



Overweight in adolescent, psychiatric inpatients: A problem of general or food-specific impulsivity?



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ABSTRACT

Adolescent psychiatric patients are vulnerable to weight problems and show an overrepresentation of overweight compared to the healthy population. One potential factor that can contribute to the etiology of overweight is higher impulsivity. As of yet, it is unclear whether it is a general impulse control deficit or weight-related aspects such as lower impulse control in response to food that have an impact on body weight. As this may have therapeutic implications, the current study investigated differences between overweight and non-overweight adolescent psychiatric inpatients ($N = 98$; aged 12–20) in relation to trait impulsivity and behavioral inhibition performance. The *Barratt Impulsiveness Scale* and two *go/no-go paradigms* with neutral and food-related stimulus materials were applied. Results indicated no significant differences concerning trait impulsivity, but revealed that overweight inpatients had significantly more difficulties in inhibition performance (i.e. they reacted more impulsively) in response to both food and neutral stimuli compared to non-overweight inpatients. Furthermore, no specific inhibition deficit for high-caloric vs. low-caloric food cues emerged in overweight inpatients, whereas non-overweight participants showed significantly lower inhibition skills in response to high-caloric than low-caloric food stimuli. The results highlight a rather general, non-food-specific reduced inhibition performance in an overweight adolescent psychiatric population. Further research is necessary to enhance the understanding of the role of impulsivity in terms of body weight status in this high-risk group of adolescent inpatients.

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1. Introduction

Overweight and obesity are one of the most common public health problems and challenges globally, reaching epidemic dimensions not only in adults, but also in children and adolescents (e.g. Wang & Lobstein, 2006; Ng et al., 2014; World Health Organization, 2015). In developed countries, 23.8% of boys and 22.6% of girls under the age of 20 were reported to be overweight or obese in 2013 (Ng et al., 2014). According to the *German Health Interview and Examination Survey for Children and Adolescents* (KiGGS), 14.8% of 2–17-year-olds in the German general population

are overweight, with 6.1% affected by obesity (Kurt & Schaffrath Rosario, 2010). Psychiatric populations have been identified as a particularly vulnerable group for the risk of overweight/obesity. Various studies have demonstrated clearly higher prevalence rates of overweight and obesity in psychiatric populations of children, adolescents and adults compared to age-matched healthy controls (e.g. Codin, 2001; Dickerson et al., 2006; Filik et al., 2006; Gracious et al., 2010; Vieweg et al., 2005). Combined overweight/obesity prevalence rates of up to 55.4% have been found in adolescent outpatients aged 12–18 (Gracious et al., 2010), and of up to 43% in inpatients aged 4–19 (Vieweg et al., 2005). In turn, obese/overweight adolescents often show more externalizing or internalizing psychiatric comorbidities (e.g. impulse control difficulties, ADHD, depression or anxiety) compared to normal-weight peers (for review, see Puder & Munsch, 2010; Halfon, Larson, & Slusser, 2013). This highlights the need to address possible mechanisms that contribute to a high body weight and to also consider weight

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problems in clinical contexts.

Research has demonstrated that excessive bodyweight is caused by multifactorial associations, resulting primarily from an interaction between high-caloric intake (e.g. Kral et al., 2009), lack of physical activity (e.g. Kimm et al., 2005; Weinsier, Hunter, Heini, Goran, & Sell, 1998) and genetic factors (e.g. Speliotes et al., 2010). As fundamental and important aspects for lifestyle habits such as high-caloric intake or low physical activity, differences on personality dimensions are considered to be additional etiological factors for weight problems. In recent years, studies on weight gain have increasingly focused on impulse control skills, or trait impulsivity. Previous research indicated in this regard that even at the ages of 3 and 5 years, children with self-regulation difficulties showed a higher weight status and a faster weight gain up to the age of 12 years than their peers with strong self-regulation skills (Francis & Susman, 2009).

Impulsivity is a comprehensive and multifaceted construct, which includes different definitions and operationalizations depending on the scientific theory and tradition. In general, three different perspectives can be distinguished: 1. trait impulsivity, which is based on theories from personality psychology and assessed with self-report questionnaires (e.g. *Barratt Impulsiveness Scale*, BIS-11, Patton, Stanford, & Barratt, 1995), 2. response inhibition (or disinhibition), which is operationalized by behavioral inhibition tasks (e.g. go/no-go tasks), and 3. sensitivity to reward, which is measured using behavioral decision tasks (e.g. delay discounting) or self-report questionnaires. Research has shown that all three types of impulsivity can be associated with high body weight (e.g. Guerrieri, Nederkoorn, & Jansen, 2008). With regard to impulsivity as a personality trait, it is possible, for example, that lower skills in the planning of food shopping and meals (e.g. non-planning impulsivity measured with the BIS-11) contribute to unhealthy food or to high-caloric snack food consumption, respectively, which may have an adverse effect on body weight. In terms of lower response inhibition, it is likely that a confrontation with attractive (mostly high-caloric) food provokes the prepotent reaction to consume it. Due to life in the current obesogenic environment of the Western world, it seems plausible that individuals with lower inhibition skills towards food might develop higher body weight (e.g. Blundell & Gillett, 2001; Guerrieri et al., 2008). It has been shown that in individuals with a high level of reward sensitivity, current appetite, or rather food craving, is more important than, for instance, future goals like reducing body weight. In addition, a high level of this facet could be associated with wrong decisions in terms of food. In this context, people favor and decide for sweet or fatty high-caloric food, since such attractive snacks have a higher reward value than healthy and “more boring” low-caloric food (e.g. Davis et al., 2007; Guerrieri et al., 2008).

However, in the field of impulsivity and body weight studies have reported mostly weak positive correlations between questionnaire-based trait impulsivity and impulsive reactions (state) using behavioral measures (e.g. Cyders & Coskunpinar, 2011; Daugherty, Mathias, Marsh, & Jagar, 2005; Guerrieri et al., 2008; Logan, Schachar, & Tannock, 1997; Reynolds, Ortengren, Richards, & De Witt, 2006). Research on the association between impulsivity and body weight has yielded inconsistent findings due to the different assessment methods applied: Some studies reported positive relationships between trait impulsivity and body weight, or decreased behavioral inhibition performance in 2–21-year-olds with excessive body weight compared to normal-weight peers (for an overview see Thamocharan, Lange, Zale, Huffhines, & Fields, 2013). However, others reported no significant differences between different body weight groups concerning behavioral inhibition performance (e.g. Verbeken, Braet, Nederkoorn, & Oosterlaan, 2009 reported different findings in children regarding

inhibition skills depending on the applied behavioral measurement) or self-reported trait impulsivity (e.g. Verdejo-Garcia et al., 2010 examined adolescent participants). Additionally, it was shown that high impulsiveness can have both a negative and a positive effect on weight reduction. On the one hand, elementary school children with lower inhibition skills lost less weight following a treatment program compared to children with higher impulse control skills (Nederkoorn, Jansen, Mulkens, & Jansen, 2007). On the other hand, it was shown that especially adolescents (aged 13–15) with lower behavioral inhibition skills were able to reduce more body weight compared to those with better inhibition skills (Pauli-Pott, Albayrak, Hebebrand, & Pott, 2009).

Inconsistent results in the field of body weight and impulsivity may be due to varying sample types (e.g. clinical vs. non-clinical population), different age groups (e.g. children vs. adolescents), small sample sizes, or different impulsivity measurements (different behavioral tasks for measuring inhibition performance vs. trait impulsivity). However, the findings of a recent meta-analytic review (Thamocharan et al., 2013) pointed out that particularly in children and adolescents (aged 2–21), behavioral tasks appear to be a more useful measurement than self-report questionnaires when investigating the association between impulsivity and weight status. In comparison to self-report questionnaires, a larger and significant effect size was found for behavioral measurements of impulsivity ($g = 0.559$ vs. $G = 0.056$). Behavioral tasks are more suitable to measure specific behavior processes and thus uncover unique variance because they provide an objective performance-based measurement which is sensitive to temporary variations. Self-report questionnaires cannot offer this because they measure trait-related aspects of impulsiveness, which requires self-reflection abilities, precise recall and insight (e.g. Daugherty et al., 2005). This, in turn, is particularly more difficult for children and adolescents.

Furthermore, recent considerations address a specific association between food-related stimuli and impulsivity (e.g. Houben, Nederkoorn, & Jansen, 2014; Nederkoorn, Coelho, Guerrieri, Houben, & Jansen, 2012). In line with these findings, it has been examined whether young and adult individuals with weight problems show a reduced response inhibition in particular towards food stimuli: Nederkoorn et al. (2012) compared 75 lean children with 14 overweight children aged 7–9 years regarding their behavioral inhibition performance in response to highly palatable food vs. attractive toy pictures. All children had lower response inhibition competences towards food pictures compared to toy pictures. However, overweight children had more difficulties in response inhibition towards food cues than non-overweight children. In a further study, Houben et al. (2014) suggested in a sample of female adults ($N = 87$; $M_{age} = 26.17$, $SD = 10.9$) that a higher BMI is not related to general response inhibition but is especially associated with a lower response inhibition towards food stimuli. Although both of these non-clinical studies suggest that excessive body weight is linked to lower food-related inhibitory control, research and empirical evidence is lacking in adolescent psychiatric patients.

In sum, prevalence rates regarding overweight and obesity in childhood and adolescence have increased disproportionately. Psychiatric populations appear to be particularly vulnerable to the risk of overweight/obesity. Population-based studies have revealed that impulse control difficulties in response to food stimuli seem to play a role in individuals with high weight status. To date, however, evidence from the field of body weight and impulsivity has not always been consistent, possibly due to differences in the dimensions of impulsivity assessed, in the approaches used to measure this construct, and in the investigated populations. Previous studies on body weight and impulsivity were mainly conducted in

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