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Low vs. High Glycemic Diets: Comparative Effects on Gut-Brain Axis Modulation and Psychological Well-Being

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ABSTRACT

The relationship between dietary patterns, gut microbiota, and psychological health has emerged as a critical area of research, particularly in understanding how carbohydrate quality, measured by the glycemic index (GI), influences the gut-brain axis (GBA) and mental well-being. This review explores the comparative effects of low- versus high-GI diets on key metabolic parameters, gut integrity, systemic inflammation, cognitive performance, and psychological health outcomes. Low-GI diets are consistently associated with improved blood glucose regulation, enhanced insulin sensitivity, reduced systemic inflammation, and better gut barrier function, collectively contributing to improved physical and mental health. They promote a more favorable gut microbiota composition, stimulate beneficial neurotransmitter production, and strengthen blood-brain barrier integrity, thereby supporting cognitive function and emotional stability. Conversely, high-GI diets are linked to gut dysbiosis, elevated inflammatory markers, glycemic volatility, and an increased risk of mood disorders such as depression and anxiety. These diets exacerbate metabolic disturbances, contribute to obesity, type 2 diabetes, and cardiovascular diseases, and may impair neurocognitive functions via inflammatory and oxidative stress pathways. Animal and human studies alike underscore that high-GI diets can cause greater fat accumulation, disrupt glucose-insulin homeostasis, and impair gut and brain health, whereas low-GI diets offer protective effects. Nevertheless, methodological inconsistencies such as variations in meal composition, duration of interventions, participant demographics, and cognitive assessment tools limit the ability to draw definitive conclusions. Future research should prioritize standardized study designs, long-term follow-ups, and integrative omics approaches to better elucidate the mechanisms underlying these relationships. Clinically, promoting low-GI, minimally processed, nutrient-rich foods may serve as an effective strategy for mitigating both metabolic and psychological disorders.

INTRODUCTION

The glycemic index (GI) is a ranking system that classifies carbohydrate-containing foods based on how quickly they raise blood glucose levels after consumption. It measures the body's glycemic response by tracking blood sugar levels over two hours following the ingestion of 50 grams of carbohydrates from a specific food (1). This response is then compared to a standard reference, usually pure glucose, which has a GI of 100. Based on this, foods are categorized as high GI (>70), moderate GI (55–70), low GI (40–54), or very low GI (<39). Several factors influence a food's GI, including the type of sugar (e.g., fructose, glucose), starch composition (amylose vs. amylopectin), food processing, cooking methods, and the presence of other macronutrients such as fiber, protein, and fat. While GI provides insight into carbohydrate quality, it does not account for the quantity consumed in a typical meal (2).

Mental health conditions like anxiety and depression contribute heavily to the global burden of disease. Rapid lifestyle changes driven by globalization and urbanization have been associated with rising rates of mental disorders. Diet, recognized as a major contributor to early death, has emerged as a common risk factor for both physical and mental health problems (3). Studies across various cultures, countries, and age groups consistently show a strong connection between dietary patterns and mental health outcomes. Among the mechanisms proposed, the gut microbiota has gained special attention. Since the composition and health of the gut microbiome are heavily influenced by diet, and because the microbiome plays a key role in factors linked to mental illness, this relationship opens promising new avenues for both the prevention and treatment of mental disorder (4).

The gut-brain axis (GBA) is a bidirectional communication system linking gastrointestinal and central nervous system (CNS) functions through neural, endocrine, and immune pathways. The GBA involves interactions between the enteric nervous system, autonomic nervous system, and hypothalamic-pituitary axis, with the vagus nerve playing a key role in retrograding signaling. Gut microbiota influence brain development and function by modulating neurotransmitters, immune responses, and blood-brain barrier (BBB) permeability (5). Dysbiosis is linked to neuropsychiatric disorders, including anxiety, depression, and neurodegenerative diseases like Alzheimer's (AD) and Parkinson's (PD). In AD, gut microbiota affects amyloid-beta (Aβ) deposition, while in PD, α-synuclein pathology is influenced by microbial metabolites. The GBA also impacts metabolic diseases (hypertension, diabetes) and stroke, where gut-derived lipopolysaccharides (LPS) worsen outcomes by triggering inflammation. Immune cells, including T-cell subsets, mediate GBA effects in conditions like multiple sclerosis (MS) and ischemic stroke (6).

Positive dietary habits such as regularly eating breakfast and consuming fruits, vegetables, and milk are associated with better self-reported health, greater happiness, and improved sleep satisfaction, even after adjusting for factors like age, sex, socioeconomic status, and physical activity (7). These healthy eating patterns are also linked to lower levels of perceived stress and fewer depressive symptoms. In contrast, unhealthy eating habits, including frequent intake of fast food, caffeine, sweetened beverages, and soft drinks, are connected to higher stress levels and more symptoms of depression, highlighting a clear relationship between diet quality and psychological well-being (8).

Glycemic Index and Glycemic Load

Glycemic index (GI)

It is a system that measures how much a carbohydrate-containing food raises blood glucose levels compared to a reference food, typically glucose or white bread. Originally created to help individuals with diabetes make better food choices, the GI encourages the selection of foods that produce a slower and more stable blood sugar response (9). However, several factors, including individual variability and measurement challenges, can affect the accuracy of GI values. Although low-GI foods are often associated with better blood sugar control and improved lipid profiles, it is important to recognize that not all low-GI foods are inherently healthy—some may still be high in sugars or unhealthy fats (10).

Glycemic load (GL)

It builds on the GI concept by also accounting for the amount of carbohydrate consumed. It combines the quality (GI) and quantity of carbohydrates to give a fuller picture of a food's impact on blood sugar levels after eating. Low-GL diets have shown potential benefits in reducing the risk of diabetes and chronic diseases. However, focusing solely on GI or GL numbers without considering overall nutritional value can be misleading. Healthier choices are best made by prioritizing minimally processed, nutrient-rich foods such as whole grains, fruits, and vegetables, rather than relying only on their glycemic response (11).

Low Vs. High Glycemic Index Foods

Emerging evidence suggests that incorporating low-glycemic index (GI) foods into the diet can improve various metabolic issues linked to insulin resistance and even help lower insulin resistance itself. Epidemiological studies also point to a protective role of low-GI diets against the development of type 2 diabetes and cardiovascular disease. However, a challenge lies in the limited availability of naturally low-GI foods, as many common staples like bread, breakfast cereals, and potato products typically have a high GI. Research indicates that the GI of starchy foods can be reduced through careful selection of raw materials and optimized processing methods. Some low-GI foods also show beneficial "second-meal effects," helping to lower blood sugar and insulin responses at subsequent meals, although not all low-GI foods have this advantage (12).

On the other hand, high-GI foods are suspected to contribute to obesity by increasing hunger and promoting overeating. While long-term studies are limited, short-term research shows that high-GI carbohydrates may lead to greater appetite and higher food intake compared to low-GI foods (13). Choosing whole grains and minimally processed cereals over refined products is a recommended strategy to help manage appetite and align with current dietary guidelines. It's important to note that some foods, like dairy products, can have a low GI but still cause a high insulin response, showing that GI alone does not capture all aspects of a food's metabolic impact (14).

Physiological effects of high-GI and low-GI diets

Dietary glycemic index (GI) influences key metabolic processes such as glucose regulation, insulin sensitivity, and energy balance, which in turn can affect psychological health. High-GI diets have been associated with greater risks of chronic diseases like obesity, Type 2 diabetes mellitus (T2DM), and cardiovascular problems, conditions that are often linked to higher rates of mood disorders, stress, and cognitive decline (15).

In contrast, low-GI diets, by supporting more stable blood sugar and insulin levels, may help reduce these health risks and potentially promote better psychological well-being. However, the research is complicated by factors like differences in food preparation and individual metabolic responses, making it difficult to draw firm conclusions. Despite these challenges, there is growing support for including GI considerations in public health strategies, highlighting the broader impact of **carbohydrate quality** on both physical and mental health (16).

Gut-Brain Axis

The gut and brain are connected through complex metabolic and signaling pathways, which can significantly influence mental, cognitive, and emotional health. Recent research has focused on the role of the gut microbiota in this communication, giving rise to the concept of the microbiota–gut–brain axis (17). Studies suggest that the gut microbiota may be linked to processes like memory, learning, stress response, anxiety, and the development of neurological and neurodegenerative disorders (18).

As a result, scientists are exploring how targeting the microbiota through nutrition and therapeutic interventions could improve brain health and psychological well-being. However, most of the current evidence is based on pre-clinical studies, and much remains unknown about the specific mechanisms and triggers involved (19). Advancing this field will require standardized methods for human research, better biological sample analysis, identification of key biomarkers, and the use of advanced technologies like omics and bioinformatics (20).

Neurotransmitters Produced in the Gut

Gut bacteria are deeply involved not only in digestion, immune function, and hormonal signaling but also in communicating with the central nervous system (CNS) by producing important metabolic compounds. These include short-chain fatty acids (SCFAs), bile acids, and key neurotransmitters such as glutamate (Glu), γ-aminobutyric acid (GABA), dopamine (DA), norepinephrine (NE), serotonin (5-HT), and histamine (21).

Signals from the gut and its microbiota travel to the brain mainly through the vagus nerve (VN), which connects not just the gastrointestinal tract (GIT) but also the esophagus, liver, and pancreas. Although VN fibers don't directly touch the gut wall or microbes, communication happens through about 100–500 million neurons of the enteric nervous system (ENS) found within the gut lining. Gut bacteria help modulate, renew, and develop these neurons, especially by producing and metabolizing hormones (22).

Inflammation and Gut Permeability

Inflammatory bowel disease (IBD) is a complex disorder involving many factors. One key aspect is a weakened intestinal barrier, often referred to as a "leaky gut," which can trigger inflammation by enhancing immune system activation. However, some interaction between the gut's contents and the immune system is essential to maintain normal gut function (23).

Research shows that deliberately disrupting gut permeability in mice increases their risk of developing colitis and influences their adaptive immune response. This suggests that while altered permeability plays an important role, leaky gut alone may not be enough to cause inflammatory diseases without other contributing factors (24).

Diet and GBA communication

Diet significantly shapes the composition of the gut microbiota. Changes in diet can quickly alter the microbial balance, though individual responses vary. Diets high in fat and protein but low in fiber, typical of Western eating habits can disrupt gut microbiota (a state called dysbiosis), leading to local inflammation, weakened gut barriers, increased harmful endotoxins like lipopolysaccharides, and chronic low-grade systemic inflammation, setting the stage for metabolic diseases (25).

Modern research emphasizes that the gut microbiota should be regarded almost like a separate organ, critical for maintaining health. Future lifestyle and nutrition guidelines should prioritize nurturing a healthy gut microbiota because ultimately, our health mirrors what our gut microbiota feeds on (26).

Low-Glycemic Diets and Gut-Brain Axis

Type 2 diabetes mellitus is a complex condition marked by problems with blood sugar control. It affects millions globally and is often linked to mental health issues, especially depression. Research shows that people with T2DM are about three times more likely to suffer from depression compared to the general population. This relationship is two-way: depression raises the risk of developing T2DM, while having diabetes increases the chances of depression, worsening its severity. Managing mental health is now recognized as a vital part of diabetes care (27).

While traditional treatments like tricyclic antidepressants can worsen blood sugar control, medical nutrition therapy offers a safer path. However, most nutrition plans mainly focus on blood sugar and less on mental health improvement. In China, a low-fat diet is recommended for diabetes, but recent studies suggest a low-carbohydrate diet (LCD) might be even more effective for managing blood glucose (28).

The link between carbohydrate intake and depression is still debated. Some studies show that high-carbohydrate diets can help reduce depression, while others warn that long-term low-carb diets may worsen mood. Yet for T2DM patients, lowering carbs remains critical to blood sugar control.

GI and Systematic Inflammation

Inflammation, marked by increased levels of cytokines, plays a key role in innate immunity. It is linked to low-grade inflammation, which has been associated with conditions like type 2 diabetes, cardiovascular disease (CVD), and other metabolic disorders. Various lifestyle factors, including diet, contribute to this low-grade inflammation. Studies have shown an association between the type and amount of dietary carbohydrates and low-grade inflammation. The glycemic index (GI) of foods, which measures their potential to raise postprandial blood glucose, is a significant factor. Following a low-GI (LGI) diet has been linked to a reduced risk of mortality, CVD, diabetes, and cancer (29).

Research also suggests a connection between dietary GI and inflammation, with some studies showing an inverse relationship between dietary GI and inflammatory biomarkers. Glycemic load (GL), which accounts for both the quality and quantity of carbohydrates, has been associated with the risk of chronic diseases and inflammation. Some studies report an inverse association between dietary GI and GL and inflammatory markers, while others find no significant link. Notably, Qi and Hu found a direct relationship between dietary GL and systemic inflammation in diabetic patients, though overall findings on this association remain mixed (30).

Low GI Diet and Enhanced Gut Barrier Function

The intestine plays a crucial role in managing diabetes mellitus (DM), as the intestinal mucosal barrier prevents the translocation of bacteria and endotoxins into the blood and lymphatic systems under normal conditions. Disruption of this barrier increases permeability, allowing pathogens and endotoxins to enter, potentially causing infection or inflammation. Studies have suggested that the low-grade inflammation seen in type 2 diabetes (T2DM) may be linked to intestinal endotoxins. An imbalance in intestinal microbiota composition can damage the mucosal barrier, triggering non-specific inflammation that exacerbates insulin resistance and metabolic dysfunctions in T2DM through pathways like NF-κB and JNK signaling (31).

Serum markers like D-lactic acid, diamine oxidase (DAO), and endotoxins are used to assess the permeability of the intestinal mucosa and bacterial translocation. In T2DM patients, glycemic control, including monitoring both short- and long-term glucose fluctuations, is critical (32).

High-Glycemic Diets and Gut-Brain Axis

The digestive characteristics of GCs impact cognitive functions and discusses healthier carbohydrate choices, research models, and future directions. Individuals, especially those in early and late life or with metabolic diseases, are more vulnerable to diet-induced cognitive impairment. It's well established that gut function is closely connected to dietary patterns. An unhealthy carbohydrate-rich diet can disturb the gut microenvironment, negatively impacting cognitive functions via the gut-brain axis (33).

Glycemic fluctuations, caused by quickly digestible carbohydrates or metabolic diseases, can impair cognitive functions by disrupting glucose metabolism, calcium homeostasis, oxidative stress, inflammatory responses, and accumulation of advanced glycation end products. Unstable glycemic status can cause more severe neurological issues than consistent hyperglycemia. In contrast, slow-digesting or resistant carbohydrates may enhance neurocognitive functions by maintaining a stable glycemic response and promoting healthier gut functions than gelatinized starch or nutritive sugars (34).

High GI Diet and Dysbiosis

Recent advances in sequencing technologies have uncovered the complexity and wide-ranging functions of the gut microbiota. Changes in the composition or balance of intestinal microbes known as dysbiosis, are strongly linked to many gastrointestinal (GI) diseases. Studies show that altering the microbiota, such as through microbiota or metabolite transfer in animal experiments, can sometimes replicate disease characteristics in a suitable host, suggesting that dysbiosis might drive certain disorders (35).

In diseases with complex causes, dysbiosis may act as a necessary condition but not the sole factor. Deepening our understanding of the gut microbiota's role in GI diseases could open up new insights into pathophysiology and lead to innovative treatments like therapeutic microbiota manipulation (36).

High GI Diet and Inflammation

Recent research highlights that chronic inflammation contributes significantly to degenerative diseases like diabetes and heart disease. Studies assessing dietary habits through food frequency questionnaires or 24-hour recalls have consistently shown that diets high in glycemic index (GI) and glycemic load (GL) are linked to elevated systemic inflammation markers such as high-sensitivity C-reactive protein (HS-CRP), interleukin-6 (IL-6), and tumor necrosis factor alpha (TNF-α) (37).

Controlled intervention trials also indicate that dietary composition modestly impacts these inflammatory markers. Key nutrients influencing inflammation include fiber, fatty acids, carotenoids, flavonoids, and magnesium. Traditional Mediterranean diets, rich in monounsaturated fats, omega-3 fatty acids, fruits, vegetables, legumes, and grains, display notable anti-inflammatory effects compared to typical North American and Northern European diets, suggesting they could be effective in managing chronic inflammation (38).

High GI Diet and Blood Sugar Fluctuations

High glycemic load (HG) diets, even when used for weight loss, can negatively affect mood. In a study with overweight adults, those on an HG diet showed a worsening of depression scores over six months, as measured by the Profile of Mood States (POMS) questionnaire ($p = 0.009$ after adjusting for hunger) (39). Although cognitive performance like memory, attention, and reasoning did not significantly differ, the HG group clearly experienced a decline in mood, suggesting that high GI diets might contribute to subclinical depression without majorly affecting cognition (40).

High GI Diet Risk Factors

Chronic insulin resistance can cause inflammation, thrombosis/impaired fibrinolysis, and dyslipidemia. The specific influence of high glycemic index (GI) and glycemic load (GL) diets on heart disease risk factors isn't fully clear. In a randomized crossover study, 24 overweight men followed both high-GI/GL and low-GI/GL diets, each for 4 weeks, with all meals prepared under strict conditions (41). Results showed that high-GI/GL diets did not significantly alter glucose metabolism, inflammation, or blood clotting factors. However, the high-GI/GL diet led to slight fat loss, slight lean mass gain, and surprising reductions in total cholesterol and LDL cholesterol, but also reduced HDL cholesterol (the "good" cholesterol) (42).

Low vs. High GI Diets on Psychological Well-being

Mental disorders like anxiety, depression, and psychological distress have become more common, bringing major economic burdens and early deaths. Lifestyle changes, especially diet choices, are believed to contribute to this rise. People with mental disorders often eat fewer fruits and vegetables and consume more sweet and fatty foods. Research, like the Whitehall II study, linked diets high in sweet desserts and refined grains to a greater risk of depression, while diets rich in fruits and vegetables showed a protective effect (43).

The glycemic index (GI) measures carbohydrate quality, and its relationship with mood is complex. Some theories suggest high-GI diets boost serotonin production by enhancing tryptophan transport into the brain, potentially benefiting mental health. However, high-GI and high-glycemic load (GL) diets can also cause blood sugar crashes, leading to hypoglycemia, brain dysfunction, and depression. Additionally, high-GI diets often lack fiber, fruits, vegetables, and whole grains, providing fewer essential nutrients for the nervous system, possibly worsening mood (44).

Low vs. high GI diets in humans and animals

In humans, low-GI diets have been shown to reduce glycated hemoglobin (HbA1c), fasting glucose, BMI, total cholesterol, and LDL cholesterol, with the most significant reductions seen in studies with longer durations (45). However, no effect was observed on fasting insulin, HOMA-IR, HDL, triglycerides, or insulin needs. In contrast, high-GI diets did not show the same benefits and might lead to fluctuations in blood glucose and potentially worsen metabolic control (46).

While in animals, particularly rats and mice, high-GI diets led to an increase in body fat, a decrease in lean body mass, and higher levels of blood glucose and insulin after glucose intake. The high-GI diet also caused plasma triglycerides to rise and showed significant disruptions in islet-cell architecture, which was not seen in animals on a low-GI diet (47).

While both humans and animals on high-GI diets show negative metabolic changes, low-GI diets seem to offer benefits in blood glucose regulation, cholesterol, and body fat composition (48).

Cognitive performance

The effect of glycemic index (GI) on cognitive performance remains unclear. A systematic review was conducted to evaluate the existing studies on this topic, examining research articles from various databases like Medline and Cochrane Central Register up until July 2012. The review aimed to analyze the impact of meals with different GI values on cognitive function (CF), with the inclusion of 11 eligible studies involving participants aged 6 to 82 years (49).

The results were inconsistent: some studies showed improvements with either high-GI or low-GI meals, while others found no differences or positive/negative effects on certain cognitive domains after consumption of the two types of meals. Several methodological factors, such as study design, sample size, age, timing of testing, and meal composition, may have contributed to these discrepancies. The review suggests that while a low-GI meal might benefit cognitive function in adults, conclusive evidence is still lacking, and future studies should address these methodological issues for clearer results (50).

Clinical Implications and Future Directions

Many countries, as recommended by the United Nations Food and Agriculture Organization, provide Nutrition Information Panels on packaged foods to guide consumer choices. While carbohydrate content is a mandatory label item, the specific details regarding dietary fiber or total sugars may vary depending on the country. These labels help consumers make better-informed decisions, but they do not address the needs of individuals managing blood glucose levels, such as those with diabetes or pre-diabetes (51).

Many people restrict carbohydrate-containing foods, including those with sugars and dietary fibers. Globally, 1 in 11 adults suffers from diabetes, with about 463 million affected. The glycemic index (GI), which ranges from 1 to 100, measures the effect of carbohydrate-containing foods on blood glucose. Foods with a low GI (≤55) cause a smaller and more gradual rise and fall in blood sugar, while high GI foods (≥70) lead to rapid increases and decreases in blood glucose (52).

Practical recommendations for dieticians

For weight loss, dietary interventions should create a negative energy balance. A reasonable target for overweight or obese individuals is a 15-30% reduction in caloric intake, equating to a 600–700 kcal/day deficit, resulting in an approximate weight loss of 0.5 kg per week. Beyond energy reduction, attention should be given to food choices to avoid nutrient deficiencies and metabolic imbalances. Carbohydrates should account for 55–60% of total daily energy intake, while proteins should contribute 12–15%, and fats should remain under 25–30% of daily intake. In Europe, carbohydrate recommendations range from 45–65% and protein from 10–20%. Popular energy-restricted diets focus on adjusting macronutrient ratios or eliminating specific foods, with some evidence suggesting they may be more effective for weight loss (53).

Two diets of note are the high-protein (HP) and low-glycemic index (LGI) diets, both of which are gaining popularity for weight loss. On the other hand, high-fat, low-carbohydrate diets (HF) are not recommended due to negative effects on metabolism. An HP diet, which is low in carbohydrates and rich in protein, typically includes 16-30% of energy from protein, compared to the 15% found in a standard balanced diet. These diets are believed to promote weight loss by increasing thermogenesis, preserving lean body mass, and enhancing satiety, which reduces overall energy intake. The short-term benefits of HP diets on weight loss, body composition, and lipid metabolism are evident, though long-term effectiveness may be similar to other macronutrient-based diets (54).

Suggestions for Future Studies

Future research should further explore the effects of low-glycemic index (GI) diets on body mass and blood glucose control, particularly in individuals with metabolic diseases. Although current studies suggest that low-GI diets slightly reduce body mass and BMI, with more substantial improvements after interventions lasting over 24 weeks, further studies could investigate longer-duration interventions and analyze inter-study differences for clearer conclusions. The evidence suggests that low-GI diets are more effective at controlling fasting blood glucose (FBG) and glycosylated hemoglobin compared to higher-GI diets (55). Further research is needed to focus on these aspects, particularly longer-term effects of low-GI diets on blood glucose (56).

In addition, prospective cohort studies examining the association of GI and glycemic load (GL) with chronic diseases like type 2 diabetes, coronary heart disease, and cancers need more comprehensive studies to strengthen the evidence base. The current evidence, which suggests a positive association between high GI/GL diets and various chronic diseases, is still rated with low certainty (57).

Future studies should aim to provide more robust evidence, particularly regarding cancer risks and other chronic diseases, by using higher-quality data and improving the certainty of findings through better research design and methodology (58).

CONCLUSION

The comparison between low- and high-glycemic index (GI) diets highlights the critical influence of carbohydrate quality on metabolic health, psychological well-being, and gut-brain axis modulation. Low-GI diets are consistently associated with improved blood glucose regulation, reduced insulin resistance, lower systemic inflammation, and enhanced gut barrier function. These benefits extend beyond metabolic parameters to mental health, showing a potential reduction in mood disorders such as anxiety and depression. The gut microbiota, a central player in the gut-brain axis, mediates many of these effects, influencing neurotransmitter production, immune responses, and blood-brain barrier integrity.

Conversely, high-GI diets tend to disrupt gut microbiota balance, increase systemic inflammation, and cause blood glucose fluctuations. Such disturbances are linked to the progression of obesity, type 2 diabetes, cardiovascular disease, and cognitive impairments. High-GI foods also contribute to psychological stress by inducing hypoglycemia and reducing the intake of essential nutrients necessary for nervous system function. Although some high-GI foods may acutely enhance serotonin production, the long-term consequences often involve exacerbated mood instability and depressive symptoms.

Both human and animal studies show that low-GI dietary patterns result in favorable outcomes, such as reductions in body fat, improved lipid profiles, better glycemic control, and potentially improved cognitive functions. However, methodological inconsistencies across studies—such as variations in meal composition, testing times, participant age groups, and intervention durations—underscore the complexity of drawing firm conclusions. Future research must address these gaps with standardized methodologies, longer follow-up periods, and advanced biological analysis techniques.

In clinical practice, emphasizing low-GI, nutrient-dense food choices within balanced diets presents a promising strategy for preventing and managing metabolic and mental health disorders. Public health policies and dietary guidelines should evolve to reflect the growing evidence linking diet quality, gut microbiota health, and psychological outcomes. Moving forward, further investigation is needed to solidify the role of low-GI diets in chronic disease prevention and clarify their long-term effects on cognitive health, mental well-being, and gut microbiome dynamics.

Ultimately, the intimate relationship between the foods we consume, our gut health, and our brain function reinforces the timeless notion that nutrition is a cornerstone of holistic health. Nurturing the gut-brain axis through thoughtful dietary choices holds promise not only for extending lifespan but also for enhancing the quality of life across the lifespan.

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