Focus on food

Impact addendum

Main findings

The aim of the current dissertation was to assess the effects of mindset, hunger, and dietary restraint brain responses to food and on attention bias (AB) for food, to better understand mechanisms behind dietary restraint. We observed that the level of brain activity in response to food stimuli does not depend on palatability or calorie content. So, the level of brain activity does not distinguish between highly palatable stimuli, which are rewarding, and highly unpalatable stimuli, which are not rewarding. Therefore, it is unlikely that the level of brain activity reflects the rewarding value of food. Instead, the level of brain activity is strongly influenced by the attentional focus of a person, with highest activity when people focus on hedonic aspects of food. So, attentional focus is crucial in determining how the brain responds to food. It is likely that food is most salient in the hedonic mindset. Therefore, the findings suggest that the level of brain activity reflects salience rather than reward value. Palatability and calorie content are reflected in multi-voxel patterns of brain activity, suggesting that the brain stores information about food characteristics in a distributed fashion. Also, brain responses to food were not related to dietary restraint. So, food does not appear to be more salient for restrained eaters. In addition, we observed no evidence for an increased AB for food in restrained eaters. Neither mindset nor hunger influenced AB for food in the current thesis. These findings suggest that AB for food might not be a crucial factor determining behavior in restrained eaters.

Relevance

In todays' society, millions of people suffer from obesity and associated health problems (WHO, 2020). Dietary restraint has been associated with weight gain and obesity (Ramírez-Contreras, Farrán-Codina, Izquierdo-Pulido, & Zerón-Rugerio, 2021; Snoek, van Strien, Janssens, & Engels, 2008). Therefore, a better understanding of the mechanisms underlying dietary restraint could help in preventing the onset of obesity and the treatment of obesity. The current thesis contributes to further understanding mechanisms underlying dietary restraint.

A dominant view in the literature proposes that levels of brain activity in response to food are increased in people with obesity and restrained eaters, which are interpreted as reflecting increased rewarding value of food in these groups. However, also the results on this proposal are inconsistent (Roefs, Franssen, & Jansen, 2018). The current thesis shows that attentional focus crucially influences the level of brain activity, but that the level of brain activity is not influenced by palatability, calorie content, or dietary restraint. The current results thus provide new insights into the field and suggest that previous approaches, which propose that increased brain activity levels in response to food are a characteristic of people with obesity and restrained eaters, have been too simplistic. Instead, the current findings show that brain responses to food are not a stable characteristic of a person but that the way one looks at food determines how the brain reacts to it. So, the current state of a person needs to be considered when assessing brain responses to food. The current thesis shows that attentional focus is relevant for daily food decisions. Possibly, prevention strategies or even intervention methods for obesity could target the attentional focus, to make people look at food from a health perspective, to influence food decision making in a healthy direction.

Previous research has proposed that an AB for food could be a mechanism underlying altered food approach behavior in restrained eaters. However, evidence for this idea is mixed (Roefs, Houben, & Werthmann, 2015; Werthmann, Jansen, & Roefs, 2015), with studies observing increased AB for food in restrained eaters (Brooks, Prince, Stahl, Campbell, & Treasure, 2011; Dobson & Dozois, 2004; Forestell, Lau, Gyurovski, Dickter, & Haque, 2012; Hepworth, Mogg, Brignell, & Bradley, 2010; Meule, Vogele, & Kubler, 2012; Neimeijer, de Jong, & Roefs, 2013) decreased AB for food in restrained eaters (Hotham, Sharma, & Hamilton-West, 2012), or no difference in AB for food between restrained and unrestrained eaters (Ahern, Field, Yokum, Bohon, & Stice, 2010; Boon, Vogelzang, & Jansen, 2000; Johansson, Ghaderi, & Andersson, 2005; Werthmann et al., 2013; Wilson & Wallis, 2013). The current thesis attempted to clarify the role of AB for food in dietary restraint by assessing it in combination with state factors that were expected to have moderating effects on AB for food. The results of this thesis show that people scoring high on dietary restraint are not characterized by increased AB for food. Considering the highly

inconsistent literature, with many studies observing no increased AB for food in restrained eaters, this suggests that increased AB for food is not a crucial mechanism underlying dietary restraint. Future research might better focus on other potential mechanisms to gain a better understanding of dietary restraint. Furthermore, interventions using AB modification training, in which attention is directed away from food, might not be useful for changing food approach behavior in restrained eaters, as increased attention for food is most likely not crucial in restrained eating.

Target groups

The current thesis examined predominantly healthy-weight college-aged females, which were categorized according to their level of dietary restraint. Therefore, this thesis is of interest to researchers who study eating behavior or who are interested in factors that lead to obesity. In addition, this thesis is of interest to dieticians and clinicians who want to deepen their understanding of processes underlying obesity. In the broadest sense, this thesis is of interest to anyone who wants to gain a deeper insight in factors motivating food-related cognition is generated by the current studies. Furthermore, this thesis is of interest to neuroscientists using fMRI because our findings demonstrate the importance of a well-controlled mental task for the interpretability of fMRI results. In addition, our results show that information about value cannot be derived from the level of brain activity but only from patterns of brain activity.

Activities

The current dissertation contributes to a better understanding of restrained eating and puts the theory on reward-related brain responses to food in a new perspective. The studies of this dissertation have been presented at conferences and will be published in scientific journals. The insights provided by the current dissertation could be useful in aiding the development of new prevention and invention methods for obesity. The current results suggest that it might be beneficial to target the attentional focus of person in future behavioral interventions. This may be implemented with ecological momentary assessment, so that the mindset of people can be targeted in daily life.