Med Discoveries
An open access journal of science and medicine

Article Type: Review Article
Volume 4, Issue 5
Received: Apr 11, 2025
Accepted: May 05, 2025
Published Online: May 12, 2025

Consumption of Packaged Ultra-Processed Foods Under Emotional Stimuli and Cardiometabolic Risk

Maksym Dmitryan[1]; Zuzanna Jakimowicz[1]; Yiqiao Qin[1]; Joanna Michalina Jurek[1,2]*

[1]Akademeia High School, Saint Ursula Ledóchowska Street 2, Warsaw, Poland.

[2]Research Unit on Myalgic Encephalomyelitis/Chronic Fatigue Syndrome and Long COVID, Rheumatology Research Division, Vall d'Hebron Research Institute, Autonomous University of Barcelona, Barcelona, Spain.

***Corresponding Author:** Joanna Michalina Jurek*

Email: joanna.michalina.jurek@gmail.com

Abstract

Ultra-Processed Foods (UPFs) consumption has risen dramatically, particularly among individuals prone to emotional eating. This review explores the interplay between emotional eating, UPF consumption, and microplastic exposure, and their consequences on cardiometabolic health. Emotional eating, driven by psychological distress, is associated with a preference for hyperpalatable, energy-dense foods, contributing to adverse cardiometabolic outcomes. UPFs, characterized by high levels of refined sugars, unhealthy fats, and additives, exacerbate metabolic dysregulation. Additionally, microplastic contamination from food packaging emerges as a potential health risk. We discuss the neurobiological mechanisms underlying emotional eating, the metabolic impact of UPFs, and the risks posed by microplastic ingestion. This review emphasizes the importance of public health strategies to limit UPF consumption, address emotional eating, and regulate food packaging to reduce microplastic exposure.

Introduction

Emotional eating refers to food consumption in response to psychological states rather than physiological hunger. This behavior, often triggered by stress, anxiety, or depression, leads individuals to consume foods providing immediate gratification and mood enhancement [16]. Ultra-Processed Foods (UPFs), characterized by high sugar, salt, and unhealthy fat content, are frequently chosen during emotional eating episodes due to their ability to stimulate the brain's reward system [28].

The increasing availability and affordability of UPFs have contributed to their widespread consumption. In many high-income countries, UPFs constitute up to 50% of total daily caloric intake (Lane et al. 2023). These foods are associated with poor diet quality and increased cardiometabolic risks, including obesity, type 2 diabetes, and hypertension [17].

Recent studies indicate that microplastics, a hidden component of UPFs due to food packaging, may exacerbate metabolic dysfunction through inflammatory pathways, further amplifying the health risks associated with these diets [30]. This emerging concern adds a new dimension to the already complex relationship between UPFs and cardiometabolic health.

This review aims to synthesize current evidence on the combined impact of emotional eating, UPFs, and microplastic exposure, emphasizing their implications on cardiometabolic health and highlighting potential strategies for public health interventions.

Emotional eating and the preference for ultra-processed foods

Emotional eating is influenced by complex psychological and neurobiological mechanisms. Stress and negative emotions activate the Hypothalamic-Pituitary-Adrenal (HPA) axis, leading to increased cortisol levels, which can enhance cravings for high-calorie foods [9]. Additionally, the brain's reward system, particularly the mesolimbic dopamine pathway, plays a critical role in reinforcing the consumption of hyperpalatable foods [7].

The food industry capitalizes on the emotional connection to food by promoting UPFs as mood-boosters, especially during times of stress or depression. Advertising often portrays these foods as a source of comfort, using catchy slogans like "satisfy your cravings" or "indulge in happiness." This marketing strategy exploits the immediate gratification provided by high-sugar and high-fat foods, which trigger dopamine release, reinforcing the emotional appeal of UPFs (Singh et al. 2023).

Citation: Dmitryan M, Jakimowicz Z, Qin Y, Jurek JM. Consumption of Packaged Ultra-Processed Foods Under Emotional Stimuli and Cardiometabolic Risk. Med Discoveries. 2025; 4(5): 1256.

UPFs are specifically formulated to maximize palatability, with high concentrations of sugar, fat, and salt designed to trigger dopamine release and reinforce habitual consumption. The addictive nature of these foods further perpetuates emotional eating patterns, contributing to excessive caloric intake and metabolic dysregulation (Wiss & LaFata, 2024). Hormonal alterations, including insulin resistance and leptin dysregulation, further exacerbate emotional eating behaviors, leading to weight gain and increased cardiometabolic risk [16].

The prevalence of UPF consumption varies across regions and income levels, reflecting differences in food availability, cultural practices, and economic factors. In high-income countries, UPFs account for 42-58% of total energy intake, while in lower or middle-income countries, this figure ranges from 16-30% (Lane et al. 2023). This disparity is linked to economic structures that promote inexpensive, calorie-dense, and nutritionally poor products, particularly affecting lower-income populations who often face difficult choices between affordability and nutritional value [4,10].

Studies have shown a strong correlation between emotional eating and overconsumption of energy-dense foods. In a U.S. Latino community health center study, 60% of participants reported emotional eating, with UPFs accounting for 23% of daily caloric intake [13]. Similarly, a study in the elderly Egyptian population found that 98% of respondents identified as moderate or severe emotional eaters, with stress perception and BMI significantly influencing this behavior [8].

Nutritional and metabolic risks of ultra-processed food consumption

The poor nutritional profile of UPFs significantly contributes to metabolic dysfunction. These foods are often high in refined carbohydrates, trans fats, and artificial additives, which together promote insulin resistance, chronic inflammation, and lipid dysregulation (Touvier et al. 2023). The high glycemic load of UPFs results in rapid spikes in blood glucose and insulin secretion, which over time contribute to the development of insulin resistance and obesity.

Artificial sweeteners and emulsifiers in UPFs alter gut microbial balance, leading to increased intestinal permeability and systemic inflammation (Chen et al. 2023). These disruptions in gut microbiota have been linked to metabolic syndrome, further exacerbating the risk of cardiometabolic diseases.

Excessive sodium intake in UPFs significantly contributes to hypertension, a key risk factor for cardiovascular disease. Furthermore, trans fats and food additives in these products promote endothelial dysfunction and atherosclerosis by increasing oxidative stress, reducing nitric oxide production, and enhancing pro-inflammatory cytokine release, leading to increased cardiovascular risk.

Studies have demonstrated the direct impact of emotional eating on cardiometabolic risk markers. In a study of police officers in North Carolina, emotional eating in response to anger was significantly associated with higher body weight, diastolic blood pressure, and mean arterial pressure. Emotional eating triggered by depression was positively associated with triglyceride levels [28].

Long-term consequences of emotional eating on cardiovascular health were observed in the French STANISLAS study, where regular engagement in emotional eating was associated with a 38% increased risk of diastolic dysfunction 13 years later [17].

Packaged ultra-processed foods as source of microplastics

Microplastics, defined as plastic particles smaller than 5 mm in diameter, are increasingly recognized as a significant contaminant in Ultra-Processed Foods (UPFs). These particles originate from food packaging materials, plastic containers, and processing equipment [18]. The ingestion of microplastics through UPFs has raised significant concerns, particularly regarding their potential implications for metabolic and cardiovascular health [12]. Microplastics enter the body through several pathways, including direct leaching from plastic packaging into food, contamination during food processing, and environmental contamination of food ingredients. Once ingested, microplastics can induce oxidative stress and inflammatory responses, leading to endothelial dysfunction and metabolic disturbances [30]. Many microplastics contain Endocrine-Disrupting Chemicals (EDCs) such as Bisphenol A (BPA) and phthalates, which interfere with glucose metabolism and lipid regulation. These EDCs disrupt insulin signaling pathways, promote adipogenesis, and alter thyroid hormone function, increasing the risk of diabetes and obesity (Marfella et al. 2024). At the vascular level, microplastics contribute to arterial plaque formation by inducing endothelial cell dysfunction, promoting foam cell formation, enhancing platelet aggregation, and stimulating pro-inflammatory cytokine release. These mechanisms collectively increase the risk of atherosclerosis and subsequent cardiovascular events [5].

Cardiometabolic consequences of UPF and microplastic exposure

The combined effects of poor diet quality and microplastic exposure create a significant burden on cardiometabolic health. A study conducted in Brazil examined the consumption of UPFs in a general population, revealing that packaged snacks, crackers, and margarine were among the most frequently consumed. Consumption of these items was found to be negatively correlated with the Cardiovascular Health Diet Index (CHDI), a measure of cardiovascular health, highlighting the potential dangers of a diet heavily reliant on UPFs (de Oliveira Neta et al. 2023).

The negative impact of UPFs on health is particularly concerning in the context of cardiometabolic conditions. UPFs are associated with a range of adverse health outcomes, including obesity, diabetes, hypertension, and cardiovascular disease. The nutrient-poor nature of these foods, which are typically energy-dense but low in essential nutrients, exacerbates the risk of developing these conditions (Touvier et al. 2023). When UPFs are combined with exposure to microplastics both may contribute to chronic low-grade inflammation, a key driver of metabolic syndrome and cardiovascular disease (Touvier et al. 2023). Furthermore, UPFs exacerbate insulin resistance, while microplastics interfere with endocrine signaling pathways, further promoting metabolic dysfunction [12]. Both UPFs and microplastics negatively impact gut microbiota diversity, increasing intestinal permeability and promoting systemic inflammation, which further compounds metabolic risk factors (Chen et al. 2023).

Public health implications for prevention and future directions

Addressing the complex interplay between emotional eating, Ultra-Processed Food (UPF) consumption, and microplastic exposure requires a multifaceted approach. Regulatory policies should include stricter regulations on food packaging to reduce

microplastic contamination, such as bans on BPA in food containers, as well as enforcing front-of-package labeling to clearly indicate UPF status and potential health risks. Additionally, implementing taxes on UPFs can help discourage consumption and subsidize healthier food options. Behavioral interventions should focus on developing targeted programs to address emotional eating, incorporating evidence-based strategies such as cognitive behavioral therapy and mindfulness-based interventions. Promoting food literacy and cooking skills can reduce reliance on UPFs, and school-based programs should be implemented to educate children about healthy eating habits and emotional regulation [1]. Environmental strategies should support initiatives to reduce plastic use in food packaging and promote sustainable alternatives, while encouraging research into biodegradable packaging materials that do not leach harmful chemicals. However, there are several challenges to implementing these strategies, including resistance from the food industry to reformulate products or change packaging practices, consumer behavior barriers such as convenience preferences and addiction to hyperpalatable foods, and economic constraints that make UPFs more accessible than healthier alternatives for many populations.

Further research is needed to establish epidemiological links between microplastic exposure and metabolic diseases. Additionally, investigations into the impact of dietary interventions in mitigating emotional eating behaviors and the development of sustainable food packaging alternatives to reduce microplastic contamination are crucial for improving public health outcomes.

Conclusion

The intricate relationship between emotional eating, ultra-processed food consumption, and microplastic exposure presents a significant challenge to public health, particularly in the context of cardiometabolic diseases. This review highlights the urgent need for comprehensive strategies to address these interconnected issues. A multidisciplinary approach involving policy reform, consumer education, and targeted interventions is essential to mitigate the growing burden of cardiometabolic diseases linked to UPFs and microplastic exposure. Future research should focus on developing innovative solutions to reduce UPF consumption, minimize microplastic contamination in food, and promote healthier eating behaviors in the face of emotional triggers.

References

1. Abu Dabrh AM, Haga CB, Conrad J, Perlman AI, Allyse MA, Albertie ML, et al. Nutrition and Emotional Health Education: The Use of Emotional Intelligence and a Plant-Based Diet to Reduce Cardiometabolic Risk. Global Advances in Integrative Medicine and Health. 2023; 12: 27536130231215014.
2. Akhbarizadeh R, Dobaradaran S, Schmidt TC, Nabipour I, Spitz J. Microplastics in different environmental compartments: A review of sources, occurrence, and potential effects on ecosystems and human health. Science of The Total Environment. 2023; 858: 159745.
3. Chowdhury K, Ahmad R, Sinha S, Haque M. Pre-packaged Food: A Universal Appraisal Regarding Cardiometabolic Syndrome Health Implication. Advances in Human Biology. 2024; 14: 92-7.
4. Diaz-Basantes MF, Conesa JA, Fullana A. Microplastics in honey, beer, milk and refreshments in Ecuador as emerging contaminants. Science of The Total Environment. 2020; 712: 136992.
5. Francesco Prattichizzo, Antonio Ceriello, Valeria Pellegrini, Rosalba La Grotta, Laura Graciotti, Fabiola Olivieri, et al. Micro-nanoplastics and cardiovascular diseases: evidence and perspectives. European Heart Journal. 2024; 45: 4099–4110.
6. Garcia-Garin O, Vighi M, Aguilar A, Tsangaris C, Digka N, Kaberi H, et al. Microplastics in marine mammals: Records of a global threat. Environmental Pollution. 2022; 303: 119112.
7. González-Velázquez VE, Pedraza-Rodríguez EM, Carrazana-Escalona R, Moreno-Padilla M, Muñoz-Bustos GA, Sánchez-Hechavarría ME. Cardiac vagal imbalance to the isometric sustained weight test in adolescents with emotional eating behavior. Physiology & Behavior. 2020; 223: 112994.
8. Hawash MM, AlHazmi AH, El-Sayed MM, Mushfiq S, El-Ashry AM, Ahmed HA, et al. Emotional eating behaviors in later life: Identifying key factors for healthy aging. Geriatric Nursing. 2024; 55: 152-60.
9. Juarascio AS, Crochiere RJ, Tapera TM, Palermo M, Zhang F. Momentary changes in heart rate variability can detect risk for emotional eating episodes. Appetite. 2020; 152: 104698.
10. Kemp E, Bui M, Grier S. When food advertising triggers snacking: The role of marketing and emotional eating. Journal of Consumer Affairs. 2021; 55: 425-445.
11. Konttinen H, van Strien T, Männistö S, Jousilahti P, Haukkala A. Depression, emotional eating and long-term weight changes: a population-based prospective study. International Journal of Behavioral Nutrition and Physical Activity. 2019; 16: 28.
12. Lee DH. Microplastics and Cardiovascular Diseases: Importance of Coexisting Environmental Pollutants. Circulation. 2024; 150: 908-910.
13. Lopez-Cepero A, Frisard CF, Lemon SC, Rosal MC. Association between emotional eating, energy-dense foods and overeating in Latinos. Eating Behaviors. 2019; 33: 40-3.
14. Madalosso MM, Martins NN, Medeiros BM, Rocha LL, Mendes LL, Schaan BD, et al. Consumption of ultra-processed foods and cardiometabolic risk factors in Brazilian adolescents: results from ERICA. European Journal of Clinical Nutrition. 2023; 77: 1084-92.
15. Maier E, Wilken R. Broad shoulders and six-packs: The effect of model body types in advertisements on food consumption. Psychology & Marketing. 2021; 38: 1022-1038.
16. Mensorio MS, Cebolla A, Lisón JF, Rodilla E, Palomar G, Miragall M, et al. Emotional eating as a mediator between anxiety and cholesterol in population with overweight and hypertension. Psychology, Health & Medicine. 2017; 22: 911-8.
17. Puchkova-Sistac A, de Lauzon-Guillain B, Girerd N, Boivin JM, Bozec E, Mercklé L, et al. Association between eating behaviour and 13-year cardiovascular damages in the initially healthy STANISLAS cohort. European Journal of Preventive Cardiology. 2023; 30: 349-57.
18. Ragusa A, Svelato A, Santacroce C, Catalano P, Notarstefano V, Carnevali O, et al. Plasticenta: First evidence of microplastics in human placenta. Environment International. 2021; 146: 106274.
19. Ricket IM, Brown JR, MacKenzie TA, Ma Y, Grewal D, Ailawadi KL, et al. Quantifying differences in packaged food and drink purchases among households with diet-related cardiometabolic multi-morbidity: a cross-sectional analysis. BMC Public Health. 2022; 22: 2101.
20. Sejuti Ray Chowdhury, Arup Dey, Sandip Mondal, Manish Kumar Gautam. Environmental microplastics and nanoplastics: Effects on cardiovascular system.

21. Stackelberg O, Björck M, Sadr-Azodi O, Larsson SC, Orsini N, Wolk A. Obesity and abdominal aortic aneurysm. Br J Surg. 2013; 100: 360-6.

22. van Strien T, Konttinen H, Homberg JR, Engels RC, Winkens LH. Emotional eating as a mediator between depression and weight gain. Appetite. 2020; 150: 104634.

23. Vilela S, Magalhães V, Severo M, Oliveira A, Torres D, Lopes C. Effect of the food processing degree on cardiometabolic health outcomes: A prospective approach in childhood. Clinical Nutrition. 2022; 41: 2235-43.

24. Wang X, Sun Q. Ultra-Processed Foods and the Impact on Cardiometabolic Health: The Role of Diet Quality. Diabetes & Metabolism Journal. 2024; 48: 1047-55.

25. Wang Y, Beydoun MA, Min J, Xue H, Kaminsky LA, Cheskin LJ. Has the prevalence of overweight, obesity and central obesity leveled off in the United States? Trends, patterns, disparities, and future projections for the obesity epidemic. International Journal of Epidemiology. 2020; 49: 810-823.

26. World Health Organization (WHO). Cardiovascular diseases (CVDs). 2021. Available at: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

27. Wright SL, Kelly FJ. Plastic and human health: A micro issue? Environmental Science & Technology. 2017; 51: 6634-6647.

28. Wu YK, Pacchioni TG, Gehi AK, Fitzgerald KE, Tailor DV. Emotional eating and cardiovascular risk factors in the police force: the Carolina blue project. International Journal of Environmental Research and Public Health. 2024; 21: 332.

29. Xu B, Liu F, Brookes PC, Xu J. Microplastics induce cardiovascular toxicity in mice. Journal of Hazardous Materials. 2023; 441: 129925.

30. Zhu X, Wang C, Duan X, Liang B, Genbo Xu E, Huang Z. Micro- and nanoplastics: A new cardiovascular risk factor? Environmental International. 2023; 173: 107763.