Self-Awareness, Task Failure, and Disinhibition: How Attentional Focus Affects Eating

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ABSTRACT Dieting and nondieting subjects were given either failure or neutral performance feedback on a problem-solving task. Failure subjects were then assigned to one of three self-awareness conditions: One group was forced to watch a video clip of themselves failing on the problem-solving task, one group was asked to watch a distracting video clip on bighorn sheep, and the final group was asked to sit quietly for 10 minutes. Subjects were then allowed to eat as much ice cream as they wanted. Only in those conditions which allowed—or promoted—low self-awareness (the failure/distraction and simple failure condition) did dieters show disinhibited eating. In the failure/videotape condition, which enforced high levels of self-awareness, eating in dieters remained inhibited. This supports the proposal that a reduction in self-awareness is necessary for lifting of inhibitions. Eating in nondieters was reduced in the failure/videotape and simple failure conditions, possibly because of the autonomic correlates of distress.

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Psychology's understanding of the effects of emotional distress on eating has evolved through several stages. Initially it was believed that distress suppressed eating for everyone because of its attendant autonomic correlates (e.g., increased levels of sugar in the bloodstream; Cannon, 1915). However, Schachter, Goldman, and Gordon (1968) showed that obese individuals failed to show this reduction of eating in response to emotional distress, and Herman and Polivy (1975) later demonstrated that distress actually increased eating among dieters while suppressing it among nondieters. The rapid accumulation of findings since then has supported that pattern, although it appears to depend on the form of emotional distress involved (see Herman, Polivy, & Heatherton, 1991, for a review). Physical fear reduces eating among nondieters but fails to produce significant increases in eating among dieters; only self-image threats produce significant increases in eating among dieters (Heatherton, Herman, & Polivy, 1991).

Thus, emotional distress produces significant increases in eating among dieters only if the distress involves some unflattering implications about the self. This suggests that the causal mechanism involves self-awareness or some related set of motivations involving the self (such as self-presentational concerns; see Schlenker & Leary, 1982, on self-presentation and self-awareness). Failure presumably activates motivations and attentional shifts involving the self, and the resulting processes may affect eating. A recent review by Heatherton and Baumleister (1991) proposed that eating binges among dieters, bulimics, and others occur when these individuals escape from aversive high self-focus by achieving a cognitively restricted state that has the effect of disinhibition.

The impact of failure on the self has been illuminated by a variety of studies. Recent work by Greenberg and Pyszczynski (1986) has shown that ego-relevant failure leads to a state of high self-awareness. This state is presumably quite unpleasant, for it involves awareness of the

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1. The term "dieter" is used to refer to individuals who chronically restrain their food intake. Such individuals may differ from casual dieters (Heatherton & Polivy, in press; Polivy & Herman, 1987). However, the majority of individuals who identify themselves as dieters are likely to display the sorts of behaviors that we describe herein. There is some controversy over the use of various dieter descriptions; those interested in this issue should consult Heatherton, Herman, Polivy, King, and McGree (1988) for a full discussion of these issues. In this article we use the terms dieter and restrained eater interchangeably. In all cases we are referring to those individuals who chronically attempt to restrain their intake of food in order to lose weight.
self as incompetent or otherwise deficient. The aversiveness of this state thus motivates people to want to escape from it (e.g., Duval & Wicklund, 1972; Greenberg & Musham, 1981).

High self-awareness in general has been linked to the strong and effective functioning of inhibitions (see Diener, 1979). For example, Diener and Wallbom (1976) showed that mirrors and other self-focusing cues substantially reduced the likelihood of cheating on a test. Beaman, Klintz, Diener, and Svanum (1979) found that the presence of a mirror reduced the stealing of Halloween candy substantially. In contrast, the process of escape from self-awareness has been associated with disinhibition (Baumeister, 1991; Diener, 1979; Wicklund, 1982). Thus, for example, the effects of alcohol include both a reduction in self-awareness (Hull, 1981) and the removal of certain inner inhibitions, leading to behavioral excess (Steele & Josephs, 1988; Steele & Southwick, 1987). Similarly, in group settings, an increase in group size is associated with a decrease in self-awareness (Mullen, 1987), as well as disinhibited aggressive behavior such as lynching mob atrocity (Mullen, 1986).

Ego-relevant failure should therefore produce a high state of self-awareness that will strengthen preexisting inhibitions, such as those against eating in dieters. Escape from this aversive self-aware state, however, should have a disinhibiting effect that could result in increased eating among dieters. The present study tested these predictions in dieting and nondieting subjects (restrained and unrestrained eaters, respectively) by exposing them to a distressing failure, manipulating their subsequent attention, and examining the consequences for their subsequent eating behavior.

The study began with two conditions comparing failure and a no-failure control. Following ego-relevant failure, some subjects were allowed to sit by themselves for 10 minutes, in order to allow them to escape from their aversive self-awareness. Consistent with past findings (cf. Baucom & Aiken, 1981; Heatherton et al., 1991; Ruderman, 1985), we predicted that dieters would show disinhibited (i.e., increased) eating following failure as compared with dieters in the control condition. To shed light on the mechanism, however, we added two further conditions. The first of these was designed to force people to remain in the highly self-aware state; these subjects were videotaped during their failure and then were required to watch the tape of their own poor performance while being questioned about their failure by the experimenter. The presence of the camera, the self-observation, and the re-
sulting self-presentational dilemma in interacting with the experimenter should make it difficult for these subjects to escape from awareness of themselves, and so their eating was predicted to remain inhibited. In contrast, the final condition sought to facilitate the subjects’ escape from self-awareness by showing them a film that had no relevance to their performance or self-concept. These subjects should therefore find it easy to escape from self-awareness and hence were predicted to show the pattern of disinhibited eating.

For comparison purposes, we extended the design of the study to include nondieters. Nondieters, by definition, lack the set of inhibitions regarding eating that dieters have, and perhaps for that reason their eating patterns follow very different patterns and principles (e.g., Heatherton et al., 1991; Herman et al., 1991). We predicted only that they would fail to conform to the patterns of dieters’ responses, since self-image threats usually have weak effects on nondieters’ eating (Herman et al., 1991).

METHOD

Subjects

Eighty female undergraduates from Erindale College at the University of Toronto took part in this study in exchange for course credit. Based on past cutoffs (cf. Heatherton et al., 1991), 39 subjects scoring 16 or higher on the Restraint scale (Herman & Polivy, 1980; Polivy, Herman, & Howard, 1988) were classified as dieters, whereas the remaining 41 subjects were classified as nondieters.

Procedure

Subjects arrived at the laboratory to participate in a perception “pilot study.” They were told that the experimenter was choosing among a wide variety of tasks that would be used in future studies, and that their task was to rate how pleasurable they found each of the tasks. Subjects completed a consent form and a brief personal history questionnaire, which included questions about their recent food consumption and hunger levels.

All subjects then were shown the “Spin Out” game. The Spin Out game is a commercially available puzzle which requires the player to use binary logic in order to extract a center slide from a long plastic frame. Along the center slide are six wheels, which all must be pointed in the same direction for the slide to be removed from the frame. These wheels can be turned only when adjacent wheels are in the correct positions. Although the puzzle can be solved
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within 1 minute, beginners usually require over 30 minutes to complete the task. Subjects were assigned randomly to one of three failure conditions or to the control condition.

**Failure groups**

*Simple failure.* The experimenter introduced the task as a valid measure of binary logic. Subjects were told that there were many ways to solve the puzzle, and that the particular method they chose would reveal aspects of their logical abilities. The experimenter then demonstrated the basic technique required to solve the puzzle, and in doing so actually solved the puzzle except for one or two final moves. This demonstration took under 20 seconds. To ensure that subjects did not believe that this solution was some sort of trick, they were told that the experimenter was particularly fast at the task, and that the fastest that any subject had solved the puzzle was just over 3 minutes. Subjects were further told that the slowest subject had taken just over 8 minutes, but that almost everyone finished in around 5 minutes. Subjects were told that they were being timed to find out how long each of the possible methods took, as well as because the length of time it took them to solve the puzzle might bias their preference ratings for the task.

The experimenter started a stop watch and left the subject alone to complete the task. After 10 minutes the experimenter returned to the room, apparently dumbfounded: “Haven’t you finished yet? Over 10 minutes have gone by!” The experimenter then seized the Spin Out game from the subjects, exclaimed that they hadn’t done very well at all, and proceeded to solve the puzzle in under 20 seconds. The experimenter then earnestly asked the subjects how they did normally at these sorts of tasks, such as in high-school math. Subjects then were told about the upcoming taste task and left in isolation for 10 minutes, supposedly waiting for the experimenter to finish setting up the task. Finally, subjects completed the 20-item State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991) and rated themselves on a list of 10 mood states before moving on to the taste task. These mood states (active, fine, awful, happy, blue, terrible, alive, elated, tired, discouraged) were rated on 7-point scales.

*Failure/videotape.* Subjects in the videotaped failure condition were introduced to the task in the same manner as the simple failure subjects, but were told that they would be videotaped while they solved the puzzle. They were told that this was done so that the experimenter could examine which strategy they had used to solve the puzzle, as well as to analyze the steps involved in the solution. The camera was adjusted so that the hands, upper body, and face of the subject were visible to the camera. All task instructions were identical to those given to simple failure subjects.

The experimenter returned after 10 minutes and repeated the same com-
ments as in the simple failure condition. The experimenter then added that a review of the videotape might be useful to see where the subject had gone wrong. The tape was then played for the subjects and they were asked to talk about what they were thinking at all times throughout the task. If subjects did not seem to be paying attention, the experimenter prompted them with a "and what were you thinking about at this point?" comment. After the video was finished, subjects were told about the upcoming taste task and asked to fill out the SSES and mood scales.

Failure/distraction. This group was treated identically to the simple failure group until the final 10 minutes, whereupon they were asked to view a 10-minute film about bighorn sheep (produced by the National Film Board of Canada and called Bighorn). Subjects were told that the experimenter was considering using the film in an upcoming study and wanted to make sure that it was somewhat enjoyable. Subjects were then left alone for 10 minutes to watch the film. After a very brief discussion about the qualities of the film, subjects were told about the taste task and asked to fill out the SSES and mood questionnaires.

Control condition. This group was asked to play with a number of puzzles (including the Spin Out game) for 10 minutes and then state their preference. Subjects were not left with the Spin Out game only since 10 minutes might have been frustrating or boring for some subjects. Control subjects were asked to wait 10 minutes before beginning the taste-rating task and were asked to fill out the SSES and the mood checklist at the end of this period. One control subject failed to complete the self-esteem measure and she is therefore not included in those analyses.

Eating task

All subjects then tasted and rated three flavors of ice cream. Subjects were told that they were doing taste ratings as part of a pilot test for future studies and that they should carefully rate the three flavors in a way that revealed their preferences. The amount of ice cream available was large enough (approximately 1,500 grams) so that subjects could indulge themselves apparently without detection by the experimenter. In reality, the bowls were weighed before and after the taste task to determine amount eaten.

Following the taste-rating task, subjects filled out the Restraint scale\(^2\) and

2. A one-way analysis of variance on restraint scores as a function of condition was conducted to assess whether the manipulation had an impact on scores. The analysis indicated that there were no significant differences between groups in dietary restraint, \(F < 1\).
RESULTS

Subject Characteristics

Two-way analyses of variance (ANOVAs) (Restraint x Condition) revealed that there were no differences in initial hunger ratings (mean rating on a scale from 1 to 7 = 2.8, SD = 1.4, all ps > .05) or in time since subjects had last eaten (M = 4.4 hours, SD = 5.0, all ps > .05). Thus, the groups were comparable in initial hunger state.

Manipulation Checks

Subjects completed the SSES and a 10-item mood checklist following each manipulation. The 10 items on the mood checklist were combined to create one mood score (possible range 7 to 70). A two-way ANOVA of condition and restraint on mood revealed a main effect of condition, $F(3,72) = 5.46, p < .002$, with subjects in the simple failure, failure/distraction, and failure/videotape conditions having significantly lower mood than subjects in the control condition ($p < .05$ by Fisher's test [Carmer & Swanson, 1973]; see Table 1 for means and standard deviations). Neither the interaction of restraint and condition ($F < 1$) nor the main effect of restraint, $F(1, 72) = 1.29, p = n.s.$, was significant. Likewise, a two-way ANOVA of restraint and condition on state self-esteem scores revealed a main effect for condition only, $F(3,71) = 3.16, p < .05$, with subjects in the simple failure and failure/videotape conditions having significantly reduced state self-esteem compared to those in the control condition ($p < .05$ by Fisher's test). The failure/distraction group did not differ from the control condition in overall state self-esteem. 3 Again, neither the interaction of restraint and condition nor the main effect of restraint was significant ($F < 1$).

An additional check of the manipulations was conducted by means of a post-experimental questionnaire. Subjects were asked to rate their performance on the Spin Out game on a 5-point scale. Subjects in the control condition reported significantly better performance by Fisher's

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3. Analysis of the subfactors of the SSES revealed some additional differences between the experimental conditions (see Heatherton & Polivy, 1991, for detailed information).
Table 1
Manipulation Checks

<table>
<thead>
<tr>
<th>Measure</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
</tr>
<tr>
<td>Mood Mean</td>
<td>56.0</td>
</tr>
<tr>
<td>Mood SD</td>
<td>6.0</td>
</tr>
<tr>
<td>State self-esteem Mean</td>
<td>77.5</td>
</tr>
<tr>
<td>State self-esteem SD</td>
<td>9.4</td>
</tr>
</tbody>
</table>

Note. Means sharing common symbols (within rows) are not significantly different from each other (pairwise mean comparisons were conducted using Fisher's test, $p < .05$).

test ($M = 2.90, SD = 1.0$) than did subjects in the simple failure ($M = 1.25, SD = .44$), failure/distraction ($M = 1.40, SD = .50$), or failure/videotape ($M = 1.35, SD = .49$) conditions, $F(3, 72) = 27.7, p < .0001$. Subjects were also asked to rate (on a 5-point scale) how pleased they were with their performance. The simple failure ($M = 1.55, SD = .61$), failure/distraction ($M = 1.85, SD = .88$), and failure/videotape ($M = 1.80, SD = .52$) groups were all less pleased with their performance than was the control group ($M = 3.15, SD = .81$), $F(3, 72) = 19.26, p < .0001$. Taken together, these various manipulation and mood checks reveal that failure on the Spin Out game was significantly distressing.

Eating Behavior

A two-way (Restraint $\times$ Distress Group) ANOVA$^4$ revealed a significant interaction effect, $F(3, 72) = 5.72, p < .002$. Follow-up analyses

4. We report ANOVAs rather than multiple regression analyses because we do not view dietary restraint as a continuum. We theorize that two distinct groups (dieter/nondieter) underlie this measure. Within each of these groups, degree of restraint is expected to have little, if any, association with eating. To test this notion, we conducted multiple regression analyses in which restraint, three dummy variables corresponding to the four treatment conditions, and the interactions of restraint with each of the dummy variables were entered as predictors of ice cream intake. In the first model, restraint was treated as a dichotomous variable producing $R^2 = .296$. In the second model, restraint was treated as a continuous variable producing $R^2 = .210$. This de-
Table 2
Ice Cream Intake in Grams

<table>
<thead>
<tr>
<th>Group</th>
<th>Control</th>
<th>Simple failure</th>
<th>Failure/distraction</th>
<th>Failure/videotape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Restrained</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>71.5^a</td>
<td>128.0^b</td>
<td>131.4^b</td>
<td>67.8^a</td>
</tr>
<tr>
<td>SD</td>
<td>33.8</td>
<td>39.2</td>
<td>67.7</td>
<td>56.2</td>
</tr>
<tr>
<td>n</td>
<td>11</td>
<td>9</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Unrestrained</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>113.8^a</td>
<td>56.1^b</td>
<td>99.7^ac</td>
<td>67.0^bc</td>
</tr>
<tr>
<td>SD</td>
<td>43.5</td>
<td>23.2</td>
<td>57.2</td>
<td>19.0</td>
</tr>
<tr>
<td>n</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

Note. All comparisons are conducted within rows (restraint conditions). Means sharing common symbols are not significantly different from each other (pairwise mean comparisons were conducted using Fisher's test, \( p < .05 \)).

(Fisher’s test, \( p < .05 \)) revealed that restrained subjects in the simple failure and failure/distraction conditions ate more ice cream than did restrained subjects in the control or failure/videotape conditions (see Table 2 for means and standard deviations). Conversely, unrestrained subjects in the simple failure and failure/videotape conditions ate less ice cream than did unrestrained subjects in the control condition; unrestrained subjects in the failure/distraction condition ate at an intermediate level.

**DISCUSSION**

The results of this study are consistent with past evidence showing that ego-relevant distress leads to increased eating among dieters, but not among nondieters (Heatherton et al., 1991; Herman et al., 1991). In addition, however, attention manipulations altered the pattern of results and shed light on possible mechanisms for the eating effects.

Perhaps most important, we found that the disinhibiting effect of fail-
ure could be removed—so that dieters ate very little—if subjects were filmed during their performance, required to watch the film of their own failure, and then questioned about their failure by the experimenter. This result requires abandoning any simple or general hypothesis that ego-relevant distress always leads to disinhibited eating among dieters. In our view, the most plausible explanation for the low eating among videotaped dieters was that the videotape manipulation sustained a high level of self-awareness in these subjects, by directing attention to one’s self and inducing self-presentational concerns. One might suggest that the failure/video manipulation had a greater effect on self-esteem than did the simple failure manipulation, which could imply a curvilinear relationship between ego threat and dieters’ eating. However, this is contradicted by our finding that the drop in self-esteem experienced by failure/videotape subjects was statistically indistinguishable from (and, if anything, slightly less than) the drop experienced by subjects in the simple failure condition. Apparently it is the attention to self, and not merely the alteration in self-esteem, that mediated the results.

One might also suggest that the effect of the failure/videotape condition was due simply to manipulating the subjects’ awareness, as opposed to allowing subjects to follow their own patterns and perhaps cope with the failure in their own way (as in the simple failure condition). This explanation is contradicted by our fourth condition, however. In that condition, we provided a strong manipulation of subjects’ awareness by showing them an irrelevant, distracting (but attention-absorbing) film. Dieters in this condition showed disinhibited eating. Apparently, simply directing the subjects’ attention is not enough to maintain inhibitions against eating; it is necessary to direct the attention to the self.

We therefore favor the interpretation that high, aversive self-awareness maintains inhibitions, whereas escape from that self-focused state leads to disinhibition. We have assumed that dieters have inhibitions against eating and that failure leads to a temporary increase in self-awareness (cf. Greenberg & Pyszczynski, 1986). When dieters were forced to remain in that self-focused state, they ate very little; when they were allowed or aided to escape from that state, they ate a great deal.

It must be acknowledged that we did not have any direct measures of self-focus, and so the role of self-awareness in mediating our results is based strictly on inference rather than on empirical evidence. Other studies have provided direct evidence that failure increases self-awareness (Greenberg & Pyszczynski, 1986), that self-awareness fosters inhibitions (Diener, 1979; Diener & Wallbom, 1976), that cam-
eras and self-observation increase self-awareness (Duval & Wicklund, 1972; Scheier & Carver, 1977), that dietary inhibitions are maintained by monitoring and attending to self (Herman, Polivy, & Silver, 1979; Polivy, Herman, Hackett, & Kuleshnyk, 1986), and that dieters tend to have high levels of public self-consciousness (Blanchard & Frost, 1983; Heatherton, in press), and we are relying on that evidence to support our inferences.

The responses of nondieters differed substantially from those of dieters. To us, this suggests that the effects of our manipulations depended on preexisting inhibitions, which are presumably present in dieters but absent in nondieters. The effects of failure and attentional manipulations on the eating of nondieters are thus probably governed by quite different mechanisms, such as gastric or autonomic effects of emotional distress (e.g., Cannon, 1915). It is important to note that we found emotional distress to reduce the eating of nondieters, whereas it increased it among dieters, as in past studies (cf. Heatherton et al., 1991).

Heatherton and Baumeister (1991) have proposed a general theory of binge eating, suggesting that disinhibited eating is the result of shifts in self-awareness. Threatening information about the self motivates people to escape from self-awareness in order to avoid the aversive implications and negative affect. The resultant cognitive shift may effectively reduce meaningful thought and dampen affect, but it also disengages many internal restraints and inhibitions that depend on meaningful processing (see also Baumeister, 1988, 1989, 1990, 1991). As a result, people may end up doing things that violate their ordinary patterns, maxims, and rules. For dieters, escaping from self-awareness may shut out negative affect, but it may also promote disinhibited eating. Our results are consistent with this theory, although we can hardly claim to have provided a thorough and unambiguous test of it.

To put our findings in a broad perspective, it is useful to recall that people inhibit their eating as a way to improve their feelings about themselves. Because diets are seldom successful, individuals who choose to continue dieting may find their self-esteem steadily diminishing, which may be accompanied by a heightening of negative affect and an increased vulnerability to situational and cognitive disinhibitors (Heatherton & Polivy, in press). Dieters may find that their motivations to avoid thinking about themselves increase over time, with the unfortunate consequence that dietary failure becomes more likely. Over time, this spiral of negative affect may exact a serious psychological toll. The temporary suspension of inhibitions may thus be considered a potentially substantial cost of coping with negative affect.
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