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Effects of Dietary Choices on Anxiety and Depression

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Cluster Analysis Reveals the Effects of Dietary Choices on Anxiety and Depression

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Abstract

Anxiety is commonly defined as a set of emotions including nervousness, restlessness or being fidgety. Depression is commonly defined as a state of unhappiness, hopelessness, worthlessness and a sense of futility. Previous research reported a positive relationship between the consumption of energy drinks, dairy and anxiety. On the other hand, other studies revealed a negative relationship between the consumption of fruit and anxiety. In addition, there is an established negative relationship between exercise, fish consumption and depression. However, there is a need to assess dietary patterns in relation to mental distress as nutrients collectively contribute to brain chemistry . An anonymous online survey was built into a Google Form and distributed on several social media platforms. A total of 2,301 participants completed the survey. Data was analyzed using K-means clustering analysis , in SPSS Version 25.0, to identify clusters of food groups that associate with mental distress. Our results suggest that a dietary pattern similar to the Mediterranean diet (high consumption of fruits, vegetables, legumes and fish) was inversely related to instances of anxiety and depression. In conclusion, dietary adjustments may be needed to improve mental wellbeing.

Introduction

Instances of depression and anxiety are observed in people of all ages, and such instances might Instances of depression and anxiety are observed in people of all ages, and such instances might be caused by particular dietary choices. A high carbohydrate, low fat diet has been associated with decreased rates of anxiety and depression while also resulting in an increase in well being (Brinkworth et al., 2009). However, a low carbohydrate, high fat diet resulted in no improvement in mood, which was proposed to be the result of a decrease in serotonin production, which is associated with depression and anxiety. In addition, it was found that the increased metabolism of glucose is related to an increase in acetylcholine levels and that glucose is also related to the activity of dopamine. The impact of a sugar rich diet on serotonin in the brain, the craving for food and anxiety was also researched (Inam et al., 2016). Low levels of brain serotonin resulted in a craving of sugar and a diet high in sugar reduced anxiety and improved mood. However, there was a discrepancy in serotonin metabolism between genders with a long-term diet high in sugar. This high sugar diet lowered serotonin metabolism more in females than in males. Metabolism of serotonin increases in the short term with a high sugar diet but over the long term the metabolism of serotonin decreased. Especially in females, this long-term diet did not decrease anxiety, it actually increased the likelihood of anxiety. A Mediterranean Diet features olive oil (high in polyunsaturated fats), vegetables, fruit, whole grains, and some diary and oily fish. The effects of switching to such a diet for ten days and the associated improvements in cardiovascular function and mood were studied (Lee et al., 2014). A significant improvement in mood, with most noticeable improvements in alertness and contentment was observed. It was hypothesized that these improvements were due to the increased consumption of magnesium and omega-3 unsaturated fatty acids, which act as mood stabilizers and stress reducers, respectively.

Methods

Participants in the Study: There were a total of 2301 participants with the overwhelming majority living in North America, 1401, and the Middle East and North Africa, 505. The rest of the participants, in descending order, live in Europe, Asia, Africa, Australia and South America.

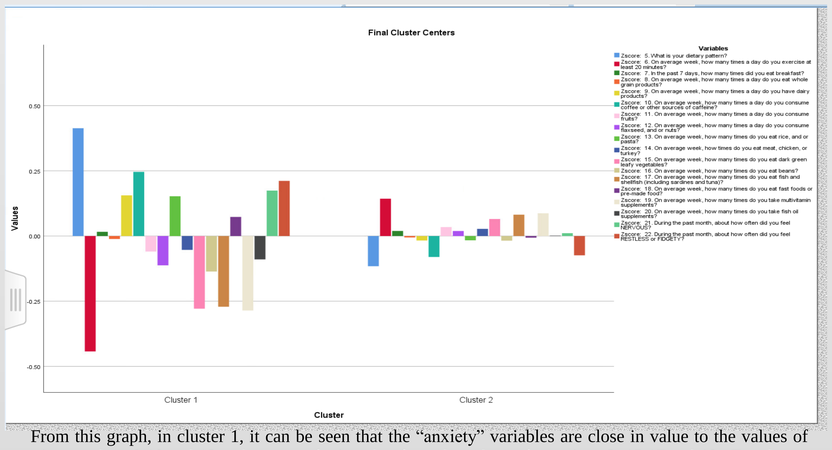
Demographics: The participants were males and females of various ages. Ages were split into groups as follows: 18-29, 30-40, 40-50 and 50 or older.

Assessment Method: This survey was a google form that was distributed via Instagram, Facebook and word of mouth. Participants were asked to fill out a one-time survey. Responses were collected from March of 2014 until October of 2019. The questions in this survey first asked general demographic information, followed by questions on the consumption of specific groups of food in a given week. The survey then asked multiple questions that looked to quantify levels of depression and anxiety.

Analysis: Once the data was collected, it was analyzed using a K-Means analysis on the SPSS program, Version 25.0.

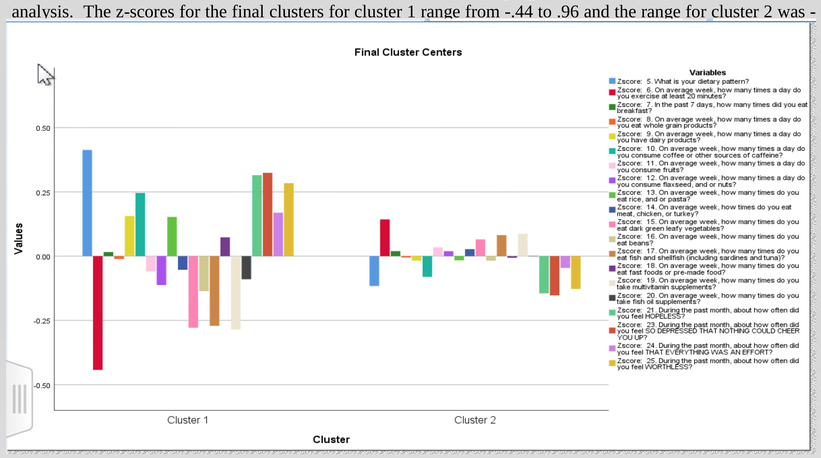
Results

The data was analyzed using a K-means analysis in the SPSS program. All data was normalized using z-cores. The data was split to isolate two separate entities, variables related to “anxiety” (questions about nervousness and restlessness and being fidgety) and variables related to “depression” (questions about hopelessness, not being able to be cheered up, everything being an effort, and feeling worthless). The first analysis focused on the former in addition to all other variables regarding diet, food choices and exercise. This analysis yielded two clusters with the first cluster having 1022 entries and the second having 1171 entries. The SPSS program left 308 entries out of the analysis. The z-scores for the final cluster centers for cluster 1 ranged from -.27 to .57 and the range for cluster 2 was -.53 to .27. This data was then used to make the following bar graph:



From this graph, in cluster 1, it can be seen that the “anxiety” variables are close in value to the values of questions such as 9,10 and 13 and are very far in value from the values of questions 2, 15,17 and 19. For cluster 2, the data on the table has much less of a spread and the values for the “anxiety” questions are close to many of the questions’ values.

The second analysis looked at the questions that related to “depression”. This analysis created two clusters. Cluster 1 had 718 entries, cluster 2 had 1475 entries and the SPSS program did not include 308 entries in this analysis. The z-scores for the final clusters for cluster 1 range from -.44 to .96 and the range for cluster 2 was -



From this graph, in cluster 1, it can be seen that the “depression” variables are close in value to the values of questions 5 and 10 and these “depression” variables are very far in value from the values of questions 2, 15, 17 and 19. Once again, for cluster two, the “depression” questions’ values are much closer to the majority of other values, but they are most close to that of questions 1 and 10.

Discussion

There is a positive relationship between anxiety and dairy, caffeine, and rice/pasta consumption. Caffeine and anxiety was previously reported (Trapp, G. et al., 2013). A positive relationship between dairy consumption and anxiety was previously established by Crichton et al. This study examined the relationship between dairy consumption and - amongst other things - self-reported brain/memory function, stress, anxiety and mood (Crichton, G. et al., 2010). The results showed that the consumption of dairy products (such as ice cream) with whole-fat was related to higher levels of anxiety (Crichton, G. et al., 2010). This finding backs up the evidence in the data from our own study. In addition, the study by Crichton et al. also found that the consumption of this type of dairy was related to higher levels of depression. This reflects the data seen in the second part of our study which focuses on the relationship between diet/exercise and depression. Our study found that there was a positive relationship between depression and dairy consumption. There was also an observed negative relationship between anxiety/depression and the fruit consumption in cluster 1 of both analyses. This inverse relationship is confirmed in a study by McMartin, S. et al. This study looked at the relationship between eating fruits/vegetables and mental health disorders (McMartin, S. et al., 2013). The results showed that eating more fruits and vegetables was associated with lower chances of depression and self reported anxiety and mood disorders (McMartin, S. et al., 2013). Thus, the negative relationships between anxiety/depression and fruit/vegetable consumption seen in our study have been corroborated by this study.

The second portion of our study looked at the relationship between various dietary factors as they related to depression. Upon analyzing the graph of the first cluster, there was a negative correlation between exercise and depression. This relationship was also seen in a study by Nabkasorn et al. The study looked at 49 females who had mild to moderate symptoms of depression (Nabkasorn, C. et al., 2006). It was found that after the exercise program the symptoms of depression decreased and when the groups switched to their normal exercise patterns there was no decrease in depression symptoms (Nabkasorn, C. et al., 2006). Thus, this study showed that exercising can lead to a lowering of the symptoms of depression, which helps explain the negative correlation between exercise and depression in our data.

The questions relating to depression were also negatively related to fish and shellfish consumption within cluster 1 of our second analysis. The study by Matsuoka et al. offers an explanation of this trend seen in our data. The study showed that there was a reverse j-shaped relationship between eating fish/shellfish and major depressive disorder (MDD) (Matsuoka, Y. et al., 2017). This study found that those who ate an average of 111 grams of fish per day had a lower risk of MDD. The study also explains that their research agrees with a recent meta-analysis that showed that eating fish is related to a decreased risk for depression (Matsuoka, Y. et al., 2017). Thus, our findings of a negative relationship between these variables is confirmed by this study.

Conclusion

Our study confirmed the negative relationship between the consumption of foods within the Mediterranean Diet such as legumes, fish, fruits, vegetables and whole grains and levels of anxiety and depression. There was an observed positive relationship between anxiety and caffeine, dairy and rice/pasta consumption. There was also a positive relationship between dairy consumption and depression. A negative relationship was seen with the consumption of fruits and vegetables and anxiety/depression. Another negative relationship between fish and shellfish consumption and depression was also seen. Lastly, as expected, there was a negative relationship between exercise and depression among participants. All of these relationships in concurrence with the hypothesis of this study as well as the previously discussed literature around the topic.

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