

What Sugar Does to Your Brain: The New Science on Sugar Addiction

Presented by Nicole Avena, Ph.D.

Webinar Questions Answered by Dr. Avena

- Did the circulation study you referenced toward the beginning of your talk differentiate between the effects of sugar vs. non-nutritive sweeteners?

They also looked at artificially sweetened beverages. Here is a [link](https://www.ncbi.nlm.nih.gov/pubmed/30882235) to the PubMed page - <https://www.ncbi.nlm.nih.gov/pubmed/30882235>

- For the Dannon example, was lactose subtracted from the total sugar to get 24g per serving of added sugar?

No. It is total Sugars. To my knowledge they still do not have their Nutrition Facts labeled updated to reflect added sugars.

- Isn't hedonic hunger the definition of appetite - the psychological drive to eat?

It is the desire to eat for pleasure. I believe there is more to the psychological drive to eat than this.

- What is your experience in using the term hedonic hunger in your practice? How do clients react to this term?

My experience is that people relate well to it and can then ask themselves which type of hunger they may be experiencing.

- Did the rats who had unlimited access to sugar have less bingeing, if so why?

Yes. We believe this is because they ate fewer, smaller meals throughout the day and did not have the need to binge eat because the sugar was always available.

- Can neurotransmitters be measured directly in the brains of living animals or must an indirect measure be used? If an indirect measure is used, how well does it represent the actual brain levels?

We used in vivo microdialysis and analytical HPLC chemistry. We are looking at changes in the amount related to baseline measures, so while we can't say for certain how much of a given neurotransmitter might be the same, we can tell the changes in the proportion of it available based on the behavioral manipulations we impose (like offering sugar to drink).

- What are some good resources that dietitians can learn more about food addiction and the neurochemistry of it?

I have a book, [Why Diets Fail: Because You're Addicted to Sugar](https://www.amazon.com/Diets-Because-Youre-Addicted-Sugar/dp/1607744864) - <https://www.amazon.com/Diets-Because-Youre-Addicted-Sugar/dp/1607744864>

There are also a lot of resources on my [website](http://www.drnicoleavena.com/). <http://www.drnicoleavena.com/>

- So many people seem to consume smoothies. Since smoothies are processed food, are they likely to be overeaten?

I think it depends on how they are prepared. Commercially available ones, like those in restaurants, often have a lot of sugar added to them. Also, beverages in general are more likely to be overconsumed than the equivalent in whole fruits/veggies. If a smoothie is prepared at home, I don't think they pose much of a risk for overeating.

- How would Dr. Avena like a food addiction to be treated legally? Would an addiction to sugar, for example, be considered a disability?

I would like it to be viewed medically as a condition so that individuals suffering from it can get treatment and insurance coverage for it.

- Did they control for restriction of those foods in these studies? It seems people also overeat these foods because they've told themselves that they're "bad food" and can't have any. I imagine you've considered this as well.

Yes, we considered this.

- What are your thoughts on Overeaters Anonymous approach for individuals in recovery from their addiction, where they say they cannot partake of their trigger foods in any amount and moderation doesn't work?

I think that for some people this type of extreme abstaining from specific foods is needed. If someone feels that they can't control their intake of something that is unhealthy for them, then I don't see why they can't decide to avoid it completely if that is what method works best. However, I think getting to a place of moderation and harm reduction is the best bet for most people.

- What is your response to the multiple studies that show when compulsive and binge-eaters have access to their forbidden foods, their binge eating decreases markedly? - Food addiction theory would predict otherwise.

I'd need to see those papers to answer this more accurately, but I don't think that your comment conflicts with our data. When we have rats with access to sugar for 24/7, they don't binge, either.

- For more vulnerable clients, would suggesting intermittent fasting make it harder for them to deal with a sugar addiction, based on the animal study? Is intermittent fasting discouraged for these people?

I don't think that people who might have a food addiction would benefit from intermittent fasting. I think that the food deprivation can create a low dopaminergic tone, that can increase the desire to binge later on for certain foods.

- If "food addiction" has similar physiology of illegal drug addiction, is there something that can be done other than knowing about it and incorporating a flexible diet regimen? We can't send pts with food addiction to "detox", right?

There are several treatment facilities in the US and Canada that I know of that use an addiction model in treating overeating.

- What do you think is the connection with restriction/deprivation of highly palatable foods like fat/sugar and likelihood of desiring it? What is happening with our brain chemistry when we have a "diet mentality" to completely refrain from a food and then allow ourselves to bring it back into our eating pattern? Do restrictive thoughts alter physiology and brain signaling?

Great questions. We haven't measured this yet.

- Is diet soda, since it is processed, addictive at all with the combination of artificial sweeteners and caffeine?

We and others have shown that it is the sweet taste that seems to drive these addiction-like effects.

- Since artificial sugars are considered processed, is it safe to say that switching to "sugar-free" is not a better option?

Correct.

- What are the differences between food addiction and binge eating disorder?

See the early papers by Gearhardt in which she discusses this.

- Can you share your bottom-line position regarding if sugar is addictive?

Too much sugar is addictive.

- Any suggestions to elicit behavior change for individuals who really struggle to give up a food? As in, they have weaned down maybe from 5 liters/day -->3 liters but really cannot cut it out completely?

I think you mean soda? I would suggest they try diluting the soda with water or seltzer. Try other drinks (with and without caffeine). Try to limit when they start drinking it each day.

- Can you share a resource appropriate for practitioners that care for children with overeating?

I don't focus on this area, so sorry, I don't have one to suggest.

- Has any research shown that starting with foods that contain higher amounts of sugar early in life i.e. 6 months have an effect of the choice's kids make when they become toddlers?

I talk about this in my book that came out recently, [What to Feed Your Baby and Toddler](#).

<https://www.amazon.com/What-Feed-Toddler-Month-Month/dp/0399580239>

- I have a client whose initial trigger is routine (getting home in her comfortable space) but then she claims intake of any processed food (crackers, chips, cookies, cake, candy, etc.) leads to bingeing. Any thoughts on how to approach?

Bingeing on any processed foods can be problematic to approach from a treatment standpoint. I would suggest starting with the foods that she seems to binge on the most, and then one-by-one work on replacing them with something healthier but still satisfying.

- What is the harm in having elevated dopamine release over time?

It can lead to a vicious cycle of craving and bingeing. There is also the risk for cross-tolerance to other addictive behaviors, like drug use, gambling, etc.

- What about people with a normal BMI but still eating a lot of sugar. How do you address that since they are not obese?

Just because someone has a normal BMI does not mean that they are necessarily healthy or engaging in healthy eating behaviors.

- Can physical activity and meditation help you cope with the drive for sugar or sweetness tastes?

Perhaps as a distractor, but I am not aware of any studies that have specifically addressed this.

- What are your thoughts on switching addictions? i.e. people who have drug addictions switching to a sugar addiction? Is this something you have looked at?

Yes, this is something we have looked at extensively and published a few papers on. Addiction transfer seems to be something that can emerge when people quit using drugs (like nicotine) or alcohol and end up turning to food and often gain weight as a result.

- Have you measured neuroplastic changes in the reward system (e.g. dopamine release and changes in dopamine receptor expression) to highly palatable foods? If so, do you see changes back to control when diets are changed (removed for a length of time) that could be translated to humans, e.g. how long it would take to eat a healthy diet to be less susceptible to relapse eating trigger foods?

Yes, we have several studies in this area. In terms of how long it takes to see changes in the other direction after discontinuing a highly palatable diet, some studies suggest that the effects on the dopamine system can persist for months. It isn't clear how long this translates to in humans, but I would suspect that like most addiction, those who have a food addiction are at greater risk for relapse than those who don't have a food addiction for years after changing the way that they eat.

- What are your thoughts on sugar addition for patients with ADHD or ADD that are more sensitive?

We wrote a paper about that a few years ago. Here is the [link](#) to the Pub Med page.

- I saw you had pizza as one of the most “tempting” — and yet it was the only one without high added-sugar. What might explain this?

You are correct that other foods on the list have more sugar, but there is a lot of added sugar in pasta sauces, especially the kind of sauce used in the fast-food pizza industry. We suspect that pizza was high on the list because it is highly processed (cheese, dough, sauce, etc.). We found that the level of processing was a strong positive predictor to whether a food was identified as being addictive.

- What are your thoughts on how much sugar is added to our food supply -- ketchup, yogurt, peanut butter, etc?

I think there is too much added. The reasons it is added is often to increase the taste and mask the taste of preservatives and other ingredients needed to make it more shelf stable or increase the life of the product.

- What is your opinion on fruit/fructose? Do you recommend limiting it? Have you found that adopting a low carb/ketogenic diet to be helpful to aid in reducing addiction tendencies?

I do not recommend that people limit fruit intake. I do recommend limiting dried fruit or fruit juice, though. We haven't studied the ketogenic diet in terms of how it impacts addiction, but I don't see that way of eating as something that is sustainable or healthy in the long-term.