Stimulus-response compatibility tests of implicit preference for food and body image to identify people at risk for disordered eating: a validation study

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A R T I C L E   I N F O

A B S T R A C T

The aim of this study was to incorporate implicit measures of relevant social cognition into eating disorder research. Fifty-three females diagnosed with an eating disorder (ED), and 41 at-risk females were recruited via ED support websites, along with 23 healthy females for comparison. Computerised online tests assessing subconscious normative ideal body image (IBI-BIAT) and personalised self-identification body image (PBI-BIAT) associations and food preferences (FP-AAT) were administered, followed by the modified version of the Eating Disorder Examination Questionnaire (EDE-Q). Anthropometric data, age, need for social approval, self-reported measures of self-esteem, normative perception and body image satisfaction were recorded. Self-reported diagnosed ED status was corroborated with BMI and EDE-Q. Diagnostic performance of the implicit measures was assessed with ROC analysis. Those diagnosed with ED showed significantly stronger automatic preferences for and self-identification with thin body image, compared to healthy females, but no differences were found in food preferences. The IBI-BIAT showed better diagnostic power than PBI-BIAT, correctly classifying 87% of the diagnosed participants. No correlation was found between IBI-BIAT and the explicit measures. The results suggest that the underlying subconscious social cognitive factors of pathological eating are linked to body image, not to food items *per se.*

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1. Introduction

Disordered eating has many long-term health consequences (Bonci et al., 2008) which can be prevented if the symptoms are detected at an early stage. A primary difficulty associated with detecting disordered eating at a very early stage arises due to the sensitivity of the behaviour and the lack of discrete, convenient yet accurate measures to detect it. The limitations to obtain accurate assessment, particularly in socially sensitive domains, through self-report measures (Gawronski, LeBel, & Peters, 2007) has led to an increased interest in implicit measurements. Because these measurements are indirect, social desirability is less of an issue (Gawronski et al., 2007). In addition, and perhaps more importantly for devising effective early prevention, these implicit measures could reveal something about people's inner thoughts that exists outside their conscious awareness by not relying on individuals making self-assessment of their attitudes. Many of those at risk of disordered eating are not only prone to concealing eating habit attitudes and behaviours but may also be unable to access the underlying cognitions guiding their behaviour, ultimately resulting in greater detrimental effects to their health.

Research in implicit cognition has flourished in social and experimental psychology examining socially sensitive issues or transgressing behaviour, where the implicit associations are captured via response-time tests. Typically, these tests are presented as a lexical or pictorial sorting task rather than direct measures of attitudes or motivations; and thus are assumed to access thoughts that are outside conscious awareness or control (Roefs et al., 2011). Most implicit measures utilise some form of stimulus-response compatibility task (De Houwer, 2003) and make interferences from the measured effect about the psychological attributes assumed to exert influence on the test performance. As such, implicit measures are also assumed to reflect 'attitudes' not necessarily manifest in explicitly expressed propositions (Hughes, Barnes-Holmes, & De Houwer, 2011).

Implicit measurements have been used to examine body image in both general populations and eating disorder groups (Ahern, Bennett, & Hetherington, 2008; Roefs et al., 2005; Schwartz, Vartanian, Nosek, & Brownell, 2006). Anti-fat bias across all weight groups was observed in a non-clinical population (Schwartz et al., 2006). Participants associated fat people with attributes such as 'lazy' and thin people with 'motivated', however the strength of the bias decreased as body weight increased. Implicit measures have also shown the ability to discriminate between participants based on their drive for thinness (Ahern et al., 2008). Those who showed stronger associations with

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underweight models scored higher on the drive for thinness measure. In a clinical population, those with anorexia nervosa (AN) displayed implicit pro-fat attitudes towards others and anti-fat attitudes towards the self (Parling, Cernvall, Stewart, Barnes-Holmes, & Ghaderi, 2012).

With regards to foodstuff *per se*, research investigating automatic associations towards foods in those with AN found either no preference for food, regardless of palatability, or found reduced automatic motivational orientation towards food when compared to healthy controls (Roefs et al., 2005). Outside clinical population, a study investigating negative and positive associations with high calorie food independently found stronger automatic tendency to approach high calorie food in restrained eaters compared to unrestrained eaters, but the two groups did not differ in their negative implicit associations toward high calorie food (Houben, Roefs, & Jansen, 2010). Contrasting explicit and implicit evaluations of high calorie food, restrained eaters displayed more positive implicit association with high calorie food in contrast to their negative explicit evaluations (Hoefling & Strack, 2008; Veenstra & de Jong, 2010).

Assessment of implicit cognition could contribute to eating disorder research beyond a concealed measure to counteract social desirability or self-denial. Non-conscious thought processes are important factors in health behaviour (Sheeran, Gollwitzer, & Bargh, 2013) because people's feelings, attitudes and preferences that motivate their behavioural choices that impact on health are not always available or fully accessible to introspective inspection. Incorporating implicit measures of relevant social cognition into eating disorder (ED) research could make advances in understanding the mental representations of ideal body images and/or food in people with ED or at risk of developing ED. Here, we use 'mental representation' as a collective term to capture mental content such as value-tagged perceptions, preferences, knowledge a person might, consciously and unconsciously, have about food and body images and their connections. Effective prevention and intervention strategies should pay attention to these mental representations that act as motivators of eating disorders outside conscious control and design intervention strategies that at the least take implicit cognition into account (Nosek & Riskind, 2012); or even aim to modify these subconsciously held thoughts and feelings in order to achieve the desired change in behaviour.

Therefore, the aim of this study is to incorporate implicit measures of social cognition into eating disorder research to capture mental representations beyond introspective self-reports. The study utilises three implicit measurements to ascertain their potential for being a non-invasive research and diagnostic screening tool. Specifically, the study examines subconsciously retrieved preferences for body image using two variants of a brief Implicit Association Test (Sriram & Greenwald, 2009) and assesses automatic motivation for food groups based on perceived fat content using the Approach-Avoidance Test (Rinck & Becker, 2007), along with the discriminatory power of the two respective stimulus-response compatibility tasks for body image preferences (also referred to as implicit attitudes) and a test that builds on task irrelevant interference for automatic motivation for food. In contrast to previous research investigating body image attitudes with thin and overweight images, this study focuses on thin and normal body images rather than measuring anti-fat bias with the use of overweight body image silhouettes. Whilst this aspect is similar to Ahern et al. (Ahern et al., 2008) using thin and normal body weight silhouettes in a non-clinical population, the current study employs (i) a clinically diagnosed group with ED (ii) modified attribute categories in the IAT from the traditional positive/negative attribute labels to ideal/not ideal attribute labels and stimuli for this category. In order to ascertain whether subconscious thoughts about food play an equal or more important role than body image attitude, the research design also incorporates an implicit measurement for automatic motivation for food categories.

It was expected that those with elevated ED symptoms, particularly those in the self-reported diagnosed ED group would have lower self-esteem, higher levels of body dissatisfaction and their body image perception of what they classify as normal weight would be lower, therefore they would perceive a thinner body image as 'normal' as compared to the healthy comparisons (HC). Consequently, it was predicted that differences would emerge on the implicit measures between the ED and HC. Those with ED were expected to exhibit preference for thin body image in both norm-based (H1) and self-referential (H2) implicit body image attitude tests, whereas the opposite trend was expected for the healthy controls; and it was hypothesised that participants in the ED group would display a stronger task-irrelevant interference from foods, possibly showing stronger avoidance of high fat foods compared to healthy controls (H3). Based on previous research showing conflicting results from explicit and implicit assessment, no strong relationship was expected between the explicit and implicit measures of the same construct (H4).

2. Methods

2.1. Participants

Initially, 140 females (age range of 12–55 years) actively volunteered for the study, of which 132 provided complete datasets. The study recruited participants by advertising through a number of websites related to eating disorders. Participants for the healthy comparison group were recruited via an advertisement through university campus, social networking sites and research websites requesting participants to take part in the study online. Although recruitment through ED support websites targeted those who were clinically diagnosed with ED, there was a considerable cohort among the participants who reported currently not having a diagnosis of an eating disorder. This group was separated from the diagnosed ED participants. Data from this group were used to investigate the selected test performance for those who, based on their presence at ED support websites and interest in taking part in the research, could reasonably be assumed to be at risk for ED. The latter aspect reduces the possibility of being a family member of a person with ED, not a person with ED. This unique group is referred to as the 'at-risk group' throughout the paper to differentiate them from those who were clinically diagnosed with ED. Self-reported diagnosed ED status was corroborated with EDE-Q scores. BMI was calculated from self-reported height and weight. The recruitment and inclusion-exclusion process are depicted as a flow diagram (Fig. 1).

In the ED group, only those who met the criteria on the EDE-Q (Fairburn & Beglin, 1994) for disordered eating remained in the study. The recommended cut-off point of the EDE-Q was used which indicates the presence of disordered eating if participants had a mean score ≥ 4 on the global scale or on either the shape or weight concern scale (Nichols, Rauh, Lawson, Ji, & Barkai, 2006), with a score above 4 indicating clinical severity (Carter, Stewart, & Fairburn, 2001). Those with an overweight or obese BMI were also excluded from the ED group. Following the exclusion criteria, 54 remained in this group (mean age = 22.56, SD ± 8.62, age range = 12–55). Those diagnosed with ED were further categorised for Anorexia Nervosa (AN) or Bulimia Nervosa (BN). For BN, the DSM 5 criteria of having one or more binge eating episode, along with compensatory behaviour (self-induced vomiting and/or use of laxatives) per week was applied (Attia et al., 2013; MacDonald, McFarlane, & Olmsted, 2014). Criteria for AN were BMI showing being underweight for the age and explicit endorsement of weight fear (Attia et al., 2013; Brown, Holland, & Keel, 2014), where the latter was indicated by having ≥ 4 on either of the shape and weight concern subscales of the EDE-Q. The reduced requirement in the DSM-5 for BN is in line with the Oxford recommendation of having 12 or more episodes of binge eating followed by compensatory behaviour for 3 months (Mond et al., 2008). Those who did not meet the criteria for AN or BN but met the criteria for having EDE-Q global score or at least one subscale score ≥ 4 were categorised as having an eating disorder not otherwise specified (EDNOS). Of the 54 diagnosed participants, 24 met the criteria for BN, 14 for AN with the remaining 16 classified as EDNOS.