

# *The Influence of “Liking” and “Wanting” on Eating Disorders*

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**Abstract:** The appropriate methods of losing weight are a popular topic since losing weight is an important task for more and more people. Meanwhile, as the number of people losing weight increases, so do eating disorders because of incorrect and extreme weight loss methods. From an eating perspective, understanding food rewards is essential to knowing how to lose weight healthily. Food rewards include wanting and liking. The paper uses the literature review research method to summarize and discuss two opposite opinions about wanting and liking different or combined systems and the relationship between food rewards and eating control methods. The paper finds that wanting and liking are different systems. Understanding and identifying the difference between them reveals the appropriate eating control methods. People will realize they are hungry or they are greedy. People need to eat food when they feel hungry, but there is no need to eat food when they are greedy.

**Keywords:** wanting, liking, appetite, palatability, eating disorders, weight

## 1. Introduction

Nowadays, losing weight has become an essential task for people, especially women. It is not difficult to see that many people share their successful or unsuccessful experiences of losing weight on social media. Even though it becomes a tendency for people to purge after eating a lot of food. Incorrect methods of losing weight cause eating disorders. Usually, the two main ways of losing weight are from an exercise perspective and an eating perspective. Inappropriate methods from an eating perspective can cause eating disorders, so understanding the eating process is important for people who want to lose weight. In other words, it is an understanding of "food reward".

Food rewards include two systems: wanting and liking, which can also be called appetite and palatability. In the research area of food reward, there are two opposite opinions. One opinion is that wanting and liking are different systems. In contrast, another opinion is that wanting and liking can be combined together. Several journals offer the results of the influence of the difference or combination of wanting and liking on the sweet taste, appetite control, weight regulation, and eating disorders from the neural perspective. The main purpose of this paper is to discuss the opposite opinions about wanting and liking and to indicate the appropriate methods from an eating perspective to help people lose weight.

The paper, through the method of literature review, firstly summarizes the published journals with an opinion that wanting and liking are different systems and secondly, presents a viewpoint that

wanting and liking can be combined together. The paper will choose and discuss an opinion from two of the journals with the opposite opinions. Afterward, the paper will discuss the reasons that cause eating disorders to offer appropriate methods of losing weight and help people avoid having eating disorders in the weight loss process.

Some opinions agree that "liking" and "wanting" are different, and they have different systems and can be affected by different kinds of substances from the neural perspective. On the contrary, other opinions agree that "liking" and "wanting" are the same and can be combined from the neural perspective. The paper discusses whether "liking" and "wanting" are different or similar based on the mentioned opinions. The paper points out how to control eating desires to control weight and the appropriate treatments for people with mental disorders. Therefore, the paper's most significant meaning is to combine the opposite opinions and determine which perspective is best to be used in reality. Meanwhile, the paper offers methods for people who need to understand the relationship between appetite and eating desire and control their weight. The appropriate eating disorders treatment in the paper is worth discussing and might be used in the future.

## **2. Definition of “Liking” and “Wanting”**

Wanting and liking are two components of food reward. In other words, wanting means appetite, and liking means palatability, so the difference between them is motivation and affect [1]. For example, people will show different affective reactions when they eat different kinds of food with different tastes. Bitter tastes or other extreme tastes can cause people to grimace, turn around, open their mouths, or vomit as if to push the unpleasant taste away [1]. "Wanting" is the attraction that humans will receive and feel in their environment; "liking" is the pleasure-giving value that humans will receive and feel from food [2]. Compared to wanting, liking is a relatively enduring trait; for example, humans will have a lower level of liking when they are in a fed state rather than a fasted state. Wanting is like a goal, and the motivational drive of wanting is not constant; for example, humans will have a higher level of wanting when they are macronutrient imbalanced or have disordered eating patterns [2]. The examples of wanting are craving, desire, and motivation; the examples of liking are enjoyment and pleasure; for instance, food addiction is related to wanting [3].

## **3. Food Reward and Eating Disorders**

"Wanting" and "liking" are separated, and "wanting" might exceed "liking", which causes overeating by excessive "wanting" [4-8]. Some binge eating disorders and even extreme overeating disorders indicate excessive "wanting," not "liking". Some people are neurally sensitized to dopamine-related mesocorticolimbic systems, which are associated with "wanting" [9].

A scale that constitutes a psychometric trait that can be assessed for binge eating disorder is called the Binge Eating Scale (BES) [8,10]. As Morales and Berridge concluded in their journal, people with higher BES scores displayed greater "wanting" for high-fat sweet foods and then greater intake of the foods. Furthermore, another conclusion was extended by the results; people with higher scores indicated a higher liking for all foods and a higher wanting for high-fat sweet foods [10]. Compared to obese high scores and high lean scores, the reason that obese high scores had greater energy was because of the greater intake of high-fat sweet foods. In contrast, lean high scores were associated with preferred food selections rather than the over-consumption of high-fat sweet foods [10].

## **4. The Relationship among Liking and Food Rewards and Eating Control Methods**

Morphine and other opioid agonists stimulate feeding by enchanting the liking component of the food reward. Susana Pecifia injected morphine into the nucleus accumbens or paraventricular nucleus of the hypothalamus to enhance the hedonic taste response pattern to sucrose. Based on the conclusion,

another similar opinion was suggested; opioid antagonists can probably suppress food pleasantness [1].

Benzodiazepine agonists can induce feeding by stimulating GABAA neurotransmission, and it is also from the liking component of the food reward to stimulate feeding, just as with morphine and other opioid agonist circuits. Based on Susana Pecifia's research of morphine injection, in detail, opioid agonist drugs enhance the liking components of food reward, but it is not clear how opioid agonist drugs activate the liking components: from the sites or spread elsewhere. Another kind of agonist that can enhance food reward is benzodiazepine agonists. The fashion of benzodiazepine agonists is receptor-specific, and they can stimulate hedonic affective reactions to sweet and other tastes. Even though the benzodiazepine-related circuits are similar to opioid agonist circuits, they still have differences. The neural substrate studies indicate that benzodiazepine agonists activate circuits mainly in the brainstem, not in the forebrain [1]. As Susana Pecifia mentioned in the research, the nucleus accumbens is a heterogeneous structure that includes multiple anatomical subregions, and the subregions respond to particular manipulations, so they differently mediate liking and wanting. Opioid activation that enhances linking only happens in the 1 mm<sup>3</sup> rostradorsal sub-region of the medial shell [3].

The ventral pallidum is related to aphagia and aversion because of the loss of the normal "liking" reactions [1, 3]. Based on the studies, the results indicated that the ventral pallidum is significant in both aversions and rewards. Injecting opioids into the posterior ventral pallidum by DAMGO microinjection enhanced sucrose liking, and this revealed a ventral pallidum hedonic hotspot; in contrast, injecting the same opioid into the anterior ventral pallidum surpassed sucrose liking, and this revealed a ventral pallidum hedonic coldspot [3]. Besides opioid injections, orexin microinjections and optogenetic stimulation can also enhance liking by the hedonic hotspot of the posterior ventral pallidum [3, 11]. The hedonic hotspots are not only in the ventral pallidum but also in the insula and orbitofrontal cortex.

## 5. The Relationship among Wanting and Food Rewards and Eating Control Methods

From an anatomical perspective, the mesocorticolimbic brain system that activates "wanting" is larger than the hedonic hotspot and includes the whole structures of NAc, the central nucleus of the amygdala, and parts of the neostriatum, etc.; the network can generate motivation and appetite without increasing liking. Some studies' results showed that even though the manipulations in both the core and shell can increase rodents' free-feeding, the manipulations in the shell have stronger effects than the manipulations in the core [3]. On the contrary, in rat research, both core and shell can change the rats' instrumental reactions to the palatable rewards [11-12]. Overall, the NAc shell is related to incentive motivation, and the core is related to reward-predictive cues [3].

The dorsal striatum is part of the neostriatum, and it is related to incentive motivation. Based on human imaging studies, food-related cravings are related to dorsal striatum activation [10, 13]. DAMGO microinjection in the dorsomedial neostriatum indicated the enhancement of "wanting" to eat sweet food but did not indicate enhancement of liking reactions to sweetness, so it is the specific incentive motivation [3].

The amygdala is also significantly associated with "wanting," and the part of the amygdala that generates the central nucleus of the amygdala plays a particularly important role in generating intense incentives [3]. When people eat palatable food, Fos expression in the central amygdala increases; then, opioids, glutamate, GABA, and several peptides within the CeA are altered to reinforce unconditioned food intake [3]. Meanwhile, CeA can also enhance the particularly learned cues of food reward [3]. For example, based on the results of Mike Robinson and Shelley Warlow's research, the rats pursued the laser-paired sucrose target by CeA optogenetic stimulation with a sucrose target, not pursuing other alternative sucrose. Thus, the overeating behavior can be explained by CeA. CeA

can magnify the "wanting" cues for the particular incentive target and encourage the desire for the food, such as high-calorie palatable food [3].

In rats with amygdala lesions, studies indicated that the rats ignored the concentrated salt solution even after sodium depletion and looked like they did not "want" the concentrated salt solution. In contrast, in the studies about hedonic liking of the concentrated solution, the rats with amygdala lesions revealed a hedonic shift in affective patterns [1].

## 6. The Similarities between “Liking” and “Wanting”

The study that focused on BED (binge eating disorder) participants indicated that BED tends to be enhanced by food rewards both from "liking" and "wanting" components. The authors pointed out that binge eating is mainly influenced by the biological overreaction to the food's hedonic characteristics and appetitive behaviors' motivation [12].

Another study focused on binge-eating females and tested the lean and obese traits in the binge-eating females. The study included two conditions: one was in a laboratory situation, and the other one was free-living eating behavior in a natural setting [14-15]. The results revealed that preference for sweet foods is probably a risk factor for overeating, and desire may underpin overeating [14]. Therefore, binge eating is associated with both "liking" and "wanting."

## 7. The Differences between “Liking” and “Wanting”

"Liking" is the hedonic influence of pleasant rewards; "wanting" can be measured by humans' subjective craving ratings [3]. The dual-process model evaluates the relationship between appetite ("liking") and ingestive behavior ("wanting"). One study offered three levels of food (low, medium, and high palatability), and the participants needed to repeat to eat the food within five days [16]. The results were that the desire to eat the low palatability declined on the first day, but the decline disappeared later, and the rating of all three levels of food was equivalent. In contrast, the pleasantness rating of each level of palatability was stable over time [16]. Therefore, the desire to eat and pleasantness are different components.

Another study compared lean and obese subjects to food products, both related to hunger and satiated feelings [16]. The ratings of appetite included special and non-special foods. The results indicated that lean and obese subjects did not rate the pleasantness of food differently after they consumed the meal; however, they rated differently in some appetites, such as "appetite for something savory," after they ate snacks [16]. Thus, the authors deduced that the difference between lean and obese subjects is about wanting, not liking.

It will be easier to explain the difference between liking and wanting from a neuroscientific perspective. The difference between liking and wanting is related to different regions of the brain, different substances to activate or suppress food rewards, and also different neural systems.

## 8. Discussion

Some studies indicate that "liking" and "wanting" are different components of food rewards. On the contrary, some studies indicate that "liking" and "wanting" can be combined. Based on the explanation and the review of the journals, "liking" and "wanting" are different systems.

The regions of the brain associated with "liking" and "wanting" are different. For example, the mesocorticolimbic system that can activate "wanting" is larger than the hedonic hotspot that can activate "liking." Even though facing the same situation, "liking" and "wanting" reveal different reflections, such as in the studies of rats with amygdala lesions. The rats did not "want" the concentrated salt solution but reacted to "liking" components.

In simple words, "liking" is related to the palatability of food. "Wanting" is related to the appetite for food. People who are obese or have eating disorders because of the "wanting" component activations. Excessive "wanting" will lead people to eat more even though they are already full, then become obese, and the extreme result is eating disorders. The way to avoid overeating is to distinguish the difference between "liking" and "wanting." If the "wanting" components are already satisfied, it means no more food is needed. Look back to the study that was based on the Binge Eating Scale (BES) [17-19]. The difference between obese high scores and lean high scores was that the obese high scores over-consume high-fat sweet foods. On the contrary, the determination of lean high scores was based on their preference selections.

When people feel hungry, they need to distinguish and realize whether they are truly hungry and need food or just want food but are not truly hungry. The first situation means they need to eat food, but the second situation means overeating if they still choose to eat food.

Understanding and distinguishing between the "liking" and "wanting" components of food reward, then determining if the intake of food is truly needed, is the neural way to help people avoid overheating, and it is also the fundamental way to prevent or help people recover from eating disorders.

## 9. Conclusion

In conclusion, wanting and liking are different systems. Understanding and identifying the difference between them reveals the appropriate eating control methods. People will realize they are hungry or they are greedy. People need to eat food when they feel hungry, but there is no need to eat food when they are greedy.

As for the limitations, on the one hand, even though the paper explains the relationships between "liking" and "wanting" in two ways: differences and similarities, and discusses their relationship in eating disorder studies, the paper is not comprehensive enough. Literature review is limited because the method helps to study and understand the topic based on the journals and research that already exist, not on one's own research results. Therefore, in the future, it is significantly important to conduct research based on the question and topic to get an answer in reality and discuss the topic.

On the other hand, distinguishing the differences between "liking" and "wanting" is one of the perspectives to understanding eating disorders and finding the appropriate treatments for them. Eating disorders are complex mental illnesses, and the reasons for them can be varied, and the differences between "liking" and "wanting" are part of them. The best treatment of people with eating disorders should be based on their situation in reality.

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## References

- [1] Berridge, K. C. (1996). *Food reward: Brain substrates of wanting and liking*. *Neuroscience & Biobehavioral Reviews*, 20(1), 1–25. [https://doi.org/10.1016/0149-7634\(95\)00033-b](https://doi.org/10.1016/0149-7634(95)00033-b)
- [2] Dalton, M., & Finlayson, G. (2014). *Psychobiological examination of liking and wanting for fat and sweet taste in trait binge eating females*. *Physiology & Behavior*, 136, 128–134. <https://doi.org/10.1016/j.physbeh.2014.03.019>
- [3] Morales, I., & Berridge, K. C. (2020). *'liking' and 'wanting' in eating and food reward: Brain Mechanisms and clinical implications*. *Physiology & Behavior*, 227, 113152. <https://doi.org/10.1016/j.physbeh.2020.113152>
- [4] H.R. Berthoud, N.R. Lenard, A.C. Shin, *Food reward, hyperphagia, and obesity*, *Am. J. Physiol. - Regul. Integr. Comp. Physiol.* 300 (2011) 1266–1277, <https://doi.org/10.1152/ajpregu.00028.2011>.

- [5] C.R. Ferrario, *Food Addiction and Obesity*, *Neuropsychopharmacology* 42 (2017) 361–362, <https://doi.org/10.1038/npp.2016.221>.
- [6] A.N. Gearhardt, R.G. Boswell, M.A. White, *The association of “food addiction” with disordered eating and body mass index*, *Eat. Behav.* 15 (2014) 427–433, <https://doi.org/10.1016/j.eatbeh.2014.05.001>.
- [7] M.J.F. Robinson, A.M. Fischer, A. Ahuja, E.N. Lesser, H. Maniates, *Roles of “wanting” and “liking” in motivating behavior: gambling, food addition, and drug additions*, in: E.H. Simpson, P.D. Balsam (Eds.), *Behav. Neurosci. Motiv. Eds., Berlin Springer*, 2016, pp. 105–136.
- [8] Gormally J, Black S, Daston S, Rardin D. *The assessment of binge eating severity among obese persons*. *Addict Behav* 1982;7(1):47–55.
- [9] Dalton, M., & Finlayson, G. (2014). *Psychobiological examination of liking and wanting for fat and sweet taste in trait binge eating females*. *Physiology & Behavior*, 136, 128–134. <https://doi.org/10.1016/j.physbeh.2014.03.019>
- [10] D.M. Small, M. Jones-Gotman, A. Dagher, *Feeding-induced dopamine release in dorsal striatum correlates with meal pleasantness ratings in healthy human volunteers*, *Neuroimage* 19(2003) 1709–1715, [https://doi.org/10.1016/S1053-8119\(03\)00253-2](https://doi.org/10.1016/S1053-8119(03)00253-2).
- [11] D.C. Castro, K.C. Berridge, *Opioid and orexin hedonic hotspots in rat orbitofrontal cortex and insula*, *Proc. Natl. A*
- [12] W.E. Pratt, A.E. Kelley, *Nucleus accumbens acetylcholine regulates appetitive learning and motivation for food via activation of muscarinic receptors*, *Behav. Neurosci.* 118 (2004) 730–739, <https://doi.org/10.1037/0735-7044.118.4.730>.
- [13] N.D. Volkow, G.J. Wang, J.S. Fowler, J. Logan, M. Jayne, D. Franceschi, C. Wong, S.J. Gatley, A.N. Gifford, Y.S. Ding, N. Pappas, *Nonhedonic” food motivation in humans involves dopamine in the dorsal striatum and methylphenidate amplifies this effect*, *Synapse* 44(2002) 175–180, <https://doi.org/10.1002/syn.10075>.
- [14] Davis, C. A., Levitan, R. D., Reid, C., Carter, J. C., Kaplan, A. S., Patte, K. A., King, N., Curtis, C., & Kennedy, J. L. (2009). *Dopamine for “wanting” and opioids for “liking”: A comparison of obese adults with and without binge eating*. *Obesity*, 17(6), 1220–1225. <https://doi.org/10.1038/oby.2009.52>
- [15] Dalton M, Blundell J, Finlayson GS. *Examination of food reward and energy intake under laboratory and free-living conditions in a trait binge eating subtype of obesity*. *Front Psychol* 2013;4:757.
- [16] Finlayson, G., King, N., & Blundell, J. E. (2007). *Liking vs. Wanting Food: Importance for human appetite control and weight regulation*. *Neuroscience & Biobehavioral Reviews*, 31(7), 987–1002. <https://doi.org/10.1016/j.neubiorev.2007.03.004>
- [17] S.H. Ahmed, N.M. Avena, K.C. Berridge, A.N. Gearhardt, K. Guillem, *Food Addiction*, D.W. Pfaff, N.D. Volkow (Eds.), Eds, Springer, New York, NY, 2016, pp. 3771–3796.
- [18] A.E. Kelley, S.L. Smith-Roe, M.R. Holahan, *Response-reinforcement learning is dependent on N-methyl-D-aspartate receptor activation in the nucleus accumbens core*, *Proc. Natl. Acad. Sci. U. S. A.* 94 (1997) 12174–12179, <https://doi.org/10.1073/pnas.94.22.12174>.
- [19] S. Peciña, K.C. Berridge, *Dopamine or opioid stimulation of nucleus accumbens similarly amplify cue-triggered “wanting” for reward: Entire core and medial shell mapped as substrates for PIT enhancement*, *Eur. J. Neurosci.* 37 (2013) 1529–1540, <https://doi.org/10.1111/ejn.12174>.