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Cognitive deficits and biases for food and body in bulimia: Investigation using an affective shifting task

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ABSTRACT

Objective: Studies suggest that attentional deficits and biases play a role in the development and maintenance of eating disorders. Many of these studies have methodological limitations and their results are difficult to interpret. In this study, we examine attentional deficits and biases in bulimia.
Method: 18 bulimic participants and 18 controls performed an adaptation of the go/no-go affective shifting task. That task allows the investigation of attention, inhibitory control and mental flexibility for stimuli related to the body and food.
Results: Bulimic participants tended to react faster than controls in the go/no-go affective task. They also had poorer discrimination ability than controls and showed inhibition problems, particularly when the targets were related to food. The magnitude of these effects ranged from moderate to large. No difference between groups was found concerning mental flexibility.
Discussion: These results suggest that bulimics present cognitive deficits and are more impulsive, especially with food-related stimuli. These cognitive deficits and biases may be at least partially responsible for the development and maintenance of bulimia.

1. Introduction

Recent studies suggest that attentional deficits and biases play a role in the development and maintenance of eating disorders (Lena, Fiocco, & Leyenaar, 2004). Attentional deficits refer to dysfunctions affecting basic attentional processes (e.g., inhibition, shifting, selective attention); these dysfunctions are unaffected by the content of the processed information. Attentional biases can be inferred when individuals preferentially attend to certain stimuli more than others, in this case, stimuli related to food and body shape (Dobson & Dozois, 2004).

In a recent meta-analysis, Dobson and Dozois (2004) identified 28 studies that examined attentional biases in eating disorders using the emotional Stroop task. In this task, the participant is asked to name the color of the ink of emotional words. When the processing time is slow, it indicates interference between the processes used to identify the word meaning and the processes used to name the ink color. In participants with bulimia, researchers have found that color naming is significantly slowed if the words are related to food and body shape or size (e.g., *fat, blubber*). The results yield a moderate effect size for the Food Stroop and Body/Weight Stroop. In Dobson and Dozois's (2004) view, the fact that moderate effect sizes were also noted for the classic Stroop

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suggests that bulimic individuals may have a general deficit affecting color naming rather than a specific content problem. They also pointed out that the findings of existing studies of eating disorders are inconsistent, and consider that the discrepancies could be related to methodological limitations, such as not considering word length and imageability or using inappropriate control stimuli (e.g., words from different semantic categories or words pertaining to clothes). Some studies even employed heterogeneous word lists combining words pertaining to weight, shape, body parts and food, which represent different aspects of eating psychopathology, in single lists.

Moreover, results on the Stroop task are quite difficult to interpret. Two hypotheses have been proposed to explain the interference with color naming: eating-disorder-related stimuli may cause a greater degree of activation, hence a greater degree of interference, or the interference may be due to a difficulty inhibiting eating-disorder-related stimuli.

However, so far, to the best of our knowledge, only three studies have used other experimental tasks to measure attentional biases in bulimic individuals. Schotte, McNally, and Turner (1990) used a dichotic listening procedure. In this paradigm, participants hear two different messages, one in each ear, and are asked to attend to only one. The authors showed that bulimics detected a body-related word (e.g., *fat*) in the message they were not attending to more frequently than normal controls. Rieger et al. (1998) used a visual probe detection task. In this task, two words are displayed, one above the other, followed by a visual probe shown in the same location as one of the word stimuli. Participants are requested to signal their detection of the probe as quickly as possible. The authors found that bulimics tend to direct their attention away from "positive" shape words (e.g., *thin*) and towards "negative" shape words (e.g., *fat*). Recently, Shafran, Lee, Cooper, Palmer, and Fairburn (2007) used a pictorial version of the dot-probe task.

Very few studies have explored the existence of attentional deficits affecting capacities such as inhibition or shifting. However, there is evidence that bulimics suffer from attentional and executive impairments. According to Ferraro, Wonderlich, and Jocic's (1997) study, bulimic participants were deficient on the Wisconsin Card Sort task, in which they are required to sort a number of cards by a rule that changes periodically. Moreover, they were faster and made more errors than controls on the WAIS-R Symbol-Digit Modalities Test, where they had to transcribe symbols paired with the numbers 1 through 9 as quickly as possible; the test comprises 100 digits in a random order. Bulimics also performed worse than controls on the Trail Making Test A and B (TMT-A and TMT-B) and the Talland Letter Cancellation Test—Revised (Jones, Duncan, Brouwers, & Mirsky, 1991; Tchanturia et al., 2004). In the latter task, the participant is asked to mark out a target letter in an array of letters. Some of the letters used are capitalized, and some are separated by double spaces. The task requirements include three variations: crossing out capital letters, crossing out the letters immediately before and after a double space, and performing both tasks at once. In addition, bulimic participants take longer to adopt new strategies in the set-shifting portion of the TMT (TMT-B). As a reminder, in the TMT-A, the participant's task is to quickly draw lines on a page connecting 25 consecutive numbers in an ascending sequence. In Part B, the lines must alternate between numbers and letters in an ascending sequence. Although these various findings are interesting, they are based on studies that use *multidetermined* tasks, which limits the detection of subtle differences in these patients. For example, the TMT requires different neuropsychological functions such as cognitive flexibility, attention, inhibition and working memory; therefore, patients may be impaired on this task for different reasons. This is a major limitation if we want *to isolate* the processes that might affect eating-disordered patients and refine the assessment of their cognitive deficits in order to better understand the psychological processes related to bulimia. Furthermore, some studies did not use a control group (Lauer, Gorzewski, Gerlinghoff, Backmund, & Zihl, 1999).

Considering all these methodological and theoretical limitations, we conducted a study to re-examine attentional biases and deficits. For this purpose, we used an adaptation of the go/no-go affective shifting task (Murphy et al., 1999). Murphy et al. (1999) successfully used this task to characterize deficits and biases *separately* in depression and mania. In this go/no-go task, words denoting "forbidden" foods, "negative" shapes or neutral objects are presented one by one in the center of a 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 bulimic 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 the various components *separately*, which is less feasible with other tasks. More specifically, this task allows for the examination of different levels of inhibitory control: (1) general ability to inhibit behavioral responses and focus attention; (2) individuals' ability to inhibit and reverse stimulus–reward associations; and (3) individuals' ability to inhibit eating-disorder-congruent attentional biases (Murphy et al., 1999).

2. Methods

2.1. Participants

The study was carried out with patients attending the Eating Disorder Center at the Clinique des Vallées in Annemasse, France, who conformed to the following inclusion criteria: (1) a DSM-IV (American Psychiatric Association, 1994) diagnosis of bulimia nervosa, as confirmed by an interview; and (2) no history of neurological or other severe medical diseases, alcoholism, or drug abuse/dependence. All patients admitted during both recruiting periods were included in the study. Thirty-six participants were recruited: 18 bulimic patients and 18 normal controls. Six patients were experiencing a current major depressive episode, one had generalized anxiety disorder, three obsessive–compulsive disorder, one posttraumatic stress disorder and one social phobia. Three participants, one of whom met standard criteria for being a statistical outlier on the modified shifting task because her discrimination and decision bias scores were more than 3 standard deviations away from the mean, one who was too underweight