

High Ultraprocessed Food Intake Linked to Lower DNA Methylation

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STORY AT-A-GLANCE

- › Two studies link high ultraprocessed food intake to differences in DNA methylation. These are chemical tags that help switch genes on and off in both adults and children, though neither study can show cause and effect
- › A small pilot study of Brazilian women compared those getting about 45% of their daily calories from ultraprocessed foods with those getting about 14%. The higher-intake group showed methylation differences in 80 genome regions, mostly lower methylation, including regions near genes linked to fat storage, insulin sensitivity and cancer-related pathways
- › An analysis of 3,152 European children found suggestive links between higher ultraprocessed food intake and methylation at seven DNA sites near genes tied to thyroid hormone and liver pathways, DNA repair, and stress response
- › In the women's study, methylation differences showed up even though blood sugar and body fat did not differ between groups, suggesting epigenetic differences may be detectable when standard metabolic markers look similar. However, the single-time-point design can't show which comes first
- › Breaking ultraprocessed food addiction starts with restocking your pantry with whole foods, building meals around quality protein and easily digested carbohydrates like whole fruit and white rice, reading ingredient labels carefully, and building supportive communities focused on healthier eating

Food is a cornerstone of health, and the healthier your choices are, the healthier you'll be. However, the modern Western diet, which is filled with ultraprocessed food, is anything but healthy. These products are made with synthetic ingredients [that have been linked to chronic disease](#).

Now, a study explores one possible mechanism behind these links, and the findings are worth a closer look. Researchers found that women who ate the most ultraprocessed foods had different DNA methylation patterns — chemical tags that help control which genes are switched on or off — than women who ate the least.¹

Ultraprocessed Food Intake Linked to Chemical Marks on Women's DNA

In a cross-sectional pilot study published in *Nutrients*, researchers from the University of São Paulo in Brazil investigated whether diets high in ultraprocessed foods are associated with differences in chemical markers on deoxyribonucleic acid (DNA) — also known as DNA methylation — among adult women. Specifically, the team wanted to know whether people who eat more of these highly refined foods show measurable differences in gene regulation compared to those who eat less.²

To test the hypothesis, the team started with 30 women, ranked them into thirds by ultraprocessed food intake and compared the lowest third — about 14% of daily calories from ultraprocessed foods — with the highest third, at about 45%. After five samples were excluded for poor sequencing quality, DNA from the white blood cells of 15 women (seven low-intake, eight high-intake) was examined using sequencing technology.

- **The team found notable differences** — After analysis, 80 regions of the genome showed differences in methylation between the high- and low-intake groups. Most of these differences showed hypomethylation in the women consuming the most ultraprocessed foods. Note that this was a small exploratory study, and the authors did not adjust these results for multiple comparisons, which raises the chance that some differences are false positives.

Basically, hypomethylation means that the molecular "off" switches that keep genes quiet were less active, possibly leaving those genes more open to being turned on. The researchers didn't measure gene activity directly, but when this pattern shows up in genes involved in metabolism, it may influence how your body processes energy.

- **Methylation differed even when metabolic markers didn't** — The women in the study had an average age of 31 (most were between 26 and 36), with an average **body mass index** (BMI) of 24.7. No significant differences in total body fat, waist size, or blood sugar were noted between groups.

In other words, methylation differences were present even though traditional markers of metabolic health did not differ between groups. Because the study captured a single point in time, it can't show which came first or whether diet caused the differences.

- **Examining the genes involved** — When the researchers looked at the regions with the largest methylation differences, several stood out, including REPIN1-AS1 and FOXP1-AS1. Both have been linked in earlier research to metabolic regulation and cancer-related pathways. REPIN1-AS1 may help regulate REPIN1, a gene involved in how your body stores fat and uses glucose — so, changes in this region could, in theory, influence how efficiently you burn or store energy.

FOXP1-AS1 appears to help regulate FOXP1, a gene involved in immune and brain development. The authors noted that FOXP1 "has been linked to autism and hematologic cancers."³ They cautioned, however, that further studies are needed to confirm any link between these genes and actual health outcomes.

- **Diet quality and methylation** — The study noted that women who ate fewer ultraprocessed foods also consumed healthier food in general. The authors list folate, B-complex vitamins, choline, and polyphenols among the nutrients that help regulate DNA methylation.

While this small pilot study can't prove cause and effect, it adds to evidence that eating large amounts of packaged snacks, frozen meals, sugary drinks, or processed meats may be linked to changes in how your genes are regulated. Thus, it's in your best interest to minimize your intake of ultraprocessed foods to help your genes function the way nature intended — maintaining balance, energy, and repair.

Childhood Diets Linked to Marks on DNA

Children's DNA methylation may also be affected. In a large-scale meta-analysis of epigenome-wide association studies published in *Clinical Epigenetics*, researchers examined whether children who eat more ultraprocessed foods show measurable differences in their DNA methylation patterns.⁴

This team selected 3,152 children aged 5 to 11 years across four major European cohorts — Human Early-Life Exposome (HELIX), Generation XXI, Avon Longitudinal Study of Parents and Children (ALSPAC), and Generation R. Parents or caregivers reported the children's diets through food diaries or food frequency questionnaires — from breakfast cereals and packaged snacks to sweetened drinks and fast-food meals — and blood samples were analyzed using DNA methylation arrays. Diet and methylation were measured at the same point in time, so the study is cross-sectional.

- **How higher ultraprocessed food intake related to methylation** — Even after adjusting for variables like age, sex, body weight, maternal education, and screen time, a pattern emerged — children consuming higher proportions of ultraprocessed foods showed suggestive DNA methylation differences at seven specific genetic locations, called CpG sites.

None of these differences met the study's standard threshold for statistical significance, and the authors describe the associations as weak, noting that methylation "might not be a key mechanism" behind the health effects of ultraprocessed foods in children. Still, the main findings were consistent in direction across cohorts, and the related genes are mainly involved in pathways tied to thyroid hormone and liver function.

- **Consumption of ultraprocessed food is widespread among children** — Intake varied widely across the cohorts studied — from about 24% of food servings in the multicountry HELIX cohort to 61% of daily energy in the U.K.'s ALSPAC cohort. The authors also cite earlier estimates that ultraprocessed foods supply about 65% of calories for U.K. children and 66% for U.S. children.

Lower figures have been reported elsewhere — about 19% in Colombia, and 15% among Romanian adults — but neither country was part of this study, so it did not test methylation at those intake levels.

- **What the flagged sites may mean** — One finding involved a site near the ATF7 gene, which was more methylated in children with higher ultraprocessed food intake. ATF7 encodes a stress-responsive regulator that plays a role in fat cell development and immune memory.

Higher methylation at this site has been associated in other research with a neurodevelopmental disorder in children, and separate studies suggest ATF7 is involved in diet-related weight gain and insulin resistance. In plain terms, eating more processed foods may be linked to changes around genes that help regulate metabolism and immune balance, though the effect sizes here were small.

- **Another flagged site was near the NHEJ1 gene** — This gene is one of the main players in repairing breaks in DNA. Higher methylation near a gene's starting point can affect how it's expressed, though the researchers did not find a link between this site and gene activity in children's blood.
- **The study also found lower methylation near the PHYHIP gene** — PHYHIP makes a brain protein involved mainly in the early development of visual function after birth. Lower methylation at this site has also been linked in earlier research to higher BMI in mothers.⁵
- **Other ways ultraprocessed food may affect children** — The authors also pointed to research linking food additives to thyroid function, which helps control growth, energy, and metabolism, while noting that methylation may not be the main

pathway:⁶

"[S]tudies have reported that some food additives are related to thyroid hormone dysregulation and an increased risk of subclinical thyroid dysfunction. A recent report on the HELIX data showed that metabolites associated with UPF intake were associated with C-peptide levels in children, a well-known marker of β -cell function and insulin resistance.

However, a wide range of non-methylation mechanisms that include the gut microbiome, oxidative stress, and inflammation are likely to be more affected by UPF intake and by the contaminants (acrylamide, etc.) and additives (emulsifiers, sweeteners, etc.) that they contain."

For parents, these findings are worth noting. The authors found only small, suggestive changes and called for intervention studies to confirm them, but the results added to a growing body of research on how diet may shape gene regulation in children. Hence, choose healthy, whole foods as much as possible, not ultraprocessed ones.

Break Free from the Clutches of Ultraprocessed Food

Companies have done extensive research into making ultraprocessed food a hit for consumers. They're designed to be tasty and convenient, which appeals to modern, busy lifestyles. Moreover, [they light up the reward circuits in your brain](#), making you crave them all the time. In short, they're made to be addictive.

However, as the research suggests, eating ultraprocessed foods does your DNA methylation — and the rest of your body — no favors. [In a previous article](#), I noted that ultraprocessed food is associated with a higher risk of a multitude of health problems — 32 of them, to be exact. That said, here are my recommendations to help you break the cycle for you and your child:

- 1. Revamp your pantry** — Begin by changing what you stock at home because what you keep on hand shapes your family's eating habits. Replace fast-grab snacks like chips, cookies, and processed bars with healthier choices that truly nourish you — fresh fruit, pastured eggs, homemade, grass fed yogurt. When junk food isn't in sight, it's far easier to make healthier choices.
- 2. Build every meal around protein and healthy carbohydrates** — These two components help stabilize blood sugar levels and improve satiety, preventing you from eating too much (as well as keeping you away from junk food). Aim for about 0.8 grams of protein per pound of your ideal body weight from quality sources like pastured eggs, grass fed beef, or wild-caught, low-fat, warm-water fish, and pair them with easily digested carbohydrates like whole fruit and white rice.
- 3. Choose healthier versions of foods you enjoy** — You don't need to give up your favorite textures or flavors, just upgrade them. For example, swap sweetened yogurt for plain yogurt made from raw, grass fed milk, topped with fresh fruit, chips for air-popped popcorn, and soda for sparkling water with lemon or lime.

You'll still enjoy the crunch or fizz you crave but without the synthetic additives and **seed oils** high in linoleic acid (LA), which may undermine your cellular health. Ideally, keep your total LA intake below 5 grams a day.

- 4. Redesign your kitchen with a focus on health** — Keep the healthiest foods within easy reach and the temptations out of sight. Move fresh fruit to eye level, store cut vegetables in clear containers, and stash processed snacks where you won't see them often. Your brain responds to visual cues — when whole foods are visible, you're far more likely to eat them.
- 5. Read ingredient lists carefully** — You don't need to memorize every chemical or ingredient — just scan for patterns that stand out. For example, long ingredient lists often signal heavy processing. Watch for artificial sweeteners, emulsifiers, and seed oils such as soybean, corn, or sunflower oil. A shorter ingredient list typically means fewer industrial formulations and more real food.

- 6. Plan your treats properly** — Instead of cutting out your favorite foods completely, schedule them intentionally. Pick one meal or event each week to enjoy something special, fully and without guilt. When you plan these moments, you remove the emotional baggage that often drives binge eating and regain a sense of control over your food choices.
- 7. Build a support network** — Changing habits is easier when others understand your goals. Share your intentions with friends or family or join a community focused on whole-food eating. If you want a personalized plan, work with a registered dietitian nutritionist (RDN) who can align strategies with your specific health goals and make your progress sustainable.

This article is for informational purposes only and does not constitute medical advice. Consult a qualified healthcare provider before making changes to your health regimen.

Frequently Asked Questions (FAQs) About How Ultraprocessed Foods May Affect DNA Methylation

Q: What did researchers discover about how ultraprocessed foods may affect your DNA?

A: Scientists from the University of São Paulo found that women who ate large amounts of ultraprocessed foods had different DNA methylation patterns than women who ate the least amounts. In their small pilot study, women whose diets were about 45% ultraprocessed showed methylation differences in 80 regions of their DNA compared with women at about 14%, including regions near genes involved in metabolism and fat storage.

These differences appeared even though blood sugar and body fat were similar between the groups. Because the study looked at a single point in time, it can't show that the diet caused the differences.

Q: How early in life do these effects begin?

A: According to a study published in Clinical Epigenetics, related differences may appear in children. Researchers analyzed 3,152 kids (aged 5 to 11) and found suggestive links between higher ultraprocessed food intake and methylation at seven DNA sites near genes tied to thyroid hormone pathways, liver function, and DNA repair. These associations held after accounting for body weight, though the authors describe them as weak and call for intervention studies to confirm them.

Q: What do these DNA changes mean for your health?

A: The studies suggest that high ultraprocessed food intake is linked to differences in DNA methylation, which is a process that helps switch genes on and off. Researchers are still working out what these differences mean. Because several of the flagged regions sit near genes involved in metabolism, DNA repair, and hormone signaling, they may be one way diet influences long-term health, but neither study measured gene activity or health outcomes directly, so more research is needed.

Q: How common is ultraprocessed food consumption, and why is it dangerous?

A: In many high-income countries, half or more of daily calories now come from ultraprocessed products such as chips, frozen meals, sweetened cereals, and soft drinks. These foods are engineered for taste, convenience, and addiction, but not for nutrition.

They often contain seed oils, emulsifiers, artificial sweeteners, and preservatives, which researchers suspect may contribute to oxidative stress, changes in gut bacteria, and inflammation. These effects may build gradually, often long before any health problem becomes apparent.

Q: What steps can I take to protect my DNA and health?

A: Start by changing what's in your kitchen. Stock real foods (fresh fruit, vegetables, eggs, and homemade meals) instead of processed snacks. Build each meal around quality protein and easily digested carbohydrates like whole fruit and white rice to stabilize blood sugar and stay full longer. Read ingredient lists carefully – shorter lists usually mean fewer additives.

Plan indulgences on purpose so you can enjoy treats without losing control, and surround yourself with people who support healthy eating.

Sources and References

- ¹ [News Medical, November 4, 2025](#)
- ^{2, 3} [Nutrients 2025, 17\(21\), 3465](#)
- ^{4, 5, 6} [Clin Epigenetics. 2025 Jan 7;17:3](#)