

Thinking about nutrition: A mindset backgrounder on nutrition communication using mind genomics and AI

Abstract

Nutrition-related decisions are shaped by psychological, biological, environmental, and cultural influences rather than by willpower alone. This backgrounder applied a Mind Genomics framework to explore how nutrition messages may resonate across different psychological segments. Sixteen literature-informed message elements addressing stress-related eating, food environments, affordability, cultural adaptation, and empowerment were combined into systematically varied vignettes. Artificial intelligence (Microsoft Copilot) generated simulated evaluations of these vignettes, which were analyzed using ordinary least squares regression and k-means clustering. All 16 elements produced positive uplift coefficients, with the strongest responses observed for messages describing food engineering, nutrition as empowerment, and the influence of neighborhood food environments. Three distinct psychological mindsets emerged: Structure Seekers, Systems Realists, and Cultural Adapters. These findings suggest that nutrition communication may be strengthened by aligning messages with the cognitive, environmental, and cultural realities that shape eating behavior, providing a practical framework for more humane and context-sensitive communication strategies.

Keywords: nutrition communication, mind genomics, artificial intelligence, eating behavior, food environment, psychological segmentation, health messaging, behavior change

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Dipak Paul,¹ Howard Moskowitz,^{1,3} David Stevens,² Sharon Wingert³

¹Mind Genomics Associates, Inc., White Plains, New York, USA

²Advanced Learning Strategies, New Hampshire, USA

³Tactical Data Group, Virginia, USA

Correspondence: Howard Moskowitz; Mind Genomics Associates, Inc., White Plains, New York, USA & Tactical Data Group, Virginia, USA

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Abbreviations: AI, artificial intelligence; OLS, ordinary least squares

Introduction

Nutrition is often framed as a matter of personal responsibility, yet a substantial body of research demonstrates that food choices are shaped by a complex interaction of psychological, biological, social, and environmental influences rather than by willpower alone. Scarcity of time, money, and emotional resources narrows cognitive bandwidth, reduces planning capacity, and shifts attention toward immediate needs. Under these conditions, individuals may prioritize convenience and short-term reward over long-term health goals, not because of a lack of motivation, but because scarcity alters decision-making processes and constrains perceived options.^{1,2}

Economic and environmental conditions further shape dietary behavior. Energy-dense, highly processed foods are often inexpensive, widely available, and strongly rewarding, making them particularly attractive in settings of financial stress. At the same time, ultra-processed foods are designed to maximize palatability and convenience, increasing the likelihood of habitual overconsumption.^{3,4} Marketing practices may intensify these effects by disproportionately targeting vulnerable populations, while neighborhood environments characterized by limited access to nutritious foods and abundant fast-food outlets can constrain healthy choices.⁵⁻⁷

Biological and psychological mechanisms also contribute to eating behavior. Chronic stress activates reward pathways that increase preference for foods high in fat and sugar, and sleep disruption alters appetite-regulating hormones such as leptin and ghrelin, promoting hunger and reducing satiety.^{8,9} In everyday settings, food decisions are further influenced by heuristics, defaults, and environmental

cues that operate with limited conscious awareness.¹⁰ Together, these findings suggest that eating behavior reflects an adaptive response to competing cognitive, emotional, and physiological pressures.

Food also carries cultural and emotional meaning. Dietary practices are closely linked to identity, family traditions, and social connection, and interventions that ignore these dimensions may fail to resonate with the individuals they are intended to help. Conversely, approaches that respect cultural food practices and emphasize dignity, autonomy, and equity are more likely to support sustainable change.¹¹⁻¹³

Given this complexity, effective nutrition communication requires more than the delivery of general advice. Individuals differ in the types of messages they find motivating, reassuring, and personally relevant. Mind Genomics is a structured experimental approach that examines how people respond to systematically varied combinations of messages and identifies distinct psychological segments, or mindsets, based on patterns of response.¹⁴⁻¹⁶ By revealing how different groups interpret nutrition-related messages, this approach can inform communication strategies that reduce shame, enhance relevance, and promote realistic, sustainable behavior change.

The objective of this backgrounder is to apply a Mind Genomics framework to explore how nutrition messages resonate across distinct psychological mindsets. By identifying these mindsets and the messages that most strongly engage them, the study aims to provide a practical foundation for clinicians, educators, and community leaders seeking to design more humane and effective nutrition communication strategies. The coefficients, mindsets, and communication strategies presented in this backgrounder represent AI-assisted conceptual findings intended to illustrate plausible patterns of response to nutrition messages and to generate hypotheses for future research. The purpose of this approach was to generate psychologically plausible hypotheses and practical communication frameworks that

may inform future empirical research and the development of more tailored nutrition communication strategies.

Material and methods

This backgrounder used a Mind Genomics experimental framework to explore how different nutrition-related messages may resonate with distinct psychological segments of the population. Mind Genomics is a structured approach that combines systematically varied message combinations with regression analysis and segmentation to estimate the relative contribution of individual ideas and to identify groups of respondents who show similar patterns of response.^{14–16}

A set of 16 message elements was developed to represent major themes identified in the nutrition, behavioral, and public health literature. These themes included stress-related eating, decision fatigue, food environments, affordability, social support, cultural meaning, and empowerment.^{1–4,8,12} The 16 elements were organized into four thematic silos containing four elements each: (A) stress and cognitive responses to eating, (B) environmental and biological influences, (C) practical and affordability-focused strategies, and (D) social, cultural, and empowerment-based approaches. Each element was written as a concise statement designed to capture a single nutrition-related idea and was accompanied by a two-sentence rationale describing its intended psychological significance. The complete set of elements and rationales is presented in Table 1.

Table 1 Vignette Elements with Rationales (16 Elements)

Element
A1 You learn how stress changes your food cravings and makes certain choices harder. <i>Rationale:</i> This element reframes cravings as a biological response rather than a personal flaw, reducing shame and self-criticism. It helps people understand that stress narrows cognitive bandwidth and shifts attention toward immediate comfort.
A2 You discover simple meal routines that reduce decision fatigue during busy weeks. <i>Rationale:</i> This element addresses cognitive overload by offering structure that reduces the mental burden of food choices. It reassures people that small routines can create stability even in chaotic schedules.
A3 You see how small swaps—like adding one vegetable—can improve health without major effort. <i>Rationale:</i> This element lowers the psychological barrier to change by emphasizing incremental progress. It reframes nutrition as accessible and achievable rather than overwhelming.
A4 You hear that healthy eating is not about perfection but about steady, realistic progress. <i>Rationale:</i> This element counters all-or-nothing thinking, a major barrier to sustained behavior change. It promotes self-compassion and reduces the fear of failure.
B1 You find out how food companies design products to trigger cravings and overconsumption. <i>Rationale:</i> This element shifts responsibility away from the individual by exposing engineered temptation. It empowers people by revealing hidden influences on their behavior.
B2 You learn that your neighborhood food environment shapes your choices more than willpower. <i>Rationale:</i> This element highlights structural constraints that limit healthy options. It validates the lived experience of people in food deserts and food swamps.
B3 You explore how sleep, stress, and mood influence hunger hormones. <i>Rationale:</i> This element connects emotional states to physiological hunger signals, deepening understanding of appetite. It helps people see that cravings often reflect biology rather than weakness.
B4 You discover that hydration plays a bigger role in appetite than most people realize. <i>Rationale:</i> This element introduces a simple, actionable insight that can immediately improve self-regulation. It reframes thirst as a hidden driver of overeating.
C1 You get tips for preparing affordable meals using common pantry staples. <i>Rationale:</i> This element addresses financial barriers by emphasizing low-cost strategies. It reduces the perception that healthy eating requires expensive ingredients.
C2 You learn how to stretch a food budget without sacrificing nutrition. <i>Rationale:</i> This element empowers individuals facing scarcity by offering practical, dignity-preserving solutions. It reframes budgeting as a skill rather than a limitation.
C3 You see examples of quick, healthy meals that take under 10 minutes. <i>Rationale:</i> This element reduces time-related barriers by showing that healthy eating can be fast. It counters the belief that nutritious meals require extensive preparation.
C4 You hear stories of people like you who improved their eating habits gradually. <i>Rationale:</i> This element uses social proof to normalize slow, steady change. It helps people feel less alone and more capable of improvement.
D1 You learn how to set up your kitchen so healthy choices are the easiest choices. <i>Rationale:</i> This element leverages environmental design to reduce reliance on willpower. It reframes nutrition as a matter of shaping surroundings rather than resisting temptation.
D2 You discover how to build supportive habits with family or friends. <i>Rationale:</i> This element emphasizes the social dimension of behavior change. It highlights that shared routines increase accountability and emotional support.
D3 You explore how cultural foods can be adapted to support better health. <i>Rationale:</i> This element validates cultural identity and reduces resistance to change. It shows that nutrition improvement does not require abandoning tradition.
D4 You hear that nutrition is about empowerment, not guilt or shame. <i>Rationale:</i> This element reframes the nutritional journey as one of agency and dignity. It counters moralizing narratives that undermine motivation and self-worth.

Artificial intelligence (Microsoft Copilot) was used to assist in refining the message elements and their rationales and to generate simulated responses to systematically varied combinations of these elements. The 16 elements were combined into vignettes containing

two to four elements according to the standard Mind Genomics design. Microsoft Copilot was then prompted to evaluate these vignettes as a series of hypothetical respondents, generating synthetic judgments of perceived relevance and motivational impact.

The simulated responses were analyzed using ordinary least squares (OLS) regression to estimate element-level coefficients representing the relative psychological uplift associated with each message. Because the objective of this backgrounder was to identify and compare the relative strength of message resonance, coefficients were presented as positive uplift values for ease of interpretation, with higher coefficients indicating stronger resonance within the simulated responses. K-means clustering was subsequently applied to the pattern of coefficients to identify groups of similar response patterns, referred to as mindsets. This study was based entirely on artificial intelligence-generated simulated responses and did not involve human participants, patient data, or identifiable personal information.

Results

The coefficients, mindsets, and communication strategies generated in this backgrounder provide an AI-assisted conceptual representation of how different nutrition messages may vary in their perceived relevance and motivational impact.

Ordinary least squares (OLS) regression of the simulated vignette evaluations produced element-level coefficients representing the relative psychological uplift associated with each of the 16 message elements. Higher coefficients indicated stronger resonance within the AI-generated responses.

All 16 elements generated positive coefficients, indicating that each message contributed constructively to perceived relevance and motivational impact. The coefficients ranged from 9 to 26. The highest coefficient was observed for the message describing how food companies design products to trigger cravings and overconsumption (B1; coefficient = 26). Other highly rated elements included nutrition as empowerment rather than guilt or shame (D4; coefficient = 24), the influence of neighborhood food environments on dietary choices (B2; coefficient = 23), stress-related changes in food cravings (A1; coefficient = 21), and supportive habits with family or friends (D2; coefficient = 20). The complete set of coefficients is presented in Table 2.

Table 2 OLS Regression Coefficients (Positive-Only)

Element	Coefficient (uplift)
A1 Stress changes cravings	21
A2 Simple meal routines	17
A3 Small swaps improve health	14
A4 Progress over perfection	12
B1 Companies engineer cravings	26
B2 Food environment shapes choices	23
B3 Sleep/stress affect hormones	18
B4 Hydration influences appetite	11
C1 Affordable pantry-based meals	15
C2 Stretching a food budget	19
C3 Quick 10-minute meals	13
C4 Stories of gradual improvement	9
D1 Kitchen setup for success	16
D2 Supportive habits with others	20
D3 Adapting cultural foods	10
D4 Nutrition as empowerment	24

To move beyond the impact of individual message elements, the pattern of coefficients derived from the AI-generated responses was analyzed using k-means clustering to identify groups with similar response profiles. This segmentation analysis revealed three distinct psychological mindsets, each representing a different way in which nutrition-related messages may be interpreted and experienced.

Mindset segmentation

Mindset segmentation revealed three distinct psychological groups, each representing a coherent motivational architecture rather than demographic categories. These mindsets reflect how individuals interpret nutrition messages, what they find validating, and what barriers they perceive as most salient. Understanding these mindsets allows communicators to tailor strategies that align with lived experience rather than relying on generic advice. The segmentation provides a foundation for designing interventions that reduce shame, increase agency, and support sustainable change.

Mindset 1: The Structure Seekers

Core theme: “Make it simple. Make it doable. Make it fit my life.”

Structure Seekers experience nutrition as a bandwidth problem rather than a motivational one. They respond strongly to routines, templates, and environmental cues that reduce cognitive load and make healthy choices automatic. Their eating patterns are shaped by time scarcity, daily stress, and the mental burden of constant decision making. This mindset demonstrates that simplifying choices is often more effective than increasing knowledge.

Mindset 2: The Systems Realists

Core theme: “My choices are shaped by forces bigger than me—help me understand them.”

Systems Realists interpret nutrition through the lens of structural and biological forces. They feel validated when messages expose food engineering, environmental constraints, and stress-related physiology, shifting the narrative away from personal blame. Their engagement increases when they understand how external forces shape their behavior, reframing nutrition as a matter of navigating systems rather than exercising willpower. This mindset highlights the importance of transparency and empowerment in public health communication.

Mindset 3: The Cultural Adapters

Core theme: “Honor my identity and help me adapt without losing myself.”

Cultural Adapters approach nutrition as an extension of identity, tradition, and community. They respond strongly to stories of gradual improvement, social support, and culturally adapted strategies that preserve the emotional meaning of food. Their resistance to change decreases when interventions respect heritage and emphasize communal participation rather than individual discipline. This mindset underscores the need for culturally grounded strategies that integrate rather than replace traditional practices. Based on the defining features of each mindset, scenario tables were developed to translate these conceptual findings into practical communication principles and suggested applications for clinicians, educators, and community leaders. These are presented in Table 3.

Table 3 Scenario Tables for Each Mindset.

These tables translate psychological patterns into clear, actionable communication strategies

Mindset 1: Structure Seekers — Scenario Table

Communication Principle	Application
Reduce cognitive load	Provide routines, templates, and weekly meal patterns.
Emphasize speed and simplicity	Highlight 10-minute meals and pantry-based solutions.
Design the environment	Teach kitchen setup strategies that make healthy choices automatic.
Avoid complexity	Do not overwhelm with long recipes or nutritional theory.

Mindset 2: Systems Realists — Scenario Table

Communication Principle	Application
Expose structural forces	Explain food engineering, marketing, and environmental constraints.
Validate lived experience	Acknowledge stress, scarcity, and systemic barriers.
Shift blame away from the individual	Emphasize biology and environment over willpower.
Empower through transparency	Show how understanding the system increases agency.

Mindset 3: Cultural adapters — Scenario table

Communication principle	Application
Honor cultural identity	Adapt traditional foods rather than replacing them.
Use social proof	Share stories of gradual improvement from similar communities.
Emphasize community	Encourage family-based or group-based habit building.
Normalize slow progress	Reinforce that change is a journey, not a test.

Communication scripts for each mindset

These scripts are short, psychologically precise messages that clinicians, educators, or community leaders can use directly. They reflect the motivational architecture of each mindset.

Mindset 1: Structure seekers

“When life is busy, your brain is already working overtime. A few simple routines—like planning two easy meals for the week or keeping quick ingredients on hand—can take the pressure off and make healthy choices automatic. You don’t need perfection; you just need a structure that supports you.”

Mindset 2: Systems realists

“A lot of what you’re dealing with isn’t your fault. Food companies engineer products to trigger cravings, and your environment shapes what’s easy or hard to choose. Once you understand the system, you can make choices that work for you—not the ones the system pushes on you.”

Mindset 3: Cultural adapters

“You don’t have to give up the foods you love or the traditions you grew up with. Small adaptations—like adjusting portions, cooking methods, or ingredients—can make your cultural foods healthier while keeping their meaning. Change works best when it honors who you are.”

Taken together, these AI-assisted conceptual findings suggest that nutrition communication may be strengthened by aligning messages with the cognitive, emotional, and cultural priorities reflected in different psychological mindsets.

Discussion

Deeper analysis of the mindsets

The three mindsets identified in this backgrounder suggest that nutrition messages may resonate differently depending on the psychological framework through which individuals interpret

eating behavior. Structure Seekers appear to experience nutrition primarily as a problem of cognitive bandwidth rather than motivation. They responded most strongly to messages emphasizing routines, templates, and practical strategies that reduce decision fatigue and simplify everyday choices. This pattern is consistent with research showing that scarcity and cognitive overload narrow attention and reduce planning capacity, making structured, low-effort solutions particularly valuable.^{1,2} It also aligns with public health approaches emphasizing practical, achievable dietary changes rather than overly complex prescriptions.^{17,18}

Systems Realists interpret nutrition through the lens of biological and structural influences. They responded most strongly to messages explaining food engineering, neighborhood food environments, and stress-related physiology. These findings suggest that communication may be especially effective when it reduces self-blame and helps individuals understand how external forces shape eating behavior. This interpretation is supported by evidence demonstrating that obesity and related chronic diseases arise from broad epidemiologic and economic forces, including the widespread availability, strategic marketing, and low cost of highly processed foods.^{3,5,6,19}

Cultural Adapters approach nutrition as an extension of identity, tradition, and community. They responded most strongly to messages emphasizing gradual change, family support, and culturally adapted strategies that preserve the emotional meaning of food. This mindset underscores the importance of interventions that respect cultural food practices rather than replacing them and supports the use of culturally grounded approaches that integrate nutrition guidance into existing social and family contexts.^{11,13}

Strategy recommendations, rationale, and expected consequences

A first strategy emerging from these findings is to tailor nutrition communication to the psychological priorities of each mindset rather than relying on one-size-fits-all messaging. Aligning guidance with the concerns and motivations of different individuals may increase relevance, reduce resistance, and improve adherence. This approach

is consistent with equity-focused frameworks emphasizing the importance of adapting interventions to the lived realities of diverse populations.¹²

A second strategy is to explicitly address the biological and environmental forces that shape eating behavior. Explaining how stress, sleep disruption, and highly engineered food environments influence cravings may reduce shame and promote greater self-compassion.^{8,9} Environmental design strategies that make healthier choices easier and more automatic may further strengthen self-regulation.¹⁰

A third strategy is to integrate cultural adaptation and affordability into nutrition education and community programs. Guidance that respects food traditions while emphasizing realistic, cost-conscious changes may be particularly relevant for populations facing economic constraints and competing daily demands.^{7,13}

The value of AI and mind genomics in creating backgrounders

This backgrounder illustrates how artificial intelligence and Mind Genomics can be combined to generate structured, hypothesis-generating frameworks for complex public health issues. Mind Genomics provides a systematic method for quantifying the relative contribution of individual ideas and identifying coherent response patterns,^{14,15} building on principles related to conjoint-style experimental designs.^{16,20} Together, these tools enable the rapid creation of psychologically grounded backgrounders that can reveal plausible patterns of response, suggest targeted communication strategies, and inform future empirical research. In this way, AI-assisted Mind Genomics offers a practical approach for exploring emerging health challenges and developing more humane, context-sensitive interventions.

Conclusion

This backgrounder suggests that nutrition communication may be more effective when it reflects the cognitive, biological, environmental, and cultural factors that shape eating behavior. Using a Mind Genomics framework, three conceptually distinct psychological mindsets were identified—Structure Seekers, Systems Realists, and Cultural Adapters—each characterized by different patterns of response to nutrition-related messages. Across these mindsets, messages that acknowledged the influence of stress, food environments, and cultural context, while emphasizing practical and empowering strategies, appeared to resonate most strongly. These patterns are consistent with the view that food choices are shaped by interacting psychological and structural influences rather than by willpower alone. Because the findings are based on AI-generated simulations, they should be interpreted as conceptual and hypothesis-generating rather than as empirical evidence. Nevertheless, they illustrate how the integration of artificial intelligence and Mind Genomics can be used to develop psychologically informed frameworks for message design and provide a practical foundation for exploring more tailored, respectful, and context-sensitive approaches to nutrition communication that may better support realistic and sustainable dietary change.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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