The Influence of Diet on the Psychological State of Adolescents

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Abstract. Our emotional and physical health are both impacted by food. For instance, a Mediterranean diet helps slow the progression of Parkinson's and Alzheimer's, yet a vitamin D deficiency can cause sadness. There is a ton of information supporting the significance of nutrition for mental health, according to tremendous Walsh, according to Roger Publishing in the October 2011 issue of The American Psychologist. Diet and nutrition have been demonstrated to have an impact on mental health in more than 160 studies [1]. Problems with mental health might result from a deficiency in several nutrients. Polyunsaturated fatty acids, which are necessary for nerve function, are found in fish and fish oil. Additionally anti-inflammatory and protective, polyunsaturated fatty acids have these qualities. Reduced polyunsaturated fatty acids have been linked to serious cases of schizophrenia and mood disorders like depression and bipolar disorder, according to certain research. This study focused on the relationship between adolescent mental health and diet. Depressed adolescents (n = 66) in a counseling clinic used a self-report to test the effect of a raw copper diet on improving mental health. This study aimed to provide good dietary advice for adolescents with depression.

Keywords: Health Psychology · Ketogenic Diet · Eating Habits · Depression · Teenager

1 Introduction

Understanding that diet has a significant impact on human health is not difficult. Numerous studies have revealed that eating is equally vital to people's spiritual and mental health as a result of more in-depth research on diet and health in recent years. High fat, sugar, and other "junk food" not only cause people to gain weight and have expanding waistlines, but also a host of emotional and mental health issues [2]. In addition to the food choices that affect people's moods, the wrong food choices are enough to affect depressive symptoms adversely. People are more inclined to give in to the temptation of high-calorie, high-sugar, and high-fat foods when they are fatigued. According to nutritionists, some foods affect digestion, make people uncomfortable, and affect people's emotions [2].

Globally, the burden of depression has risen worldwide as people shift from healthy diets to diets high in processed foods and refined sugars, affecting around 300 million

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people. Depression has now become a significant problem for people's mental health worldwide. Depression rates among adolescents are also rising by 30 percent over the past ten years [3]. In addition to considering education, income level, and other important health factors, a link between diet and mental health has been noted. Studies have shown that dietary changes, even for a short period, are sufficient to help young people continue to improve their symptoms [4]. Research on the relationships between diet, gut health, brain physiology, and mental health is a specialty of Professor Jacka, Director of the Centre for Food and Mood at Deakin University in Australia [5]. She cited several research that shown how eating well may fend off depression. Eating a healthy, balanced diet can provide your brain with the nutrition it requires to stay happy and healthy while also enhancing communication between brain cells. Therefore, dietary modification has become a critical factor in relieving depression.

An animal experiment in 2016 [6] confirmed that unhealthy food choices could negatively affect mental health. The researchers fed the mice a refined starch diet for 12 weeks, compared with mice fed a regular diet, and found that although the mice on the refined carbohydrate diet did not gain weight, they had higher body fat than the mice on the regular diet. On behavioral tests, mice fed a high-carbohydrate diet exhibited behaviors with symptoms of anxiety and depression after being stressed.

Researchers at Macquarie University in Australia studied 76 students between the ages of 17 and 35 [7] with generally poorer eating habits and moderate to severe depressive symptoms. One group of participants was instructed by the researchers to alter their diets by consuming fewer refined carbohydrates, sugar, processed meats, and soft drinks while consuming more vegetables, fruits, dairy products, nuts, seeds, healthy fats, and anti-inflammatory foods like turmeric and cinnamon. Participants in the healthy eating group noticed significant changes in their mood after just three weeks, and their depression test results fell within the normal range. Additionally, they scored much worse on tests of anxiety, and neither of the participants' symptoms of depression or anxiety disorders changed in the control group that did not adjust their diet. Among the participants who ate a healthy diet for three months, 21 percent experienced sustained improvement in their mood.

One of the main topics in health education and promotion is health psychology [8]. To preserve and enhance people's mental health, health psychology promotes employing psychological and health promotion strategies. It focuses primarily on the role psychology should play in preventing destructive behaviors and various diseases, as well as in treating destructive behaviors that harm people or create diseases. In this approach, medical and nursing systems can be enhanced by psychological knowledge. Establish appropriate healthcare measures, find ways to save healthcare costs, reduce social losses, and provide constructive comments on relevant health decision-making.

Under the guidance of the theory of health psychology, starting from the eating habits of depressed adolescents, this paper explores why food choices affect mental health. Then, the "ketogenic diet" was proposed, and the solution's effectiveness was verified. The study aims to break down the idea that eating sweets can relieve anxiety and provide dietary advice to depressed teens.

2 Present Work

2.1 Causes of Depression

Processed foods may contribute to depression in teens. There is growing evidence that the causes of depression are closely related to the food choices people make and their psychological and physical feelings. Researchers at the University of Alabama at Birmingham analyzed urinary sodium and potassium excretion in 84 urban low-income adolescents [9]. Adolescents may be at higher risk for unhealthy diets and depression. Everyone knows that eating junk food risks the body while ignoring the hidden risks to mental health.

Higher levels of sodium in people's urine indicate higher levels in people's diets, such as processed foods and high-salt snacks containing high amounts of sodium. Low potassium levels indicate a diet is lacking fruits, vegetables, and other healthy foods rich in potassium. Indicators of sodium and potassium content provide an objective measure of dietary intake. In a follow-up after a year and a half, the researchers found that high sodium and low potassium excretion rates (indicating a diet high in fast food or processed foods) were associated with more frequent symptoms of depression. This experiment confirmed the association between objective measures of unhealthy diet and subsequent changes in depressive symptoms in adolescents. The researchers also added: "Adolescents may be particularly vulnerable at this stage of development, given the extensive development that the brain undergoes during adolescence and the impact of diet on the neural mechanisms underlying emotion regulation and depression."

2.2 The Dangers of Eating Junk Food

Why does food affect people's moods?

The relationship between diet and mental health is complex, involving multiple biological mechanisms. Of particular note is sugar, which is known to harm mental health and has been strongly linked to depression. Sugar is a known pro-inflammatory food, and depression is increasingly recognized as a problem caused by chronic inflammation. Sugar intake may increase circulating inflammatory markers (such as CRP, IL-1, IL-6, and TNF-α) in humans, leading to depression [10]. In addition to sugar, many processed foods can also trigger inflammation, and in general, pro-inflammatory diets are associated with the recurrence of depression symptoms.

A second association is that poor diet may affect brain function by disrupting the gut microbiota, ultimately leading to depression [11]. The gut communicates with the central nervous system in various ways, and small things happening in the gut can become significant events in the central nervous system. Animal studies have shown that sugar and the "Western diet" can adversely affect parts of the brain's hippocampus, leading to behavioral and cognitive problems. At the same time, research also shows that an unhealthy diet is closely related to the smaller hippocampus in humans. At the same time, a healthy diet is closely associated with a larger hippocampus [12]. The hippocampus is a crucial part of the brain involved in learning, memory, and mental health, so it impacts people from childhood to old age.

2.3 Ketogenic Diet

A ketogenic diet (keto diet) refers to foods that are high in fat, low in protein, and extremely low in carbohydrates. The ketogenic diet was originally used as a treatment method for epilepsy patients. The classic regimen is: 90% fat, 6% protein, and 4% carbohydrate [13].

Nevertheless, the ketogenic diet gradually expanded, and it was found to have a good effect on metabolic diseases, inflammation, Etc. According to Professor Jacka, data from randomized controlled trials demonstrated that assisting depressed individuals in improving their nutrition could significantly enhance their mental health and functionality. A typical low-carb diet full of whole grains, vegetables, fruits, fish, and olive oil was found to be the most beneficial for participants in the research. This is the classic ketogenic diet.

So, based on previous research, the study hypothesized that the ketogenic diet could positively affect adolescents with depression.

3 Methods

The experiment consists of two parts, using self-report and conversation. The first experiment studied the eating habits of adolescents with depression. Based on the previous discussion, such teens generally have bad eating habits. The second part was a long-term study that looked at the effects of the ketogenic diet by documenting changes in the condition of adolescents with depression one month after the ketogenic diet. This research aims to help adolescents with depression seek better eating habits.

3.1 Participant

The author used G*Power 3.1 to estimate the sample size for the current study. A sample was used. It was a sample for adolescent depression patients in a counseling clinic. All participants were voluntary and aged from 15–21 years old. Participants consisted male and female adolescents, all Caucasian and Caucasian. They all come from the same consulting clinic and represent similar financial strengths. Our sample selection guarantees the similarity of most backgrounds. Doing so maximally controls the effect of variables on the results. The author chose high effect size $f = 0.4$, alpha $= 0.05$, test power $P = 0.8$, calculated sample size: $N = 66$. The author will recruit at least 80 participants to allow potential invalid/incomplete data.

3.2 Design

First, the researchers needed to measure the relationship between eating habits and levels of depression. Here the independent variable is eating habits, including (breakfast, lunch, afternoon tea & dinner). Second, the researchers needed to measure improvements in the participants' depression levels by adding the ketogenic diet. The independent variable here is the degree of compliance.

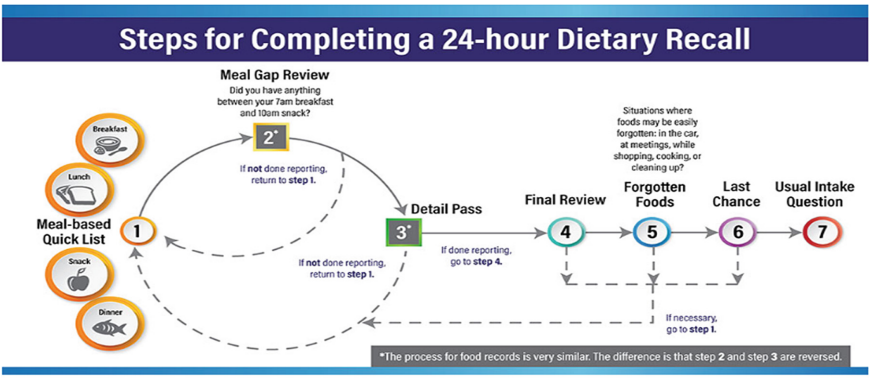

Figure: An infographic detailing the steps for completing 24-hour food recalls or food records using ASA24. These include: step 1: meal-based quick list (breakfast, lunch, snack, and dinner); step 2: meal gap review; step 3: detail pass; step 4: final review; step 5: forgotten foods; step 6: last chance; and step 7: usual intake question. The process for food records is very similar. The difference is that step 2 and step 3 are reversed.

Fig. 1. Steps for competing 24-h Dietary Recall [14]

3.3 Procedure

This work employed a mixed design to obtain data on the independent and dependent variables. First, participants were required to complete a self-report form. The first is a 24-h dietary recall over three consecutive days designed to provide a comprehensive and detailed record of all foods, beverages, and, in some cases, supplements consumed on a given day. The Automated Self-Administered 24-h Dietary Assessment Tool (ASA24) [14] was used to aid documentation. The second table is about mental state assessment. Here, participants will talk to researchers and complete The Mental Status Exam (MSE) [15], standard tool clinicians use to assess a client's basic functioning. After the data was collected, the experimenters analyzed the data statistically Fig. 1 and Fig. 2.

Then on the fourth day, participants were given a ketogenic diet plan and asked to take pictures every day for the next month. In order to avoid bias, the researchers will evaluate the level of dietary compliance based on the photos provided by the participants each day.

Finally, after a month, participants were asked again to complete The Mental Status Exam (MSE) to compare with previous records.

3.4 Measurement

The dependent variable for the first part of the experiment was how healthy the eating habits were. Participants' eating habits were scored by filling out the ASA24 form three times online. In order to ensure the validity of the experiment, the author takes the average of three times as the input data. Both experiments involved a measure of depression (mental state). Depression level was an independent variable in the first experiment. Depression level (mental state) was a dependent variable in the second trial. This variable, the participant's degree of depression (mental state), will be measured by The Mental Status Exam. in measuring observations, mood, cognition, perception, thoughts, and

Mental Status Exam

Client Name					Date
OBSERVATIONS					
Appearance	□ Neat	□ Disheveled	□ Inappropriate	□ Bizarre	□ Other
Speech	□ Normal	□ Tangential	□ Pressured	□ Impoverished	□ Other
Eye Contact	□ Normal	□ Intense	□ Avoidant	□ Other	
Motor Activity	□ Normal	□ Restless	□ Tics	□ Slowed	□ Other
Affect	□ Full	□ Constricted	□ Flat	□ Labile	□ Other
Comments:					
MOOD					
□ Euthymic	□ Anxious	□ Angry	□ Depressed	□ Euphoric	□ Irritable	□ Other
Comments:					
COGNITION					
Orientation Impairment	□ None	□ Place	□ Object	□ Person	□ Time
Memory Impairment	□ None	□ Short-Term	□ Long-Term	□ Other	
Attention	□ Normal	□ Distracted	□ Other		
Comments:					
PERCEPTION					
Hallucinations	□ None	□ Auditory	□ Visual	□ Other	
Other	□ None	□ Derealization	□ Depersonalization		
Comments:					
THOUGHTS					
Suicidality	□ None	□ Ideation	□ Plan	□ Intent	□ Self-Harm
Homicidality	□ None	□ Aggressive	□ Intent	□ Plan	
Delusions	□ None	□ Grandiose	□ Paranoid	□ Religious	□ Other
Comments:					
BEHAVIOR					
□ Cooperative	□ Guarded	□ Hyperactive	□ Agitated	□ Paranoid	
□ Stereotyped	□ Aggressive	□ Bizarre	□ Withdrawn	□ Other	
Comments:					
INSIGHT	□ Good	□ Fair	□ Poor	Comments:	
JUDGMENT	□ Good	□ Fair	□ Poor	Comments:	

Fig. 2. Mental Status Exam [15]

behavior. Each domain will contain several statements, with participants' cognition to choose from. Forms have structured implementation methods, scoring mechanisms, and preset thresholds. These tests are designed to identify patients with impaired cognitive function effectively. The Mental Status Inventory is particularly suitable for identifying which cognitively impaired patients may benefit from a more comprehensive assessment.

The focus of the whole experiment is the second part. The independent variable is the degree of compliance. Researchers will judge compliance using a likert scale from 1(least disagree) to 10 (most agree). This is their overall rating of compliance for the month.

Each participant will provide a set of independent data, including the value of healthy eating habits and the value of depression in the first test and dietary improvement adherence and depression in the second test; a total of 2 groups and 4 data. After the data was collected, the researchers put each data set into a scatterplot to see where it went.

The first is a separate analysis of the two scatter plots to observe the correlation between the dependent and independent variables. The second analysis used one-way ANOVA to compare the variability of the data. This time, the independent variable was

the degree of adherence to dietary improvement, and the dependent variable was the number of differences in the depression scores (before & after the change).

Participants will be excluded if they:

- Do not agree to participate in research.
- Have incomplete questionnaires (<80%).
- Have inability to complete a one-month diet change program.

4 Results

After data collection, the experiment will be analyzed three times. The first analysis used scatterplots to determine how healthy eating habits were and how depressed participants were. This is a downward curve (Fig. 3), representing a negative correlation between two variables. Poor eating habits accompany high levels of depression. When people are in a bad mood, they choose to consume higher levels of sugar. The mood stabilizes when eating but does not improve after a while and may rise to worse. This is a vicious cycle process. The second analysis still uses the scatter plot to judge the relationship between the two variables (Fig. 4). The dependent variable is the degree of adherence to the new diet plan. A downward curve appears again, representing a negative correlation between the two variables. It means that the higher the compliance level at the time, the lower the depression level. The third analysis, a study of the participants, focused on comparing their mood changes before and after the trial. Most participants had lower scores on the second Mental Status Exam, validating the effectiveness of dietary improvements in teen depression relief.

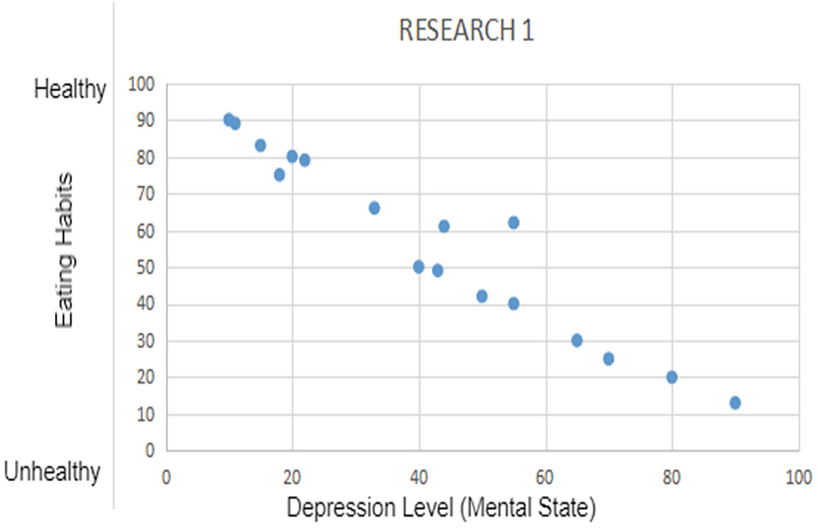

Fig. 3. The result of research 1

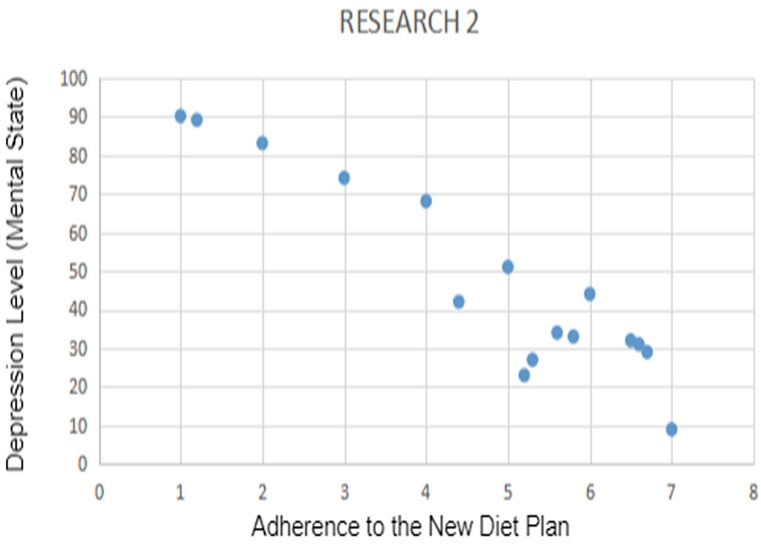

Fig. 4. The result of research 2

5 Conclusion

When people eat high-carbohydrate foods, especially sweets, blood sugar spikes instantly, and the body is full of energy. At this time, the brain will respond quickly and secrete higher-than-normal levels of dopamine, a substance that makes people feel joyful. So the human body will feel delighted, but this pleasant emotion is only short-lived. When blood sugar is rapidly lowered under the action of insulin, this reward mechanism will also dissipate, and then the emotions may be tension, anxiety, irritability, and so on. Furthermore, when people are feeling down, people are more likely to choose "comfort" foods high in sugar. So emotions begin to show a vicious cycle of "roller coaster," that is, short-term pleasure + long-term anxiety and depression, which may cause depression after a long time.

In the predicted results, our assumptions hold. The more people's diets improve, the more their depression improves. A ketogenic diet helps to rebalance neurotransmitter systems, stabilize neural networks, and improve neuroplasticity. While making healthy food choices can be difficult for teens and young adults, it is also critical to establish a lifelong healthy eating pattern. In addition to setting an example of healthy eating for young people, parents should also let teens know that they are being manipulated by food marketers with this simple way to help teens improve their diets. The healthier people eat, the more likely people are to maintain mental health.

Using all self-report methods, adolescents may misreport intake due to social expectations bias. To account for the potential impact of social expectations on intake in data analysis, a study may include a measure of this bias and a measure of intake to characterize and adjust for this source of error. This was missing in this experiment. Our sample came from specific communities, mainly young people in North America. People in different regions/countries have different eating habits, on which their cultural backgrounds

may influence. So our results are not too general to generalize to all populations. Future research could involve cross-cultural studies.

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