

Thesis Summary

Obesity/ overweight is one of the most demanding and challenging global public health issues of the 21st century (Amro, Euro, & Wpro, 2017; Kelly, Yang, Chen, Reynolds, & He, 2008; Ogden, Yanovski, Carroll, & Flegal, 2007). Obesity is a risk factor for a long list of both immediate and long-term physical, social as well as psychological health consequences, such as type II diabetes, cardiovascular diseases, many types of cancer, sleep apnea, stigmatization, poor self-esteem, and Alzheimer's disease (Craft, 2005; Koch, Matthias, & Pollatos, 2014; Secretan et al., 2016). Moreover, obesity is associated with psychopathologies such as depression and anxiety (Simon, Korff, Saunders, & Diana, 2007).

There is ensuing debate regarding whether obesity can be regarded as a disease/psychopathology (Geisler, 2017; Volkow, Wang, Tomasi, & Baler, 2013). In that vein, it should be noted that studies show considerable overlap between obesity and addiction with respect to the brain mechanism that drives the problematic behaviour (Robinson, Fischer, Ahuja, Lesser, & Maniates, 2016b; Volkow, Wang, Fowler, Tomasi, & Baler, 2011; Volkow et al., 2013).

Obesity relates to executive function (EF), which refers to self-regulatory cognitive processes that contain three components such as inhibitory control, updating and monitoring working memory and mental set shifting (Miyake et al., 2000). Indeed, particularly visuospatial attention and inhibitory control, have been suggested to drive a significant part of the behavioral component in relation to abnormal weight gain (Nederkoorn, Coelho, Guerrieri, Houben, & Jansen, 2012; Smith & Robbins, 2013; Zhang, Chen, Chen, Gu, & Xu, 2017). On the other hand, previous research suggests that overexposure to palatable food disrupts the brain mechanism important for reward/inhibitory processing, and may partly drive the observed deficits of inhibitory control and anomalous visuospatial attention, most notably in a reward context (Batterink, Yokum, & Stice, 2010; Robinson, Fischer, Ahuja, Lesser, & Maniates, 2016a; Stice, Yokum, Bohon, Marti, & Smolen, 2010). However, previous studies have painted a contradictory picture with respect to the exact role of these processes in obesity. Importantly, a recent study that investigated inhibitory control in relation to BMI has suggested that higher BMI is associated with deficient inhibitory control, specifically in contexts of palatable food relative to a neutral context (Houben, Nederkoorn, & Jansen, 2014). This result seems in line with studies that have specifically investigated striatal processing in individuals with obesity during presentation of food cues and

food ingestion (Stice, Spoor, Bohon, Veldhuizen, & Small, 2008). But it remains the questions whether the inhibitory deficit really represents a specific deficit in a palatable food context or perhaps a general deficit of executive control in any context of reward. And whether the aforementioned inhibitory deficit could be explained (at least in part) by attentional mechanisms. In addition, less is known about the role of moderating factors stress, rumination, mindfulness, and eating behaviors regarding the relation between BMI and the aforementioned executive factors (i.e. visuospatial attention and inhibitory control) has not yet been investigated. Lastly, as mentioned, there is sizeable overlap between the brain mechanism implicated in obesity and pharmacological addiction. Now, one remaining question was whether the obesity associated behavioural response patterns, especially in contexts of reward, would be mirrored in pharmacological addiction such as nicotine addiction. These main questions were addressed in the current dissertation.

Following the general introduction, in this dissertation includes three empirical studies and one book review chapter. In chapter two, we reviewed the main psychological factors that play a role in the onset and persistence of obesity. In this chapter more discuss the role of emotional and cognitive factors, mood and emotional regulation, stigma and discrimination and personality traits in relation to obesity. Different studies show that individuals with obesity have a stronger attentional bias for and motivational drive (wanting) towards foods rich in fat and sugar food coupled with deficient impulse control in contexts of anticipated palatable food. Currently, obesity is not classified as a mental disorder mainly because of the heterogeneity and uncertainty with respect to its etiology. This may be surprising as this is the case with several other included disorders, and the debate continues. At least part of the issue of current suboptimal treatment approaches is a lack of understanding of the key mechanism implicated in obesity. Hence, increased insight into the main psychological mechanisms could assist in future treatment directions.

Our first empirical study on chapter three, investigated the role of attentional bias/disengagement across conditions that differ in terms of anticipated reward. The results showed that bias was reduced in the food condition relative to the neutral condition, however this effect was not affected by BMI. Similarly, bias was significantly reduced in the money condition as compared to the neutral condition, but this effect was not affected by BMI. Disengagement was significantly enhanced in the food condition as opposed to the neutral condition, but BMI was not

affected. Disengagement increased in the money condition compared to the neutral condition and BMI increased this effect. As regards to moderator factors both self-reported mindfulness and stress did not affect any of the BMI x conditions.

Our second empirical study on chapter four, investigated the role of inhibitory control across three conditions. The results of this study showed that BMI, maladaptive eating and stress were associated with reduced inhibitory control in the food context relative to the neutral context, but not in a money context relative to the neutral context. To conclude our results of this study, the effects of BMI, maladaptive eating behavior, and stress on inhibitory control were specific to the food context and did not generalize to a non-intrinsic reward condition, operationalized with money pictures.

In chapter five, on the third empirical study, we investigated the role of inhibitory control in relation to nicotine addiction in contexts that differ in terms of reward. The results showed that smokers relative to nonsmokers showed less inhibitory control in the specific reward condition relative to the neutral condition. Similarly, smokers relative to nonsmokers also showed reduced inhibitory control in the general reward (i.e., money) condition relative to the neutral condition. Importantly, response time analyses showed that smokers relative to nonsmokers responded slower in the neutral context relative to reward contexts. We concluded based on our main results smokers as compared to nonsmokers have reduced inhibitory performance in a smoking context which extends to a general reward context. The reduced inhibitory performance may be due to the speeded responses in these conditions, indicating increased reward related response bias.

Chapter six include the discussion of this dissertation started with a brief introduction of main aim of the dissertation and a summary of the main findings of our four published studies. Then discusses briefly our main topics BMI and visuospatial attention in conditions that differ in anticipated reward, BMI and inhibitory control across three reward conditions, different moderator factors that affect the relation of BMI and executive function (visuospatial attention and inhibitory control), and inhibitory control and smoking across different rewarding condition. Finally, the discussion included brief summary of the limitation of our three empirical studies and suggestion for future studies then end with a brief conclusion