RELATIONSHIP BETWEEN OMEGA-3 FATTY ACID CONTAINING FOODS AND SYMPTOMS OF DEPRESSION

by

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Submitted in partial fulfillment of the

requirements for Departmental Honors in

the Department of Nutritional Sciences

Texas Christian University

Fort Worth, Texas

4 May 2015

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ACKNOWLEDGEMENTS

The author is grateful to the following individuals and groups for advice and assistance in the completion of the research project:

Gina Jarman Hill PhD, RD, LD

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ABSTRACT

Background: Although results are mixed, some research has suggested that a diet high in omega-3 fatty acids may help reduce the incidence of depression in certain individuals. This study surveyed college students between the ages of 18 to 26 regarding their omega-3 fatty acid intake and their reported symptoms of depression using a self-reported depression questionnaire.

Methods: The Institutional Review Board approved this study. An electronic survey was developed to obtain information regarding depression risk, intake of omega-3 fatty acid containing foods, and omega-3 supplement use among students at a private university. A convenience sample of participants provided informed consent. Researchers assigned participants to quartiles based upon intake of omega-3 containing foods. Data were coded into SPSS. Correlation between omega-3 quartile and depression scores were measured using Spearman's rho.

Results: Participants (N=222) averaged 20.4+/-1.7 years old and were ~79% female. Approximately 82% were categorized as having no risk of depression, ~19% were at mild risk and none were categorized as moderate, severe, or very high risk of depression. There was no correlation between consumption of omega-3 fatty acid foods and depression scores. Only 19% of participants were high consumers of omega-3 fatty acid foods.

Discussion: Although no association between omega-3 food consumption and depression scores was detected, this population had a low incidence of depression risk. A sample with greater variation in depression scores would better evaluate if a relationship between omega-3 consumption and depression scores existed.

Conclusions: This study showed that this population consumes less than the recommended amounts of omega-3 fatty acids in their diets. In fact, only 9% of participants consumed two or more servings of fatty fish weekly. Due to the importance of omega-3 fatty acid intake for health, further research is needed to determine methods to improve omega-3 intake in this population.

CHAPTER I

INTRODUCTION

According to the Centers for Disease Control (CDC), 8% of individuals in the United States twelve years of age or older report suffering from depression. This was based on research done by the CDC in their Nation Health and Examination Survey conducted from 2007 to 2010. With mental illness and depression cases on the rise throughout the years, many scientists and individuals are searching for ways to treat depression when medication alone does not work. One of the ways individuals look to do this is through the use of complementary and alternative medicine (CAM). In the 2008 National Health Statistics Reports, the CDC explains the use of CAM treatments in today's society.

> "Many types of CAM practitioners try to treat not only the physical and biochemical manifestations of illness, but also the nutritional, emotional, social, and spiritual context in which the illness arises; the overwhelming majority of CAM approaches do so to complement conventional care rather than as an alternative to conventional care."[1]

One of the CAM treatments for depression currently being researched is the use of omega-3 supplements and foods sources and the effect it may have on the neurological function of the brain. Omega-3 fatty acids have been known for a long period of time to have major health benefits mainly as being a heart-healthy monounsaturated fatty acid. Some omega-3 fatty acids, docosahexaenoic acid (DHA) in particular, have been linked to brain health. According to the Academy of Nutrition and Dietetics, DHA is present in the nerve endings of the brain, and the consumption of DHA can have cognitive, behavioral, and mental performance benefits.[2] While there are no definitive links to the supplementation of omega-3 fatty acids and the treatment of depression, current research is promising that there may be a positive link for treatment of depression through the consumption of omega-3 fatty acids.

The objective of this research is to determine the correlation between the consumption and supplementation of omega-3 fatty acids and symptoms of depression in college students 18 to 26 years old.

CHAPTER II

REVIEW OF LITERATURE

Depression Overview

With over 8% of the US population suffering from depression symptoms, it is no surprise that antidepressants are the third most commonly prescribed drug in the United States. In a survey conducted by the CDC, researchers found that from 2005 to 2008, 11% of Americans aged 12 years and older took an antidepressant. This study also states, "From 1988-1994 through 2005-2008 the rate of antidepressant use in the United States among all ages increased nearly 400%."[3]

While the rate of depression is on the rise across all groups, there are even greater increases among specific groups. According to Pratt, females were more than 2.5 times more likely to be on an antidepressant than males.[3] Also, individuals over the age of 40 were more likely to take antidepressants than any other age group. When it came to race, this study showed that non-Hispanic whites were the most likely to be prescribed an antidepressant over any other race. With the high rate of depression in the United States, it is easy to understand that many college and university students suffer from a variety of mental and cognitive disorders, as this is a time of social, emotional, and mental development.

With the multitude of life changes that occur when young adults attend college, it is common that many of them suffer from depression symptoms at some point in their college career. Hunt and Eisenburg found that mental disorders represent one-half of the diseases that affect American young adults and can have "significant implications for academic success, productivity, substance use, and social relationships" if untreated during college.[4] With the increase in depressive symptoms across all ages, it is important to focus on an area where treatments will be most successful.

Depression Symptom Rating Tool

The Quick Inventory of Depressive Symptomatology 16-item Self Report (QIDS-SR16) is a tool that can be used to screen individuals for symptoms of depression. The subject takes this test that can then be scored to determine the number of different depression symptoms the subject demonstrates. Bartko et al. conducted research that shows the QIDS-SR16 to be an effective tool to use in helping to determine depression symptoms in individuals.[5]

Each individual answers 16 questions. The screen is scored with scores ranging from 0 to 27 in nine symptom domain categories: depressed mood, loss of interest or pleasure, concentration and decisions making, self-outlook, suicidal ideation, energy and fatigability, sleep, weight and appetite change, and psychomotor changes.[6] Sixteen items are used to rate these nine criterion domains: four to rate sleep disturbances, two to rate psychomotor disturbances, four to rate appetite and weight disturbances, and one to rate the other six.[7] The scores correspond to a severity level ranging from 0-4 with each number representing the depression class of none, mild, moderate, severe, and very severe, respectively. This is a valid self-administered test that can show individuals the severity of their depression symptoms.

The following chart depicts the scoring and rating scale, with the severity level rankings as follows: 0 = none, 1 = mild, 2 = moderate, 3 = severe, 4 = very severe.[8]

Figure 1: Conversion Between IDS-SR$_{30}$ and QIDS-SR$_{16}$ Total Scores

Severity[1]	IDS-SR$_{30}$	QIDS-SR$_{16}$	HRSD$_{17}$	HRSD$_{21}$	HRSD$_{24}$
0	0-3	0	0	0-1	0-1
0	4-5	1	1-2	2	2
0	6	2	3	3	3-4
0	7-8	3	4	4	5
0	9-11	4	5-6	5-6	6-7
0	12-13	5	7	7-8	8-9
1	14-16	6	8	9	10-11
1	17-18	7	9-10	10	12
1	19-21	8	11	11-12	13-14
1	22-23	9	12	13	15-16
1	24-25	10	13	14-15	17-18
2	26-28	11	14-15	16	19
2	29-30	12	16	17	20-21
2	31-33	13	17	18-19	22-23
2	34-36	14	18-19	20-21	24-25
2	37-38	15	18-19	22	26
3	39-40	16	20	23	27-28
3	41-43	17	21-22	24-25	29-30
3	44-45	18	23	26	31-32
3	46-47	19	24	27	33
3	48	20	25	28	34
4	49-53	21	26-27	29-31	35-38
4	54-55	22	28	32	39
4	56-58	23	29	33-34	40-41
4	59-61	24	30-31	35-36	42-44
4	62-24	25	32	37-38	45-46
4	65-67	26	33-35	39-41	47-49
4	68-84	27	36-52	42-64	50-75

Omega-3 Overview

Omega-3 fatty acids are known to be a key nutrient in many vital processes of the body. Deckelbaum and Torrejon reported that omega-3 fatty acids are used in bodily processes such as immune and inflammatory responses and can aid in heart health by decreasing blood pressure. They also are used in cell synthesis and the expression of various body receptors and are responsible for mental and cognitive development in early childhood.[9]

Found in various plant and animal sources, omega-3 fatty acids are long-chain polyunsaturated fatty acids.[10] The three main types are docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA), and alpha-linolenic acid (ALA). ALA is found in plant sources like some vegetable oils, seeds and nuts, as well as some green vegetables like Brussels sprouts, kale, and spinach. The body has the ability to convert ALA into EPA and DHA. Plant sources of omega-3 containing ALA may not have the same health benefits as sources of DHA and EPA from coldwater fish. Coldwater fish, such as tuna, herring, salmon, mackerel and sardines, provide the majority of DHA and EPA in the diet. A conversion from ALA to the longer chain EPA and DHA occur when the fish consume krill and algae. Deckelbaum and Torrejon state that various forms of DHA and EPA occur at different seasons, and this can be a substantial difference in the fatty acid contained in the fish.[9]

DHA is synthesized in phytoplankton and animals but not in plants, which is why our dietary sources of DHA come from animal tissue lipids, specifically fatty fish. DHA is important for nervous tissue growth and function. Research has shown that a diet low in DHA can cause deficits in neurogenesis, neurotransmitter metabolism, and learning and visual functions.[11]

Omega-3 Fatty Acids and Depression

Recent research has shown that consuming omega-3 fatty acids through either dietary means or supplementation on a regular basis may have positive effects on the mental health of individuals who suffer from depression, especially those that suffer from major depressive disorders (MDD). Part of this is due to a decreased inflammatory response seen in those who consume more omega-3 fatty acids than those who consume less in their diet.[12]

Lin et al. studied 254 MDD patients with omega-3 treatment and 222 patients with placebo treatment and concluded that a significant antidepressant effect of omega-3 fatty acids could be found when used in the treatment of the individual's depression symptoms.[13] Long chain omega-3 polyunsaturated fatty acids, eicosapentaenoic acid, and docosahexaenoic acid have been recommended by health authorities for management of many wide-ranging chronic diseases, including depression.[14] According to Qureshi and Al-Bedah, a deficiency in omega-3 fatty acids has been associated with increased suicide risks of those suffering from depression. Therefore, omega-3 supplementation may be a complementary and alternative medicine option for individuals suffering from depression conditions.[15] Due to the importance of certain fatty acids in the proper functioning of the brain, it has been concluded that further research is needed to support a direct link to the increased consumption of omega-3 fatty acids and a decrease in the signs and symptoms of depression.

CHAPTER III

METHODS

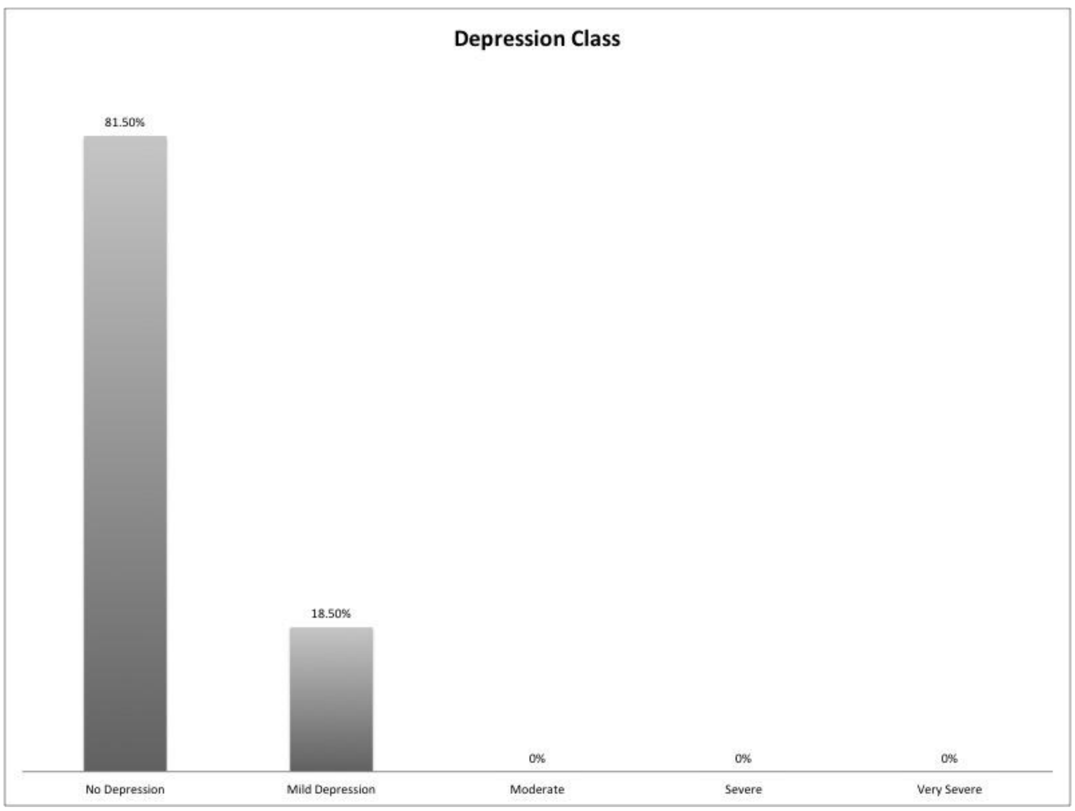
The Institutional Review Board at Texas Christian University approved this study. An electronic survey was developed using Survey Monkey in order to obtain information regarding depression risk, intake of foods containing omega-3 fatty acids, and omega-3 supplement use among students at a private university. The depression symptoms were obtained using The Quick Inventory of Depressive Symptomatology 16-Item Self-Report or QIDS-SR16. This questionnaire allows individuals to check responses that best describe different behaviors such as sleep patterns and emotional status. When completed, the scores from each question were added up and scored together. Based on the score, the participants were placed in one of five depressive symptoms categories ranging from (0) being mild, to (4) being very severe. Omega-3 intakes were evaluated using a food frequency questionnaire developed to represent the types and amounts of omega-3 foods and supplements that would most likely be consumed in this population. Researchers assigned participants to quartiles based upon intake of omega-3 containing foods ranging from low (0) to high (4). Participants were required to give informed consent before proceeding with the survey. The participants were based on a convenience sample. They were contacted using random emailing, TCU Announce, and word of mouth. No individuals included in this study received any compensation for their participation; participation was on a voluntary basis. Data were coded into SPSS, a predictive analytics software. Correlation between omega-3 quartile and depression scores were measured using Spearman’s rho.

CHAPTER IV

RESULTS

There were 222 participants in this study and they averaged 20.4 +/- 1.7 years old. Approximately 79% were female and approximately 21% were male. The reports of depression symptoms in this population were low, with about 82% categorized as having no risk of depression and the other 19% having only a mild risk based upon the scored QIDS-SR16. No participants were categorized as having a moderate, severe or very severe risk of depression.

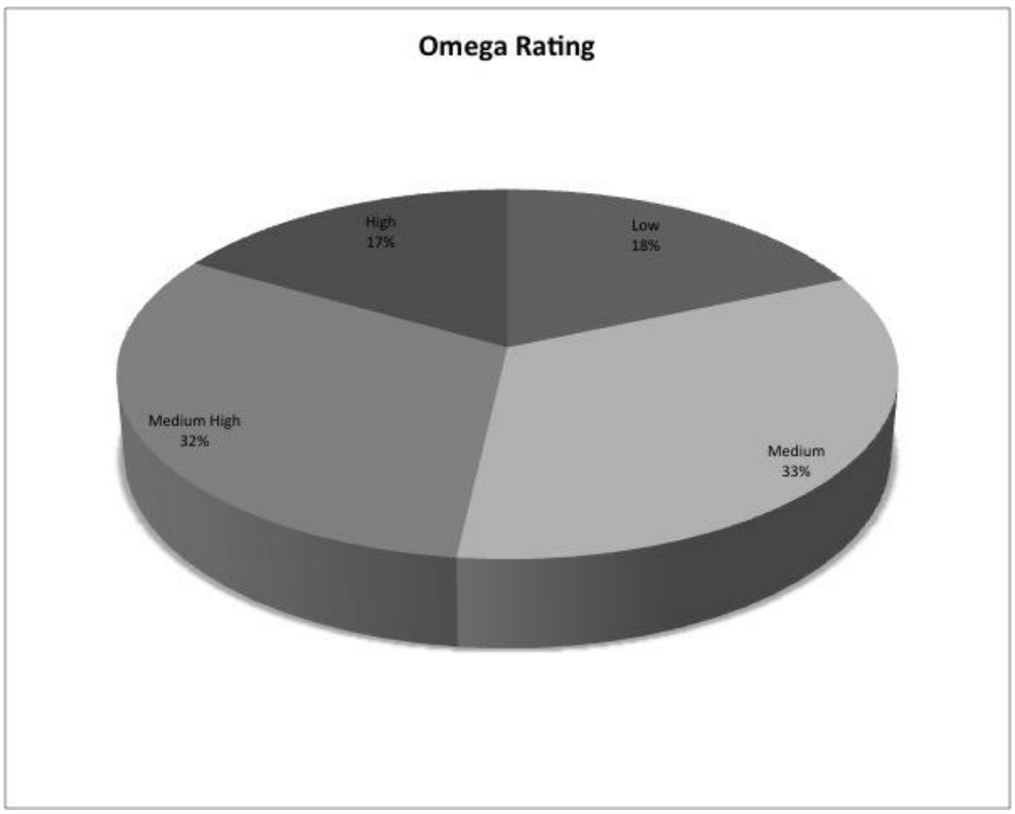
Figure 2: Depression Class



Almost 10% of participants in the total sample were taking medications for depression. Among participants classified as having mild risk for depression, 12% were taking medications for depression, while 88% were not. Approximately 9% of participants categorized as not at risk for depression were taking medications for depression.

Overall, only 17% of participants were high consumers of omega-3 fatty acid foods. The most representation was in the middle groups, with 33% of the participants classified as medium consumers and 32% medium high consumers. Only 18% were classified as low consumers.

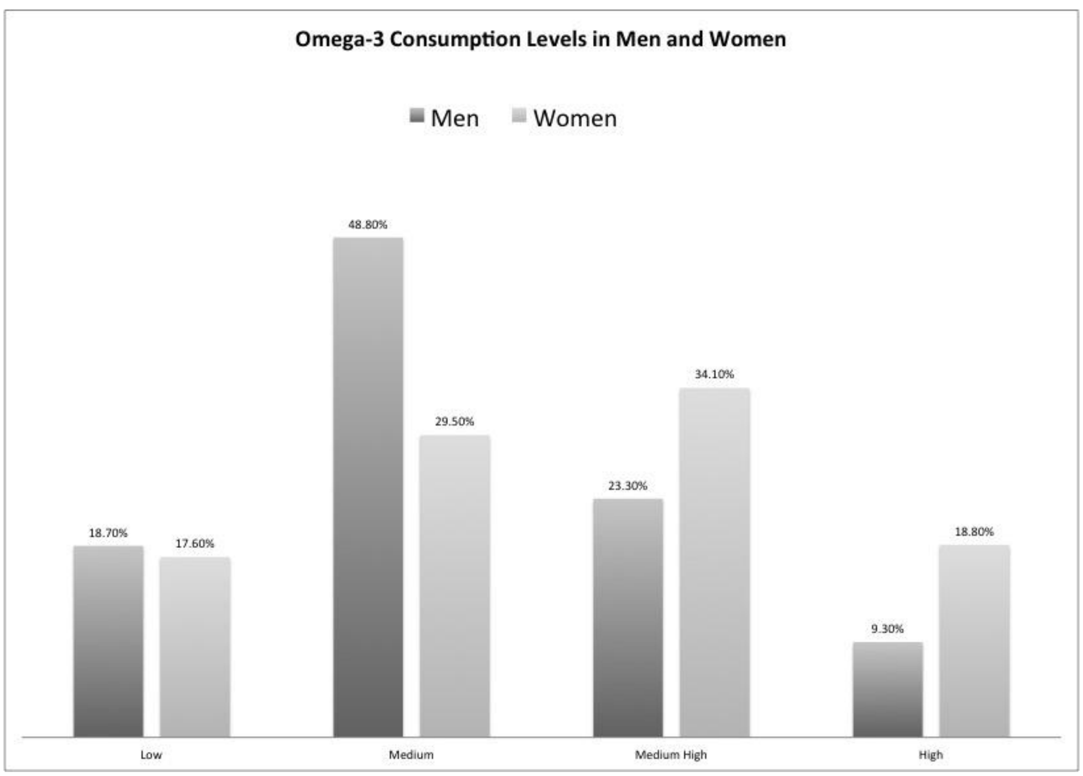
Figure 3: Omega Rating of Participants



There was no significant correlation between consumption of omega-3 fatty acid food and depression scores for the entire sample or for those not taking medications for depression. Overall intakes of foods that are best sources of omega-3 fatty acids were also low. Participants reported consuming 0-1 servings weekly of high omega-3 fatty acid fish (89%), medium high omega-3 fatty acid fish (89%) and low omega-3 fatty acid fish (91%). Participants consumed two or more weekly servings of high omega-3 fatty acid fish (9%), medium high omega-3 fatty acid fish (9%) and low omega-3 fatty acid fish (7%). Approximately 14% of participants reported consuming omega-3 fatty acid enriched eggs, while the majority did not know what type of eggs they consumed (59%) or reported consuming non-omega-3 fatty acid enriched eggs (24%). Approximately 10% of participants reported taking some form of an omega-3 fatty acid supplement.

Although neither men nor women consumed a high amount of omega-3 fatty acid-rich foods, more women were categorized as medium-high to high consumers of omega-3 fatty acid foods when compared to men, with approximately 33% of men consuming medium-high or high versus a higher 53% in women.

Figure 4: Omega-3 Consumption Levels in Men and Women



CHAPTER V

CONCLUSIONS

Although no association between omega-3 food consumption and depression scores was detected, this population had a low incidence of depression risk as determined by the QIDS-SR16. A sample with greater variation in depression scores would better detect if a relationship between omega-3 consumption and depression scores existed.

This study showed that this population consumes less than the recommended amounts of omega-3 fatty acid in their diets. In fact, only 9% of participants consumed two or more servings of fatty fish weekly. The American Heart Association recommends all healthy individuals should consume two servings of fatty fish per week, with each serving consisting of approximately three and half ounces. In following these guidelines, 91% of the sample population is not consuming the recommended levels of fish in their diets to ensure adequate intake of omega-3 fatty acids.

This study also showed that women were more likely to consume medium-high to high amounts of omega-3 fatty acid food sources on a weekly bases with an average of 9% of the female population consuming two or more servings of high omega-3 fatty acid fish in their diet a week. Twelve percent of the female respondents said they consumed some level of omega-3 fatty acid fish in their diet per week. This is more than the male respondents, of which only 10% consumed some sort of fish throughout the week and only 7% ate two servings of high omega-3 fatty acid fish during the week.

Due to the importance of omega-3 fatty acid intake for health, further research is needed to determine methods to improve omega-3 fatty acid intake in this population as well as determine why female respondents tend to eat more omega-3 fatty acid high foods in their diets than their male counterparts.

One weakness of this study was the homogenous sample in which omega-3 fatty acid dietary intakes and overall depression symptom scores were both low. This led to the lowered ability to detect a correlation between depression symptoms and the overall dietary intake of omega-3 fatty acid. This study did not limit the sample population to only those who have no history of depression and included all data collected from the survey respondents. Some of the participants may have a history of depression and may show no symptoms of depression due to medications. These participants may have skewed the data and may have not allowed a correlation between omega-3 consumption and depression symptoms to be identified.

Suggestions for Future Research

Future studies should take into consideration limiting or excluding participants who are or ever have been on depression medications to allow for a more clear correlation between omega-3 consumption and depression symptoms.

Although this study did not find a correlation between the level of consumption of omega-3 fatty acids and the presence of depression symptoms, it did show that the majority of individuals surveyed are not consuming the recommended amount of omega-3 fatty acid servings per day. With fatty fish being the primary source of omega-3 fatty acids in the human diet, it is clear from this study that many individuals are not consuming the correct amounts. It is evident that many individuals need to be educated on the importance of consuming adequate amounts of omega-3 fatty acids in their diets.

Further education is needed, particularly in this population, on the importance of fatty acids in many physiological functions throughout the lifecycle. Further education may provide valuable information to individuals who are currently not consuming adequate amounts of this nutrient and may help them understand the importance of increasing their consumption of omega-3 fatty acids. This should help to increase their physical as well as mental health in the years to come.

APPENDIX A

CONSENT FORM

Relationship Between Consumption of Omega-3 Fatty Acid Containing

1.

***1. Texas Christian University**
Fort Worth, Texas

CONSENT TO PARTICIPATE IN RESEARCH
Title of Research: Relationship Between Consumption of Omega-3 Fatty Acid Containing Foods and Symptoms of Depression among University Students

Funding Agency/Sponsor: Texas Christian University Department of Nutrition.

Study Investigators: Gina Hill, PhD, RD, LD (principle investigator), Rebecca Dority, MS, RD, LD, CDE, Jesse Davenport, Wade Kammel, Mollie Richardson

What is the purpose of the research? The purpose of the study is to determine if there is a relationship between the consumption of omega-3 fatty acid containing foods and symptoms of depression among adults aged 18 to 26.

How many people will participate in this study? 400 – 500 participants

What is my involvement for participating in this study? You will be asked to complete a survey with about how often you eat foods that contain omega 3 fatty acids and questions about symptoms that are related to depression.

How long am I expected to be in this study for and how much of my time is required? This is an online survey and it will take you approximately 5-10 minutes to complete.

What are the risks of participating in this study and how will they be minimized?
This survey is anonymous so confidentiality issues are minimal. Your name and personal information cannot be linked back to your answers. The survey will be conducted online but any paper copies will be locked in the Department of Nutritional Sciences. Participants may experience emotional stress from thinking about past events. However, the depression survey is a standardized survey commonly used in research settings; questions will be phrased to limit stress.

What are the benefits for participating in this study?
There are no direct benefits to you completing this study. However, this study will allow researchers to detect if there is a relationship between the intake of omega 3 fatty acids containing foods and symptoms of depression.

Will I be compensated for participating in this study?
There is no compensation for participation in this study.

What is an alternate procedure(s) that I can choose instead of participating in this study?
There is not an alternative procedure to taking the survey.

How will my confidentiality be protected?
This study is completely anonymous. There will be no names or other personal identifying information collected.

Relationship Between Consumption of Omega-3 Fatty Acid Containing

Is my participation voluntary? Your participation is voluntary.

Can I stop taking part in this research?
You may stop taking the survey at any time by closing out the browser. Incomplete surveys will not be used in the analysis of the data gathered or in the final findings of the research.

What are the procedures for withdrawal?
You may stop taking the survey at any time by closing the browser of Survey Monkey.

Will I be given a copy of the consent document to keep?
Yes. Please email Dr. Gina Hill at g.jarman@tcu.edu if you want a copy of the consent form.

Who should I contact if I have questions regarding the study?
You may contact:
Dr. Gina Hill at 817-257-7309 or g.jarman@tcu.edu

Who should I contact if I have concerns regarding my rights as a study participant?
Dr. Dan Southard, Chair, TCU Institutional Review Board, Phone 817 257-6869.
Dr. Bonnie Melhart, TCU Research Integrity Office, Telephone 817-257-7104.

By clicking on "I agree" below, you indicate that you have read or been read the information provided above, you have received answers to all of your questions and have been told who to call if you have any more questions, you have freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.

◯ I agree.

APPENDIX B

AUTHORIZATION FORM

Relationship Between Consumption of Omega-3 Fatty Acid Containing

2.

*1. PROTECTED HEALTH INFORMATION AUTHORIZATION FORM

Researchers from the study "Relationship Between Consumption of Omega-3 Fatty Acid Containing Foods and Symptoms of Depression among University Students" would like your permission to use your health information which will be gathered as a part of this study.

The following health information will be gathered from you:

Dietary intake of specific foods
Personal questions about symptoms of depression
Use of antidepressants

The names of the TCU researchers who will gather this information from you are (insert the names of all TCU researchers starting with the lead researcher):

Gina Hill, PhD, RD, LD
Rebecca Dority, MS, RD, LD, CDE
Jesse Davenport
Wade Kammel
Mollie Richardson

Your health information may be shared with others who are working with the TCU researchers on this study, institutes that are paying for this study or involved in any other way, or as required by law. The names of these other researchers (include name, affiliation, and role in the study) or institutions (name and role in the study) are listed below.

No others will access individual information.

The TCU researchers and other researchers who work with TCU will protect your health information in the following ways:
• Your health information will be kept private
• Your name or any other identifying information will not be made known
• Your health information may be shown in research papers or meetings without any information about you that will link it to you.
• Your health information will be given a special code for security
• Your health information will be grouped together with other people's health information to form an average
• Your health information will be locked in a cabinet and kept safe

You can agree or not agree to sign this form. If you agree to sign this form but change your mind, you can choose to stop being in the study at any time. If you decide to stop being in the study, you will need to contact the researcher (insert the name, telephone, and e-mail of the PI): Dr. Gina Hill, g.jarman@tcu.edu, 817-257-6320.

Relationship Between Consumption of Omega-3 Fatty Acid Containing

Yes. Please email Dr. Gina Hill at g.jarman@tcu.edu if you want a copy of this form.

If you have any questions or concerns about your rights as a study participant, you can contact:
Dr. Dan Southard, Chair, TCU Institutional Review Board, Phone 817 257-6869.
Dr. Bonnie Melhart, TCU Research Integrity Office, Telephone 817-257-7104.

By choosing "I agree" below, you are saying that you understand what is being said in this form, you have received answers to all your questions, you have freely agreed to sign this form, you have been told who to contact if you have questions regarding your rights as a participant, and you have allowed TCU to gather, use, and share your health information as described in the form.

- [ ] I agree.

APPENDIX C

DEMOGRAPHICS SURVEY

Relationship Between Consumption of Omega-3 Fatty Acid Containing

3. Demographics

1. Sex

- ○ Male
- ○ Female

2. Please select your age. (You must be 18-26 years old to participate in this survey.)

3. Are you currently taking medications for depression?

- ○ Yes
- ○ No

APPENDIX D

QIDS-SR16 SURVEY

Relationship Between Consumption of Omega-3 Fatty Acid Containing

4. Quick Inventory of Depressive Symptomatology 16-item Self Report (QIDS-SR16...

During the past seven days...

1. Falling Asleep:

- ◯ 0- I never take longer than 30 minutes to fall asleep.
- ◯ 1- I take at least 30 minutes to fall asleep, less than half the time.
- ◯ 2- I take at least 30 minutes to fall asleep, more than half the time.
- ◯ 3- I take more than 60 minutes to fall asleep, more than half the time.

2. Sleep During the Night:

- ◯ 0- I do not wake up at night.
- ◯ 1- I have a restless, light sleep with a few brief awakenings each night.
- ◯ 2- I wake up at least once a night, but I go back to sleep easily.
- ◯ 3- I awaken more than once a night and stay awake for 20 minutes or more, more than half the time.

3. Waking Up Too Early:

- ◯ 0- Most of the time, I awaken no more than 30 minutes before I need to get up.
- ◯ 1- More than half the time, I awaken more than 30 minutes before I need to get up.
- ◯ 2- I almost always awaken at least one hour or so before I need to, but I go back to sleep eventually.
- ◯ 3- I awaken at least one hour before I need to, and can't go back to sleep.

4. Sleeping Too Much:

- ◯ 0- I sleep no longer than 7-8 hours/night, without napping during the day.
- ◯ 1- I sleep no longer than 10 hours in a 24-hour period including naps.
- ◯ 2- I sleep no longer than 12 hours in a 24-hour period including naps.
- ◯ 3- I sleep longer than 12 hours in a 24-hour period including naps.

5. Feeling Sad:

- ◯ 0- I do not feel sad.
- ◯ 1- I feel sad less than half the time.
- ◯ 2- I feel sad more than half the time.
- ◯ 3- I feel sad nearly all of the time.

PLEASE COMPLETE EITHER 6 OR 7 (NOT BOTH)

Relationship Between Consumption of Omega-3 Fatty Acid Containing

6. Decreased Appetite:
Please complete either 6 or 7 (NOT BOTH)

- ◯ 0- There is no change in my usual appetite.
- ◯ 1- I eat somewhat less often or lesser amounts of food than usual.
- ◯ 2- I eat much less than usual and only with personal effort.
- ◯ 3- I rarely eat within a 24-hour period, and only with extreme personal effort or when other persuade me to eat.

7. Increased Appetite:
Please complete either 6 or 7 (NOT BOTH)

- ◯ 0- There is no change from my usual appetite.
- ◯ 1- I feel a need to eat more frequently than usual.
- ◯ 2- I regularly eat more often and/or greater amounts of food than usual.
- ◯ 3- I feel driven to overeat both at mealtime and between meals.

PLEASE COMPLETE 8 OR 9 (NOT BOTH)

8. Decreased weight (Within the Last Two Weeks):
Please complete either 8 or 9 (NOT BOTH)

- ◯ 0- I have not had a change in my weight.
- ◯ 1- I feel as if I have had a slight weight loss.
- ◯ 2- I have lost 2 pounds or more.
- ◯ 3- I have lost 5 pounds or more.

9. Increased Weight (Within the Last Two Weeks):
Please complete either 8 or 9 (NOT BOTH)

- ◯ 0- I have not had a change in my weight.
- ◯ 1- I feel as if I have had a slight weight gain.
- ◯ 2- I have gained 2 pounds or more.
- ◯ 3- I have gained 5 pounds or more.

10. Concentration / Decision Making:

- ◯ 0- There is no change in my usual capacity to concentrate or make decisions.
- ◯ 1- I occasionally feel indecisive or find that my attention wanders.
- ◯ 2- Most of the time, I struggle to focus my attention or to make decisions.
- ◯ 3- I cannot concentrate well enough to read or cannot make even minor decisions.

Relationship Between Consumption of Omega-3 Fatty Acid Containing

11. View of Myself:

◯ 0- I see myself as equally worthwhile and deserving as other people.

◯ 1- I am more self-blaming than usual.

◯ 2- I largely believe that I cause problems for others.

◯ 3- I think almost constantly about major and minor defects in myself.

12. Thoughts of Death and Suicide:

◯ 0- I do not think of suicide or death.

◯ 1- I feel that life is empty or wonder if it's worth living.

◯ 2- I think of suicide or death several times a week for several minutes.

◯ 3- I think of suicide or death several times a day in some detail, or I have made specific plans for suicide or have actually tried to take my life.

13. General Interest:

◯ 0- There is no change from usual in how interested I am in other people or activities.

◯ 1- I notice that I am less interested in people or activities.

◯ 2- I find I have interest in only one or two of my formerly pursued activities.

◯ 3- I have virtually no interest in formerly pursued activities.

14. Energy Level:

◯ 0- There is no change in my usual level of energy.

◯ 1- I get tired more easily than usual.

◯ 2- I have to make a big effort to start or finish my usual daily activities (for example, shopping, homework, cooking, or going to work).

◯ 3- I really cannot carry out most of my usual daily activities because I just don't have the energy.

15. Feeling Slowed Down:

◯ 0- I think, speak, and move at my usual rate of speed.

◯ 1- I find that my thinking is slowed down or my voice sounds dull or flat.

◯ 2- It takes me several seconds to respond to most questions and I'm sure my thinking is slowed.

◯ 3- I am often unable to respond to questions without extreme effort.

16. Feeling Restless:

◯ 0- I do not feel restless.

◯ 1- I'm often fidgety, wringing my hands, or need to shift how I am sitting.

◯ 2- I have impulses to move about and am quite restless.

◯ 3- At times, I am unable to stay seated and need to pace around.

APPENDIX E

FOOD RECALL SURVEY

Relationship Between Consumption of Omega-3 Fatty Acid Containing

5. Food Recall Omega-3 Consumption

1. On average how many times per week do you eat walnuts, hemp seeds, chia seeds, pecans, or flax seed?

0-1	2-3	4-5	6 or more
○	○	○	○

2. How many 3.5 oz servings do you eat each week of European seabass, herring, mackerel, oysters, salmon, sardines, or trout?

0-1	2-3	4-5	6 or more
○	○	○	○

3. How many 3.5 oz servings do you eat each week of black bass, catfish, clam, cod, crab, croakers, flounder, haddock, hake, halibit, perch, callop, shrimp, swordfish, or tilapia?

0-1	2-3	4-5	6 or more
○	○	○	○

4. How many 3.5 oz servings do you eat each week of cod, grouper, lobster, mahi mahi, red snapper, tuna, skate, or triggerfish?

0-1	2-3	4-5	6 or more
○	○	○	○

5. On average how many times per week do you consume soy foods such as soybeans, tofu, edamame, or soy milk?

0-1	2-3	4-5	6 or more
○	○	○	○

6. On average how many times per week do you eat beans such as pinto beans, black beans, navy beans or black eyed peas?

0-1	2-3	4-5	6 or more
○	○	○	○

7. On average how many times per week do you eat kale, spinach, broccoli, or Brussels sprouts?

0-1	2-3	4-5	6 or more
○	○	○	○

8. On average, how many whole eggs (yolk and white) do you eat each week?

9. Do you usually eat eggs that are omega 3 enriched?

- ○ Yes
- ○ No
- ○ I don't know

APPENDIX F

VITAMINS AND SUPPLEMENTS SURVEY

Relationship Between Consumption of Omega-3 Fatty Acid Containing

6. Vitamins and Supplements

1. Do you take a multivitamin/mineral supplement?

- ◯ Yes
- ◯ No

2. If yes, what kind and brand is it?

3. On average how many days each week do you take a multivitamin/mineral supplement?

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7

4. Do you take any type of fish oil, omega 3, Docosahexaenoic Acid (DHA), Eicosapentaenoic Acid (EPA), or Conjugated Linoleic Acid (CLA) supplement?

- ◯ Yes
- ◯ No

5. If yes, what kind and brand is it?

6. If yes, how many milligrams is it?

Relationship Between Consumption of Omega-3 Fatty Acid Containing

7. How many days per week do you take a fish oil, omega 3, DHA/EPA, or CLA supplement?

- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5
- [ ] 6
- [ ] 7

*** 8. If you take an omega-3 supplement were you instructed to do so by a health care professional?**

- ◯ Yes
- ◯ No

9. If yes, who was the health care professional that instructed you to do so?

- [ ] Physician or Doctor
- [ ] Registered Dietitian
- [ ] Pharmacist
- [ ] Registered Nurse
- [ ] Other (please specify)

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