# The Effect of Sugar on Your Brain: What the Evidence Shows

Name Date Class

## Reading

1 Few foods carry as many beliefs about the mind as sugar does. Some people insist that a sweet snack sharpens concentration before an exam. Others warn that sugar is a drug that quietly damages memory and mood. Both views contain a grain of truth, and neither survives close inspection. The brain makes up about two percent of body weight but uses roughly a fifth of the body's energy at rest, and its main fuel is glucose. That fact is real, yet it does not show whether extra sugar helps or harms. The evidence comes from very different kinds of study.

2 The best-known belief is the sugar rush, and it has been hard to **dispel**. In 1995, Mark Wolraich and colleagues combined 23 controlled experiments in a **meta-analysis**, a study that pools the results of earlier studies. Compared with a **placebo**, an inactive substitute, sugar did not change children's behavior or thinking. A 1994 experiment by Daniel Hoover and Richard Milich suggests why the belief survives. Thirty-five boys received a sweetener without sugar, but half of their mothers were told that their sons had had a large dose. Those mothers rated their sons as more hyperactive. It was the expectation, not the sugar, that changed what they saw. Adults do not seem to gain either. A 2019 meta-analysis of 31 studies and 1,259 participants, led by Konstantinos Mantantzis, found no mood improvement at any point after carbohydrates were eaten, and found more **fatigue** and less alertness within the first hour.

3 The picture is mixed. A 2023 systematic review of 77 human studies reported that glucose can produce a **transient** improvement in some memory tasks, such as immediate recall. Over longer periods the results point the other way. In that review, all three **cohort** studies, which follow the same people over time, and eight of nine cross-sectional studies, which measure people once, linked added sugar to a higher risk of cognitive impairment.

4 Two large studies show both the appeal and the weakness of this kind of evidence. In the Framingham Heart Study, about 4,300 adults took memory tests and about 3,800 had brain scans. People who drank more sugary beverages had smaller total brain volume and poorer episodic memory, and daily fruit juice drinkers had a smaller **hippocampus**, a region important for learning. The authors used drinks as a **proxy** for total sugar intake, and what a single snapshot cannot show is which came first. In Britain's Whitehall II study, men in the highest third of sugar intake from sweet food and drinks had 23 percent higher odds of a new common mental disorder five years later. The researchers tested for **reverse causation**, in which low mood leads to eating more sugar, and found no sign of it. No such link appeared in women, and the association in men was **modest**.

5 Experiments test cause more directly. In a 2020 randomized study, 110 healthy, lean adults ate either their usual diet or a Western-style diet, high in added sugar and saturated fat, for one week. The second group scored lower on a memory test linked to the hippocampus, although the difference had disappeared at a three-week follow-up. What the trial cannot separate is the effect of sugar from the effect of fat. In a 2026 review of 27 rodent studies, whose senior author works in Sydney, memory recovered after a switch back to a healthy diet when the earlier diet was high in fat, but not when it contained sugar. Scientists cannot **extrapolate** from rodents to people with confidence, and the reviewers called the **persistent** impairment after sugar a tentative conclusion.

6 The most heated argument concerns addiction. In rat experiments, animals given sugar solution for part of each day showed bingeing, signs of withdrawal, and repeated dopamine release in a reward area called the nucleus accumbens. A 2016 review by Margaret Westwater, Paul Fletcher, and Hisham Ziauddeen found little evidence for sugar addiction in humans. They argued that such behavior arises from **intermittent** access to **palatable**, or pleasant-tasting, food rather than from the chemistry of sugar. Other researchers disagree, and the question remains **contested**. It may be the pattern of access, not the sugar itself, that matters. Craving is real; the label is what researchers dispute.

7 Official guidance was written with other outcomes in mind. The World Health Organization's 2015 guideline recommends that free sugars supply less than 10 percent of energy intake and, conditionally, under 5 percent. Those figures rest on evidence about body weight and tooth decay, not the brain, and they exclude sugars in fresh fruit. In people, one week of a diet rich in sugar and fat was followed by recovery within three weeks. In rodents, recovery after sugar-containing diets was incomplete. Which pattern applies to people who eat high-sugar diets for years has not been tested.

## Vocabulary Matching

*Match each word from the reading with its meaning. Write the letter on the line.*

| | | | | |
|---|---|---|---|---|
| 1 | **dispel** | _____ | **A** | a study that pools the results of many studies |
| 2 | **meta-analysis** | _____ | **B** | stopping and starting again repeatedly |
| 3 | **placebo** | _____ | **C** | pleasant to taste |
| 4 | **fatigue** | _____ | **D** | when the supposed effect is really the cause |
| 5 | **transient** | _____ | **E** | a measure used in place of another one |
| 6 | **cohort** | _____ | **F** | argued about and not agreed on |
| 7 | **hippocampus** | _____ | **G** | lasting only a short time |
| 8 | **proxy** | _____ | **H** | an inactive substance used for comparison |
| 9 | **reverse causation** | _____ | **I** | a brain region important for learning and memory |
| 10 | **modest** | _____ | **J** | apply findings from one case to another |
| 11 | **extrapolate** | _____ | **K** | continuing for a long time |
| 12 | **persistent** | _____ | **L** | extreme tiredness after effort or illness |
| 13 | **intermittent** | _____ | **M** | a group of people followed over time |
| 14 | **palatable** | _____ | **N** | make a false belief disappear |
| 15 | **contested** | _____ | **O** | fairly small in size or amount |

## Fill in the Blank

*Choose a word from the box to complete each sentence. Use each word once. The words are already in the correct form.*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **cohort** | **contested** | **dispel** | **extrapolate** | **fatigue** | **hippocampus** | **intermittent** | **meta-analysis** | **modest** |
| **palatable** | **persistent** | **placebo** | **proxy** | **transient** | | | | |

1 It has been hard to _____ the myth of the sugar rush.

2 In the experiment, the control group received a _____ instead of the real drug.

3 The nurse felt deep _____ at the end of a long night shift.

4 The pain was _____ and had gone within an hour.

5 Researchers followed the same _____ of adults for twenty years.

6 Damage to the _____ can make it hard to form new memories.

7 Household income is sometimes used as a _____ for social class.

8 A _____ effect is small, so it may not matter much in daily life.

9 It is unwise to _____ from a study of mice to human beings.

10 She has a _____ cough that has lasted since the spring.

11 The power supply was _____ , so the lights kept going on and off.

12 A little honey made the bitter medicine more _____ .

13 Whether sugar is addictive is still _____ among scientists.

14 A _____ combines the results of many earlier studies into one overall analysis.

## Comprehension Questions

*Answer in your notebook or discuss with a partner. Questions 10 to 12 are IELTS-style.*

1 According to the reading, what is the main fuel of the brain, and why does the writer say this fact does not settle the question about extra sugar?

2 What did the 1995 meta-analysis by Wolraich and colleagues compare, and what did it find?

3 How did the Hoover and Milich experiment test the idea that expectation, not sugar, changes what parents see?

4 What did the 2019 meta-analysis find about adults, and what does the writer say is still unexplained?

5 How do the short-term and long-term findings in the 2023 systematic review differ?

6 What is the difference between a cohort study and a cross-sectional study, and why does the writer say a single snapshot is a weakness?

7 Why did the Whitehall II researchers test for reverse causation, and what did they conclude?

8 Why can the one-week Western-style diet trial not tell us that sugar alone affected memory, and what happened at the follow-up?

9 The writer places the rodent review and the human trial side by side at the end. What do the two results suggest, and why can they not yet be combined into one conclusion?

**IELTS-Style Questions**

10 **True, False, or Not Given:** "*The Framingham Heart Study proved that sugary drinks shrink the hippocampus.*" Explain your answer using evidence from the reading.

11 **Yes, No, or Not Given:** "*The writer believes that sugar is completely harmless to the brain.*" Explain your answer using evidence from the reading.

12 **Author's purpose:** Why does the writer end with the sentence "Which pattern applies to people who eat high-sugar diets for years has not been tested"? Is its purpose to warn readers about sugar, to show what remains unknown, or something else?

## True or False

*Circle T (true) or F (false) according to the reading. Write a correction for each false statement on the dotted line.*

1 **T / F** The reading says that the brain's main fuel is glucose.

2 **T / F** The 1995 meta-analysis found that sugar made children more hyperactive than a placebo did.

3 **T / F** In the Hoover and Milich experiment, all the boys received a sweetener without sugar.

4 **T / F** The 2019 meta-analysis found that carbohydrates improved adults' mood within the first hour.

5 **T / F** The 2023 systematic review reported a short-term benefit of glucose for some memory tasks.

6 **T / F** The Framingham Heart Study showed that sugary drinks cause the brain to shrink.

7 **T / F** The Whitehall II study found no link between sugar intake and new common mental disorders in women.

8 **T / F** In the 2020 randomized trial, the difference in memory scores was still present three weeks later.

9 **T / F** The 2026 review found memory recovery after a high-fat diet, but not after diets that contained sugar.

10 **T / F** The reading states that sugar addiction has been confirmed in humans.

## Discussion Questions

*Talk with a partner or in a small group. The questions move from personal to more abstract.*

1. Do you believe in the "sugar rush"? Where did you first hear about it, and has this article changed your view?
2. Think of a snack or drink you often choose when you need to concentrate. What do you expect it to do for you, and how do you know?
3. In the Hoover and Milich experiment, the mothers' expectations changed what they saw. Can you think of a time when your own expectations changed how you judged a situation?
4. In your country, are sweet foods linked to rewards, celebrations, or comfort? How might those customs shape people's beliefs about sugar?
5. The reading says the brain uses about a fifth of the body's energy at rest. Does that surprise you? Why might a fact like this be used to support very different arguments?
6. When you read a health headline, how do you decide whether to trust it? What would you check first?
7. The Framingham and Whitehall II studies found associations, not proof of cause. Why do headlines often treat an association as a cause, and who is responsible for correcting this?
8. The 2020 diet trial combined added sugar with saturated fat. Is it fair to say anything about sugar alone from that study? Explain your view.
9. Researchers use rodents because they can control what animals eat. What are the advantages and the risks of learning about human health this way?
10. The reading says the idea of sugar addiction is contested. Do you think the word "addiction" is useful for describing strong cravings, or does it cause confusion?
11. Some countries tax sugary drinks, and many require labels on food. Should governments act on evidence that is still uncertain, or should they wait for firmer proof? Give reasons.
12. If a food company paid for a study on sugar and memory, how much would you trust its result? Would your answer change if the result was unfavorable to the company?
13. The WHO guideline rests on evidence about weight and tooth decay, not the brain. Should a guideline be judged only by the outcomes it was written for? Why or why not?
14. Scientists often say that more research is needed. When is that phrase an honest description of the evidence, and when might it be a way to avoid a conclusion?

### Language Focus: Cleft Sentences for Emphasis

A cleft sentence splits one idea into two parts so that one part receives extra emphasis. Common patterns are It is/was + focus + that … and What + clause + is/was + focus.

**In the reading:**

- "**It was the expectation, not the sugar, that** changed what they saw."
- "…and **what** a single snapshot cannot show **is** which came first."
- "**What** the trial cannot separate **is** the effect of sugar from the effect of fat."

**Practice:** Rewrite this sentence as a cleft sentence that emphasizes *the size of the study*: *"The size of the study limits the conclusion."*

**Activities and speed challenge**
englishbridges.com/lessons/sugar-and-the-brain

**Notes**