. Specifically, the Seven Countries Study was a monumental study to not only display the universal risk factors of cardiovascular disease, but also provide the framework for distinguishing the Mediterranean diet and its health benefits.

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10. **Location: Specifically describe where the research will take place. If on TCU campus please list the exact location. If off campus please describe the exact location(s) where you plan to conduct your research.** N/A. The Culinary Medicine program took place in the TCU Bass Building.

11. **Subject Population: Describe the characteristics of the participant population, including the inclusion and exclusion criteria and the number of participants you plan to recruit:**

Results on male and female participants in the 2019 CM program will be compiled. To participate in the CM program, participants must be teachers at the All Saints' Episcopal School in Fort Worth, TX and over the age of 18. The CM program was limited to 18-24 participants who will engage in two-hands-on cooking classes in the Annie Richardson Bass Building kitchens.

12. **Recruitment Procedure: Describe your recruitment strategies including how the potential participants will be approached and precautions that will be taken to minimize the possibility of undue influence or coercion. Include copies of the recruitment letters, leaflets, etc. in your submission.**

Due to the nature of this study, recruitment is not necessary because the results from the 2019 CM program was conducted as part of routine education and has already been previously recorded.

13. **Compensation: Describe in detail if participants will be compensated for their time and effort to complete the study procedures. Compensation can take on many forms and can include monetary (cash, gift cards, etc.) and/or non-monetary (gifts, course credit, extra credit, SONA credit etc.) payments to subjects. Your consent document should clearly specify what form(s) of compensation would be provided to participants in your study and the amount of payment. For non-monetary items, please provide an approximate value.**

None.

14. **Consenting Procedure: Describe the consenting procedure, whether participation is completely voluntary, whether the participants can withdraw at any time without penalty, the procedures for withdrawing, and whether an incentive (describe it) will be offered for participation. If students are used as participants, indicate an alternative in lieu of participation if course credit is provided for participation. If a vulnerable population is recruited, describe the measures that will be taken to obtain surrogate consent (e.g., cognitively impaired participants) or assent from minors and permission from parents of minors.**

There is not a consent form for this study because data for the study was conducted as part of a routine educational experience in the CM program. This study involves the analysis of previously collected data. Participation in the Culinary Medicine program was voluntary.

15. **Study Procedures: Provide a chronological description of the procedures, tests, and interventions that will be implemented during the course of the study. Indicate the number of visits, length of each visit, and the time it would take to undergo the various tests, procedures, and interventions. If blood or tissue is to be collected, indicate exactly how much in simple terms. Flow diagrams may be used to clarify complex projects.**

This study is designed to analyze previously collected data from 2019 as part of routine participation in the Culinary Medicine program. As part of the program, participants completed a pre- and post-questionnaire.

16. **Data Analyses: Describe how you will analyze your data to answer the study question.**

Questionnaire data will be analyzed to reflect the study objectives. Analyses will assess each element of the Mediterranean Diet Score in concordance with the diet and lifestyle of the participants. Data will determine how well All Saints' faculty adhere to the Mediterranean Diet.

17. **COVID-19 SOP (If your study will involve in-person interaction): Describe the COVID-19 risk mitigation specific to your study. Any pre-screening plans/procedures before and during each study visit. Stopping procedures for an enrolled subject who self-reports they may have been exposed to COVID-19. Describe any specific requirements that may be required from your department, if any.**

N/A

18. **Potential Risks and Precautions to Reduce Risk: Indicate any physical, psychological, social, or privacy risk which the subject may incur. Risk(s) must be specified. Also describe what measures have been or will be taken to prevent and minimize each of the risks identified. If any deception is to be used, describe it in detail and the plans for debriefing.**

Potential risks included participants feeling uneasy about their privacy and whether their privacy is being protected by researchers. To diminish this risk, we will ensure that the participants' responses are completely anonymous. This will not only protect participants, but it also gives them respect.

19. **Procedures to Maintain Confidentiality: Describe how the data will be collected, de-identified, stored, used, and disposed to protect confidentiality. If protected health information is to be re-identified at a later date, describe the procedure for doing so. All signed consents and hard data must be stored for a minimum of 3 years in a locked filing cabinet (and locked room) in the principal investigator's office, lab, or storage closet at TCU. Your professional society may recommend keeping the materials for a longer period of time.**

Data was collected anonymously through a pre- and post-test questionnaire as part of routine participation in the Culinary Medicine program in 2019. The information from the questions will be utilized by researchers to determine adherence to the Mediterranean Diet and how it influences the risk for chronic diseases.

20. **Potential Benefits: Describe the potential benefits of the research to the participants, to others with similar problems, and to society.**

None

21. **Training for Protecting Human Research Participants: Submit training certificates for all the study investigators. The training link is available on the TCU IRB webpage at www.research.tcu.edu.**

22. **Check List for the Items That Need to be Submitted: Please combine all the files into one pdf document before submitting the materials electronically to the IRB. To prevent any delay in the approval of your protocol, use the most recent template for the protocol, consent document, and HIPAA form by downloading them from www.research.tcu.edu each time you prepare your materials.**

- a. Protocol
- b. Consent document (*Not Applicable*)
- c. HIPAA form if applicable (*Not Applicable*)
- d. Protecting Human Research Participants Training certificate for each investigator
- e. Recruitment fliers, letters, ads, etc. (*Not Applicable*)
- f. Questionnaires or other documents utilized in screening and data collection

Principal Investigator Assurance

23. **By signing below, I certify to the following:**

- As the Principal Investigator, I will be cognizant of any changes in TCU guidelines as it relates to COVID-19. Knowing the situation is fluid, I agree to comply with University guidelines as they change. I will also ensure there are appropriate protections in place in the protocol document and informed consent document to keep human subject research participants safe.
- The project described herein will be conducted in accordance with applicable TCU policies and procedures, as determined by the IRB of record. All Human Subject Research projects occurring at TCU must be conducted in compliance with the Office of Human Protection (“OHRP”) regulations at 45 CFR 46 and all other applicable federal and state laws and regulations (collectively “Applicable Law”)
- I have a working knowledge of Applicable Law

- All personnel who work with human participants under this protocol have received, or will receive, appropriate training in protocol procedures and protection of human subjects prior to working with humans.
- All experiments involving human participants will be performed only by the qualified individuals listed in this protocol and individuals not listed in this protocol will not participate in the protocol experiments.
- Procedures on experimental subjects described in this IRB protocol accurately reflect those described in the funding applications and awards, if externally supported.
- I and all personnel have read and will comply with any pertinent safety information, IRB requirements, and security procedures.
- I will maintain records of all human participants and the procedures carried out throughout the entire term of my project.
- As Principal Investigator, I am aware that I have the ultimate responsibility, on a day-to-day basis, for the proper care, treatment, and protection of the human participants.

Jada L. Willis, PhD, RDN, LD

10/27/2020

Signature of Principal Investigator

Date

APPENDIX B: OLDWAYS MEDITERRANEAN DIET SCORE QUESTIONNAIRE



RATE YOUR MED DIET SCORE

with Oldways and the Mediterranean Foods Alliance

Scientific studies show that people who follow the Med Diet enjoy better health than those who don't. Find out your Med Diet Score today, by giving yourself one point for each yes below, and zero for each no.

I eat....		If Yes, score 1	If No, score 0
Vegetables	Two or more cups of vegetables a day		
Fruit	Two or more pieces of fruit a day		
Whole grains	2 or more whole grains a day		
Wine	½ to 1 drink a day for women, 1 to 2 for men (but no more)		
Fish	Fish 2 or more times a week		
Legumes / beans	2 or more servings a week		
Nuts / Seeds	A handful of nuts most days		
Fat	Lots of olive oil and few other fats		
Red or Processed Meat	2 servings or fewer a week		
Your Total Med Diet Score			

If your score is...

- 8-9 Long life! Your eating habits follow the Med Diet very closely.
- 6-7 You're doing well. What would help you to add another point or two?
- 4-5 A good start, but you can do better, if you value your health.
- 0-3 Time to turn your life around.

If your score was lower than you'd like, pick one category every month and start to change your eating habits for the better. The Mediterranean Diet is delicious and satisfying — and you deserve the best. Visit www.Oldwayspt.org for recipes and resources to help you on your way.

APPENDIX C: CITI CERTIFICATIONS**Jada L. Willis (Stevenson)**

Completion Date 06-Mar-2019
Expiration Date 05-Mar-2023
Record ID 30430666

This is to certify that:

Jada Stevenson

Has completed the following CITI Program course:

Human Subjects Research	(Curriculum Group)
Human Subjects Researcher (social-behavioral-educational)	(Course Learner Group)
1 - Basic Course	(Stage)

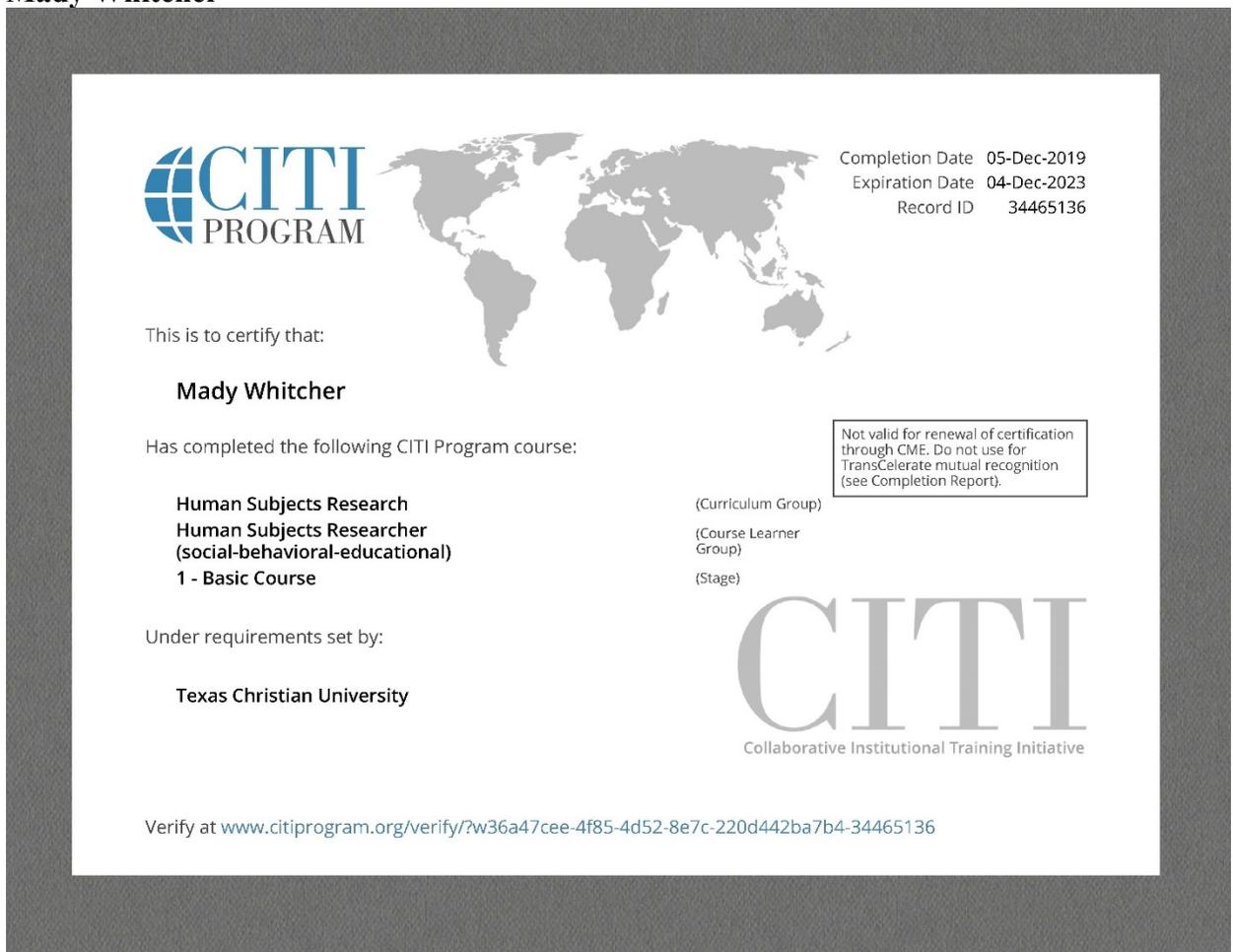
Under requirements set by:

Texas Christian University



Verify at www.citiprogram.org/verify/?wea450286-c2f9-4aa6-b9c8-3e83db62a1d4-30430666

Mady Whitcher



Completion Date 05-Dec-2019
Expiration Date 04-Dec-2023
Record ID 34465136

This is to certify that:

Mady Whitcher

Has completed the following CITI Program course:

**Human Subjects Research
Human Subjects Researcher
(social-behavioral-educational)
1 - Basic Course**

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

(Curriculum Group)
(Course Learner Group)
(Stage)

Under requirements set by:

Texas Christian University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w36a47cee-4f85-4d52-8e7c-220d442ba7b4-34465136

APPENDIX D: IRB APPROVAL

From: IRB Submit
Sent: Monday, November 2, 2020 2:21 PM
To: Willis, Jada <jada.willis@tcu.edu>
Cc: IRB Submit <IRBSubmit@tcu.edu>
Subject: RE: 1920-336

Greetings Dr Willis,

Attached is your NHSR determination letter for the research titled, “The Use of a Culinary Medicine Course to Improve Nutrition Knowledge, Attitudes, and Behaviors of Teachers in the K-12 Setting.”

Congratulations and Happy Researching!

Kind Regards,
Office of Research Compliance

Isuru Perera, MLA
Assistant to the Associate Provost for Research
and Manager of [Research Compliance](#)
Texas Christian University
Isuru.perera@tcu.edu
(O): (817)-257-4657
(C): (817)-709-3799

“Be humble. Be hungry. And always be the hardest worker in the room.” – Dwayne Johnson



TCU Institutional Review Board
3101 Sadler Hall
Fort Worth, Texas 76129

DATE: 30-October-2020

TO: Jada L. Willis & Mady Whitcher

FROM: TCU Institutional Review Board

RE: Determination – Not Human Subjects Research

Dear Dr Willis & Ms Whitcher:

In accordance with applicable federal law governing the use of human subjects in research the TCU Institutional Review Board ("IRB") has reviewed your proposed project entitled, "The Use of a Culinary Medicine Course to Improve Nutrition Knowledge, Attitudes, and Behaviors of Teachers in the K-12 Setting" and determined that this project does not meet the definition of human subjects research, as defined in Title 45 Code of Federal Regulations Part 46 et al (also known as the "Common Rule"). Specifically, you are not collecting private, identifiable information and secondary data is already de-identified. Therefore, this project is not subject to further TCU IRB oversight.

Even so, please remember that you are responsible for ensuring that your study is conducted in an ethical manner and in accordance with applicable law and TCU policies and procedures.

Please contact Research Compliance at research@tcu.edu or (817) 257-5070, if you need any additional information.

Sincerely,
TCU Institutional Review Board