

Neuroscience

Obesity and Cognition What Do We Need to Do?

Hayashida Oyabu*

Nagoya University, Kawasumi, Mizuho-cho, Mizuho-ku Nagoya 467-8601, Japan

*: All correspondence should be sent to: Dr. Hayashida Oyabu.

Author's Contact: Hayashida Oyabu, Ph.D., E-mail: hayashida.oyabu@gmail.com

DOI: <https://doi.org/10.15354/si.23.co127>

Funding: No funding source declared.

COI: The author declares no competing interest.

The influence of obesity on cognition is a growing concern in the disciplines of public health and neuroscience. As the global prevalence of obesity continues to rise, it is increasingly evident that excess adiposity is not only a risk factor for various physical health conditions but also exerts a substantial influence on cognitive function. There are associations between obesity and cognitive deficits, particularly in memory, executive function, and attention, according to research. Given the profound societal and individual repercussions of cognitive impairment, it is imperative to develop comprehensive strategies to address this complex relationship. These strategies should include early prevention efforts, interprofessional healthcare models, and policies promoting healthy lifestyles. By addressing the impact of obesity on cognition with these multifaceted strategies, we can preserve cognitive health and mitigate the cognitive decline associated with this global health issue. To refine these strategies and advance our comprehension of the obesity-cognition nexus, additional research and interdisciplinary collaboration will be essential.

Keywords: Obesity; Cognition; Prevention; Interventions; Outcomes

Science Insights, 2023 September 30; Vol. 43, No. 3, pp.1035-1037.

© 2023 Insights Publisher. All rights reserved.



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the [Creative Commons Attribution-NonCommercial 4.0 License](https://creativecommons.org/licenses/by-nc/4.0/) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed by the Insights Publisher.

THE prevalence of obesity has escalated on a global scale in recent decades, exerting a substantial influence on both public health and healthcare systems across the globe (1). In addition to its extensively proven correlation with a range of physical health issues, including cardiovascular disease, diabetes, and specific types of cancer, recent studies have provided insights into the complex connection between obesity and cognitive performance (2, 3). The emerging discipline of re-

search has prompted significant inquiries regarding the potential impact of obesity on cognitive well-being and the necessary measures to alleviate its detrimental consequences (4).

The bidirectional nature of the interaction between obesity and cognition is a significant concern. Obesity is acknowledged as a significant risk factor contributing to cognitive decline and the onset of neurodegenerative disorders, including Alzheimer's disease. The presence of surplus adipose tissue, particularly

visceral fat, is believed to result in the secretion of pro-inflammatory cytokines and hormones, which may have detrimental effects on brain function (5). Furthermore, there is a correlation between obesity-related ailments such as insulin resistance and metabolic syndrome, and the negative impact they have on brain metabolism and cognitive functioning (6). Hence, it is crucial to comprehend the neurological mechanisms that underlie these relationships in order to develop interventions that are effective.

On the other hand, cognitive function can exert an influence on behaviors related to weight management, thereby establishing a reciprocal relationship. Individuals, who experience deficits in executive processes, including challenges in impulse control and decision-making, may encounter difficulties in maintaining adherence to dietary programs and exercise routines, which can increase their susceptibility to weight gain and the development of obesity (7). Moreover, there exists a connection between the brain's reward circuits linked to food consumption and those associated with cognitive processes, giving rise to thought-provoking inquiries on the potential intersection of mechanisms governing food addiction and cognitive impairment (8). Therefore, it is crucial to consider these reciprocal interactions when formulating comprehensive methods to mitigate the cognitive repercussions of obesity.

Given the complex interplay between obesity and cognition, it is crucial to establish a comprehensive strategy to address their collective influence. Primarily, the implementation of early preventative and intervention techniques is of utmost importance. Promoting good living behaviors from infancy and adolescence can effectively reduce the likelihood of developing obesity and its associated cognitive consequences in adulthood (9). The therapies should include not only alterations to the diet and in-

creased engagement in physical exercise, but also cognitive training aimed at improving executive functions (10).

Furthermore, it is pivotal for healthcare systems to acknowledge the significance of implementing integrated care strategies for persons afflicted with obesity (11). This encompasses the management of both physical health as well as the evaluation of cognitive function and mental well-being. To ensure comprehensive care for persons with obesity and cognitive deficits, it is critical to adopt an interdisciplinary framework that incorporates the expertise of nutritionists, exercise physiologists, psychologists, and neurologists. In addition, it is essential for public health policies to prioritize the establishment of conducive surroundings that facilitate the adoption of healthy dietary habits and engagement in physical activities (12). This entails placing particular emphasis on mitigating the prevalence of food deserts and enhancing the availability of reasonably priced, nourishing food choices.

In conclusion, the correlation between obesity and cognition is intricate and reciprocal, encompassing a range of intricate neurobiological and behavioral pathways. To effectively tackle this matter, a comprehensive strategy is necessary, encompassing early preventative and intervention measures, integrated healthcare models, and supportive public policies. By acknowledging the intricate relationship between obesity and cognition and implementing proactive strategies to address both, it is possible to potentially alleviate the impact of cognitive decline and neurodegenerative disorders linked to obesity, while concurrently enhancing the general welfare of individuals affected by these conditions. Additional research is imperative in order to elucidate further intricacies in this correlation and enhance the tactics required to safeguard cognitive well-being throughout the worldwide obesity crisis. ■

References

1. Hruby A, Hu FB. The epidemiology of obesity: A big picture. *Pharmacoeconomics* 2015; 33(7):673-689. DOI: <https://doi.org/10.1007/s40273-014-0243-x>
2. Cook RL, O'Dwyer NJ, Donges CE, Parker HM, Cheng HL, Steinbeck KS, Cox EP, Franklin JL, Garg ML, Rooney KB, O'Connor HT. Relationship between obesity and cognitive function in young women: The food, mood and mind study. *J Obes* 2017; 2017:5923862. DOI: <https://doi.org/10.1155/2017/5923862>
3. Dye L, Boyle NB, Champ C, Lawton C. The relationship between obesity and cognitive health and decline. *Proc Nutr Soc* 2017; 76(4):443-454. DOI: <https://doi.org/10.1017/S0029665117002014>
4. Wang C, Chan JS, Ren L, Yan JH. Obesity reduces cognitive and motor functions across the lifespan. *Neural Plast* 2016; 2016:2473081. DOI: <https://doi.org/10.1155/2016/2473081>
5. Longo M, Zatterale F, Naderi J, Parrillo L, Formisano P, Raciti GA, Beguinot F, Miele C. Adipose tissue dysfunction as determinant of obesity-associated metabolic complications. *Int J Mol Sci* 2019; 20(9):2358. DOI: <https://doi.org/10.3390/ijms20092358>
6. Uranga RM, Keller JN. The complex interactions between obesity, metabolism and the brain. *Front Neurosci* 2019; 13:513. DOI: <https://doi.org/10.3389/fnins.2019.00513>
7. Butryn ML, Martinelli MK, Remmert JE, Roberts SR, Zhang F, Forman EM, Manasse SM. Executive functioning as a predictor of weight loss and physical activity outcomes. *Ann Behav Med* 2019; 53(10):909-917. DOI: <https://doi.org/10.1093/abm/kaz001>
8. Frank GK. Altered brain reward circuits in eating disorders: Chicken or egg? *Curr Psychiatry Rep* 2013; 15(10):396. DOI: <https://doi.org/10.1007/s11920-013-0396-x>

9. Smith JD, Fu E, Kobayashi MA. Prevention and management of childhood obesity and its psychological and health comorbidities. *Annu Rev Clin Psychol* 2020; 16:351-378. DOI: <https://doi.org/10.1146/annurev-clinpsy-100219-060201>
10. Galindo Muñoz JS, Morillas-Ruiz JM, Gómez Gallego M, Díaz Soler I, Barberá Ortega MDC, Martínez CM, Hernández Morante JJ. Cognitive training therapy improves the effect of hypocaloric treatment on subjects with overweight/obesity: A randomised clinical trial. *Nutrients* 2019; 11(4):925. DOI: <https://doi.org/10.3390/nu11040925>
11. Fastenau J, Kolotkin RL, Fujioka K, Alba M, Canovatchel W, Traina S. A call to action to inform patient-centred approaches to obesity management: Development of a disease-illness model. *Clin Obes* 2019; 9(3):e12309. DOI: <https://doi.org/10.1111/cob.12309>
12. Gorski MT, Roberto CA. Public health policies to encourage healthy eating habits: Recent perspectives. *J Healthc Leadersh* 2015; 7:81-90. DOI: <https://doi.org/10.2147/JHL.S69188>

Received: July 20, 2023 | Revised: August 09, 2023 | Accepted: August 16, 2023
