



Research report

Cognitive deficits in obese persons with and without binge eating disorder. Investigation using a mental flexibility task[☆]

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ABSTRACT

Objective: Studies suggest that cognitive deficits and attentional biases play a role in the development and maintenance of obesity and eating disorders. In this study, we simultaneously examine attentional biases, as well as inhibitory control and mental flexibility, which are keys to controlling unwanted behaviors and thoughts in obese patients with and without binge eating disorder. **Methods:** 16 obese patients with binge eating disorder and 16 patients without binge eating disorder were compared with 16 normal-weight controls on a “food/body-mental flexibility task”, which allows the investigation of inhibitory control, mental flexibility and attention for stimuli related to the body and food. **Results:** All obese patients made significantly more errors (i.e., pressing a key when a distracter displayed) and more omissions (i.e., not pressing a key when a target displayed) than controls in both food and body sections of the task. Obese participants with binge eating disorder made significantly more errors and omissions than those without binge eating disorder. No difference between groups was found concerning mental flexibility and cognitive biases for food- and body-related targets. **Discussion:** These results suggest that obese patients have a general inhibition problem and difficulty focusing attention, which do not depend on the types of stimuli processed. The results also suggest that these cognitive deficits are more severe in obese patients with binge eating disorder, which indicates that there is a continuum of increasing inhibition and cognitive problems with increasingly disordered eating. These cognitive deficits may contribute to problematic eating behaviors.

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Introduction

Studies suggest that attentional/executive deficits and biases play an important role in the development and maintenance of obesity and eating disorders (e.g., Lena, Fiocco, & Leyenaar, 2004). Attentional/executive deficits refer to dysfunctions affecting basic control processes such as inhibition, shifting and selective attention; these dysfunctions are unaffected by the content of the processed information. Attentional biases can be inferred when individuals process certain stimuli differently than others, in this case, stimuli related to food and body shape. Attentional biases can be evidenced when people detect food- and body-shape-related stimuli faster (speeded detection), focus their attention longer on these stimuli (slower disengagement), or avoid them.

Studies conducted on cognitive deficits indicate that individuals with bulimia have deficits affecting response inhibition, mental flexibility and attention/vigilance (for a review, see Dobson & Dozois, 2004; Lena et al., 2004; Roberts, Tchanturia, Stahl, Southgate, & Treasure, 2007). Inhibition deficits may contribute to the loss of control over eating and the consumption of an excessive amount of food, as well as the self-induced vomiting that can follow overeating for weight control. Likewise, as proposed by Roberts et al. (2007), poor mental flexibility may account for rigidity or perseverance in the pursuit of weight loss, which is a highly invested goal in bulimia and a key factor in the development and maintenance of problematic eating behaviors. Problems with mental flexibility may also reduce the bulimic patients' ability to engage in adaptive problem solving: indeed, binge eating is used to cope with a variety of situations, in which more adaptive solutions should be used.

Studies conducted on attentional biases in bulimia reveal that bulimic participants have attentional biases for food and body shape (for a meta-analysis, see Dobson & Dozois, 2004). Smets, Roefs, van Furth, and Jansen (2008) showed automatic biases

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(speeded detection) for body-related information and more controlled and later attentional biases (increased distraction) for food-related information in bulimia and anorexia patients. Attentional biases for food and body shape may contribute to excessive preoccupation with food and to body dissatisfaction, a core symptom of bulimia (Engel et al., 2006).

Some studies have explored cognitive functions in obese persons. Existing studies suggest that obese adults and children have various deficits affecting executive control, including poor inhibition (Nederkoorn, Braet, Van Eijs, Tanghe, & Jansen, 2006; Nederkoorn, Smulders, Havermans, Roefs, & Jansen, 2006) poor mental flexibility (Boeka & Lokken, 2008; Cserjési, Luminet, Poncelet, & Lénárd, 2009; Cserjési, Molnar, Luminet, & Lénárd, 2007; Gunstad et al., 2007), poor planning and problem-solving capacities (Boeka & Lokken, 2008), as well as selective and sustained attention deficits (Cournot et al., 2006; Cserjési et al., 2009, 2007). As such, they resemble bulimic patients. Inhibition deficits may underlie obese persons' overeating and their difficulty controlling their thoughts of food. Poor mental flexibility may account for their perseverance in the use of ineffective strategies to control their weight (e.g., dieting and skipping meals). Some of these results are based on studies that used *multidetermined* tasks to assess executive control, which limits the detection of subtle differences in obese patients. For example, the Trail Making Test and the Wisconsin Card Sorting Test, which were used by Gunstad et al. (2007), Boeka and Lokken (2008) and Cserjési et al. (2007), call on different cognitive functions such as mental flexibility, selective attention, inhibition and working memory; therefore, patients may be impaired on these tasks for a variety of different reasons (Van der Linden et al., 2000). Using multidetermined tasks does not allow one to identify the specific processes that might affect obese patients or to refine the assessment of their cognitive deficits in order to better understand the psychological processes related to their condition.

To this end, it is also important to investigate cognitive biases in obese patients. However, to the best of our knowledge, this aspect has been explored in only a limited number of studies (Braet & Crombez, 2003; Castellanos et al., 2009; Nijs, Muris, Euser, & Franken, 2010). More specifically, obese people have been reported to automatically direct their visual attention to the sight of foods more than non-obese people in a visual probe task (Nijs et al., 2010). Similarly, Braet and Crombez (2003) found a cognitive bias for food-related information in a Stroop task with obese children, evidenced by a slowing when they named the color of food-related words. Exploration of this aspect of cognitive functioning in obese persons is crucial because, as has been shown in bulimic patients, attentional biases for food and body shape may contribute to excessive preoccupation with food and to body dissatisfaction. These biases, together with lower mental flexibility and poor response inhibition, might be responsible for obese persons' overeating and weight gain (Nijs et al., 2010).

Considering that obesity and eating disorders occur on a continuum of increasingly disordered eating (see, e.g., Neumark-Sztainer, 2003), the cognitive deficits and attentional biases may be more marked in some obese persons. Indeed, it has been found that 25–50% of obese individuals present binge eating disorder (BED) (Spitzer et al., 1992). BED refers to frequent episodes of binge eating characterized by loss of control over eating and consumption of a large amount of food, accompanied by marked distress. However, until now, only a few studies of the cognitive functions of obese adults and children have compared the cognitive functioning of obese persons without eating disorders with that of obese persons with eating disorders (e.g., Nasser, Gluck, & Geliebter, 2004; Nederkoorn, Braet, et al., 2006).

In this context, the goal of the present study is threefold. The first goal is to re-examine cognitive deficits in obese persons using

a task which allows to separate between general deficits and cognitive biases for food and body. More specifically, we examined mental flexibility (shifting) and inhibition. Inhibitory control is a key to controlling unwanted behaviors and thoughts; mental flexibility is a key mechanism for disengaging from excessive preoccupations with food and weight. The second goal of the study is to explore cognitive biases. The third is to compare the cognitive functioning of obese persons without binge eating disorder with that of obese persons with binge eating disorder. For this purpose, we used an adaptation of the go/no-go affective mental flexibility task (Murphy et al., 1999). Murphy et al. (1999) successfully used this task to characterize deficits and biases in depression and mania. Recently, we adapted and used this task for bulimia Mobbs, Van der Linden, d'Acromont, and Perroud (2008). In this go/no-go task, words denoting “forbidden” foods, “negative” body shapes or neutral objects are presented one by one in the center of a computer screen. Half of the words are targets and half are distracters. Participants must respond to targets by pressing the space bar as quickly as possible but must withhold responses to distracters. The aim was to test obese persons' ability to discriminate between food/body-related and neutral words. Sometimes, the food/body-related words were the targets for the “go” response, with the neutral words as distracters, and sometimes the reverse was true. Several shifts in target type occurred during the task. Due to its structure (see “Methods” section for more details), the affective shifting task allows one to examine different levels of inhibitory control: (1) general ability to inhibit behavioral responses and focus attention; (2) ability to inhibit and reverse stimulus-reward associations; and (3) ability to inhibit eating-disorder-congruent cognitive biases (Murphy et al., 1999).

Methods

Participants

The study was carried out with obese patients attending the outpatient unit of the Service of Therapeutic Patient Education for Chronic Diseases, who conformed to the following inclusion criteria: (1) Body Mass Index (BMI: weight/height² [kg/m²]) in the obese range (BMI ≥ 30) and (2) no history of neurological or other severe medical illnesses, alcoholism, or drug abuse/dependence. On the basis of a clinical interview using the DSM-IV diagnosis for binge eating disorder (American Psychiatric Association, 1994), obese persons were classified as obese with binge eating disorder if they reported the criteria for binge eating disorder in the last 6 months or as obese without binge eating disorder if they reported no binge eating behavior in the last 6 months. Forty-eight participants were recruited: 16 obese participants without binge eating disorder, 16 obese participants with binge eating disorder and 16 normal-weight controls. There were 12 women and 4 men in the obese without eating disorders group, 11 women and 5 men in the obese with eating disorders group, and 11 women and 5 men in the control group.

The controls were recruited among university students and volunteers. They had no history of eating disorders and were not being treated with medication that might potentially influence cognition (e.g., benzodiazepines and antidopaminergics).

ANOVAs revealed no significant differences between patients and controls in terms of age or years of education and socioeconomic status¹ but significant differences in terms of BMI (Table 1). The controls' mean BMI was in the normal range. The

¹ Socioeconomic status was derived from the patient's current occupation and was classified as recommended by the French national statistic institute (“Institut National Français de la Statistique et des Études Économiques”; INSEE).

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