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Emotional responses to images of food in adults with an Eating Disorder: a comparative study with healthy and clinical controls.

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Abstract

Emotive responses to foods in people with eating disorders are incompletely understood in relation to whether the extent of emotional response is due to the eating disorder or non-specific emotional states.

The aims of the present study were to investigate negative and positive emotive responses to food images in adults with an eating disorder, and to compare responses to a (i) healthy and a (ii) clinic (psychiatry) control group. Participants viewed 20 images (16 of foods previously found to evoke fear, disgust and happiness and 4 neutral images) at half-minute intervals and rated emotive responses on 3 visual analogue scales for each image. Participants with an eating disorder (n=26) were found to have significantly increased negative emotive (disgust and fear) responses and reduced positive (happiness) responses to the images compared to the 20 clinic and 61 healthy participants. Differences between groups remained significant when controlling for baseline levels of fear, disgust and happiness. Thus, the emotive responses to foods did not appear due to non-specific increases in anxiety or depression but rather was due to the presence of an eating disorder.
1. Introduction

Eating disorders (ED) are common mental health problems (APA, 2013). In addition to maladaptive cognitions and behaviours (e.g., Giel, Teufel, Friedrich, Hautzinger, Enck, & Zipfel, 2011) people with EDs experience strong negative emotions towards food and eating (McNamara, Hay, Katsikitis, Chur-Hansen, 2008; McNamara, Chur- Hansen, Hay 2008; Katsikitis & Sharman, in press). Macht (2008) has proposed that the desire to eat may also be suppressed by emotions such as fear, which are high in arousal or intensity. Overeating and/or binge eating can occur as well in an effort to diminish or escape from negative or even positive emotions (Jeppson, Richards, Hardman, and Granley, 2003; Hamilton-Wasson, 2003).

Giel et al. (2011) conducted a systematic review investigating the processing of food stimuli in patients diagnosed with an ED. The review reported that individuals with an ED experienced food stimuli as less pleasurable and imaging studies suggested that patients were more emotionally involved with such stimuli (Giel et al., 2011). In addition, several studies have implicated the emotions of fear and disgust as mediating factors in how individuals with EDs or with elevated levels of ED symptoms respond to food. Davey, Buckland, Tantow, and Dallos (1998) reported that individuals with an ED had significantly higher levels of disgust to food than a sample of normal individuals. This study and others (Davey et al., 1998; Schienle, Stark, Schafer, Walter, Kirsch, and Vaitl, 2004) found that ED patients were not significantly higher in disgust sensitivity in general, but rather in relation to specific aspects of the human body, bodily products and food.

While Davey and colleagues did not utilise images of food in their study, Harvey, Troop, Treasures, and Murphy (2002) found elevated levels of disgust and fear to high calorie food images in a sample of non-ED participants with increased ED symptoms. More recently, McNamara, Hay, Katsikitis, and Chur-Hansen (2008) examined emotional responses to food images in a non-ED sample of young adult women. Consistent with predictions, as eating concern increased, fear responses to food increased.

Based on these previous studies the current study was planned to further research how people with EDs emotionally respond to food compared to a group of psychiatry controls and a group of controls without a disorder. The decision was made to include a group of psychiatric controls due to the high co-morbidity of ED with anxiety, depression and other disorders (Swinbourne and Touyz, 2007; Giel et al., 2011; Steinglass et al., 2012). It has even been suggested that emotional responses to food stimuli may in part be due to components of
disorders such as anxiety and depression, and not the ED per se (Giel et al., 2011). Furthermore, there is a substantial overlap between certain characteristics of anxiety disorders such as OCD and EDs such as anorexia nervosa (AN) (Steinglass et al., 2012).

The main aim of this study was to investigate whether non-ED disorder specific emotions account for responses to foods in people with an ED. Based on results of our previous study (MacNamara, Hay, Katsikitis & Chur-Hansen, 2008) we hypothesised that those with an ED would have a greater emotive response to food than the normative control groups. Comparisons between those with an ED and another psychiatric disorder were exploratory.

2. Method

2.1 Participants

Three groups of 107 females aged ≥ 18 years participated in this study. Group 1, the “ED group” (n=26) were recruited from university clinics in Townsville (n=14) and NSW (n=12). Group 2 (the ‘psychiatry controls’) consisted of individuals diagnosed with an Axis I (APA, 1994) psychiatric disorder and who had not received a diagnosis of an ED. (DSM-IV criteria were applied as were current at the time of data collection). The psychiatry control group participants (n=20) were recruited from two University Clinics in Queensland (n=14) and from a clinical out-patient program of a large Sydney teaching hospital (n=6). Group 3, the ‘healthy’ control group of participants without a current psychiatric disorder (n=61), were volunteers from an undergraduate university psychology (n=54) and nursing program (n=7).

2.2 Procedure

A set of PowerPoint slides of a range of food and non-food images was presented to each participant at half-minute intervals. Images were the 20 images used in previous studies in our laboratory (McNamara, Hay, Katsikitis, & Chur-Hansen, 2008). Participants rated their level of fear, happiness and disgust, separately for each image, on three 10 cm visual analogue scales (VAS) from “no emotion” to “most ever fear, happiness, or disgust”. A summary mean score for disgust, fear and happiness was computed for all 16 food item responses, and all analyses were conducted on these summary scores.

The foods were photographed from a local supermarket and widely used trading market. They included foods that aroused disgust (e.g., green spotted herbal sausages), a happy or “excited” response (e.g., McDonald’s “Happy meal”) and fear due to unfamiliarity (e.g., Chinese skinned ducks) or, in those with eating disorders, possible
fear of binging (e.g., a chocolate block). Four non-food images, (e.g., a chair, building) were included to check for aberrant responses, such as rating all images as high on fear. There were no such aberrant responses. Immediately prior to the PowerPoint presentation participants rated their level of happiness, fear and disgust on a 10 cm visual analogue scale from “no (emotion)” to “most ever”.

2.3 Questionnaires

The Eating Disorder Examination Questionnaire (EDE-Q) was used to assess eating disorder symptomatology during the past four weeks (Beglin & Fairburn, 1992). The EDE-Q is comprised of 41 items and yields a global score in addition to scores on four subscales (i.e., Restraint, Shape Concern, Weight Concern, and Eating Concern) with each subscale demonstrating excellent reliability and validity (Beglin & Fairburn 1992; Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004). Australian community norms and validation studies have been published (Mond, Hay, Rodgers, & Owen, 2006. BMI was calculated from self-reported height and weight.

Diagnoses were confirmed by experienced clinicians (clinical psychologists and psychiatrists) according to DSM-IV criteria and the Mini International Neuropsychiatric Diagnostic Interview for the DSM (Sheehan & Lecrubier, 2005). This is a widely used and well validated instrument.

2.4 Ethics

The study was approved by the Human Research Ethics Committees of the respective Universities (H6644, A/09/209) and lead teaching hospital (08/CHW/259).

2.5 Statistics

Quantitative statistical analyses used the Statistical Package for the Social Sciences (SPSS) Version 20.0 software program. Data were inspected for normality and because the group data displayed a non-normal distribution, the Kruskal Wallis test was used to ascertain between group differences, with Mann Whitney U Test for post-hoc tests. The Spearman correlation statistic rho ($r_s$) was used to test for correlations between baseline levels of emotion (i.e., before the viewing of the images) and levels of emotive response to food. Data were subsequently transformed and analysis of covariance (ANCOVA) was used to control for baseline levels of emotion.

3. Results

3.1 Study sample description (Table 1)
There were no significant differences between groups for age and BMI (Table 1). Of those with an ED, 45% were employed and 43% gave employment status as a student. This was similar to those with the psychiatry control group of whom 45% were employed and 45% gave employment status as a student, and in contrast to the healthy control group of whom 95% gave employment status as student. Of those with an ED, 39% were married or living as married and 58% were never married (single). This was similar to those in the psychiatry control group where 40% reported that they were married or living as married and 50% were never married (single), and to the healthy control group of whom 24% were married or living as married and 53% were never married (single).

Three ED participants had AN, 8 had ED not otherwise specified (NOS) of AN type, 13 had bulimia nervosa (BN) and two had EDNOS of a BN type. As expected, on all ED features, the ED group had significantly higher levels of symptoms compared to the two control groups which did not differ. Eight of the psychiatry control group had a depressive disorder (major depression or depressive disorder NOS), two had an anxiety disorder, six had both an anxiety and depressive disorder, one had dysthymia with adult attention deficit hyperactivity disorder, and one was diagnosed with hypomania and alcohol abuse.

3.2 Emotive responses at baseline and to food images (Table 2)

At baseline, the psychiatry control group and the ED groups differed on all emotive ratings (all p<0.03) except baseline happiness (p=0.09) and fear (p=0.09). The healthy control and ED groups differed on all emotive ratings (all p<0.01) except for baseline disgust (p=0.3). The two control groups did not differ on any emotive response except for disgust now (p<0.03).

As shown on Table 2, all three emotive responses to foods were significantly higher in the ED group compared to either control group, who did not differ. As each of the emotive responses to foods correlated significantly (all p<0.001) with the respective baseline level: happiness \( r_s = 0.58 \), disgust \( r_s = 0.53 \), fear \( r_s = 0.72 \). Differences between diagnostic and normative groups were further tested with three ANCOVA controlling for each baseline emotive levels. There remained a significant effect of group type on: a happy emotive response to food controlling for baseline level of a happy response (\( F= 5.05, p= 0.008 \), effect size - partial \( \eta^2 = 0.10 \)); a disgust emotive response to food controlling for baseline level of a disgust response (\( F= 13.79, p < 0.001 \), effect size - partial \( \eta^2 = 0.24 \)), and an anxious emotive response to food controlling for baseline level of an anxious
response (F=8.54, p< 0.01, effect size- partial eta² = 0.16).

4. Discussion

The main finding of the present study was that people with an ED had greater aversive, namely disgust and fear, emotive responses to images of foods compared to people without an ED. Concurrently, they had a lower happiness response to food. This was both compared to a healthy control group and a clinical control group of people with another psychiatric disorder, most with depression and anxiety. Thus our hypothesis was confirmed. Furthermore, we did not find that concurrent depression or fear explained the emotive response to foods in the ED participants.

The findings support our previous qualitative exploration of emotive responses (McNamara, Chur-Hansen, & Hay, 2008). In this former study we found participants described aversive responses of fear and disgust associated with fear of loss of control over eating that appeared unique to the experience of someone with an ED. The findings also accord with the conclusion of Giel et al. (2011) that people with an ED respond to food stimuli in a different manner from healthy controls. This study additionally answers the question raised by Giel et al. (2011) as to the contribution of co-morbid anxiety and depression to the responses to foods found for people with an ED. Furthermore, this study investigated a positive emotion as well as negative emotions.

Limitations included not investigating emotive responses to non-food images, and thus not exploring the question of an innate disgust sensitivity, and having an insufficient number of images to enable comparison of high versus low energy foods. Numbers and diagnostic group types were also insufficient to test differences in emotive responses across ED diagnostic groups.

The findings indicate that clinicians should be cognisant of the severity of the emotive responses when discussing food and negotiating changes to diet and increases in consumption. While there have been developments in therapies to include emotion regulation skills (e.g., Fairburn, 2008) the present study suggests that more therapeutic attention should as well be given to the primary emotions of disgust and fear, as well as anger and more complex emotional states.

In conclusion, we found people with an ED have a heightened aversive emotive (disgust and fear) response and reduced positive (happiness) response to images of foods. This response did not appear due to non-specific increases in anxiety or depression, but rather was a feature of the ED in itself.
References


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Table 1. Participants demographic data and eating disorder symptom severity scores

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<thead>
<tr>
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<th>Eating Disorder</th>
<th>Psychiatry controls</th>
<th>Normal controls</th>
</tr>
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<tr>
<td></td>
<td>Mean (SD)</td>
<td>Median IQ range</td>
<td>K-W $\chi^2$, p, df=2</td>
</tr>
<tr>
<td>N</td>
<td>26</td>
<td>20</td>
<td>61</td>
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<tr>
<td>Age</td>
<td>26.1 (8.3)</td>
<td>30.9 (10.9)</td>
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<td></td>
<td>23.5 (18-34)</td>
<td>25 (22.5-42.8)</td>
<td>18 (24-33)</td>
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<td>Body Mass Index</td>
<td>22.4 (6.5)</td>
<td>23.8 (5.3)</td>
<td>23.9 (5.8)</td>
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<td>(kg/m$^2$)</td>
<td>20.7 (18.6-25.1)</td>
<td>22.4 (20.8-24.6)</td>
<td>22.5(20.6-24.3)3.5, 0.17</td>
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<td>EDE-Q* scores:</td>
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<td></td>
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<tr>
<td>Global score</td>
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<td>1.9 (1.4)</td>
<td>1.7 (1.3)</td>
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<td>4.9 (3.4-5.3)</td>
<td>1.4 (0.7-3.2)</td>
<td>1.4 (0.6-2.7)</td>
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<tr>
<td></td>
<td>4.5 (1.3)</td>
<td>1.9 (1.3)</td>
<td>1.5 (1.4)</td>
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<tr>
<td>Restraint</td>
<td>4.9 (3.5-5.8)</td>
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<td>1.2 (0.2-2.4)</td>
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<td>4.5 (1.3)</td>
<td>1.9 (1.3)</td>
<td>1.5 (1.4)</td>
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<tr>
<td>Shape Concern</td>
<td>5.0 (1.2)</td>
<td>2.4 (1.8)</td>
<td>2.4 (1.8)</td>
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<td>1.7 (1.0-3.9)</td>
<td>1.9 (0.9-4.2)</td>
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<td>1.5 (1.4)</td>
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<td>Weight concern</td>
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<td>4.1 (1.3)</td>
<td>1.3 (1.3)</td>
<td>0.9 (1.2)</td>
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<tr>
<td>Eating Concern</td>
<td>4.2 (3.0-5.1)</td>
<td>0.9 (0.2-1.9)</td>
<td>0.4 (0-1.4)</td>
</tr>
</tbody>
</table>

*EDE-Q=Eating Disorder Examination –Questionnaire, Differing subscripts indicate post hoc Mann Whitney U tests of between group significance p<0.05
Table 2. Comparative participant baseline emotive levels and emotive responses to images

<table>
<thead>
<tr>
<th>Eating Disorder</th>
<th>Psychiatry controls</th>
<th>Normal controls</th>
<th>Mean (SD)</th>
<th>Median IQ range</th>
<th>K-W $\chi^2$, p, df=2</th>
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Baseline VAS$^a$:

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<th></th>
<th>Eating Disorder</th>
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<th>Normal controls</th>
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<tr>
<td>Happy</td>
<td>3.5 (2.4)</td>
<td>4.8 (2.4)</td>
<td>5.3 (2.5)</td>
</tr>
<tr>
<td></td>
<td>3.7 (1.4-5.6)$_a$</td>
<td>4.8 (3.5-6.7)</td>
<td>5.3 (3.6-7.3)$_c$</td>
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<tr>
<td>Anxious</td>
<td>4.2 (3.0)</td>
<td>2.9 (2.9)</td>
<td>2.3 (2.3)</td>
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<td></td>
<td>4.7 (1.2-6.6)$_a$</td>
<td>2.6 (0-5.3)</td>
<td>1.5 (0.2-4.7)$_c$</td>
</tr>
<tr>
<td>Disgust</td>
<td>2.4 (3.2)</td>
<td>0.8 (1.6)</td>
<td>1.3 (1.9)</td>
</tr>
<tr>
<td></td>
<td>0.6 (0.1-4.0)$_{ac}$</td>
<td>0 (0-0.7)$_b$</td>
<td>0.3 (0-1.7)$_{ac}$</td>
</tr>
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</table>

VAS$^a$ to food images

<table>
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<th>Eating Disorder</th>
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<th>Normal controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy average</td>
<td>2.5 (2.0)</td>
<td>3.8 (2.1)</td>
<td>4.4 (1.5)</td>
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<tr>
<td></td>
<td>1.5 (0.9-3.8)$_a$</td>
<td>4.0 (1.7-5.9)$_b$</td>
<td>4.3 (3.2-5.4)$_b$</td>
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<tr>
<td>Fear average</td>
<td>4.4 (3.0)</td>
<td>1.7 (2.0)</td>
<td>1.4 (1.3)</td>
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<td></td>
<td>4.3 (1.8-7.2)$_a$</td>
<td>1.3 (0.1-4.1)$_b$</td>
<td>0.9 (0.2-2.4)$_b$</td>
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<tr>
<td>Disgust average</td>
<td>5.0 (2.5)</td>
<td>2.4 (1.6)</td>
<td>2.6 (1.4)</td>
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<td></td>
<td>5.4 (2.7-7.1)$_a$</td>
<td>1.6 (1.2-3.9)$_b$</td>
<td>2.5 (1.4-3.6)$_b$</td>
</tr>
</tbody>
</table>

$^a$VAS=Visual Analogue Scale, Differing subscripts indicate post hoc Mann Whitney U tests of between group significance $p<0.05$
Statement 1. Role of funding sources.
None, the study was funded from internal resources.

Statement 2. Contributors
Both authors were responsible for study design, execution, data analysis and writing the manuscript. Mary Katsikitis conducted the literature review. Both authors have read and approved the final manuscript.

Statement 3. Conflict of Interest
None to declare

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Highlights

- Negative emotive responses to foods appear an inherent feature of an eating disorder.
- Non-specific anxiety and depression do not contribute to the fear people with an eating disorder have towards food.
- Therapy should address emotional distress towards foods in people with an eating disorder.