Preconscious Processing of Threat Cues: Impact on Eating among Women with Unhealthy Eating Attitudes

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Abstract: Objective: This study examined the role of different forms of threat cues in generating eating behavior among nonclinical women with more or less healthy eating attitudes. Method: The participants were 60 non-eating-disordered women, divided into those with relatively high and low Eating Disorder Inventory (EDI) scores. An ego (self-esteem) threat, a physical threat, or a neutral message was presented subliminally via a tachistoscope, and the amount eaten subsequently was measured. Results: The women with healthy eating attitudes ate slightly more after exposure to the ego threat, but not after the physical threat. The group with unhealthy eating attitudes ate more after exposure to both forms of threats, but particularly after the ego threat. Conclusions: A cognitive interpretation of these findings indicates preconscious activation of elaborate threat-related schemata among women with relatively unhealthy eating attitudes, leading to subsequent “escape” behavior (eating). Further testing is needed to elaborate on this phenomenon, its psychological substrates, and its therapeutic implications. © 1998 by John Wiley & Sons, Inc. Int J Eat Disord 24: 83–89, 1998.

Key words: threat processing; subliminal perception; eating disorders; overeating

INTRODUCTION

A common theme that has emerged from the eating disorders literature is that overeating may be associated with a reduction of awareness of negative emotions, although there are differences between the models used to explain that link (Heatherton & Baumeister, 1991; Herman & Polivy, 1980; Lacey, 1986; McManus & Waller, 1995; Root &

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Fallon, 1989; Ruderman, 1985). In understanding the origins of these negative emotions, Heatherton, Herman, and Polivy (1991, 1992) emphasize the particular salience of “ego threats” (i.e., threats to one’s self-esteem) rather than threats of physical harm. However, Schotte (1992) suggests that one should not discount the potential role of physical threats.

Testing the hypothesis that overeating is associated with the processing of threat, evidence from modified Stroop studies has demonstrated that bulimics and nonclinical women with bulimic attitudes are differentially sensitive to specific forms of threat cues (McManus, Waller, & Chadwick, 1996; Waller, Watkins, Shuck, & McManus, 1996). In particular, they are slower to color-name ego threat cues (words such as failure, inferior, stupid) than physical threat cues (e.g., hurt, maim, kill). These findings indicate that bulimic attitudes and behaviors are associated with highly developed schemata for ego threats. Everill and Waller (1995) suggest that overeating reduces the activation or salience of those threat-related schemata—a process akin to dissociation (Spiegel & Cardena, 1991). However, the psychological processes underlying such findings cannot be determined with confidence, as responses on the modified Stroop task might reflect a number of processes (Foа, Feske, Murdock, Kozak, & McCarthy, 1991) and may be under some degree of conscious control. Nor does this paradigm provide any evidence that the activation of such threat schemata results in changes in eating behavior.

An alternative method for assessing the relationship between bulimic attitudes and the processing of threat cues has been demonstrated by Patton (1992). She used subliminal visual presentation of a threatening stimulus (“Mama is leaving me”) or a neutral message (“Mama is loaning it”). In a subsequent taste discrimination task, women with unhealthy eating attitudes ate more following the threat message. There was no such effect when the message was presented supraliminally or for women with healthy eating attitudes. This finding suggests that subliminal presentation of threat-related cues might be a useful method for determining the preconscious cognitive processes of individuals with eating psychopathology. Very brief visual presentation is a more valid paradigm than a dichotic listening task, as it more reliably avoids conscious awareness (Hoelander, 1986; Trandel & McNally, 1987).

In common with many researchers using subliminal activation (Dauber, 1984; Silverman, 1983), Patton (1992) interpreted her findings within a framework of psychodynamic theory. Support for this interpretation of subliminal processing is uncertain, due to methodological and conceptual considerations (Balay & Shevrin, 1988; Bornstein, 1990; Weinberger & Hardaway, 1990). It appears to be more feasible to consider the phenomena of preconscious processing of subliminal visual cues within a cognitive framework (Brewin, 1988; Wells & Matthews, 1994; Williams, Watts, MacLeod, & Matthews, 1988), as long as the methodological considerations are borne in mind.

It was the aim of the present study to test the hypotheses of Heatherton et al. (1991) and Schotte (1992) experimentally, using subliminal visual presentation of different forms of threat and measuring their impact upon eating. The participants were nonclinical women, divided into groups with relatively healthy and unhealthy eating attitudes. In keeping with Patton’s (1992) findings, it is hypothesized that women with relatively unhealthy eating attitudes will respond to subliminal threat cues by eating more than women with healthy eating attitudes. If Heatherton et al.’s model is correct, then it can be hypothesized that the women with unhealthy eating attitudes will show a greater response to ego threats only. However, if Schotte is correct, then they should also respond to physical threat cues.
METHOD

Design

This was an experimental study of an analog, nonclinical population. In the first stage, participants completed a measure of eating psychopathology, which was used to divide them into two groups (healthy vs. unhealthy eating attitudes). In the second stage, each participant was presented with one of three subliminal visual stimuli, and was then asked to wait for 5 min. The dependent measure was the amount eaten over those 5 min.

Participants

The participants were a nonclinical sample. All were female undergraduates, recruited via personal contact and advertisement within a psychology department. In order to establish the final sample of 60 women, 74 completed the Eating Disorders Inventory (EDI; Garner, 1991; see below). A score was calculated for each woman by adding scores on the three EDI scales that most directly reflect eating psychopathology (Drive for Thinness, Bulimia, and Body Dissatisfaction). These are the scales that were used by Patton (1992) to create similar groups, since they reflect the behaviors and attitudes of bulimia. The 30 women who scored lowest on the compound EDI scale (M = 3.27; SD = 2.26; range = 0–7) and the 30 women who scored highest (M = 22.4; SD = 11.4; range = 12–50) were those who participated in the experimental task—the low-EDI and high-EDI groups (these labels are used in preference to Patton’s less accurate terms—“low and high eating disorder groups”). The two groups had mean ages of 21.9 years (SD = 5.90) and 23.7 years (SD = 6.34), respectively [analysis of variance (ANOVA); F(1, 58) = 1.25; p = .27].

All participants were volunteers, who received no payment or course credit for participating. During the initial stage (completion of the EDI), they were told that they might be contacted later to take part in a second stage. It was stressed that they were free to decline to participate at any point, although none chose to do so. It was necessary to keep the participants blind to the nature of the second part of the study until the task was completed, but the study was explained at that stage.

Measures and Procedure

In the first stage, all 74 women completed the EDI (Garner, 1991), a well-validated measure of eating attitudes and related personality characteristics. On all scales, higher scores indicate greater levels of eating psychopathology. As described above, three EDI scales were used to divide the women into the high- and low-EDI groups.

In the second stage (at least 2 weeks later), the 60 women who were selected for the experimental task were contacted and were asked to participate in a further stage. All 60 agreed to do so. It was explained that the task would be a test of their ability to perceive stimuli when they were mildly hungry, and that therefore they should not eat for 2 hr before testing. They were told that there would be a short period of viewing very brief messages, followed by a break while the experimenter set up the equipment for a further period of testing.

The participants were allocated to one of three conditions (neutral, physical threat, ego threat) in such a way as to ensure that the three subgroups within the low- and high-EDI groups had very similar mean EDI scores and ages [F(2, 27) < 1, in all cases]. All partici-
pants were exposed to one of three subliminal messages (10 presentations of 4 msec each, at 5-sec intervals) presented at the center of a tachistoscope display. The messages were “Mum sees me” (neutral); “Mum hurts me” (physical threat); and “Mum hates me” (ego threat). Each presentation was preceded by the display of a fixation box. Participants were told that the message would be presented at the center of the box and would be very hard to see. The messages were 1 × 8 cm, presented at a distance of 34 cm. The fixation box consisted of four asterisks, and was 2 cm high × 10 cm wide.

After the 10 presentations, the experimenter left the room, ostensibly to set up the equipment for the next phase. Upon leaving, the experimenter told the participant, “It doesn’t matter whether or not you eat before this next task. In case you are hungry after not eating for a while, there are some peanuts for you. I’ll be back in a few minutes.” The participant was left with the nuts (a bowl containing 200 g of roasted salted peanuts) for exactly 5 min before the experimenter returned. The experimenter explained that there was in fact no further stage to complete, and debriefed the participant about the purpose of the experiment.

The weight of peanuts eaten was the dependent variable (calorific value = 150 kcal per 25 g). Patton (1992) used taste discrimination as the apparent task. However, it is possible that eating more in such a task reflects a difficulty in decision-making following threat, rather than a tendency to overeat per se. The current task removed this potential confounding factor, so that the amount eaten was the clear outcome of the experimental manipulation.

Validation of the Subliminal Processing Task

The presentation time of 4 msec was chosen because Patton (1992) and Dauber (1984) have shown comprehensively that participants are not aware of the semantic content of such a message. None of the subjects in this experiment reported being able to read the message, and nearly all claimed that they had not seen anything at all. To confirm that the particular messages used in the present study were not available for conscious report, a further 10 participants were recruited. Each of these participants was given the three phrases used in the main experiment (“Mum sees me”; “Mum hurts me”; “Mum hates me”) on a card. They were then exposed to each of the three stimuli 10 times (4 msec each) in random order, and were asked to indicate after each presentation which of the stimuli they had just seen. Simple random guesswork should yield an accuracy rate of 33%. In this case, the overall accuracy rate was 31% (with similar rates for each of the three individual messages), supporting the contention that the 4-msec presentation time did not lead to semantic awareness. There was also no evidence of learning to discriminate the stimuli over time. Accuracy during the first 15 trials was 32.7%, while accuracy during the final 15 trials was 29.3%.

Data Analysis

The dependent variable was the weight (in grams) of peanuts eaten. The two grouping variables were the level of eating psychopathology (low- vs. high-EDI) and the nature of the message presented (neutral; physical threat; ego threat). There were no within-subjects measures. The dependent variable was not normally distributed, so nonparametric statistical analyses were used to test the reliability of any differences. The amounts eaten by the low- and high-EDI groups were compared for each of the three messages, using Mann-Whitney tests. For each of the groups (low- and high-EDI), the amounts eaten after each of the three messages were compared initially using Kruskal-Wallis ANOVAs. Post
hoc Mann-Whitney tests were used to determine the source of any differences on these ANOVAs.

RESULTS

Table 1 shows the amount eaten by each group, and the results of the statistical analyses. The amount eaten under any condition was relatively small. In Patton’s (1992) study, the amount of crackers eaten by the high-EDI group under the subliminal threat condition (mean weight = 38.8 g, energy value = 330 kcal) was greater than the amount of peanuts eaten under the subliminal ego threat condition in this study (19.0 g, 105 kcal). This difference is likely to be partly a reflection of the procedural difference from Patton’s taste discrimination task, but the amount eaten in the present task may more accurately reflect pure disinhibition of eating following threat (rather than a general decision-making difficulty).

There were a number of reliable differences between the groups and conditions, forming a coherent pattern. The low-EDI group ate slightly (but significantly) more under the ego threat condition than under either of the other two conditions. In contrast, the high-EDI group ate more under the physical threat condition than following the neutral message, but ate even more following the ego threat message. There was no difference between the groups in the amount eaten following the neutral message, demonstrating that the high-EDI group was not more likely to eat per se. However, there were differences in the amount eaten by the two groups following both the physical threat and the ego threat messages. Thus, all the women were affected by ego (self-esteem) threats, but the eating of the group with relatively unhealthy eating attitudes was affected by physical threats and was particularly responsive to ego threats.

DISCUSSION

This experimental study tested the hypothesis that subliminal activation of different forms of threat-related schemata would have differential effects upon the eating of non-clinical women with relatively unhealthy eating attitudes. The results support Schotte’s (1992) proposal that both ego threats and physical threats are related to overeating among women with more unhealthy eating attitudes, although they also demonstrate that Heatherton et al. (1991, 1992) were correct in identifying ego threats as being particularly salient. While these results are generally compatible with those of Patton (1992), it is interesting to note that even the low-EDI group in this study ate reliably more after exposure to the

<table>
<thead>
<tr>
<th>Group</th>
<th>Stimulus</th>
<th>Low-EDI</th>
<th>High-EDI</th>
<th>Mann-Whitney</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Neutral message (N)</td>
<td>1.40 (2.95)</td>
<td>1.80 (3.33)</td>
<td></td>
<td>0.40 NS</td>
</tr>
<tr>
<td>Physical threat (P)</td>
<td>2.00 (2.26)</td>
<td>12.2 (6.11)</td>
<td>3.26</td>
<td>.002</td>
</tr>
<tr>
<td>Ego threat (E)</td>
<td>5.40 (3.63)</td>
<td>19.0 (6.83)</td>
<td>3.64</td>
<td>.0003</td>
</tr>
</tbody>
</table>

Kruskal-Wallis \( \chi^2 \) 7.73 19.0  
\( p \) .021 .0001  
Multiple comparison (\( p < .05 \)) E > P = N E > P > N
subliminal ego threats, although the amount eaten was far smaller than in the high-EDI women.

These initial results appear to favor the cognitive model of threat-related overeating in eating disorders, since neither threat cue directly involved the “fear of abandonment” construct (as embodied by Patton’s [1992] use of “Mama is leaving me” as a threat cue). Within a cognitive model, these findings suggest that schemata relating to threat (particularly ego threats) are activated prior to (or even without) conscious awareness of the threat, particularly among women with unhealthy eating attitudes. This model is compatible with the finding (McManus et al., 1996; Waller et al., 1996) that bulimic behaviors and attitudes are particularly associated with an attentional bias to ego threats. Binge eating appears to be one way of reducing activation or dominance of those schemata, although the reason for the use of this particular dissociative mechanism rather than another (e.g., alcohol use, self-harm) is likely to rest in the other factors in the etiology of the individual’s psychological disturbance.

This study does not allow for any differentiation of the two competing models of why perceived threat should lead to overeating. Lacey (1986) and Root and Fallon (1989) propose that bulimics learn that binging serves the function of reducing awareness of negative affect and cognitions. In contrast, Heatherton and Baumeister (1991) suggest that attention is narrowed as a means of reducing awareness of threat, and that eating is disinhibited as a result of this narrowing of attention. Clinical experience suggests that both mechanisms might take place in the same individual at different times and to different degrees during the development of that individual’s bulimic disorder (McManus & Waller, 1995). Further studies might use the subliminal processing paradigm to differentiate the two cognitive-behavioral models.

While the present findings have been described as particularly compatible with a cognitive framework, it has been noted (Balay & Shevrin, 1988) that subliminal psychodynamic activation is similar to many other psychological theories, in that it is beset with the generation of auxiliary hypotheses and “ad hoc explanations of discrepant data” (p. 170). Therefore, it is not inconceivable that these results might be interpreted within a psychodynamic framework. While the present study retained reference to mothers for purposes of comparison with Patton’s (1992) research, it would be valuable if future work directly compared the impact of these threat cues versus similar threats without the relationship context. Similarly, it would be informative to compare the impact of such threat cues with the impact of other subliminal cues, such as direct instruction to eat. If it were the case that threat cues led to a greater degree of eating than food cues among relatively bulimic women, that would tend to support models that suggest a cognitive primacy for the processing of threat in binge eating (Heatherton et al., 1991), rather than models based on the hypothesis that the core cognitive representations center on food, weight, and body shape (Fairburn & Cooper, 1989).

The present study did not determine if any of the participants had a diagnosable eating disorder, since the aim was to represent the wide spectrum of eating attitudes in the nonclinical population. It is important to assess the impact of these methodological and experimental factors among a broad range of individuals. However, it should be borne in mind that the participants ate relatively small amounts in this and in Patton’s (1992) study. Therefore, further experimental studies should be carried out with clinical groups, where the overeating more closely parallels binging behavior (Telch & Agras, 1996a, 1996b). While such work will require careful attention to ethical issues, it will have the most direct clinical applicability, particularly if applied idiographically. Cognitive-behavioral therapy with eating-disordered patients might be enhanced by a focus on
challenging the individual’s perception of general self-esteem threats (Heatherton & Baumeister, 1991), rather than simply addressing self-esteem in relation to food intake.

REFERENCES


