

# Hedonic Overeating-Questionnaire

## German and English Version

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## ***Introduction***

The Hedonic Overeating-Questionnaire (HEDO-Q) was developed as a brief trait assessment of hedonic overeating (Hilbert et al., 2022). Based on a biopsychological framework of food reward (Finlayson, 2017), the HEDO-Q was designed to assess the motivational component of wanting (i.e., incentive salience), defined as food craving or a strong desire or urge for food, and the hedonic component of liking (Berridge, 1996), defined as qualitative-evaluative experience of pleasure (Mela, 2006). As state-dependent processes, both components were found to be enrooted in two distinguishable, yet partly overlapping neural pathways (Berridge & Robinson, 2016; Berridge & Kringelbach, 2015). With wanting and liking being normative hedonic processes of regular eating, it has been suggested that hedonic overeating results from an adaptation to the obesogenic food environment (Finlayson, 2017; Lacroix, Tavares, & von Ranson, 2018) in terms of an incentive sensitization, enlarging wanting separately from liking (Morales & Berridge, 2020). Behaviorally, only specific components of wanting or liking have been measured as traits (e.g., Cepeda-Benito, Gleaves, Williams, & Erath, 2000; Epel et al., 2014; Lowe et al., 2009; Meule, Hermann, & Kübler, 2014; Vainik et al., 2019); instead, states have primarily been assessed directly by explicit self-report (e.g., Arumäe, Kreegipuu, & Vainik, 2019). In this context, the HEDO-Q provides a joint operationalization of trait food-related wanting and liking.

Neuroscientific research further suggests that the obesogenic environment promotes a hedonic rather than homeostatic control of food intake in vulnerable persons, which—combined with impaired inhibitory control (Yang, Shields, Guo, & Liu, 2018; Saruco & Pleger, 2021)—may increase the risk of hedonic overeating and weight gain (Stice & Yokum, 2016). In fact, it is believed that the reward system interacts with the predominantly prefrontal cognitive control system (Michaud et al., 2017), providing top-down regulation of attention, decision-making, and motivation related to food (Kalon et al., 2016). In this context, the HEDO-Q operationalizes not only trait wanting and trait liking, but also dyscontrol or a breakdown of cognitive control over eating as a trait for the assessment of hedonic overeating.

### ***Development of the HEDO-Q***

Three phases of the HEDO-Q development were carried out in accordance with scale development guidelines (Boateng et al., 2018; Simmes, 2008). As described in Hilbert et al. (2022), in phase I (item development), an item pool was constructed to assess the three theoretically derived domains: wanting (food craving; anticipatory reward component), liking (pleasure to eat; consummatory reward component), and dyscontrol (loss of control over eating). Patients with obesity and binge-eating disorder ( $n=15$ ) at the Obesity Outpatient Unit of Leipzig University Medical Center provided descriptions of hedonic overeating which were used as sources for item construction. Additionally, self-report questionnaires targeting similar content were examined as sources of inspiration. In a next step, content validity was evaluated for the resulting pool of 52 items, to make sure that an item assessed the given domain, was applicable across the range of eating or weight disturbances, and was likely to differentiate between them. The items did not refer to specific foods or food properties, and addiction labels were left out, thereby avoiding overlap with a food addiction framework (Gearhardt, Corbin, & Brownell, 2009; Gearhardt & Schulte, 2021). In order to purely target trait aspects, items addressing state aspects such as antecedents (e.g., emotional eating, restrained eating) or consequences of eating (e.g., fear of weight gain) were excluded, resulting in a condensed item pool of 18 items.

In phase II (scale development), each of these 18 items was evaluated for validity and understanding on a 5-point Likert scale by research psychologists ( $n = 5$ ) who specialized in eating and weight disorders at Leipzig University Medical Center. Nine items total—three each addressing wanting, liking, and dyscontrol (0=never to 4=always)—were chosen for the preliminary questionnaire, one of which had a reversed score. The three reversed-scored questions were eliminated in phase III (scale evaluation, see below) due to psychometric deficiencies.

The HEDO-Q was psychometrically evaluated in a large random sample from the German population ( $N=2531$ ), including 1350 women (53.3%) and 1181 men (46.7%) with a mean age of 48.4 years ( $SD=17.9$ ) and a mean body mass index (BMI,  $\text{kg}/\text{m}^2$ ) of 25.8  $\text{kg}/\text{m}^2$  ( $SD=5.0$ ). A confirmatory factor analysis supported the unidimensional nature of the 6-item HEDO-Q with the three postulated components of wanting, liking, and dyscontrol. Psychometric properties were favorable with good corrected item-total

correlations, and acceptable item difficulty and homogeneity. The internal consistency of the total score was high (Cronbach's  $\alpha=0.82$ , 95% CI 0.81-0.84; McDonald's  $\omega$  total=0.83, 95% CI 0.81-0.84). For the components of wanting, liking, and dyscontrol, the Spearman-Brown coefficients for two-item consistency estimation indicated internal consistency ( $r_{sb}=0.70-0.75$ ). Sex-, age-, and weight status-specific population norms were provided. The HEDO-Q revealed strict measurement invariance for sex, and partial invariance for age and weight status. Discriminant validity was demonstrated in distinguishing participants with versus without eating disturbances or obesity. Associations with established measures of eating disorder and general psychopathology (e.g., Eating Disorder Examination-Questionnaire8 [Kliem et al., 2016]; Patient Health Questionnaire-4 [Löwe et al., 2010]) supported the convergent and divergent validity of the HEDO-Q.

A component analysis on the same dataset addressed potential interactions between wanting, liking, and dyscontrol in the explanation of BMI (Meule et al., in preparation). While liking showed a small-sized positive associations with BMI, wanting and dyscontrol showed small-to-medium-sized positive associations with BMI. These associations were modified by significant two- and three-way interactions: For example, participants with high wanting and high liking had the highest BMI, whereas those with low wanting and high liking had the lowest BMI. In addition, higher dyscontrol was associated with higher BMI, especially at high wanting, and this interaction between wanting and dyscontrol was most pronounced at low liking. These results which are partially consistent with the incentive-sensitization theory of addiction in its application to obesity (Berridge, 1996; Berridge & Robinson, 2016) and support the distinction of the three components of the HEDO-Q in the explanation of BMI.

Overall, these initial evaluations indicate good psychometric properties of the HEDO-Q in the general population. Future validation work is warranted on the HEDO-Q's stability, sensitivity to change, and predictive and construct validity. The brevity of the 6-item HEDO-Q, developed and evaluated in German—and translated into English based on a backtranslation procedure with a licensed translator—allows for ease of use in a variety of research and clinical settings. Validation work on the English version of the HEDO-Q is indicated.

### ***Instructions***

The six items of the HEDO-Q were provided with a 5-point scale (0=*never* to 4=*always*) containing two items each targeting wanting, liking, and dyscontrol. A total mean score averaging the six items can be computed, with higher scores indicating greater hedonic overeating.

In case of acceptable sample-specific psychometric properties, especially internal consistencies of the two items within a component, a meaningful use of the mean scores of wanting, liking, and dyscontrol could be justified.

- Wanting: Items 1 and 4
- Liking: Items 3 and 5
- Dyscontrol: Items 2 and 6

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# HEDO-Q

Name:

Datum:

Bitte kreuzen Sie für jede der folgenden Aussagen an, wie häufig sie **im letzten Monat** auf Sie zugetroffen hat.

|   | Niemals <sub>0</sub>     | Selten <sub>1</sub>      | Manchmal <sub>2</sub>    | Oft <sub>3</sub>         | Immer <sub>4</sub>       |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Ich habe ein starkes Verlangen nach Essen.                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Wenn ich zu essen angefangen habe, kann ich nicht mehr aufhören. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Etwas zu essen, ist wie der Himmel auf Erden.                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Ich habe ständig Appetit.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Ich genieße Essen viel mehr als die meisten anderen Menschen.    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Mein Essverhalten ist völlig außer Kontrolle.                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

# HEDO-Q

Name:

Date:

Bitte kreuzen Sie für jede der folgenden Aussagen an, wie häufig sie **im letzten Monat** auf Sie zugetroffen hat.

|   | Never <sub>0</sub>       | Rarely <sub>1</sub>      | Sometimes <sub>2</sub>   | Oftentimes <sub>3</sub>  | Always <sub>4</sub>      |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. I have a strong craving for food.                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Once I start eating, I cannot stop anymore.      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. To eat something is like heaven on earth.        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. I always have appetite.                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. I enjoy eating much more than most other people. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. My eating behavior is completely out of control. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |