

Overconsumption of foods high in fat and sugar linked to worse performance on hippocampus-dependent memory tasks

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A new study has found that individuals who report consuming diets high in fat and sugar tend to perform worse on two memory tasks known to heavily engage the hippocampus region of the brain. These participants were both less successful in these tasks and had longer reaction times. The study was published in [Physiology & Behavior](#).

The last century has seen a large global shift towards the use of industrially produced, highly processed foods. Rather than prepare meals inside the household from raw ingredients, modern meals are mostly prepared from ingredients that have undergone at least some processing. Much of this processing includes adding sugars and fats to the food. These additions improve the taste of meals, make them more palatable, but also increase their calorie content.

Researchers refer to diets that primarily consist of food items with lots of added sugar and fat as high-fat and high-sugar diets. Such diets typically consist of lots of pastries and baked food items, candies and chocolates, fast food meals, such as burgers, French fries, fried chicken, sweetened beverages such as soft drinks, energy drinks, flavored juices or sweetened teas, processed snacks such as chips, crackers, or snack cakes, breakfast cereals, sauces, dressings, and similar foods.

Studies have suggested that consuming an excessive amount of high-fat and high-sugar foods may have negative effects on the hippocampus, which can in turn affect memory functions that rely on this region. Selena Atak and her colleagues from the University of Michigan-Dearborn wanted to investigate this further. They hypothesized that individuals who consume a lot of high-fat and high-sugar foods would perform poorly on tasks related to memory and self-report more everyday memory failures.

These researchers also predicted that a high-fat and high-sugar diet would predict poorer performance on executive functioning tasks. Executive cognitive functions refer to higher-level mental processes that are involved in goal-directed behaviors, problem-solving, decision-making, and self-regulation. They encompass abilities such as planning, organizing, inhibiting impulses, shifting attention, and working memory.

To test their hypotheses, the researchers conducted an online study with 340 participants recruited from Amazon MTurk. The participants were between the ages of 18 and 35, and most of them were female. They were required to complete various tasks and questionnaires related to their dietary habits, memory, and executive functioning.

The participants completed the study online through Qualtrics. They completed an assessment of their dietary habits (the Dietary Fat and Sugar Short Questionnaire), four different memory measures – the Pattern Separation Task, the Associative Memory Task, the Word Memory Task, and an assessment of subjective memory complaints (the Everyday Memory Questionnaire-Revised). They also completed two assessments of executive functioning – the Trail Making Task and the Stroop task. The Trail Making task assesses the ability to shift attention and cognitive flexibility. The Stroop task measures cognitive processing speed and inhibitory control.

The researchers also collected data on participants' height and weight (to calculate body mass index), depression and anxiety symptoms (the Depression Anxiety Stress Scale-21), eating behavior (the Three-Factor Eating Questionnaire), sleep disturbance severity (PROMIS-level 2 sleep disturbance-short form), and physical activity habits (questions about frequency, duration and intensity of physical exercises).

The results showed that all memory measures were positively associated — participants who performed better on one memory task tended to do better on all the others. Better memory performance was associated with fewer complaints about everyday memory failures. It was also linked to better performance on executive tasks.

Participants who reported higher intake of high-fat and high-sugar foods tended to have poorer scores on all memory tasks. The only exception was the word recognition task. These participants also had slower reaction times on the Stroop task. However, when the researchers considered factors like depression, anxiety, eating behavior, sleep quality, height, and weight, the association between high-fat and high-sugar diets and one of the memory tasks disappeared. The same was true for the association with self-reported memory failures in daily life.

“In conclusion, we have shown that high-fat and high-sugar dietary intake is associated with poorer hippocampus-dependent memory. A high-fat and high-sugar diet also predicted poorer executive functioning of attention alternating ability and processing speed. We have demonstrated that a high-fat and high-sugar diet is associated with poorer executive control, which may also indirectly contribute to worse memory in high-fat and high-sugar consumers. Given the scarcity of human research, our findings are valuable and claim evidence for the role of diet in impairing critical cognitive functioning, which may in turn further impede engagement in a healthy lifestyle,” study authors concluded.

The study sheds light on the link between dietary habits and cognitive functioning. However, it also has limitations that need to be considered. Notably, the study design does not allow any cause-and-effect conclusions to be made. Additionally, these researchers did not take into account how hungry participants were at the time of the study and the assessment of dietary habits was solely based on self-reports.

The study, “[High-fat-sugar diet is associated with impaired hippocampus-dependent memory in humans](#)”, was authored by Selen Atak , Alyssa Boye , Susana Pecina , and Zhong-Xu Liu.