Change Is the only constant

DOI:
10.26481/dis.20211122yl

Summary

The current dissertation investigated the dynamic nature of attentional bias (AB) for food in the background of the global obesity epidemic. Theories (Berridge, 2009; Nijs & Franken, 2012) proposed that palatable foods automatically grab attention, and this AB for palatable foods was proposed to be a trait-like characteristic of both restrained eaters and people with overweight/obesity (e.g., Hendrikse et al., 2015; Meule, Vögele, & Kübler, 2012). However, empirical evidence in this field does not consistently support this hypothesis (e.g., Hagan, Alasmar, Exum, Chinn, & Forbush, 2020; Roefs, Houben, & Werthmann, 2015; Werthmann, Jansen, & Roefs, 2015). Palatable foods are both a source of reward and of weight/health concerns, which, therefore, could cause people to alternate between food approach and food avoidance when confronted with palatable foods. Conflicting motivations might therefore lead to fluctuations in attention towards and away from the food over time. This dissertation aimed to quantify and understand the fluctuations in AB for food across different groups. In addition, whether food stimuli capture attention more than neutral nonfood stimuli was also studied.

Chapter 1 discussed the inconsistent findings about the stable trait-like view of AB for food and the reliabilities about the dynamic view of AB for food. This Chapter firstly discussed and proposed that people's AB for food is not a stable process and it might be affected by conflicting food-related motivations (eating enjoyment vs weight/health concerns), the ability of executive control, and attentional capacity. After that, methods to capture the extent of fluctuations in attention to critical stimuli were discussed. Finally, the research goals of the current dissertation were elaborated. More specifically, the first two goals of this dissertation were to investigate the mean and intra-individual fluctuations in AB for food, which was quantified by TL-BS variability, across different groups. The third goal was to reveal the underlying mechanism behind TL-BS variability for food. The final goal was to test whether attentional capacity affected attentional capture by task-irrelevant food stimuli.

Chapter 2 investigated the relations between TL-BS variability for food and BMI/dietary restraint. The TL-BS computing method was adopted to reanalyze AB data on the food dot-probe task from three published earlier studies (Werthmann et al., 2015; Werthmann et al., 2011, 2013). The target groups in these studies were overweight/obese adults, obese children, and restrained eaters, which were all compared to their respective

control group. In addition, this Chapter also tested whether TL-BS variability could still significantly explain variance in BMI or dietary restraint after controlling for the variability in general responding (reaction times (RTs)) and in mean AB score. Moreover, we also linked the RT-based AB for food, TL-BS variability, to the eye-movements (EMs)-based AB for food, dwell time variability. The results showed that both TL-BS variability for food and the variability in general responding could significantly predict variance in BMI, but could not significantly predict variance in dietary restraint. When controlling for the variability in general responding and in mean AB score, TL-BS variability for food still predicted BMI in obese children and the aggregated dataset of the three studies. However, TL-BS variability for food was not significantly correlated with dwell time variability. Therefore, it was concluded that individuals with a higher BMI are characterized by more variability in AB for food and in general responding, which might be caused by weak executive control ability.

Chapter 3 tested whether TL-BS variability for food was a reflection of conflicting food-related goals (hedonic vs health). More specifically, because high-calorie foods are both a source of reward and of weight/health concerns, people might fluctuate between approach and avoidance of palatable foods, which in turn might lead to fluctuations in AB for food. This conflict between food enjoyment and weight/health concerns might be larger in people who are high in dietary restraint (Stroebe, van Koningsbruggen, Papies, & Aarts, 2013). However, if people focus exclusively on either a hedonic or a healthy facet of food, they might show less variability in AB to food as compared to a neutral focus. To examine this hypothesis, this study primed female participants with a hedonic, health, and neutral context successively, and examined whether the primed context influenced AB for food. In addition, it was tested if such effects were moderated by dietary restraint. Both the mean AB for food and TL-BS variability for food were measured in a food dot-probe task with an eye-tracker. However, contrary to our hypotheses, neither context nor the interaction between context and dietary restraint significantly affected measures of AB for food. Instead, in line with prior studies, BMI was correlated with TL-BS variability for food. In conclusion, this study does not find any support that either mean AB for food or TL-BS variability for food depends on a primed context. However, again, this study reveals a significant relationship between TL-BS variability for food instead of mean AB for food and BMI.

Chapter 4 studied the relation between TL-BS variability for food and adjusted BMI% among Dutch and Chinese children. In addition, it examined whether attentional control moderated the relationship between two of them. Moreover, whether the correlation between adjusted BMI% and TL-BS variability was specific for food stimuli or existed for other attractive nonfood stimuli as well was also investigated. The results showed that adjusted BMI% was only positively associated with TL-BS variability for food, and not for attractive nonfood stimuli, in Dutch children. However, this significant association did not hold in Chinese children, and attentional control did not significantly moderate the relation between TL-BS variability for food and adjusted BMI% in both Dutch and Chinese children. Unexpectedly, Chinese children had stronger attentional control ability as compared to Dutch children, and the attentional control ability was negatively related to the adjusted BMI% in Chinese children. The results provide some evidence that both TL-BS variability for food and attentional control are related to adjusted BMI%.

Chapter 5 also aimed to reveal the underlying mechanism behind TL-BS variability for food. it was hypothesized that weak executive control could cause both increased attention variability and weight gain, which might, at least partly, lead to the significant association between TL-BS variability for food and BMI. Results showed that inhibitory control, measured by a stop-signal task, indeed was significantly related to BMI. However, contrary to the result of our prior research, TL-BS variability for food was not significantly related to BMI, and executive control was not significantly related to TL-BS variability for food. In conclusion, this study does not provide any evidence that executive control can explain the positive correlation between TL-BS variability for food and BMI. However, the result indicates a relationship between poor executive control and overweight/obesity.

Chapter 6 tested whether food stimuli were special in the sense that they can still grab attention under a high perceptual load. According to the perceptual load theory (Lavie, Hirst, De Fockert, & Viding, 2004), high perceptual demand of the current task can reduce interference from task-irrelevant distractors, however, salient cues can still capture attention even under high demand. From an evolutionary perceptive, palatable foods are assumed as salient stimuli, so we speculated that palatable food distractors, but not neutral nonfood stimuli, could still attract attention even under a high perceptual load. Under a low load, we expected that both food and neutral stimuli equally distracted participants. To test our hypotheses, an online perceptual-load-plus-distractor task was conducted. However, we did not find that palatable foods could capture more attention than neutral nonfood distractors in both the low and high perceptual load conditions. Instead, in both perceptual load conditions, food and nonfood neutral distractors induced more interference than a no-distractor condition. The results imply that both food and non-food neutral distractors equally interfere with the current task irrespective of the load condition.

Chapter 7 summarized and discussed the main findings from this dissertation. In addition, methodological considerations and suggestions for future research were presented. Finally, a conclusion based on the main findings from this dissertation was drawn. In brief, there was no evidence to support that an increased AB for food is a trait-like feature in people with a higher BMI or scoring higher on dietary restraint, whereas TL-BS variability for food was positively correlated to BMI but not to dietary restraint. As for the mechanism behind the TL-BS variability for food, we found that neither conflicting food-related motivations nor executive control (attentional control, response inhibition, and sustained attention) could explain the significant relationship between TL-BS variability for food and BMI. In addition, palatable foods did not capture attention more than neutral nonfood distractors in general. Future research could continue to investigate the underlying mechanism behind the relation between TL-BS variability for food and BMI. In addition, future research should be aimed at unraveling if and how our food environment attracts our attention and influences our eating behavior.