Diet to Treat Depression and Anxiety

David Puder, M.D., Adam Borecky, M.D., Jonathan Nowlin M.A.

Introduction

In the first part of this article, we will discuss the importance of diet and food categories as outlined by Dr. Drew Ramsey in his new book, *Eat to Beat Depression and Anxiety*. Dr. Ramsey has promoted healthy eating for a healthy brain, but this isn't another diet book with strict rules to follow. Rather, he has made healthy eating accessible for everyone by detailing the needed nutrients and the food items that can easily be added to our diet. We will discuss Dr. Ramsey's journey of finding ways to make healthy eating accessible and his insights into how the food we eat affects our mood and brain function.

In the second part, we will take you through some of the most compelling research that suggests diet can be used to treat depression and anxiety, especially if the person is starting from a poor diet. Unfortunately, there is never going to be a very impressive healthy food lobby promoting what is in this article, so please share it with friends and start the conversation!

Dr. Ramsey receives royalties from Brain Food Media for his intellectual property rights.

David Puder, Adam Borecky, and Jonathan Nowlin have no conflicts of interest to disclose.

This article is further discussed in the podcast "Psychiatry & Psychotherapy" **Episode 131** found on **iTunes**, **Google Play**, **Stitcher**, **Overcast**, **PlayerFM**, **PodBean**, **TuneIn**, **Podtail**, **Blubrry**, **Podfanatic**

Healthy Food for a Healthy Brain

Food is a necessary staple for life, but food is about far more than just consumption; food is culture and connection. It fosters connection with the people we share meals with and the natural bounty that is provided to us from nature. However, in recent years with the convenience of fast foods, there has been a disconnection between the necessity and joy of food. We all know that processed and fast foods are not good sources of nutrients. Often, consuming these types of foods leads to guilt and a short-term inauguration into the newest diet fad, which seems to always shout the mantra: "change everything you know about dieting." Unfortunately, there is a lot of fearmongering around food when it should be mostly pleasurable associations. One of the major contributions in *Eat to Beat Depression* is finding fulfillment in what you're eating by focusing on nutrients, value, and joy rather than a particular diet. Naturally, there is going to be resistance and a long process in making changes to diet, but fortunately it is possible to start with the smallest changes to meals you currently eat and grow into healthier eating habits that will make your brain and your taste buds happy.

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Major Roadblocks to Healthy Eating

1) ***Diet Trends***
   New diet trends are a constant source of irritation for people trying to make healthier food choices. Often it seems there will be a new diet that has finally solved the problem of unhealthy eating habits, only for it to be outdone or proven wrong by the next dieting fad. It can be stressful and frustrating trying to keep up with all the information out there (which often contradicts each other).

2) ***Cost***
   One trip to the specialty foods aisle can be a complete turn-off for those on a strict grocery budget. Many might assume that eating healthy requires breaking the bank in order to go all organic. However, shopping for the nutrients the body needs doesn't require bankruptcy. In fact, it's all about adding foods rich in nutrients to your meals. Try adding fruits, rainbow veggies, and leafy greens into your current recipes. Add nuts into your daily snack food rather than chips. Add fish into 2 meals of the week. These small changes will increase your much needed nutrients without it costing a major hole in your wallet. In fact, the SMILES trial (detailed below) showed that people were actually able to save money by incorporating food categories rather than adhering to strict diets.

3) ***Time***
   We live a lifestyle where we don't have enough time to take care of ourselves or we live under the assumption that someone else will take good care of us. We're too busy to exercise, sleep well, or eat well. Mental health, for many, is not a priority in their lives. One step towards eating healthier is making it a priority.

4) ***Trying New Foods***
   It can be difficult to add new food items to meals (especially if you have kids!). When we cook a meal, we want everyone to enjoy what we're cooking, so it is certainly understandable that people have a hard time taking the risk. One of the reasons this can be a roadblock is because people are not used to cooking certain types of food, such as fish, which can come down to lack of understanding the flavor palette. Luckily, this is something that can be learned. For example, canned salmon is not a common household item, but making salmon burgers out of canned salmon is a quick and easy option. There might be some trial and error, but once we begin introducing new, nutrient-rich ingredients we will find ways to keep them in our diet that are easy and delicious.

The answer to all these issues is much simpler than you might think. The best way to start eating healthier is simply adding certain foods to the meals you already make. Regardless of

what your dietary needs are, there are plenty of food sources that contain essential nutrients and you can certainly find one that fits even the strictest diet. Adding a few extra ingredients to your diet won't cost an arm and a leg either.

Importance of the Microbiome

The food we eat affects our bodily inflammation (the immune system's response to fighting injury and infection) and chronic/persistent inflammation can lead to depression and anxiety problems. Our microbiome (the bacteria system that exists within our gut) is in constant communication with our brain and regulates our immune system. A healthy microbiome is capable of decreasing depression and anxiety. Eating nutrient-rich foods will increase the diversity of the bacteria in our gut, amplifying the functionality of our immune system as well as brain function.

The necessity of a healthy microbiome cannot be understated. In 2004, a study was conducted by Kyushu University in which germ-free mice and mice with a regular microbiome measured for the differences in stress response after being restrained for sixty minutes. The germ-free mice showed little capability of handling the stress, causing them to exhibit fearful behavior long after they were released from their restraints. The germ-free mice exhibited higher levels of stress hormones. Once the scientists gave the germ-free mice a probiotic and conducted the same experiment, they were able to handle the stress of restraint in the same manner as other mice [(Sudo et al. 2004)](). In order to stay healthy, the human body requires a diverse microbiome that consists of a variety of good bugs to alleviate stress, increase total brain function, and regulate the immune system.

Key Nutrients ([Ramsey 2021]())
- **Folate:** Supports the creation of new cells
- **Iron:** Builds hemoglobin, which is a critical protein for the red blood cells that transports oxygen to the brain. Red blood cells are an essential piece of high brain function.
- **Long-chain omega 3/6 fatty acids:** These are some of the longest chain fats in our body. Omega-3s create anti-inflammatory mediators, while omega-6s make pro-inflammatory mediators. It's important to have a good balance of both in our system.
- **Magnesium:** Regulates neurotransmitters, including ones that affect mood
- **Potassium:** Necessary for the electric impulses that travel along neurons
- **Selenium:** Assists in creating antioxidants in the brain. It is also necessary for proper thyroid function, which is responsible for regulating mood, energy, and anxiety.
- **Thiamine:** Plays a major role in energy production
- **Vitamin A:** A key component in the brain's ability to grow and adapt to its environment (neuroplasticity)
- **Vitamin B6:** Necessary for brain development and function

- **Vitamin B12:** Produces serotonin, norepinephrine, and dopamine, which are necessary for mood regulation. Also supports myelination, which is responsible for efficient and effective signal transmissions through the brain.
- **Vitamin C:** Powerful antioxidant
- **Zinc:** Regulates brain signals and neuroplasticity

The Problem with Multivitamins

Multivitamins are often seen as magic pills capable of giving the human body any missing nutrients it needs. In some cases, people need to take multivitamins for medical reasons or don't have access to healthy food, or maybe they are just starting to eat healthier. It is certainly better to have multivitamins than nothing. However, they are not the best source of nutrition. The human body is meant to absorb nutrients from food, which is where we gain the most benefit. The process that multivitamins must go through often takes away key nutrients or even counteracts the body's ability to absorb them, especially when vitamins are combined in one pill. Supplements also have a difficult time replicating certain nutrients such as phytonutrients or sulforaphane, which can be found in leafy greens and rainbow vegetables (Ramsey 2021). Ultimately, ingesting multivitamins and vitamin supplements is better than not getting any vitamins in the body, but they are not an alternative for the nutrients our body receives from healthy food.

Another issue is that multivitamins are also not the best option for your wallet. As previously discussed, a roadblock for many people is the perceived cost of healthy eating, which is exacerbated by the idea that multivitamins are necessary. Depending on where you shop, certain vitamins can be marked up to outrageous prices compared to their competitors.

The Solution: Food Categories

Rather than following a strict diet that has the potential to strip away the enjoyment of food, Dr. Ramsey believes that increasing the intake from food categories is a far better practice for healthy eating. The key benefit of food categories (as shown below) is that each category has multiple food options that you can choose from to introduce more nutrients into each meal. Picking the food from each category a person already enjoys eating makes it much easier to stick with healthier foods. Even categories that are not part of a person's regular diet, such as seafood, have multiple options that will give the crucial complex omega-3s that we all need.

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The Food Categories ([Ramsey 2021](#)):

Category	Benefits	Examples
Leafy Greens	- Fiber - Vitamin C &A - Folate	- Kale - Spinach - Collard Greens
Rainbow Fruits and Vegetables	- Flavonoids - Carotenoids - Fiber	- Bell Peppers - Berries - Avocados
Seafood	- Long-chain Omega-3s - B12 - Selenium - Iron - Zinc - Protein	- Salmon - Cod - Oysters - Mussels
Nuts, Beans, and Seeds	- Fiber - Zinc - Iron	- Lentils - Legumes - Almonds/Cashews - Pumpkin seeds
Meat	- Iron - B12 - Protein	- Chicken - Liver - Grass-fed beef
Eggs and Dairy	- Protein - Choline - Vitamin B - Calcium	- Eggs - Yogurt - Kefir
Dark Chocolate	- Potassium - Fiber - Protein - Iron - Zinc - Magnesium	70% dark chocolate bar - Cacao nibs/beans/powder

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Healthy Food Studies

For those who would like a deeper dive into the studies mentioned above and in the podcast, below are descriptions of two of the most significant recent studies that reveal the importance of healthy eating: The SMILES and SUN studies. Each section consists of a detailed summary of how the study was conducted and the results.

SMILES Study ([Jacka et al, 2017](#))

- **Take-Home Pearl:** Getting rid of unhealthy foods, adding healthy foods, and learning to eat them mindfully made a significant difference in depression symptoms.
- **Background/Objective:** The SMILES trial was conducted to find what effects food has on moderate to severe depression.
- **Methods**: This 12-week trial consisted of 67 participants, randomized to the control group, receiving 7 sessions of "befriending protocol" (positive conversations) or the dietary intervention group receiving 7 sessions of nutritional counseling and mindful eating, integrating a Mediterranean-style diet: whole grains, vegetables, fruit, legumes, low-fat/unsweetened dairy foods, raw and unsalted nuts, lean red meat, chicken, eggs, and olive oil. There was also an emphasis on reducing sugary and processed foods.
  - Both groups were selected coming from a poor diet (scored 75 or less on the Dietary Screening Tool to confirm poor diet).
  - The Montgomery-Asberg Depression Rating Scale (MADRS) was the primary scale used to determine the outcomes of each group.
    - MADRS measures depressive symptomatology with 10 items on a 6-point scale (60 points possible). Higher scores indicate greater depressive symptoms.
    - Remission was defined as a MADRS score <10
- **Results**: By the end of the study, 32.3% of the dietary intervention group (n=10) were in remission for depression compared to 8% in the control group (n=2), revealing that moderate changes to one's diet can have a positive outcome in treatment for depression.
  - Specifically, MADRS, on average, decreased 7.1 more points in the diet group compared to the control group with a Cohen's d= -1.16 (95% CI -1.73, -0.59).
  - Weight loss was not seen at all (meaning the change in mood was not from weight loss but rather the quality of the food).
- Here are the details of how the intervention group actually changed their diet:
  - Increase in whole grains 1.2 servings per day
  - Increase in fruit 0.46 servings per day
  - Increase in dairy 0.52 servings per day
  - Increase in olive oil 0.42 servings per day
  - Increase in chickpeas, garbanzo beans, peas, lentils 1.4 servings per week

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- ○ Increase in fish 1.12 servings per week
- ○ Decrease in unhealthy foods 21.76 servings per week
- ● **Conclusion**: Helping depressed individuals improve their diets may be an effective and low cost way to improve their symptoms.

The SUN Study

A second big study of 10,094 participants found that diet impacted how many future depressive events took place ([Sánchez-Villegas et al, 2009](#)).

- ● **Take-Home Pearl:** The Mediterranean dietary pattern may play a protective role in preventing depressive disorders.
- ● **Background/Objective:** Eating a Mediterranean diet has been hypothesized to improve inflammatory, vascular, and metabolic pathways linked to the development of depression. This study attempted to test this hypothesis by measuring depression incidence in people eating a Mediterranean diet.
- ● **Methods**: The authors mailed a 136-item food frequency questionnaire to university graduates every 2 years beginning in 1999 that attempted to quantify how closely the individual's diet resembled a Mediterranean diet. Higher adherence meant more intake of vegetables, fruits, nuts, cereal, legumes, fish, moderate alcohol use, and higher intake of monounsaturated fatty acids relative to saturated-fatty-acids. People with lower adherence to the Mediterranean diet ate more meats, meat products, and whole-fat dairy. The incidence of depression was recorded if they reported being diagnosed with clinical depression by a physician and/or prescribed an antidepressant at any point during the follow-up period.
- ● **Results**: They separated the survey respondents into 5 groups, ranging from lowest to highest adherence to the Mediterranean diet. After a follow-up period of 4.4 years, the hazard ratios for developing depression within the 4 highest quintiles of adherence to the Mediterranean dietary pattern were 0.74, 0.44, 0.49, and 0.58 (P for trend <.001).
  - ○ Stratifying the respondents into 5 groups can give us information on if there is a linear change or if there is a step up or step down in risk at a certain level of adherence.
  - ○ When they looked at the individual food categories (they broke them up into 5 groups of increased consumption), they found that fruits and nuts decreased the hazard ratio in the initial step from the first group to the second group (it seems like an early step down in risk). Fish and seafood did not have a statistically significant linear decrease in hazard overall with the exception for the third quintile, raising the possibility that *moderate* seafood intake might be more effective than either low or high intake.
  - ○ MUFA/Saturated fatty acid ratio seemed to have a linear decrease in risk, as MUFA% increased compared to SFA%. Interestingly, as you can see in the chart below, the P value on the right is only looking at the linear trend and not taking

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into account that steps up and down might be significant (moderation might have value) for some things like fish. Interestingly, vegetable intake did not achieve statistical significance for lowering depression risk in any of the quintiles.

Table 3. Association Between the Consumption of Each Component of the Score Built to Assess the Adherence to the Mediterranean Dietary Pattern and Risk of Depression

Component of the Score [a]	Sex-Specific Median, g/d [b]		HR (95% CI) for Depression in the 4 Upper Quintiles of Each Item Compared With the Lowest Quintile				P Value for Trend
	Men	Women	Quintile 2	Quintile 3	Quintile 4	Quintile 5	
Vegetables	398	485	0.88 (0.67-1.17)	0.87 (0.66-1.16)	0.94 (0.71-1.25)	0.93 (0.69-1.24)	.81
Fruit and nuts	236	290	0.69 (0.53-0.91)	0.67 (0.51-0.88)	0.69 (0.52-0.91)	0.61 (0.45-0.82)	.007
Legumes	21	21	0.76 (0.58-1.00)	0.73 (0.55-0.96)	0.65 (0.49-0.86)	0.76 (0.57-1.00)	.03
Cereal	86	79	0.95 (0.72-1.26)	0.85 (0.64-1.13)	0.86 (0.64-1.15)	0.81 (0.60-1.07)	.16
Fish and seafood	85	84	0.83 (0.64-1.09)	0.63 (0.47-0.85)	0.77 (0.58-1.02)	0.85 (0.64-1.13)	.31
Meat and meat products	177	167	0.92 (0.67-1.26)	0.98 (0.72-1.32)	1.14 (0.84-1.53)	1.35 (1.01-1.80)	.008
Whole-fat dairy	181	136	0.73 (0.53-1.02)	1.00 (0.74-1.35)	1.18 (0.89-1.56)	1.11 (0.83-1.48)	.03
MUFA/SFA ratio	1.19	1.24	0.94 (0.71-1.23)	0.81 (0.61-1.07)	0.73 (0.54-0.98)	0.76 (0.56-1.02)	.04
Alcohol [c]			0.85 (0.64-1.13)	1.07 (0.82-1.40)	0.79 (0.58-1.06)	0.84 (0.62-1.14)	.35

Abbreviations: CI, confidence interval; HR, hazard ratio; MUFA, monounsaturated fatty acid; SFA, saturated fatty acid.
[a] Energy-adjusted components consumption.
[b] Median of consumption used to build the Mediterranean dietary pattern. These medians, as used to define the components of the Mediterranean dietary pattern score, were not adjusted for energy intake. The HR was adjusted for sex, age (years), smoking status (never, current, past smoker), body mass index (calculated as weight in kilograms divided by height in meters squared) and its quadratic term, physical activity during leisure time (metabolic equivalent hours per week), energy intake (kilocalories per day), and employment status (no or yes). The HRs (95% CIs) are presented for the 4 upper quintiles (second through fifth) by use of the first quintile as reference.
[c] Alcohol consumption was not adjusted for energy intake. For alcohol, as a component of the Mediterranean dietary pattern score, 1 point was scored if the consumption was moderate (10-50 g/d for men and 5-25 g/d for women). Therefore, alcohol medians were not used.

- **Conclusions**: This study showed the value of how diet can potentially prevent future episodes of depression, with a particular value of increased fruits, nuts, high MUFA foods, and fish in moderation.

Resources:

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