

UNIVERSITY STUDENTS' KNOWLEDGE AND ATTITUDES
OF A WHOLE-FOODS, PLANT-BASED DIET

by

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ABSTRACT

Background

Studies assessing the general population's knowledge and attitudes regarding a plant-based diet found that the majority of participants were reluctant to follow the diet. Specific concerns included perceived lack of satiety, low protein content, and undesirable taste. However, there is a lack of research in the university student population. The purpose of this study was to determine university students' general knowledge and attitudes of a whole-foods, plant-based diet.

Study Design

After providing informed consent, participants (N=209) completed a 28-question online research survey via Survey Monkey®. These questions covered four sections: health status, eating habits, knowledge and attitudes towards a whole-foods, plant-based diet, and demographics. Analysis using Pearson correlation coefficients was performed to assess associations between knowledge and attitudes towards a whole-foods, plant-based diet in concordance with participants' health status and eating habits (SPSS, $p \leq 0.05$).

Results

Of the 209 students included in the analysis, 42 (20.1%) were male and 167 (79.9%) were female. 108 students (51.7%) were pursuing health science and nutrition majors, while 101 (48.3%) were pursuing non-health science majors. When asked if they had taken a nutrition course while in university, 98 students (46.9%) answered "yes" and 111 (53.1%) answered "no." Further analysis showed that students who were pursuing health science and nutrition majors were more likely to understand the meaning of the WFPB diet ($p \leq 0.01$), and students who have taken a nutrition course in college were more likely to be aware of the diet's meaning ($p \leq 0.01$). Males tended to believe that they needed to eat meat to maintain their health ($p \leq 0.01$), and they were more likely to disagree that following a plant-based diet would be beneficial to their health ($p \leq 0.01$).

Conclusions

Respondents who had negative attitudes toward a whole-foods, plant-based diet tended to lack knowledge/understanding of the diet. Providing nutrition education about the whole-foods, plant-based diet by registered dietitian nutritionists could result in improved health outcomes among this population.

CHAPTER I: INTRODUCTION

Plant-based diets, including vegetarian and vegan diets, have rapidly grown in popularity within the last few years. More and more medical professionals are publishing information in support of the whole-foods, plant-based (WFPB) diet. Doctors such as Dr. Michael Greger have authored books about the diet.¹ A collection of medical professionals are working to promote the plant-based lifestyle through their nonprofit organization, the Physicians Committee for Responsible Medicine (PCRM).² The Academy of Nutrition and Dietetics also supports vegan and vegetarian diets as potentially beneficial eating patterns, provided that individuals follow the diet with appropriate planning.³ In general, more people are starting to recognize the potential health benefits of following a WFPB diet.

The WFPB diet emphasizes eating non-processed plant foods. These foods include vegetables, fruits, whole grains, nuts, and seeds. Although some people who follow this diet still eat meat as well, meat is typically only eaten on occasion and not served as the center of an entrée (like in the traditional Western diet).

Interest in plant-based eating is growing in the context of increasing chronic disease rates within the United States. According to the Centers for Disease Control and Prevention (CDC), 60% of adults in the U.S. have at least one chronic disease, while 40% have two or more.⁴ Chronic diseases range from heart disease to diabetes to cancer. Although university students do not yet suffer from chronic diseases, they still need to be aware of their lifestyle habits, particularly their diets. Poor nutrition is one of the key risk factors for chronic disease development.⁴ Currently, university students are moving away from healthier eating patterns such as the Mediterranean diet.⁵ Most university students lack appropriate nutrition knowledge on healthy dietary habits.⁵ Although this population typically does not experience many adverse

events to indicate any serious health conditions, their poor nutrition can contribute to the eventual progression of chronic disease that is seen in so many U.S. citizens today.

Since the WFPB diet offers great potential for improving the health of its followers, it is important to determine how this diet is received by university students. This study seeks to examine the knowledge, beliefs, and attitudes towards the WFPB diet among university students.

CHAPTER II: LITERATURE REVIEW

Plant-Based Diets for University Students

When students begin their first year at a university, they gain a new level of independence. With this freedom comes the opportunity to choose how one's diet looks. Many factors can influence a student's food choices, such as taste, convenience, and health. For students making their decisions based on health, they may consider following a plant-based diet. Researchers from the Health Promotion Sciences department at the University of Arizona determined the feasibility of having college students follow a plant-based diet for ten days.⁶ The researchers recruited ten participants from a public health course at the university.⁶ Each participant was asked to consume only whole-foods, vegan meals during the study period.⁶ After ten days, researchers determined that it was feasible for a plant-based intervention to be used with college students, and this intervention changed the way the students viewed the plant-based diet.⁶ Although the study used a very small sample size, it indicates that college students may be willing to accept plant-based meals as a new component of their diets.

Nutrients of Concern with the Whole-Foods, Plant-Based Diet

A common point of opposition to plant-based diets is the belief that adherence to these types of diets would result in mineral deficiencies, such as with iron. Although there is a strong association between vegan/vegetarian diets and conditions like iron-deficiency anemia, plant-based diets can provide ample amounts of iron in the diet and support a healthy lifestyle.⁷ Some researchers suggest that although red meat is one of the best sources of iron in the diet, it may actually play a role in the development of chronic diseases. For example, excess red meat intake may increase the risk for cancer, diabetes, cardiovascular disease, and even overall mortality.⁷ This study also supports the "role of plant ferritin as a readily available source of iron that

sidesteps red meat's potential adverse health effects.”⁷ Plant-based iron sources such as leafy green vegetables, legumes, and whole grains, when consumed as part of a long-term healthy and balanced diet, can meet nutritional needs while decreasing the risk of developing chronic disease.⁷

A second common nutrient of concern in plant-based diets is the mineral calcium. Calcium can be obtained from a variety of plant-based foods. However, the bioavailability of calcium in a plant-based diet can be lessened when combined with vegetarian constituents that inhibit its absorption. A review from *The American Journal of Clinical Nutrition* supports the plant-based diet as a sufficient source of dietary calcium as long as certain precautions are considered in diet planning.⁸ The article suggests that those who choose to limit or exclude meat from their diets may find ease in increasing consumption of calcium while also reducing protein consumption to offset protein-induced urinary loss of calcium.⁸ Additional methods to increase calcium absorption with plant-based diets include taking calcium supplements and consuming fortified foods.⁸ Although liberal consumption of dairy products is the easiest and most convenient way to receive calcium in the diet, it is not a necessary component in a carefully planned WFPB diet.⁸

The comparison between animal and plant proteins is another common topic of discussion regarding a WFPB diet. When comparing the quality of protein in the diet, protein absorption and availability are similar for plant protein and protein from meat.⁹ While a plant-based diet may lack other nutrients such as iron and vitamin B12 (if not carefully carried out), protein appears to be of no concern in these diets. However, the importance of binding substances such as phytates, trypsin inhibitors, and tannins should be stressed in the assessment and prescription of a plant-based diet.⁹ Vegan and vegetarian diets have proven capable of

supporting a healthy lifestyle and normal growth and development in humans but should be carefully planned to avoid restricting quality and variety.⁹ Careful thought and consideration should go into meal planning on a plant-based diet to adequately obtain the nutrients necessary to sustain life. With that understanding, meat can be considered as an optional, rather than essential, part of a healthy diet.

Benefits of the Whole-Foods, Plant-Based Diet

The growing obesity epidemic in the United States has caused substantial health and economic burdens on U.S. citizens. Cardiovascular diseases related to obesity, such as heart disease, stroke, and type 2 diabetes are some of the leading causes of the poor health status in America.¹⁰ However, these diseases can be easily prevented with proper diet and exercise interventions. Plant-based diets are a primary area of interest for these interventions. Researchers from the Physicians Committee for Responsible Medicine suggest that a well-planned, balanced vegetarian diet has the ability to effectively support weight management, glycemic control, and prevention and control of cardio-metabolic disease.¹⁰ Vegan and vegetarian diets often provide healthier nutrient profiles compared to standard American diets. These diets may reduce the risk of coronary heart disease by 40% and type 2 diabetes by about 50%.¹⁰ Such evidence supports the healthful benefits of a WFPB diet in the management and prevention of disease.

Diabetes management is widely covered in the field of nutrition and dietetics. Therefore, it is important to determine the feasibility of following specific diets that can support a healthy lifestyle in patients with diabetes. In a study conducted by the Department of Medicine at the George Washington University School of Medicine, researchers assessed various diet interventions for type 2 diabetes and concluded that a low-fat vegan diet is comparable to a conventional diabetes diet in regards to acceptability and adherence.¹¹ The findings revealed the

importance of not only therapeutic diets in diabetes management, but also their acceptability to patients and likelihood of being followed.¹¹ After a 74-week trial, results concluded that the acceptability of a plant-based diet appears to be no barrier to nutrition intervention for diabetes.¹¹ These findings support using a WFPB diet as a healthful and sustainable medical nutrition therapy strategy for diabetes management.

A different study offers promising evidence supporting the use of a WFPB diet to treat obesity. Researchers in New Zealand studied individuals who were diagnosed with obesity or overweight and at least one other comorbidity (type 2 diabetes, ischemic heart disease, hypertension, or hypercholesterolemia).¹² Each participant in the study was given normal care throughout the study period, but the intervention participants were also instructed to follow a non-energy-restricted WFPB diet and attend facilitated meetings.¹² Participants were monitored after 6 months of following the diet, as well as one year after doing so.¹² Despite having no calorie restrictions, participants who followed the WFPB diet had a significantly greater BMI reduction than the participants in the control group.¹² They also had a greater amount of cholesterol reduction, although the difference between the two groups was not statistically significant.¹² The findings of this study were impressive because the WFPB intervention “achieved greater weight loss... than any other trial that does not limit energy intake or mandate regular exercise.”¹² Therefore, this diet intervention can be successfully implemented to help in the treatment of obesity by facilitating weight loss without imposing challenging restrictions.

In addition to treating obesity, WFPB diets may be effective in reducing inflammation, which can help reduce the risk for cancer. One review from *Nutrition Research and Practice* summarizes research that has shown that a wide variety of compounds typically found in plant foods are associated with decreased inflammation.¹³ For example, isoflavones have been “shown

to decrease proinflammatory cytokines and suppress chronic inflammation in obese mice.”¹³ Isoflavones are naturally occurring phenolic flavonoids that are most commonly found in soybeans, which can be a component of a WFPB diet. Stilbenes, another class of chemical compounds naturally found in plant-based foods, were shown to reduce inflammation and slow cancer growth.¹³ These anti-inflammatory effects are important because chronic inflammation is associated with an increased risk for cancer and other chronic diseases.¹³ Therefore, the WFPB diet should be implemented because it contains many phytonutrients that can help reduce the risk of the aforementioned chronic diseases.

Responses to the Whole-Foods, Plant-Based Diet

Despite the many benefits of a WFPB diet, few people follow the diet on a consistent basis. Researchers from the Department of Food Science at the University of Copenhagen sought out some of the reasons why one may choose not to adopt a plant-based diet.¹⁴ Using an online questionnaire, the researchers asked 462 Danish adults (with ages ranging from early 20s to late 40s) about their intake of animal products and their attitudes towards plant-based food consumption.¹⁴ The results of the study indicated that “negative attitudes about protein content, satiety effect, taste, environmental and health effects could serve as barriers towards adopting a plant-based diet.”¹⁴ A lack of education about the WFPB diet may lead to these negative attitudes, which can prevent individuals partaking in such a diet.

Ultimately, an individual can be well-educated on the benefits and challenges to following a WFPB diet, but a simple pros and cons list is not always enough to convince one to follow the diet or not. In fact, there are multiple factors that contribute to a person’s decision regarding which diet they will follow. Researchers from the Instituto Universitário de Lisboa decided to further explore what influences a consumer’s choice over whether or not they will

adopt a plant-based diet.¹⁵ They developed a survey that was then promoted on social media to Portuguese users; 410 individuals (aged 18-69 years) responded.¹⁵ The survey included a variety of questions to determine the opinions and feelings towards a plant-based diet and the reasons for their responses.¹⁵ The researchers determined that an “affective connection towards meat” influenced an individual’s perception of plant-based diets and their willingness to adopt such a diet.¹⁵ Evidently, food is not simply a substance that nourishes the body. Rather, it can have emotional implications that influence an individual’s choices. This is important to consider as the opinions of college students may be impacted by a wide variety of factors.

Based on the literature that is currently available, more information is still needed on plant-based diets in the specific population of university students. This population is unique in many ways, such as the typical living situation, dining options, and social settings of university students. These factors may influence how university students feel about plant-based eating in ways that other groups of people would not experience. This study seeks to fill this gap of knowledge by focusing only on students who are enrolled in a university.

CHAPTER III: METHODS

Study Design

This study used an electronic survey to collect information about university students' attitudes and beliefs about a WFPB diet. The researchers developed this survey using Survey Monkey®. The survey was divided into four sections: (1) Health Status, (2) Eating Habits, (3) Knowledge and Attitudes, and (4) Demographics (see Appendix B). In total, the survey included 28 questions. It was approved by the TCU Institutional Review Board.

Participants

The population for this study was selected using convenience sampling. The survey was distributed to students using a link sent in emails and posted on social media platforms. The emails were primarily sent by Texas Christian University faculty, particularly those within the Department of Nutritional Sciences. Only students attending a college or university were recruited for this study. The inclusion criteria for completing the survey only required that participants be 18 years or older and currently attending a college or university. No criteria discriminated between age, gender, race, ethnicity, family income, employment status, education level, or region/state of residence. Participants were only excluded if they were younger than 18 or if they did not have access to the Internet. A total of 248 individuals responded to at least one question on the survey.

Participation in the study was voluntary. Informed consent was obtained through the first page of the survey, prior to showing the questions. No incentives or compensation were offered for participating in the survey. All study participants and their corresponding responses were anonymous; no personal information was disclosed.

Statistical Analyses

The survey was active from April 23, 2020 to September 21, 2020. Once the data collection period ended, the researchers closed the survey to prevent further responses outside of the collection time. Survey Monkey provided the initial results from the survey. In order to further analyze the data, it was transferred into SPSS, a statistical software package. Pearson correlation coefficients were calculated to identify any relationships between university students' demographics and their attitudes toward a WFPB diet.

CHAPTER IV: RESULTS

A total of 248 university students were recruited to complete a survey about following a WFPB diet. Participants were initially included if they were attending a university at the time of the survey distribution and had access to an electronic device to complete the survey. Some participants who did not answer all of the survey questions were excluded from the final data analysis. In total, 248 students responded to at least one of the survey questions, but only 209 completed all of the questions. Thus, 209 responses were included in the analysis.

Of these 209 students included in the analysis, 42 (20.1%) were male and 167 (79.9%) were female (see Figure 1). 108 students (51.7%) were pursuing health science and nutrition majors, while 101 (48.3%) were pursuing non-health science majors (see Figure 1). When asked if they had taken a nutrition course while in university, 98 students (46.9%) answered “yes” and 111 (53.1%) answered “no” (see Figure 1). Approximately half of the respondents had followed a diet at least once prior to taking the survey, and the diets included plant-based diets, the ketogenic diet, a gluten-free diet, and other elimination diets (see Figure 2). Interestingly, the plant-based diet was indicated most often as one of the diets students had tried in the past.

Figure 1: Distribution of various demographic characteristics.

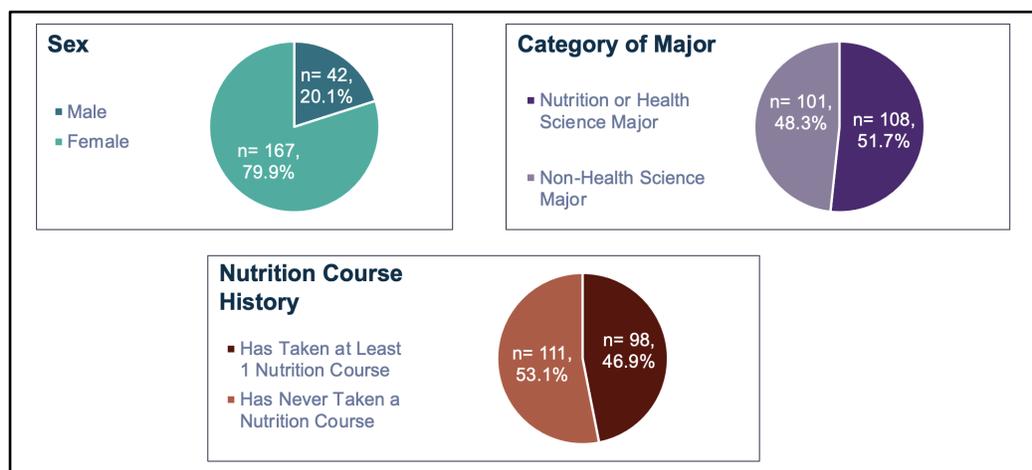
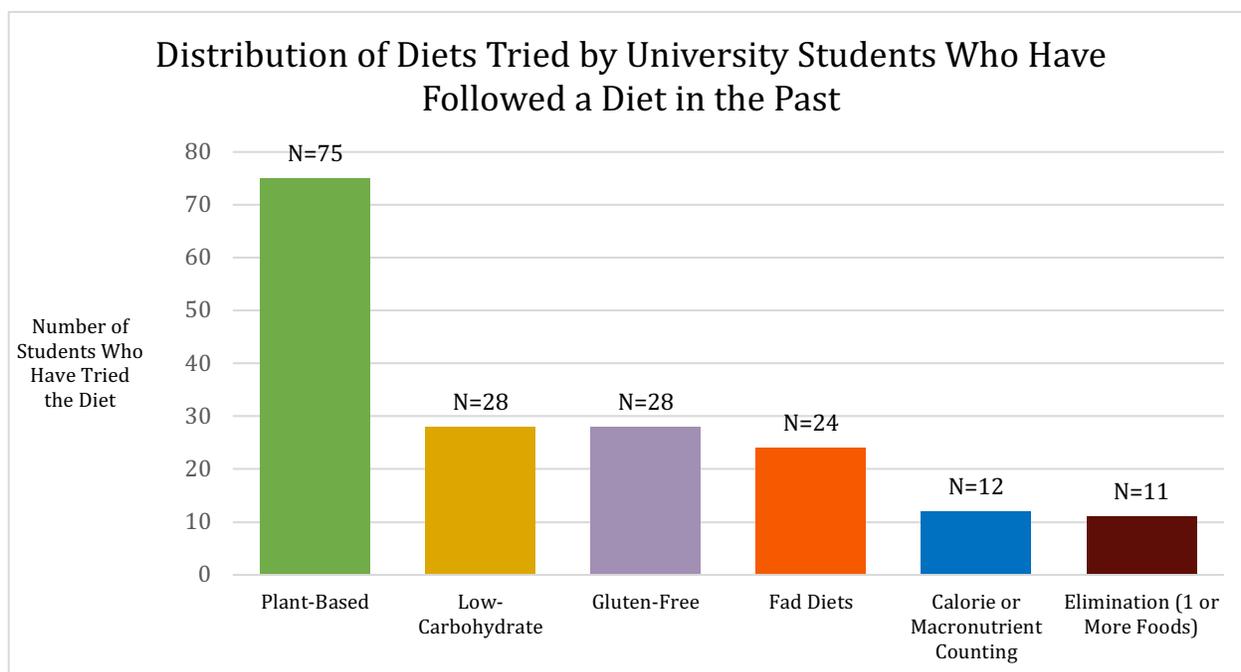


Figure 2: Distribution of Diets Tried by University Students Who Have Followed a Diet in the Past.



The data analysis revealed associations between students' knowledge and their positive attitudes and beliefs regarding the WFPB diet (see Table 1 and Table 2). 73.7% of students indicated that they understood what it means to follow a WFPB diet. The SPSS results showed that students who were pursuing nutrition and health science majors were more likely to understand the meaning of the diet ($p \leq 0.01$). Similarly, students who have taken a nutrition course in college were more likely to be aware of the diet's meaning ($p \leq 0.01$). Those who had already taken a nutrition course in college were also more likely to state that they had started eating healthier since starting university ($p \leq 0.01$). Students who stated they understood the meaning of a WFPB diet were more likely to believe that the diet is beneficial to their health, compared to the students who did not understand the meaning of the WFPB diet ($p \leq 0.01$).

Table 1: Significant Correlations with Nutrition and Health Science Majors

Variable	Correlation Coefficient (r)	p-Value
Understand the meaning of the whole-foods, plant-based diet	0.189	.006**
Believe that hunger would never be satisfied by eating a whole-foods, plant-based diet	-0.302	.000**
Believe that one must eat meat to maintain their health	-0.178	.010**

*Note: ** indicates correlation is significant at the 0.01 level.*

Table 2: Significant Correlations with Students Who Have Taken a Nutrition Course

Variable	Correlation Coefficient (r)	p-Value
Understand the meaning of the whole-foods, plant-based diet	0.354	.000**
Believe that hunger would never be satisfied by eating a whole-foods, plant-based diet	-0.284	.000**
Believe that one must eat meat to maintain their health	-0.224	.001**
Started eating healthier in college	0.223	.001**

*Note: ** indicates correlation is significant at the 0.01 level.*

On the contrary, students who lacked knowledge of the WFPB diet tended to reflect more negative views of the diet in their survey responses. 18.7% of students indicated that they did not understand the meaning of a WFPB diet. Those who did not understand what it meant to follow the diet were more likely to believe that their hunger would never be fully satisfied on a WFPB diet ($p \leq 0.01$). Students who did not understand the diet's meaning also tended to believe that they needed to eat meat to maintain their health ($p \leq 0.01$). In addition, these respondents were more likely to believe that there is no benefit to following a WFPB diet ($p \leq 0.01$).

The negative or incorrect assumptions about the WFPB diet, as well as the lack of knowledge regarding the diet, may be related to the courses that students take. Non-health science majors were more likely to believe that their hunger would never fully be satisfied by eating a WFPB diet ($p \leq 0.01$). Those who had never taken a nutrition course were also more likely to believe their hunger would never be satisfied ($p \leq 0.01$). Both non-health science majors and those who had not taken a nutrition course were also more likely to believe that they needed to eat meat to maintain their health (both $p \leq 0.01$).

Many statistically significant data arose when looking at participants' sex and its associations with other variables (see Table 3). While only 29% of respondents had ever followed a plant-based diet prior to taking the survey, these individuals were more likely to be female ($p \leq 0.01$). Females were also more likely to believe that the WFPB diet was beneficial ($p \leq 0.01$). Males tended to believe that they needed to eat meat to maintain their health ($p \leq 0.01$), and their hunger would never be satisfied if they were to follow a WFPB diet ($p \leq 0.01$). Males also were likely to believe that such a diet would decrease their energy levels ($p \leq 0.01$).

Table 3: Significant Correlations with Sex (Male)

Variable	Correlation Coefficient (r)	p-Value
Has followed a plant-based diet in the past	-0.243	.000**
Believe that following the whole-foods, plant-based diet is beneficial	-0.264	.000**
Believe that one must eat meat to maintain their health	0.304	.000**
Believe that hunger would never be satisfied by eating a whole-foods, plant-based diet	0.194	.005**
Believe that following a whole-foods, plant-based diet would decrease energy levels	0.161	.020**

*Note: ** indicates correlation is significant at the 0.01 level.*

CHAPTER V: DISCUSSION

The purpose of this study was to determine how university students perceive the WFPB diet and to identify their attitudes about the diet. Understanding how the general university student population views plant-based eating could guide dietitians and other professionals as they figure out how to best educate the public on healthy eating patterns.

The researchers used Survey Monkey to create and distribute a 28-question electronic survey. The resulting data was analyzed using SPSS, revealing many statistically significant correlations between certain responses.

One primary finding of this study was that students with a greater knowledge and understanding of the WFPB diet were more likely to have positive beliefs and attitudes toward the WFPB diet. Those who understood the meaning of the diet were more likely to believe it is beneficial to one's health. On the contrary, those who did not understand what it means to follow a WFPB diet did not see the benefits of the diet, and they believed their hunger wouldn't be satisfied without meat. This connection between knowledge and likelihood of implementing the diet indicates that perhaps increased education on plant-based diets could increase general participation in plant-based eating. This hypothesis is also consistent with previous research, such as a systematic review that showed that nutrition education could improve the diets of college or university students.¹⁶

Current evidence shows that plant-based diets have positive impacts on one's health.¹⁰⁻¹³ Although there can be nutritional benefits of a moderate consumption of meat, an individual does not have to eat meat to have a healthy diet. People who are familiar with plant-based eating patterns may be more aware of its health benefits, especially if they learned about the WFPB diet in a nutrition course. If they can see the benefits, then perhaps they are more likely to put the diet

into practice. Many trusted sources for health and nutrition information, including the Dietary Guidelines for 2020-2025, recommend that people follow a plant-based diet.

Based on the results of this study, health professionals may help more people follow a plant-based diet by educating them so that they are aware of its many health benefits. Knowing the proven benefits of the WFPB diet would encourage people to consistently follow the diet. Furthermore, people may be more likely to trust that they would eventually see positive results, helping the diet to be a more sustainable option compared to the fad diets that typically produce quick, but fleeting, results.

The positive impact of nutrition education on health was further supported by data regarding whether students had previously taken a nutrition course. If they had taken a course, they were more likely to see the benefits of the WFPB diet, and they believed they had started eating healthier in college themselves. The latter correlation may indicate that the nutrition course taught the students about a healthy diet, which allowed them to implement those practices into their own lives. Greater knowledge about general nutrition practices from a nutrition course may also help students recognize the benefits of a plant-based diet specifically.

One interesting trend observed in this study was the tendency for males to have more negative attitudes towards the WFPB diet. It is possible that this association appeared because the male respondents tended to be non-health science majors ($p \leq 0.01$). However, social influences could have been present as well. A 2020 systematic review showed that people often associate meat with masculinity; vegetarian and vegan diets are perceived as less masculine than omnivorous diets.¹⁷ Gender norms may have compelled the male respondents in this study to indicate more negative attitudes towards plant-based eating patterns. Further research is needed in order to determine whether this trend is consistently observed and why it occurs.

The current study had a few limitations that may have impacted the data. First, some of the questions on the survey asked about very similar ideas with different wording. Specifically, Question 17 asked participants to indicate the extent to which they agreed with the statement, “A whole-foods, plant-based diet is beneficial to my health.” Question 22, structured the same way, used the statement, “I see no benefit in following a whole-foods, plant-based diet.” Perhaps these questions confused some participants, and the survey could have been streamlined by eliminating one of these questions. However, it is highly unlikely that this issue had any significant impact on the results, as both questions resulted in responses showing the same trends/associations with other variables. A second limitation was that participants were recruited using a convenience sample. Despite attempts to recruit a diverse set of respondents via professors outside of the nutrition department, most of the respondents were females. Additionally, the types of participants’ majors were not representative of the wide range of majors pursued at TCU. Still, the SPSS analysis showed that there were highly significant associations between many different variables, so this convenience sampling likely did not invalidate the data.

As far as we know, this was the first study to assess knowledge regarding a WFPB diet in the university-aged population specifically. These students are actively learning and are exposed to new information daily. For most university students, they are also living independently for the first time, which means they are making their own dietary choices (at dining halls, restaurants, and grocery stores). Further studies should be performed to expand the body of knowledge on health practices of university students specifically.

Since this study revealed a likely association between nutrition education and compliance with a plant-based diet, it is recommended that health practitioners educate their college-aged patients on the benefits of plant-based diets. Building healthy eating habits in younger

populations could extend the life expectancy and improve the quality of life of the nation by reducing rates of chronic diseases.

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APPENDIX A: IRB 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](#) (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:** 9/6/2019
2. **Study Title:** University Students' Knowledge and Attitudes of Whole-Foods, Plant-Based Diet
3. **Principal Investigator (must be a TCU faculty or staff):** Kelly Fisher DCN, RD, CSP, LD, Department of Nutritional Sciences
4. **Department:** Nutritional Sciences
5. **Other Investigators:** List all faculty, staff, and students conducting the study including those not affiliated with TCU.
Alex Burgess, Junior – Coordinated Program in Dietetic
Katherine Crider, Junior – Coordinated Program in Dietetics
6. **Project Period (mm/yyyy - mm/yyyy):** 01/2020-05/2021
7. **If you have external and/or internal funding for this project –**
Funding Agency: N/A **Project #:** N/A **Date for Funding:** N/A

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

9. Purpose: Describe the objectives and hypotheses of the study and what you expect to learn or demonstrate: To determine University students' general knowledge and attitudes of a whole-foods, plant-based diet.

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

When students begin their first year at college, they gain a new level of independence. With this freedom comes the opportunity to choose how one's diet looks. Many factors can influence a student's food choices, such as taste, convenience, health, and many more. For students basing their decisions on health, they may consider following a plant-based diet. Researchers from the Health Promotion Sciences department at the University of Arizona determined the feasibility of having college students follow a plant-based diet for ten days.¹ The researchers recruited ten participants from a public health course at the university.¹ Each participant was asked to consume only whole-foods, plant-based, vegan meals during the study period.¹ After ten days, researchers determined that it was feasible for a plant-based intervention to be used with college students.¹ Although this was a very small sample size, the study indicates that college students may be willing to accept plant-based meals as a new component of their diets.

A leading opposition to plant-based diets is the belief that adherence to these types of diets would result in mineral deficiencies such as iron. Although there is a strong association between vegan and vegetarian diets and conditions like iron-deficiency anemia, plant-based diets can provide ample amounts of iron in the diet and support a healthy lifestyle.² Agarwal (2013) suggests that the most valued source of iron in the diet, red meat, may actually play a role in the development of more chronic conditions such as cancer, diabetes, cardiovascular disease, and even mortality.² This study (2013) also supports the "role of plant ferritin as a readily available source of iron that sidesteps red meat's potential adverse health effects."² The effects of non-heme iron consumption along with a general healthful diet has proven to provide all the required nutrients of infants from birth to twelve months.² Studies show that non-heme iron sources such as leafy green vegetables, legumes, and whole grains, when consumed as part of a long-term healthy and balanced diet, can meet nutritional needs while decreasing the risk of developing chronic disease.^{2,3}

Animal protein versus plant protein is a common topic of discussion regarding a whole-foods, plant-based diet. When comparing the quality of protein in the diet, protein absorption and availability are similar for plant protein and protein from meat.³ While a plant-based diet may lack other nutrients such as iron and vitamin B12 if not carefully carried out, protein evidently appears to be of no concern in these diets; however, the importance of inactivating anti-nutritive substances such as phytates, trypsin inhibitors, and tannins

should be stressed in the assessment and prescription of a plant-based diet.³ Vegan and vegetarian diets have proven capable of supporting a healthy lifestyle and normal growth and development in humans but should be carefully planned to avoid restricting quality and variety.³ Careful thought and consideration should go into meal planning on a plant-based diet to adequately obtain the needed nutrients to sustain life. With that under consideration, meat can be considered as an optional rather than essential part of a healthy diet.

A common nutrient of concern in plant-based diets is the mineral Calcium. Calcium can be obtained from a variety of plant sources in one's diet; however, the bioavailability of Calcium in a plant-based diet can be lessened when combined with vegetarian constituents that can inhibit its absorption.⁴ Weaver et al (1999) supports adherence to a plant-based diet as a sufficient source of dietary Calcium as long as certain precautions are considered in diet planning.⁴ Weaver et al (1999) suggests that those who choose to limit or exclude meat from their diets may find ease in increasing consumption of Calcium while also reducing protein consumption to offset protein-induced urinary loss of Calcium.⁴ Another suggested way to increase absorption of Calcium in plant-based diets is by taking Calcium supplements or consuming fortified foods.⁴ Although liberal consumption of dairy products is the easiest and most convenient way to receive Calcium in the diet, it is not a necessary component in a carefully planned whole-foods, plant-based diet.⁴

The recent and growing obesity epidemic in the United States has induced substantial health and economic burdens on U.S. citizens. Cardiovascular diseases related to obesity, such as heart disease, stroke, and type 2 diabetes are some of the leading causes of the poor health status in America.⁵ However, these diseases can be easily prevented with proper diet and exercise intervention, with plant-based diets being a primary area of interest. Kahleova et al (2015) suggests that a well-planned, balanced vegetarian diet has the ability to effectively support weight management, glycemic control, and prevention and control of cardio-metabolic disease.⁵ Vegan and vegetarian diets often provide greater nutrient profiles compared to standard American diets and may reduce the risk of coronary heart disease by 40%, and type 2 diabetes by about 50%.⁵ Such evidence supports the healthful benefits of a whole-foods, plant-based diet in the management and prevention of disease.⁵

Diabetes management plays a large role in the field of nutrition and dietetics; therefore, it is important to determine the feasibility of following specific diets that can support a healthy lifestyle in patients with diabetes. In a study conducted by the Department of Medicine at the George Washington University School of Medicine, researchers assessed various diet interventions for type 2 diabetes and concluded that a low-fat vegan diet is comparable to a conventional diabetes diet in regards to acceptability and adherence.⁶ The findings revealed the importance of not only therapeutic diets in diabetes management, but also their acceptability to patients and likelihood of being followed.⁶ After a 74-week trial, results concluded that the acceptability of a plant-based diet appears to be no barrier to nutrition intervention for diabetes.⁶ These findings are significant as they support a whole-foods, plant-based diet as a healthful and sustainable medical nutrition therapy strategy for disease management.

One study offers promising evidence of the success of using a whole-foods, plant-based diet to treat obesity. Researchers in Gisborne, New Zealand studied individuals who were diagnosed with obesity or overweight and at least one other comorbidity (type 2 diabetes, ischemic heart disease, hypertension, or hypercholesterolemia).⁷ Each participant in the study was given normal care throughout the study period, but the intervention participants were also instructed to follow a non-energy-restricted whole-foods, plant-based diet and attend facilitated meetings.⁷ Participants were monitored after 6 months of following the diet, as well as one year after doing so.⁷ Despite having no calorie restrictions, participants who followed the whole-foods, plant-based diet had a significantly greater BMI reduction than the participants in the control group.⁷ They also had a greater amount of cholesterol reduction, although the difference between the two groups was not statistically significant.⁷ The findings of this study were impressive because the whole-foods, plant-based intervention “achieved greater weight loss... than any other trial that does not limit energy intake or mandate regular exercise.”⁷ Therefore, this diet intervention can be successfully implemented to help in the treatment of obesity by facilitating weight loss.

In addition to treating obesity, whole-foods, plant-based diets may be effective in reducing inflammation, which can help reduce the risk for cancer. Hardman (2014) summarizes research that has shown that a wide variety of compounds typically found in plant foods are associated with decreased inflammation.⁸ For example, isoflavones have been “shown to decrease proinflammatory cytokines and suppress chronic inflammation in obese mice.”⁸ Isoflavones are naturally occurring phenolic flavonoids that are most commonly found in soybeans, which can be a component of a whole-foods, plant-based diet. Stilbenes, another class of chemical compounds naturally found in plant-based foods, were shown to reduce inflammation and slow cancer growth.⁸ These anti-inflammatory effects are important because chronic inflammation is associated with an increased risk for cancer and other chronic diseases.⁸ Therefore, whole-foods, plant-based diet may be implemented because it contains many phytonutrients that can help reduce the risk of the aforementioned chronic diseases.

Despite the many benefits of a whole-foods, plant-based diet, few people follow the diet on a consistent basis. Researchers from the Department of Food Science at the University of Copenhagen sought out some of the reasons why one may choose not to adopt a plant-based diet.⁹ Using an online questionnaire, the researchers asked 462 Danish adults (with ages ranging from early 20s to late 40s) about their intake of animal products and their attitudes towards plant-based food consumption.⁹ The results of the study indicated that “negative attitudes about protein content, satiety effect, taste, environmental and health effects could serve as barriers towards adopting a plant-based diet.”⁹ A lack of education about the whole-foods, plant-based diet may lead to these negative attitudes, which can prevent individuals partaking in such a diet.

In the end, an individual can be well-educated on the benefits and challenges to following a whole-foods, plant-based diet, but a simple pros and cons list is not always enough to convince one to follow the diet or not. In fact, there are multiple factors that contribute to a person’s decision regarding which diet they will follow. Researchers from the Instituto Universitário de Lisboa decided to further explore what influences a consumer’s choice over

whether or not they will adopt a plant-based diet.¹⁰ They developed a survey that was then promoted on social media to Portuguese users; 410 individuals (aged 18-69 years) responded.¹⁰ The survey included a variety of questions to determine the opinions and feelings towards a plant-based diet and the reasons for their responses.¹⁰ The researchers determined that an “affective connection towards meat” influenced an individual’s perception of plant-based diets and their willingness to adopt such a diet.¹⁰ Evidently, food is not simply a substance that nourishes the body. Rather, it can have emotional implications that influence an individual’s choices. This is important to consider as the opinions of college students may be impacted by a wide variety of factors.

References

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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:

The study population will include students attending college and university. Inclusion criteria will not discriminate between age, gender, race, ethnicity, family income, employment status, education level, region/state of residence. Exclusion criteria include any individual younger than 18 years of age and/or any individual who does not have access to the Internet. The goal of the research is to have 300 participants who successfully complete the entire questionnaire. The study questionnaire, including consent form, should take no more than 15 minutes to complete.

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.

The first recruitment strategy will be to send a weblink for the survey to the Administrative Assistant of the Department of Nutritional Sciences, and she will disperse the link to all students within the department. The weblink will also be sent to other TCU professors for dispersal to students. Finally, the researchers will post information on social media outlets, asking for fellow students to complete the survey.

Recruitment strategies include dispersing a weblink for a survey that will be completed individually on Survey Monkey®, inviting individuals to participate through social media outlets, and advertising to students and faculty at Texas Christian University.

13. 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.

Participation in the study is voluntary. Consent for survey will be presented before proceeding to the first survey question. Consent will acknowledge that the participant is

answering voluntarily with their personal experience and has the ability to stop the survey at any time. No incentive will be administered for participation. The study participants will remain anonymous, not disclosing personal information.

14. 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.

1. Recruit participants via email, social media messaging, and in-person advertising.
2. Completion of the consent form and questionnaire by participants.
3. Analyze statistics to determine the validity of findings.

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

Survey data will be analyzed to reflect the study objectives. Analyses will assess knowledge and attitude towards a whole-foods, plant-based diet in concordance with participants' health status and eating habits. Data will determine University students' general knowledge and attitudes of a whole-foods, plant-based diet (SPSS, $p \leq 0.05$).

16. 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 include 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.

17. 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 will be collected anonymously through a questionnaire on Survey Monkey®. The surveys will be observed, organized, and managed with a randomly assigned number and stored online in the Department of Nutritional Sciences' Survey Monkey® for a minimum of five years.

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

Although the participants will not directly benefit from being in this study, others might benefit because we might find out more about University students' general knowledge and attitudes of a whole-foods, plant-based diet. With this information, we could better promote and educate this population on the benefits of a whole-foods, plant-based diet.

19. 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.

20. 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 | <input checked="" type="checkbox"/> |
| b. Consent document | <input checked="" type="checkbox"/> |
| c. HIPAA form if applicable (N/A) | <input type="checkbox"/> |
| d. Protecting Human Research Participants Training certificate for each investigator | <input checked="" type="checkbox"/> |
| e. Recruitment fliers, letters, ads, etc. | <input checked="" type="checkbox"/> |
| f. Questionnaires or other documents utilized in screening and data collection | <input checked="" type="checkbox"/> |

Principal Investigator Assurance

21. By signing below, I certify to the following:

- 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.

Signature of Principal Investigator Date

APPENDIX B: Survey

University Students' Knowledge and Attitudes of a Whole-Foods, Plant-Based Diet



Texas Christian University Fort Worth, Texas

CONSENT TO PARTICIPATE IN RESEARCH

Title of Research: University Students' Knowledge and Attitudes of Whole-Foods, Plant-Based Diet

Funding Agency/Sponsor: None

Principal Investigator: Kelly Fisher DCN, RD, CSP, LD, Department of Nutritional Sciences

Co-investigators:

Alex Burgess, Junior – Coordinated Program in Dietetics Katherine Crider, Junior – Coordinated Program in Dietetics

You are invited to participate in a research study. In order to participate, you must be over the age of 18, currently enrolled in college or university level courses, and have access to the internet.

A summary of things you should know:

- This is a research study involving human subjects that has been approved by TCU Institutional Review Board.
- The purpose of the study is to determine University students' general knowledge and attitudes of a whole-foods, plant-based diet. If you choose to participate, you will be asked to complete one survey on Survey Monkey® which takes approximately 10 minutes.
- We don't believe there are any risks from participating in this research that are different for risk that you encounter in everyday life.
- There are no direct benefits for participants related to this study.
- Taking part in this research project is voluntary. You don't have to participate and you can stop at anytime.

Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What is the purpose of the research?

To determine University students' general knowledge and attitudes of a whole-foods, plant-based diet.

How many people will participate in this study?

If you decide to be in this study, you will be one of 300 participants in this research study.

What is my involvement for participating in this study?

If you agree to be in the study, we will ask you to complete one online anonymous survey on Survey Monkey®.

How long am I expected to be in this study for and how much of my time is required?

Participants will voluntarily complete one survey on Survey Monkey® which takes approximately 10 minutes.

What are the risks to me for participating in this study and how will they be minimized?

We don't believe there are any risks from participating in this research that are different for risk that you encounter in everyday life. Your responses in the survey are anonymous and will not be linked to you in any way.

What are the benefits for participating in this study?

Although you will not directly benefit from being in this study, others might benefit because we might find out more about University students' general knowledge and attitudes of a whole-foods, plant-based diet. With this information, we could better promote and educate this population on the benefits of a whole-foods, plant-based diet.

Will I be compensated for participating in this study?

You will receive no compensation for participating in this study.

How will my confidentiality be protected?

Data will be collected anonymously through a survey on Survey Monkey®. Anonymous survey data will be organized according to a given number.

What will happen to the information collected about me after the study is over?

Anonymous survey data will be observed, organized, and managed with a randomly assigned number and stored online in the Department of Nutritional Sciences' Survey Monkey® for a minimum of five years. Anonymous survey data will not be used for future research or other purposes.

Is my participation voluntary?

It is totally up to you to decide to be in this research study. Participating in this study is voluntary. Even if you decide to be part of the study now, you may change your mind and stop at any time. You do not have to answer any questions you do not want to answer. Consent may be withdrawn at any time during the study by stopping the online survey.

Who should I contact if I have questions regarding the study?

You can contact Kelly Fisher DCN, RD, CSP, LD at k.fisher2@tcu.edu and 817-257- 7309 with any questions that you have about the study.

Who should I contact if I have concerns regarding my rights as a study participant?

Dr. Dru Riddle, Chair, TCU Institutional Review Board, (817) 257-6811, d.riddle@tcu.edu; or Dr. Floyd Wormley, Associate Provost of Research, research.tcu.edu

By clicking below this document, you are agreeing to be in this study. Make sure you understand what the study is about before you click. If you have any questions about the study, you can contact the study team using the information provided above.

By clicking below, I understand what the study is about and my questions so far have been answered. I agree to take part in this study.

University Students' Knowledge and Attitudes of a Whole-Foods, Plant-Based Diet

* 1. Which category below describes your age?

- Younger than 18
- 18-20
- 21-25
- 26-30
- Older than 30

University Students' Knowledge and Attitudes of a Whole-Foods, Plant-Based Diet

Health Status

* 2. On average, how often do you engage in physical activity?

- 0 hours/week
- Less than 1 hour/week
- 1-3 hours/week
- 4-6 hours/week
- More than 6 hours/week

* 3. Using your best judgment, how do you rate your eating habits?

- Unhealthy
- Slightly unhealthy
- Normal
- Healthy
- Very healthy

* 4. How do you interpret your current weight?

- Underweight
- Slightly underweight
- Normal weight
- Overweight
- Very overweight
- Obese

University Students' Knowledge and Attitudes of a Whole-Foods, Plant-Based Diet

Eating Habits

* 5. Do you prepare your own meals?

- Yes
 No

* 6. Since starting college, have your eating habits changed in any way?

- Eating healthier
 Eating less healthy
 No change

* 7. Have you ever followed any type of diet?

- Yes
 No

* 8. If you answered "yes" to question 7, which type(s) of diets have you followed? (Check all that apply)

- Vegetarian
 Vegan
 Keto
 Whole30
 Gluten-free
 Atkins
 Weight Watchers
 Does not apply
 Other (please specify)

* 9. If you answered "yes" to question 7, how long did you follow the diet?

- Less than a week
- 1-2 weeks
- 2-4 weeks
- Over 1 month
- Does not apply

* 10. Do you currently or have you ever followed a plant-based diet? (vegetarian or vegan)

- Yes
- No

* 11. If you answered "yes" to question 10, for what reason(s) did you follow the plant-based diet?

- Health
- Weight loss
- Environment
- Animal rights
- Religion
- Does not apply
- Other (please specify)

* 12. How often do you eat meat (beef, pork, bison, chicken, turkey, duck, fish)?

- With every meal
- 7+ times/week
- 3+ times/week
- 1-2 times/week
- Occasionally
- Never

University Students' Knowledge and Attitudes of a Whole-Foods, Plant-Based Diet

Knowledge and Attitudes

* 13. Which of the following terms are familiar to you? (Check all that apply)

- Vegan diet
- Vegetarian diet
- Pescatarian diet
- Ovo-vegetarian diet
- Lacto-vegetarian diet
- Plant-based diet
- Whole-foods diet
- I'm not familiar with any of the above terms

* 14. I believe that following a whole-foods, plant-based diet would benefit me in the following way(s). (Check all that apply)

- Lose weight
- Benefit the environment
- Reduce disease risk
- None
- Other (please specify)

* 15. Have you ever taken a nutrition course in college?

- Yes
- No

For questions 16-22, read the statement and choose the answer that best applies.

* 16. I understand what it means to follow a whole-foods, plant-based diet.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

* 17. A whole-foods, plant-based diet is beneficial to my health.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

* 18. I am confident that I can successfully follow a whole-foods, plant-based diet.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

* 19. I think that following a whole-foods, plant-based diet would decrease my energy levels.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

* 20. My hunger would never be fully satisfied if I followed a whole-foods, plant-based diet.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

* 21. I need to eat meat to maintain my health.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

* 22. I see no benefit in following a whole-foods, plant-based diet.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

University Students' Knowledge and Attitudes of a Whole-Foods, Plant-Based Diet

Demographics

* 23. What is your gender?

- Male
 Female

* 24. What is your race?

- American Indian/Alaska Native
 African American/Black
 Asian/Pacific Islander
 Caucasian/White
 Hispanic American
 Other (please specify)

* 25. Where do you live while at college/university?

- University/Residence hall
 Apartment/House independently
 At home with parents

* 26. In what subject area is your major?

- | | |
|---|--|
| <input type="radio"/> Business | <input type="radio"/> Mathematics |
| <input type="radio"/> Computer Science | <input type="radio"/> Physical Sciences |
| <input type="radio"/> Education | <input type="radio"/> Social Sciences |
| <input type="radio"/> Engineering | <input type="radio"/> Technology |
| <input type="radio"/> Health Sciences | <input type="radio"/> Visual and Performing Arts |
| <input type="radio"/> Interdisciplinary | <input type="radio"/> I have more than one major |
| <input type="radio"/> Liberal Arts/Humanities | <input type="radio"/> Undecided |
| <input type="radio"/> Other (please specify) | |

* 27. Are you employed (part-time or full-time) while in school?

- Yes
 No

* 28. If you answered "yes" to question 27, in what industry do you work?

- Foodservice
 Retail
 Health and fitness
 Desk job
 Does not apply
 Other (please specify)

APPENDIX C: IRB Exemption Letter



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

DATE: 30-March-2020

TO: Kelly Fisher, Alex Burgess & Katherine Crider

FROM: TCU Institutional Review Board

RE: Exempt Approval of Protocol 1920-188

Dear Kelly, Alex & Katherine:

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 "University Students' Knowledge and Attitudes of Whole-Foods, Plant-Based Diet" and determined that your study is considered minimal risk, qualifying for an exemption from further IRB review under category 2. Specifically, 45 CFR 46.104(d)(2)(i) identifies studies that are exempt from further IRB review, including: research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) where the following information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

The IRB has determined that your proposed project qualifies under 45 CFR 46.104(d)(2)(i). For these reasons, the IRB has determined that your proposed study is exempt from further IRB review.

Remember that even though your project is exempt from further IRB review, the research must be conducted according to the proposal submitted to the IRB. Minor changes to this study generally will not require IRB review. Substantive modifications, however, will need IRB review, since the review category might change as a result of modification. Some examples of substantive modifications include: change in PI, study purpose, procedures, funding source, study population, level of risk, or identifiability of collected data. If at any time you are unsure as to whether a change is minor or substantive, please submit a question to Research Compliance for assistance.

If you wish to make substantive changes to the approved protocol, you must submit a [Request for Amendment/Modification to Protocol](#) form to the IRB. You may not implement any changes until you have received IRB approval of such changes. Also, please be aware that changes to the research protocol may prevent the research from qualifying for



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

exempt review and require submission of a new IRB application or other materials to the IRB.

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

Sincerely,
Research Compliance on behalf of TCU Institutional Review Board

APPENDIX D: CITI Training

Completion Date 12-Sep-2019
Expiration Date 11-Sep-2023
Record ID 33255872

This is to certify that:

Alex Burgess

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

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w44f87cd2-4e9f-4014-af45-362d15a58486-33255872