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Influence of negative affect on decision making in women with restrictive and binge-purge type anorexia nervosa

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ABSTRACT

The present study aims to examine the influence of negative affect on decision making in women with anorexia nervosa (AN) compared to healthy control women and, secondly, to assess differences between the restrictive (ANR) and binge-purge (ANBP) subtypes. One hundred four women (32 with ANR, 32 with ANBP, and 40 healthy controls) participated. All women were asked to watch either a negative or a control film fragment, both followed by the Bechara Gambling Task (BGT). Before and after the fragments negative affect was measured. Additionally, relevant characteristics (e.g., overall depressive symptoms) were assessed. Differences in negative affect did not influence decision making performance. Independent of affective state, decision making was found to be impaired in women with ANBP (no learning effect on the BGT), but not in women with ANR. These findings highlight the importance of considering different AN subtypes when examining decision making processes. However, the role of negative affect on decision making remains uncertain. Since other affect related factors such as affect dysregulation may also play a role, future studies on decision making in AN should take the role of affect into account.

1. Introduction

Individuals with anorexia nervosa (AN) are characterized by a below-normal weight, and are often even severely underweight. Low adherence to treatment and high drop out rates are common (Macdonald, et al., 2012; Schnicker, et al., 2013). Only half of the patients fully recovers from the disorder (Keel and Brown, 2010) and a substantial part remains chronically ill. AN has a serious negative effect on quality of life, impairing cognitive, interpersonal and societal functioning (Engel, et al., 2009; Bamford and Sly, 2010). It is therefore striking that individuals with AN are often reluctant to engage in treatment (in particular to gain weight). Their decisions seem to be based on the expected short-term consequences of their behavior despite of the longer-term outcome. Thus, on a more general level their decision making seems maladaptive with a strong focus on short-term goals that come at the cost of long-term goals (Cavedini et al., 2006). This is most evident in their eating behavior with avoiding food intake to lose weight or to reduce anxiety, while ignoring the long-term goal of eating food to gain weight and to recover from AN. Cavedini et al. (2006) tested the idea that anorectic psychopathology could be an expression of difficulties modulating reward and punishment in a longer-term perspective by using a neuropsychological measure of decision making, the Gambling Task (GT; Bechara et al., 1994) in a sample of individuals with AN.

The majority of studies on decision making in AN indeed point towards general decision making difficulties in individuals with AN compared to healthy controls, as they are inclined to make decisions based on the expected short-term consequences as examined with the GT (Bechara, et al., 1994), which varies the valence of the short-term and longer-term consequences of the choices (Cavedini et al., 2004; Tchanturia et al., 2007; Brogan, et al., 2010; Danner et al., 2012b; Fagundo et al., 2012; Galimberti et al., 2012; Lindner, et al., 2012; Tchanturia et al., 2012; Garrido and Subira, 2013).[1] The GT simulates

[1] A few studies did not find these decision making difficulties in AN (Bosanac et al., 2007; Jollant et al., 2007; Guillaume et al., 2010). The studies of Guillaume et al. (2010) and Jollant et al. (2007) that did not find decision making problems in AN, used exclusion criteria related to emotional problems, which may possibly account for their lack of findings: Guillaume et al. (2010) only included patients without comorbid depression and medication and Jollant et al. (2007) included AN patients who were normothymic (referring to a relative normal emotional state). The exclusion of these affect-related states may be responsible for the absence of observed decision making difficulties in AN, as the experience of negative affect and decision making performance in AN may importantly cohere, as will be argued in more detail below.

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real-life decision making under circumstances of uncertainty (i.e. not knowing what the exact outcome of a certain choice will be). Decision making behavior in this task is suggested to be complex and to rely on affective feedback from autonomic somatic changes (somatic marker hypothesis; Damasio, 1994). One of the hypothesis is that the affective feedback is experienced differently by individuals with AN resulting in poorer decision making ability. Direct evidence for this idea was reported by Tchanturia et al. (2007) who tested skin conductance response while participants with AN performed the task. Their results showed participants with AN to have significantly lower anticipatory SCR to all choices. In the GT, participants are asked to choose between four decks of cards and with every choice they win (=reward) or loose (=punishment) money. Gains and losses differ with each card and two of the decks have higher immediate gain but are disadvantageous in the longer-term. The idea is that participants with intact decision making ability forgo immediate gains for a longer-term successful outcome by learning to avoid these disadvantageous decks[1].

Decision making ability can be considered an important topic to investigate in AN, as assessing it may have prognostic value: a study of Cavedini et al. (2006) investigating the prognostic value of decision making abilities in AN showed that a better decision making profile (i.e., learned to make more advantageous choices during the GT) at the start of treatment was indicative of greater improvement in body mass index (BMI; an important marker of their nutritional state). Accordingly, the present paper aims to study decision making performance in women with AN, and will particularly focus on the role of negative affect.

Affect plays an important role in the decision making process (Damasio, 1994). Generally, negative affect comes at the cost of the more beneficial long-term goals and seems to trigger a focus on the short-term goals. For example, de Vries et al. (2008) found that participants in a negative affective state, as induced by a video excerpt, scored worse on a decision task (the GT) than participants in a positive state (see also Suhr and Tsanadis (2007)). Affect thus can be an important element influencing the decision making process.

The disadvantageous effect of negative affect in relation to decision making may play an extra prominent role in AN patients. Studies have shown disturbances in the affective system of AN patients (Wagner et al., 2007; O'Hara, et al., 2015). Furthermore, affective disorders such as depressive disorders, are the most frequent observed comorbid disorders in AN (e.g., Salbach-Andrae et al., 2008) and it is even suggested that emotional problems lie at the core of AN (Harrison, et al., 2009). In a large study among patients with different kind of psychiatric diagnoses including AN, it was found that impaired decision making was directly related to affective instability (Jollant et al., 2007) suggesting an influence of affective dysfunction on decision making. Additionally, several studies demonstrated that AN patients are inclined to regulate their emotions in dysfunctional ways (e.g. Danner et al., 2014, 2012a; Svaldi et al., 2012) resulting in the maintenance of negative affect. Whilst it thus seems likely that negative affect and decision making performance in AN are related, this has not yet been investigated.

Most studies on decision making in AN did not differentiate between AN subtypes, whilst this may be crucial. In other words, whilst the two subtypes share some eating disorders-related characteristics, such as restricted food intake and clinical perfectionism, they also show different and distinguishing characteristics. For example, binge-purge behaviors are specific to an ANBP diagnosis, whilst these are absent in ANR. Similarly, ANBP patients tend to display impulsivity, whilst ANR patients rarely do. Precisely these latter two concepts may be important in relation to the decision making process (Franken, et al., 2008). To illustrate, ANBP individuals have a more impulsive personality and report more behaviors that are regarded as impulsive behaviors such as stealing and substance abuse than ANR. ANBP patients also revealed less inhibitory control than ANR patients (Bruce, et al., 2003; Rosval et al., 2006). Furthermore, ANBP patients have been assessed as more sensitive to reward than ANR patients which may explain their tendency towards impulsive behaviors (Harrison, et al., 2010; Chan et al., 2014). The characteristic of ANBP patients being more impulsive than ANR patients seems important for decision making processes: Impulsive tendencies may cause reliance on short-term gains, while ignoring the longer-term consequences of the decision outcome in particularly ANBP patients. Studies that addressed the AN subtypes in relation to decision making ability, however, showed inconsistent findings. While Galimberti et al. (2012) found both subtypes to perform similarly poor on a decision making task, two other studies found different decision making patterns in the subtypes (Cavedini et al., 2004; Garrido and Subira, 2013). Both studies showed decision making impairments in all patients with AN, but contrary to what may be expected ANR patients performed worse than ANBP. The rationale for this remarkable difference is unclear, but the moderating impact of negative affect may provide an explanation. That is, perhaps ANBP patients are particularly likely to show decision making problems in emotionally negative situations.

There are as yet no studies that have investigated differences in decision making between subtypes in relation to negative affect. However, based on the finding that affect-driven impulsiveness (i.e., the tendency to act rashly when experiencing negative affect; Whiteside and Lynam, 2001) is typically associated with bulimic-related behaviors (Fischer, et al., 2003; Claes, et al., 2005), behaviors prototypically displayed in ANBP patients, it can be assumed that negative affect may increase the tendency to make more impulsive decisions in ANBP (and not ANR) patients, thus resulting in more decisions based on the short-term instead of long-term outcomes.

1.1. Present study

The present study aims to firstly examine the influence of negative affect on decision making in women with AN compared to healthy controls and secondly to test differences between the ANR and ANBP subtypes. Negative affect will be triggered by means of a negative affect induction. Each participant within each group (ANR, ANBP and healthy participants) will be randomly assigned to either a negative affect condition or a neutral condition.

First, we expect both patient groups to display poorer decision making compared to the control group, in line with previous findings (Cavedini et al., 2004; Tchanturia et al., 2007; Danner et al., 2012b). More importantly, we expect an increase in negative affect to worsen decision making performance (Raghunathan and Pham, 1999), particularly for ANBP patients. Decision making of these patients will be stronger impaired when their negative affect intensifies, conform their affect-driven impulsiveness tendency (Fischer et al., 2003; Claes et al., 2005). Decision making will be examined using the GT (Bechara et al., 1994).

2. Methods

2.1. Participants

All 104 participants in this study were female and at least 18 years of age: 32 women with a diagnosis of AN restrictive subtype or EDNOS clinically referred to as ANR (24 women with ANR and 8 women with EDNOS-ANR), and 32 women with a diagnosis of AN binge-purge subtype or EDNOS clinically referred to as ANBP (23 women with ANBP and 9 women with EDNOS-ANBP) and 40 healthy control women. Only patients without a history of